Albedometer

Installation and User Manual



VISIONSEN
Sensor Technology

www.visionsen.com
www.vsias.com

Vsias Mühendislik Endüstri A.Ş

E-posta: sales@visionsen.com
info@vsias.com

Table of Contents

1 Warranty Conditions 1

2 Support 2

3 Safety 3

3.1 General 3

3.2 Electrical 4

3.3 Working at Height and Weather Conditions 4

4 Introduction 5

5 Product Description 6

6 Installation 7

7 Mechanical Installation 8

7.1 Mounting Bracket Dimensions 8

7.2 Albedometer Dimensions 9

7.3 lbedometer Field Panel Installation 10

8 Electrical Installation 20

8.1 Power Connection 20

8.2 Power Consumption 20

9 Computer Connection 21

10 Communication 22

10.1 Connection Settings... 22

10.2 Register Addresses 23

10.3 Device Settings 24

10.4 Modbus® Table and Configuration Settings 25

11 Models 26

Vsias Engineering Industry Inc. All Rights Reserved.

1 WARRANTY CONDİTİONS

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

Product user manuals can be downloaded online from **www.visionsen.com**

- Products not manufactured by VSIAS but resold by VSIAS are warranted only within the limits extended by the original manufacturer.
- In case of unauthorized repair or modification of the sensor, the warranty conditions will be void.
- Short circuits and other faults that may occur due to not switching off the power source during electrical connections are not covered under warranty.
- Failures caused by cleaning the sensor and additional equipment with abrasive chemicals and similar substances are not covered under warranty.
- VSIAS's obligation under this warranty is limited to the repair or replacement of defective products (at VSIAS's discretion), which shall be the sole and exclusive remedy under this warranty.
- The customer bears all costs related to removal, reinstallation, and shipment of products deemed defective to VSIAS. VSIAS covers the return shipping costs of these products.
- This warranty shall not apply to products exposed to modification, misuse, negligence, improper service, natural disasters, or transportation damage.
- Programming according to customer specifications, electrical connections to products manufactured by VSIAS, and product-specific training services provided by VSIAS are part of VSIAS's product warranty.
- "VSIAS disclaims all express, implied, or statutory warranties and conditions relating to the products, except as expressly stated herein, to the extent permitted by applicable law."

Vsias Engineering Industry Inc. All Rights Reserved.

2 HELP SUPPORT

Products cannot be returned without prior authorization. The following contact information is directly for customers of VSİAS Mühendislik Endüstri A.Ş. Please use the contact addresses for returned products.

Vsias Engineering Industry Inc.

(Teknopark Ankara) İvedik OSB. Mah.
Melih Gökçek Bulvarı No: 61/7
Yenimahalle / ANKARA

+90 543 874 27 46

sales@visionsen.com
info@vsias.com

www.visionsen.com
www.vsias.com

Vsias Engineering Industry Inc. All Rights Reserved.

3 SAFETY

THIS SCOPE RELATES TO THE INSTALLATION, USE, MAINTENANCE, AND WORK ON OR AROUND SENSORS, TRIPODS, MOUNTING STANDS, AND ALL TYPES OF EQUIPMENT AND COMPONENTS.

IMPROPER INSTALLATION, OPERATION, OR MAINTENANCE OF SENSORS, TRIPODS, MOUNTING STANDS, AND ALL TYPES OF EQUIPMENT AND COMPONENTS, AS WELL AS FAILURE TO FOLLOW WARNINGS, INCREASES THE RISK OF DEATH, ACCIDENTS, SERIOUS INJURY, PROPERTY DAMAGE, AND PRODUCT FAILURE. TAKE ALL REASONABLE PRECAUTIONS TO PREVENT THESE HAZARDS. BEFORE PERFORMING ANY WORK, CONSULT YOUR ORGANIZATION'S SAFETY COORDINATORS AND OCCUPATIONAL HEALTH SPECIALISTS REGARDING PROCEDURES AND REQUIRED PROTECTIVE EQUIPMENT.

Use sensors, tripods, mounting stands, and all types of equipment and components only for their intended purposes. Do not exceed design limits. Familiarize yourself with and comply with all instructions provided in the product manuals. Manuals are available at www.visionsen.com or through other contact addresses. You are responsible for compliance with applicable laws and regulations, including safety regulations, and for the integrity and positioning of the structures or systems where sensors, tripods, mounting stands, and all types of equipment and components are installed. Installation sites must be evaluated by a qualified engineer and processed by experienced technical personnel. If you have questions or concerns regarding the installation, operation, or maintenance of electrical connections of systems, consult a licensed and qualified engineer or experienced technical personnel.

3.1 General

- Obtain the necessary approvals and permits before carrying out field or installation work.
- Comply with occupational health guidelines.
- Only qualified personnel should be used for the installation, operation, and maintenance of all connections of mechanical parts. The use of licensed and qualified contractors is strongly recommended.
- Read all applicable instructions carefully and fully understand the procedures before starting work.
- If any drilling or cutting work is to be performed during installation, wear eye protection and take other appropriate safety measures.
- Do not allow unauthorized personnel to intervene in installed products.
- Only use parts, materials, and tools recommended by the manufacturer.

Vsias Engineering Industry Inc. All Rights Reserved.

3 SAFETY

3.2 Electrical

- If the tripod, or any attachments or tools you install, construct, use, or maintain come into contact with overhead or underground power lines, you may be killed or suffer serious bodily injury.
- Maintain a distance from overhead power lines equal to at least one and a half times the height of the structure, or the distance required by applicable law (whichever is greater).
- Inform those persons or organizations that may be affected by the installation before carrying out field or installation work.
- Comply with all electrical regulations. Electrical equipment and related devices must be installed by licensed and experienced personnel.

3.3 Working at Height and Weather Conditions

- Exercise extreme caution when working at height.
- Use appropriate equipment and safety practices.
- Keep mechanical or electrical parts away from untrained or unnecessary personnel during installation and maintenance. Take precautions to prevent tools and objects from falling.
- Do not perform any work or maintenance in severe weather conditions such as wind, rain, snow, lightning, etc.
- Periodically (at least once a year), inspect for wear and damage including corrosion, stress cracks, worn cables, loose cable clamps, cable tension, etc., and take necessary corrective actions.
- Periodically (at least once a year), check electrical grounding connections.

VSIAS reserves the right to refuse service for products that have been exposed to contaminants that may pose health or safety risks to VSIAS employees.

Vsias Engineering Industry Inc. All Rights Reserved.

4 INTRODUCTION

An albedometer is a measuring instrument used to determine the intensity and wavelength of incoming and reflected solar radiation. The albedometer uses photovoltaic (PV) cells to measure solar radiation. It measures the response of the photovoltaic cells to sunlight and calculates the amount and intensity of solar radiation based on this response.

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

Advantages:

- Size
- Fast and Accurate Data Collection
- Low Cost
- Versatility
- Easy Installation
- Easy Mounting and Configuration
- Data Integration

Vsias Engineering Industry Inc. All Rights Reserved.

5 PRODUCT DESCRIPTION

Albedometer sensors manufactured under the Visionsen brand are professional measuring instruments designed to accurately measure surface reflectivity (Albedo) and solar irradiance under outdoor environmental conditions for solar power plants, meteorological observation systems, and environmental monitoring applications.

Son kullanıcının sistem tercihine göre analog çıkışları hem de Modbus® (RS485) aracılığıyla dijDepending on the end user's system preference, versions with both analog outputs and digital communication via Modbus® (RS485) are available. Visionsen albedometer sensors incorporate a microprocessor architecture that stores calibration data, eliminating the need to reprogram data loggers or SCADA systems when installing a new plant.ital iletişimi gerçekleştirilen çeşitleri mevcuttur. Visionsen Albedometer sensörleri, kalibrasyon verilerini saklayan bir mikroişlemci yapı içerir ve yeni bir santral kurulurken veri kaydedicileri veya SCADA sistemlerini yeniden programlama ihtiyacını ortadan kaldırır

Visionsen albedometers feature a symmetric PERC sensor structure facing both directions (upper and lower). The internal layers of the device consist of Front Sheet, EVA, PERC Film, EVA, and Back Sheet components, laminated under optimum temperature and pressure conditions.

- Measurement Principle: The short-circuit current of PV cells is measured through precision shunt resistors connected to the terminals and converted into instantaneous irradiance data (W/m²).
- Temperature Compensation: To obtain the most accurate irradiance value independent of environmental conditions, real-time temperature compensation is performed using high-precision RTD-PT1000 temperature sensors integrated behind the cell.

Visionsen albedometers provide durability and reliability for outdoor environments with IP69K-rated communication and power cables. They also offer easy installation during setup thanks to an M8 circular connector.

Vsias Engineering Industry Inc. All Rights Reserved.

6 INSTALLATION

The albedometer is installed in the same plane as the panels for plane-of-array (POA) measurements. With this installation, the sensor is exposed to the same irradiance conditions as the panels.

Position the albedometer sensor to allow easy access for maintenance and ideally avoid any obstruction or reflection on the plane of the sensing element.

For accurate measurements, the albedometer must be mounted at exactly the same angle as the panels. If installed at a different angle, measurement errors may occur.

The device can be mounted using a self-provided bracket or a mounting accessory supplied by Visionsen.

Attention :

- ***Do not perform unauthorized repair or modification on the sensor***
- ***Turn off the power source before making electrical connections.***
- ***Be careful of fall and shading risks during installation.***
- ***Do not clean with abrasive chemicals.***
- ***Must be installed and used only by authorized personnel.***

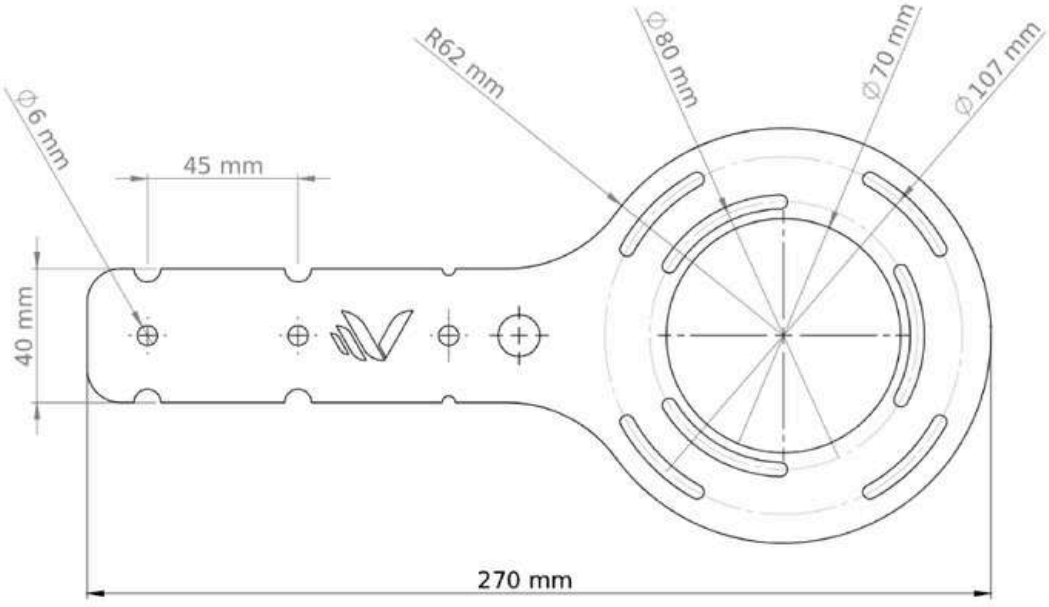
Vsias Engineering Industry Inc. All Rights Reserved.

7 MECHANICAL INSTALLATION

7.1 Mounting Bracket Dimensions and Measurements

PL_2 Mounting Bracket Dimensions

Weight :
Platform : 270 x 124 x 3 mm
Material Type : Galvanized, Paint



Vsias Engineering Industry Inc. All Rights Reserved.

7 MECHANICAL INSTALLATION

7.2 Albedometer (ALB) Dimensions

Sensor Dimensions

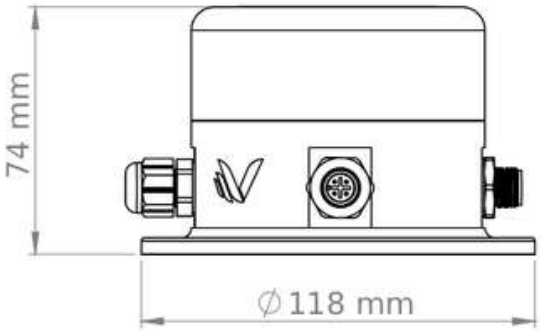
Weight :

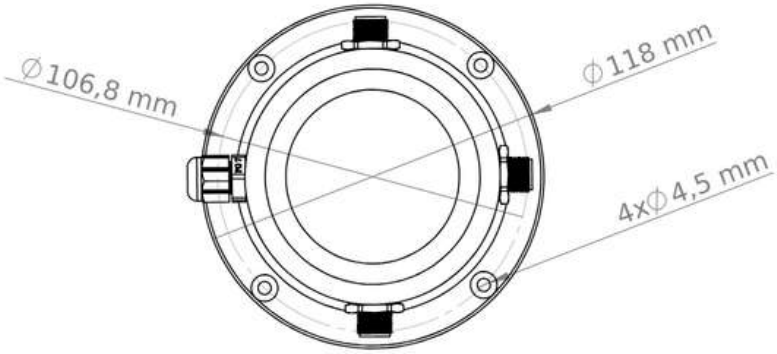
Sensor : 118 x 74 mm

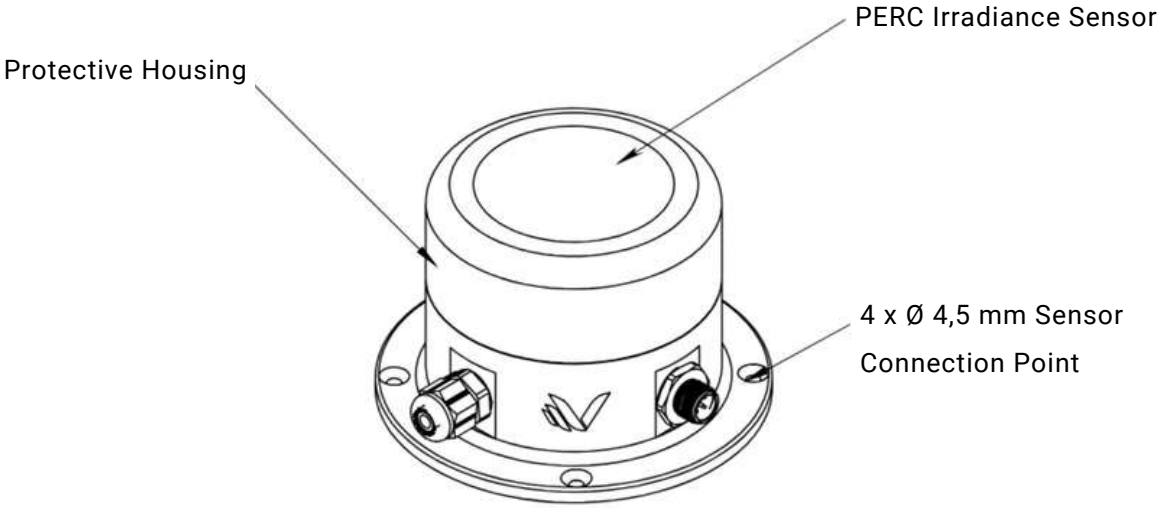
Mounting Dimensions

Hole Center Diameter : Ø106,8 mm

Screw Connection : 4 x Ø4,5 mm







Vsias Engineering Industry Inc. All Rights Reserved.

7 MECHANICAL INSTALLATION

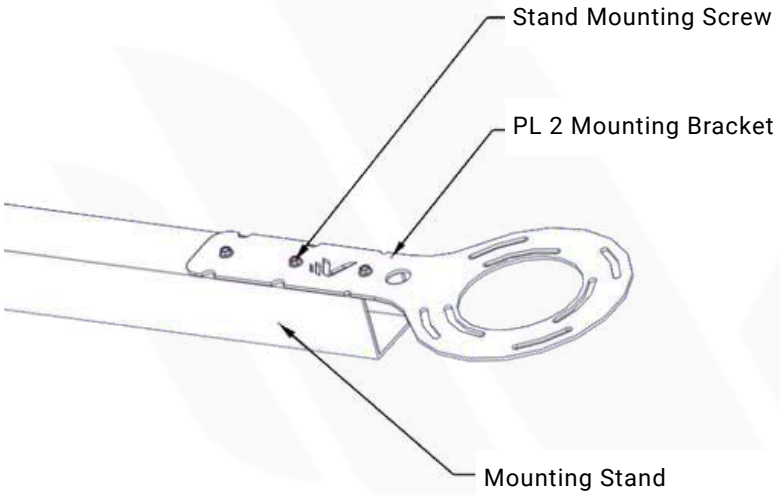
7.3 Albedometer (ALB) Field Panel Installation

The PERC Irradiance Sensor is supplied with the following mounting accessories:

Box Contents:

- 1 pcs Albedometer
- 1 pcs Mounting Bracket
- 4 pcs M4 x 12 mm Stainless Steel Screws
- 4 pcs M4 Stainless Steel Nuts
- Electronic Connection Manual

Mounting Steps

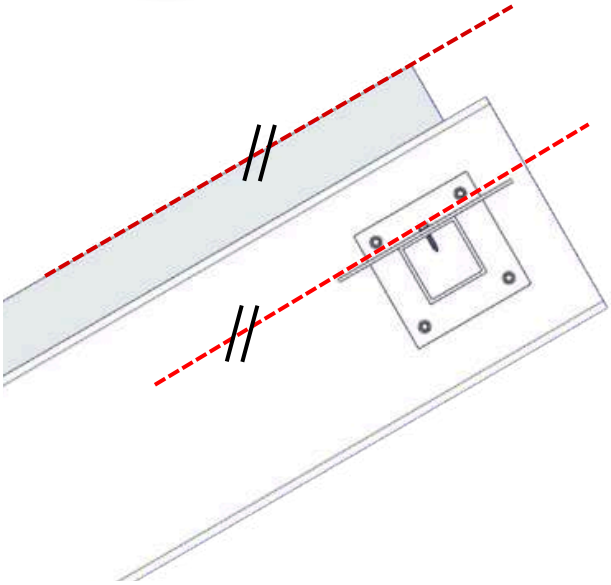


1.Step:

- A suitable wrench tool is prepared for the screws and nuts.
- The PL_2 Mounting Bracket is attached to the Mounting Stand as shown in the image.

2.Step:

- The PL_2 mounting bracket attached to the mounting stand is fixed parallel to the panel plane as shown.

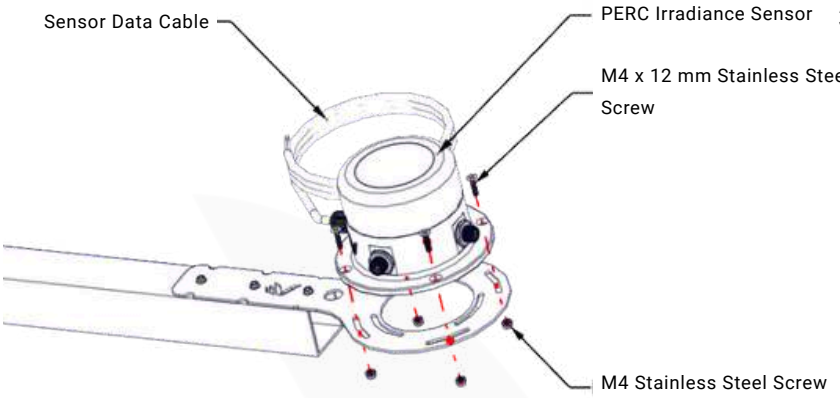


⚠ ***Attention :*** ***If the mounting bracket is not parallel to the panel plane, it will cause errors in the sensor measurement results.***

Vsias Engineering Industry Inc. All Rights Reserved.

7 MECHANICAL INSTALLATION

7.3 Albedometer (ALB) Field Panel Installation

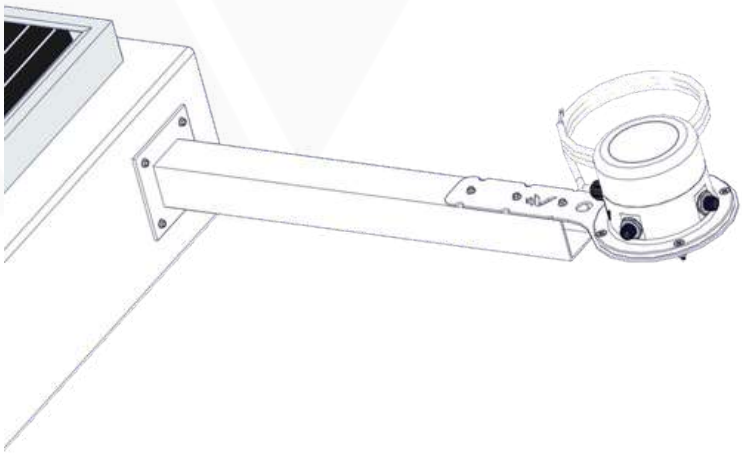


3.Step:

- The sensor is attached to the PL_2 mounting bracket using the 4 M4x12 mm screws and nuts supplied in the box.

4.Step:

- After the mounting and fixing operations are completed, electrical cable connections are made.



Attention : ***After the installation process, check whether there is any physical damage. Verify that there are no loose screws or cable connections.***

Vsias Engineering Industry Inc. All Rights Reserved.

8 ELECTRICAL INSTALLATION

Depending on the albedometer model, it is manufactured with a 3 or 4-core 3 m high-quality PUR FLEX cable and a waterproof IP68 connector.

8.1 Power Connection

The MB Series irradiance sensors require a minimum supply voltage of 9 V DC. A supply voltage of 12 V DC is recommended for reliable performance. It is recommended that the power supply output be protected with a fast-acting fuse rated at a maximum of 250 mA.

8.2 Power Consumption

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

Maximum power consumption is 72 mW at the highest input voltage.

- At the lowest input voltage, the maximum input current is 3 mA.
- Maximum inrush current is 100 mA.

The AN series (current output versions) are configured so that 4 mA output represents 0 W/m² and 20 mA full-scale output represents 1600 W/m², and 0 V output represents 0 W/m² while 1.5 V full-scale output represents 1600 W/m².

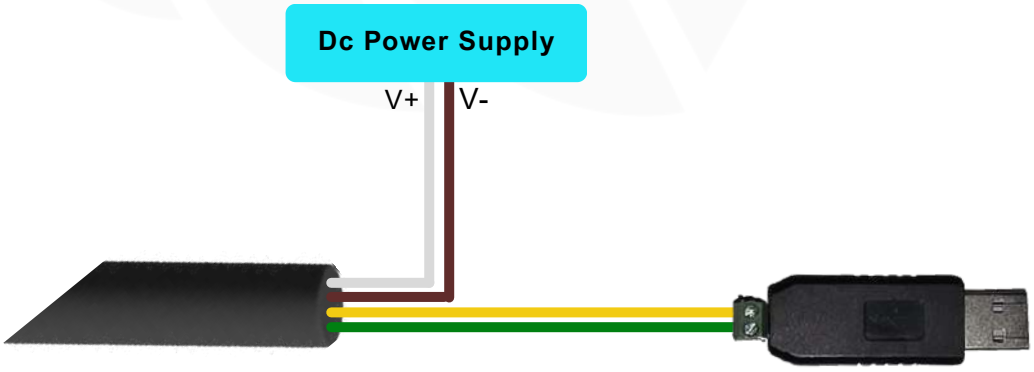
Vsias Engineering Industry Inc. All Rights Reserved.

9 COMPUTER CONNECTION

Power supply units of portable computers such as laptops can generate high voltage spikes. This may damage the device's digital interface. Ensure that there is galvanic isolation between the input and output of the converter.

	Cable Color	Description	
	White	9 - 28 V DC (+)	
	Brown	9 - 28 V DC (-)	
	Yellow	A	Data (+)
	Green	B	Data (-)

Attention : ***"The white cable is the positive (+) terminal, and the brown cable is the negative (-) terminal. Faults arising from incorrect connections are not covered under warranty."***



Vsias Engineering Industry Inc. All Rights Reserved.

10 COMMUNICATION

Visionsen Smart Tool software enables configuration of Modbus® PERC irradiance sensors and real-time data monitoring.

10.1 Connection Settings



- You can download the Visionsen Smart Tool application from www.visionsen.com.
- After downloading the application, install it.
- Plug the converter into the computer's USB port.
- Select the COM port.
- Baud Rate: 9600
- Stop Bits: 1
- Parity: None
- Address: 1
- Press the Connect button.
- If the connection is established, the current sensor data will automatically start being read in the lower section.

Configure the appropriate connection settings from the "New Connection Settings" section and complete the setup by clicking the "Send Settings" button.

Attention : Before changing the address, ensure that no other sensor is defined with the same address. Record the updated connection settings together with the sensor serial number.

Attention : If the converter port cannot be found in the COM Port section, repeat the connection process by following the steps below.

In case the COM port cannot be found:

1. Perform a USB driver update.
2. Search for "Device Manager" in the computer search box.
3. Device Manager > Ports (COM & LPT) > USB-SERIAL CH----, and check the port status.
4. If the Ports section does not appear when the USB-RS485 converter is connected, check and update the driver.
5. Restart your computer.
6. Repeat the checks starting from Step 2.

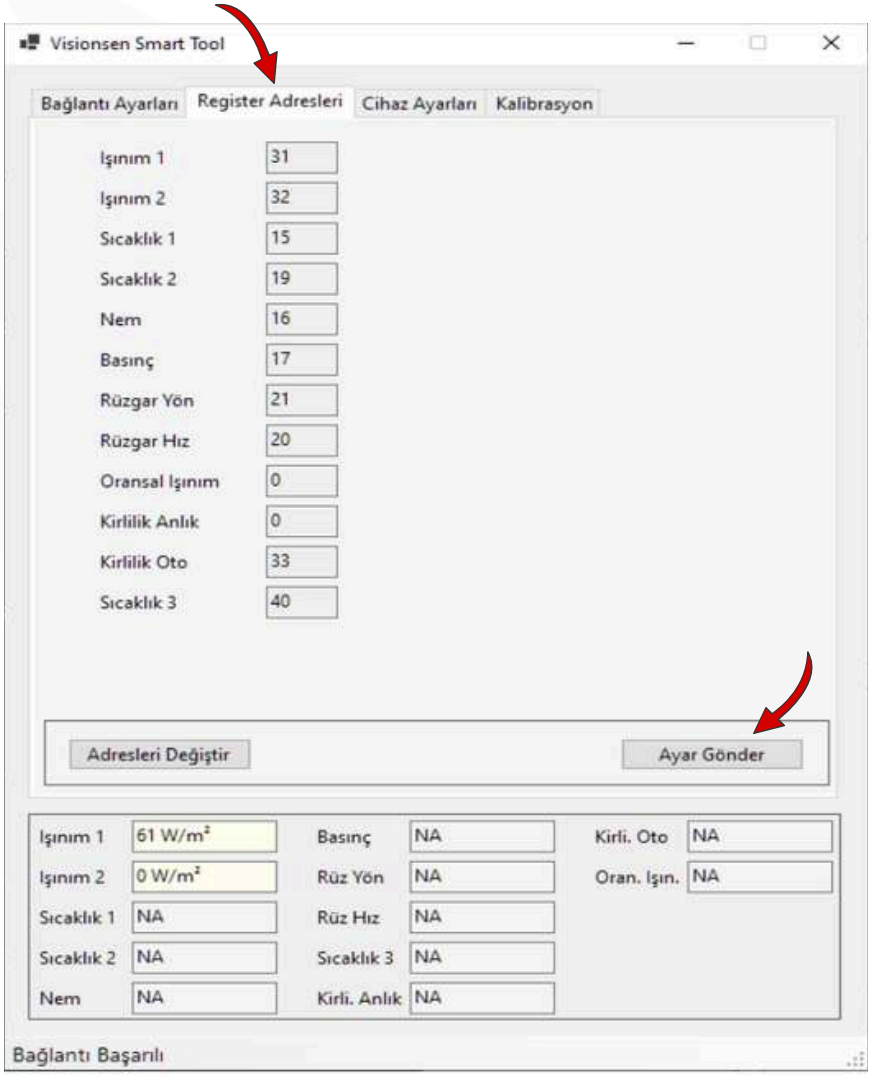
Vsias Engineering Industry Inc. All Rights Reserved.

10 COMMUNICATION

10.2 Register Addresses

If it is desired to change the register addresses defined in the Modbus® map:

- From the tab menu, “Register Addresses” is selected.
- The new address for the desired sensor is entered into the box.
- After pressing the “Send Settings” button, a new register address assignment can be made.



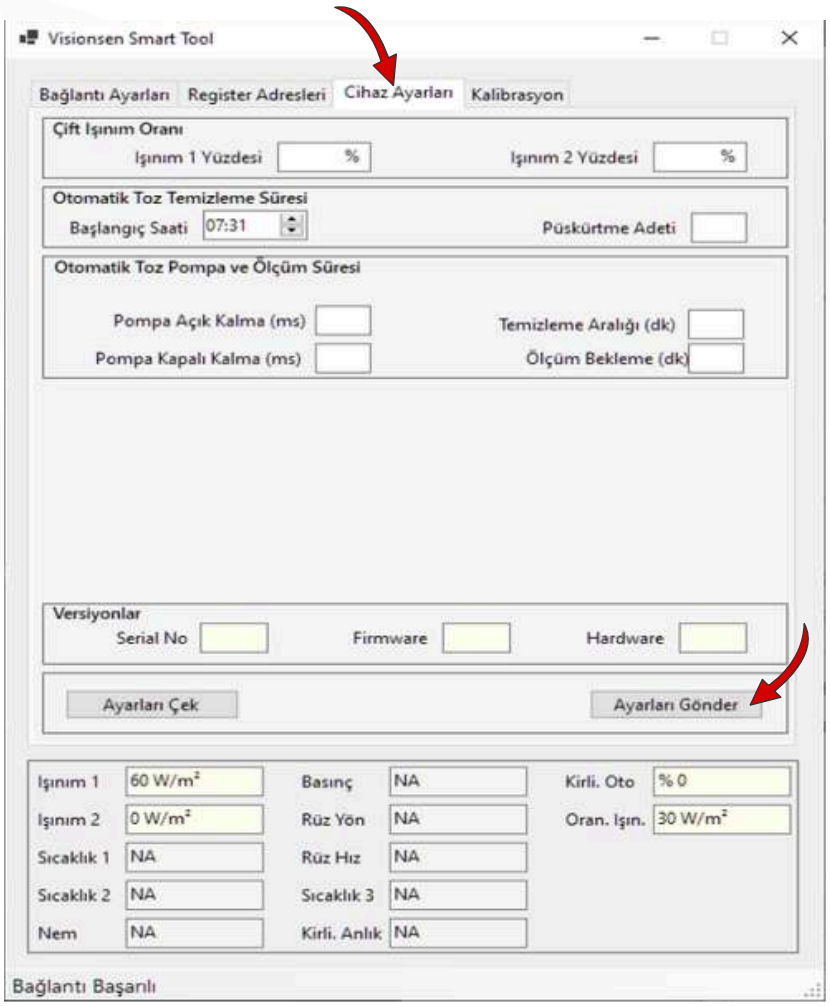
Attention : ***If an assigned register is already defined for another sensor, an error will occur. Before making any changes, ensure that the assigned register is free.***

Vsias Engineering Industry Inc. All Rights Reserved.

10 COMMUNICATION

10.3 Device Settings

After entering the proportional values for the albedometer, you must press the “Send Settings” button to obtain the effective (proportional) irradiance value. After establishing the device connection, you can also view the device serial number, firmware and hardware information, as well as real-time values.



Vsias Engineering Industry Inc. All Rights Reserved.

10 COMMUNICATION

10.4 Modbus® Table and Configuration Settings

Communication parameters:

Baud Rate : 9600

Parity : None

Data Bits : 1

Stop Bits : 1

Adress : 1

If you are using the software on-site, ensure that it is pre-installed on the laptop.

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

Adress		Type	Gain	Unit	Description
Hex	**Decimal**				
0x28	41	uint16	10	W/m2	Albedometer

Vsias Engineering Industry Inc. All Rights Reserved.

11 MODELS

Albedometer Models

Model	Modbus RTU RS-485	Analog 4-20 mA
ALB-MB	+	
ALB-AN		+

Model Description

ALB-MB	Modbus RTU RS485 Albedometer
ALB-AN	Analog 4–20 mA Albedometer

© 2025 Vsias Engineering Industry Inc. All Rights Reserved.