M. B. Control & Systems Pvt. Ltd.

CIN : U67120WB1980PTC033012 | PAN : AABCM7980K | GST NO. : 19AABCM7980K1ZU

Registered & Corporate Office

📍 31/1, Ahiripukur Road, Kolkata, West Bengal 700019 | 📞 +91 98313 30473, 98312 06454

📠 +91 033 2287 0445 | ✉ enquiry@mbcontrol.com | 🌐 www.mbcontrol.com

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QM 004, EM 016

PV Module Temperature Transducer Operation and Installation Manual (RS-485 Modbus) (R6)
Model – MBMet-803 / MBMet-803-BI

(For HW Ver- 1.04 and SW Ver- 1.10)

Document Number: M4 011 030 010 01 (R6) Dt. 14.05.2025

Contents

Warnings

- Installation at site should be done by skilled and qualified personal after taking required approvals.
- Use proper protection gear and tool while installing the device.
- Be aware of your surroundings while doing the installation work. Serious injury can occur if proper safety norms are not followed.
- Compliance with all utility and electrical safety codes regulations are mandatory.
- Read the manual and get acquainted with the data logger connections and terminals before commencing installation activity.
- Before connecting the data logger, read its label to confirm power supply requirements.
- All connections should be done only when power to data logger is switched off.
- Improper installation and connections may damage the device and sensor connected to the same.
- Protect from overvoltage and static electricity.
- To prevent potential fire or shock hazard, do not expose the data logger to rain or moisture.
- Physically damaged data logger should not be used or connected to main power. Use proper earth connection.

Declaration

Important User Information

Thank you for purchasing a M.B. Control & Systems instrument. Complete reading of this manual is essential for understanding the proper use and safe operation of this product.

If there are any queries regarding the manual, please write to us at: service@mbcontrol.com and info@mbcontrol.com

Warranty and Liability

M.B. Control & Systems guarantees that the product delivered has been thoroughly tested to ensure it meets the defined specifications. The Warranty is applicable only if the product is handled and installed according to the instructions supplied by M.B. Control & Systems.

M.B. Control & Systems will in no event be liable for incidental or consequential damages, including without limitation, lost profits, loss of income, loss of business opportunities, loss of use and other related exposures. A Detailed policy is given later in the Manual.

Any modifications made by the user can affect the validity of the CE declaration.

Warranty Policy

These Warranty Terms and Conditions ("Warranty") outline the terms under which M.B. Control & Systems Pvt. Ltd. ("MBCS") provides warranty coverage for it's products to the Purchaser ("Customer"). By Purchasing and using MBCS' products, the Customer agrees to abide by these Terms and Conditions.

Warranty Coverage:

MBCS Warrants that all goods manufactured by it under the MBMet Brand Name to be free from defects in materials or workmanship for a period of 2 Years (24 Months) from the date of invoice in the case of new goods, unless specifically stated otherwise. If a special sales contract including Warranty has been decided between MBCS and Customer, that will take precedence over this policy.

If the product is repaired free of charge under the warranty, the original warranty period will not be extended or reduced.

In case of chargeable repair after the Warranty period, MBCS warrants that its products will be free from defects in materials and workmanship under normal use for a period of 6 months for the parts subject to repair.

Exclusions:

This Warranty does not cover:

Damages caused by Transportation or Movement.

Damage resulting from misuse, abuse, accident, neglect, or proper installation.

Damage caused due to Abnormal Voltage, Lightning Strike, Electronic Surges, Electrical over Stress.

Damage caused by unauthorized repairs or modifications.

Normal Wear & Tear, Cosmetic Damage or Damage due to environmental factors, caused by Animals.

Damage caused by improper maintenance (cleaning, checking, etc.)

Malfunctions or damage consecutively caused by Third Party devices or softwares used in combination.

Calibration or Re-Calibration of the product.

Products with removed or altered serial numbers or identification labels.

Limitation of Liability:

To the extent permitted by law, MBCS' liability under this Warranty is limited to the cost of repairing or replacing the defective product.

MBCS is not liable for any incidental, consequential, or indirect damages arising from the use or inability to use the products such as personal injury, consequential damages, loss of business profits, business interruption, loss of business information, and other monetary losses that pertain to the Customer or to Third Parties.

Declaration of Conformity

M.B. Control & Systems Private Limited
31/1 Ahiripukur Road
Kolkata – 700017
West Bengal, India

Declares under our sole responsibility that the product:

MBMet-800Series PV Module Temperature Sensors

Is in conformity with the essential requirements of the European Harmonised Standards as published in the Official Journal of the EU, based on the following standards and provisions:

CE – Marking Directives / Regulations	Standard Details
Electromagnetic Compatibility (EMC): 2014/30/EU	EN 61326-1:2013
Restriction of Hazardous Substances: RoHS 2011/65/EU	EN 50581:2012

V.K. Agarwal
Director
M.B. Control & Systems Pvt. Ltd.
Date: 11/04/2021

1.   Temperature Transducer - Parts

Module Temperature Sensor RS-485 is shipped with the following parts

A. PT1000 Sensor Unit(with three meters Teflon cable) – 1 No (Dimension: 4x4x15 mm)
B. PT1000 to RS-485Transducer   – 1 No
C. Transducer extension cable   – According to customer requirement
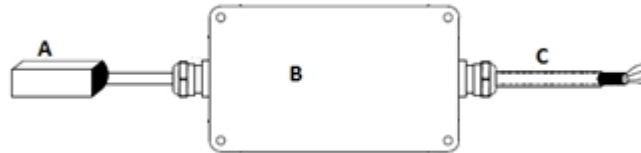D. Sensor cable holding cable cradles   – 3 Nos.

Fig 1.1 –PV Module Surface Temperature transducer (RS-485)

2.   Installation of PV Module Sensor

Selection of the place of mounting the sensor is important factor for the correct temperature measurement of the photo-voltaic module. Refer figure 2.1 for RTD sensor installation of MBMet-803-BI and figure 2.2 for RTD sensor installation of MBMet-803. Use the three cable cradles with cable ties to hold the sensor cable in proper position.

2.1   Installation of PV module Sensor for MBMet-803-BI

The sensor is to be pasted to the **front side** of the PV Module in the **corner position** of the panel. Care is to be taken so that the sensor does not fall in between two cells. It should be at the center of the corner cell of the panel as shown in the fig 2.1
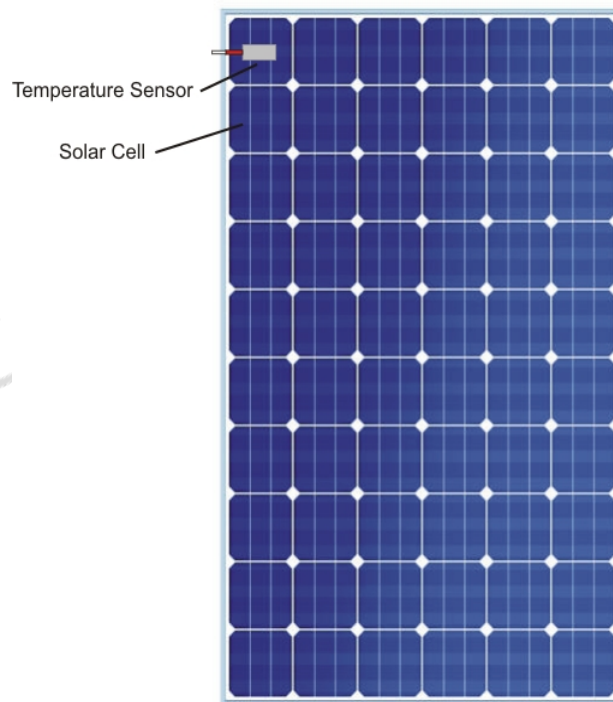

Fig 2.1 – Position of RTD sensor installation for MBMet-803-BI Model

2.2   Installation of PV module Sensor for MBMet-803

The sensor is to be pasted to the **back side** of the PV Module in the **center** most position of the panel. Care is to be taken so that the sensor does not fall in between two cells. As shown in the fig 2.1
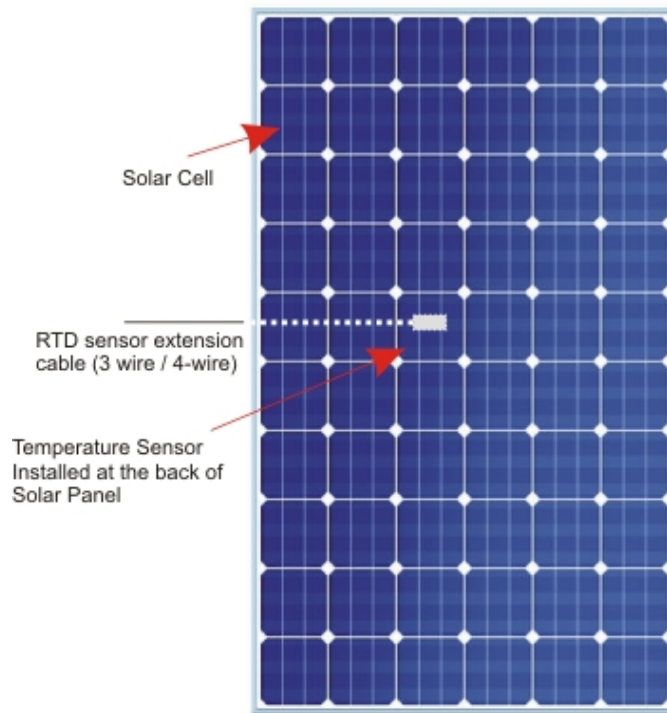

Fig 2.2 – Position of RTD sensor installation for MBMet-803 Model

3.   Installation of Temperature Transmitter

The temperature transmitter is to be fixed on the solar table structure (piling).

i)   Open 4nos screws from the top cover of the temperature transmitter.
ii)   Now fix the temperature transmitter on the solar panel table (piling) with 2nos 3/16'' x 2'' round head screw provided with the shipment. As in fig 3.1
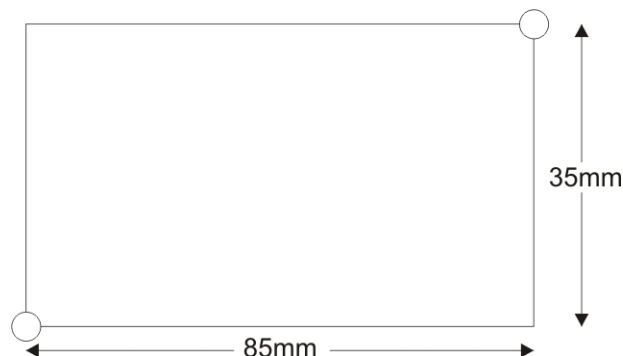

Fig 3.1 – Mounting holes dimensions details of Temperature Transmitter

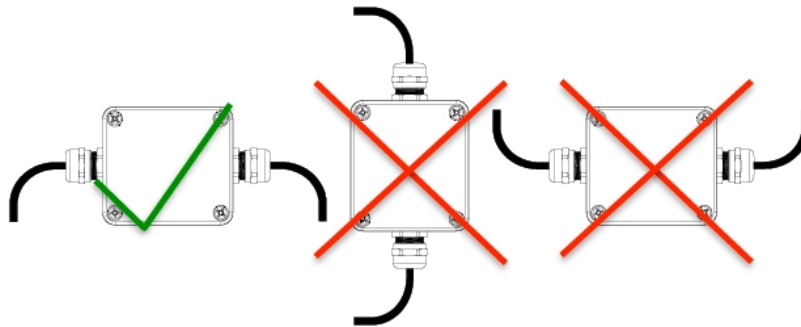iii)   Install the transmitter as per details in the picture provided below.

Fig 3.3 – Enclosure mounting in correct way

iv)   Fix the enclosure to the structure.

4.   Connection of PV Temperature Transducer

i)   Open the top cover of the transmitter.
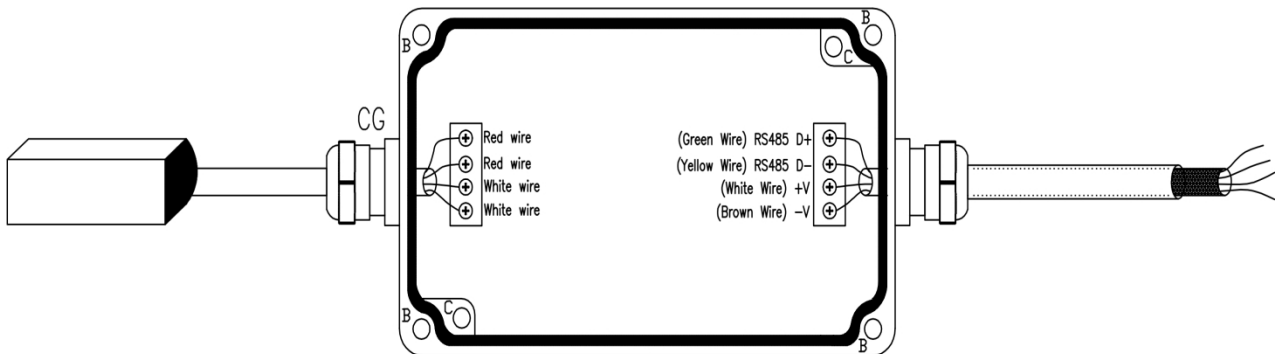ii)   Connect the sensor extension cable as shown in the fig4.1.

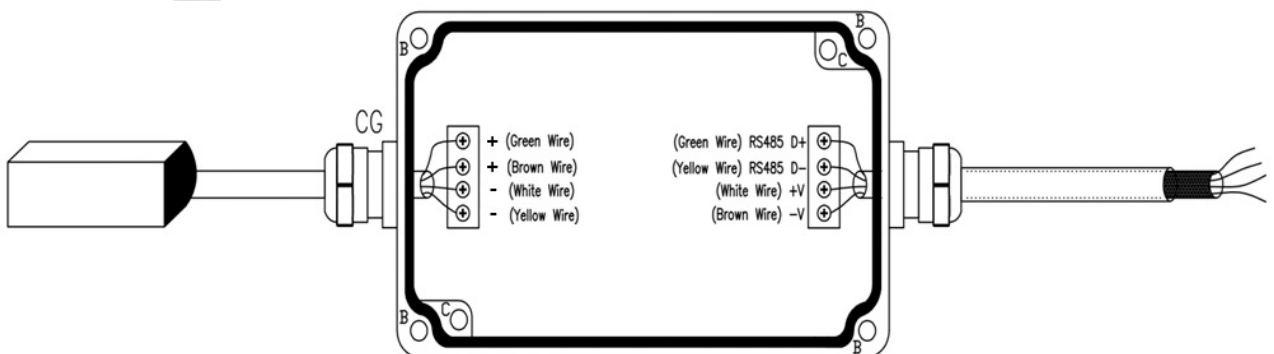Fig- 4.1: Wiring inside the enclosure (with Silicon insulated cable)

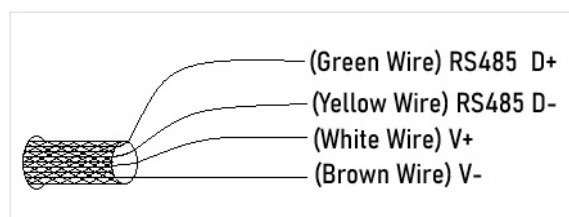Fig- 4.2: Wiring inside the enclosure (with Lapp insulated cable)

Fig 4.3 – Field wiring

5.   PV Temperature Transducer Specifications

Model	MBMet-803 / MBMet-803-BI
Measurement Range	-40° to +150°C
Temperature Accuracy	±0.2°C
Temperature Stability	<0.02°C per year
Sensor Element Type	RTD Class A
Sensor Cable-Length	Teflon insulated cable – 3 meters (MBMet-803-BI) Silicon insulated cable – 3 meters (MBMet-803) Lapp insulated cable – 3 meters (MBMet-803)
Sensor Housing	Self-Adhesive Aluminum
Self-Adhesive Tape	High Temperature Acrylic Adhesive Tape. Operating temperature tolerance up to 147°C.
Sensor Transmitter Housing	Powder Coated-Cast Aluminum, IP67
Sensor Transmitter Cable	Length : 5 meters (default), PVC insulated, 4-wire cable
Sensor Transmitter Output	Rs-485 Modbus
Power supply	10 to 30 VDC
Operating Atmospheric Temperature	-10°C to +70°C
Operating Ambient Humidity	0.1 to 77.7% RH
Sensor Standard	Meets IEC-61724-1 (2017-03) Class A

Table No: 5.1 – PV Module Temperature Transducer Specification

6.   Modbus Address for reading temperature

MODBUS Register Address	Length (bits)	Parameter	Register Type	Parameter Type
0	16	PV Module Temperature*	Read only	Signed Integer

Table No: 6.1 – Modbus Address for Temperature value in integer

* Resolution for PV Module Temperature is 0.1°C

MODBUS Register Address	Length (bits)	Parameter	Register Type	Parameter Type
20	32	PV Module Temperature	Read only	Float

Table No: 6.2 – Modbus Address for Temperature value in float

7.   Configuration of communication parameters

7.1   Default Communication Parameters
Modbus ID: 1
Baud Rate: 7600
Parity: None
Stop Bit: 1
Temperature Unit: ºC

7.2   Modbus register details for communication parameters

MODBUS Register Address	Length (bits)	Parameter	Register Type	Parameter Type
100	16	MODBUS ID (Default:1) 1<ID<247	Read/Write	Unsigned Integer
101	16	Baud rate (Default: 1) 0=4800; 1=7600; 2=17200	Read/Write	Unsigned Integer
102	16	Parity (Default: 0) 0=None; 1=Odd; 2=Even	Read/Write	Unsigned Integer
103	16	Stop bits (Default: 1) 1; 2	Read/Write	Unsigned Integer
104	16	Temperature Units (Default: 0) 0 = ºC; 1 = ºK; 2 = ºF	Read/Write	Unsigned Integer
105	16	Save Configured parameters 1=Save **	Write only	Unsigned Integer

Table No-8.2: Modbus Details of MBMet-803 / MBMet-803-BI Transducer

** You must send 1 in register 105 to save the settings otherwise the settings will not be saved
Note: If any value given other than as mentioned in Table 8.1, then it will show illegal data

7.3   Setting Required Communication Parameter
Let's take the example that the following communication parameters need to be set
Modbus ID: 10
Baud rate: 17200
Parity: Even
Stop Bit: 2
Temp: ºC

Step-1   Connect the sensor to the Modbus Master Software with the default settings.
Step-2   Set the following
        Function: Write Multiple Registers
        Starting Address: 100
        Number of registers: 6
        Data Type: Integer
Step-3   Set the communication parameters as per your requirement. (See example settings)

Modbus Register	Value with description
100	10 (Modbus ID=10)
101	2 (Baud Rate = 17200)
102	2 (Parity = Even)
103	2 (Stop Bit = 2)
104	0 (Temperature: ºC)
105	1 (Save)**

Table No-8.3: Set values according to your requirement

** You must set 1 in register 105 to save the settings otherwise the settings will not be saved

Step-4   After all the Parameters are set, send the same to the sensor. The sensor will stop communication. Please note that writing single register is not allowed. All the registers are to be written in one go.

Step-5   Connect the sensor using the modified communication parameters that is set in Step-3. The sensor will start communicating.

7.4   Re-setting Default Communication Parameter

Procedure for re-setting default communication parameters is as follows.

Step-1:   Switch Off the power supply of the Transducer.
Step-2:   Open the transducer cover for gaining access to the PCB.
Step-3:   Locate the Jumper J4 in the PCB.

Jumper J4 location on PCB
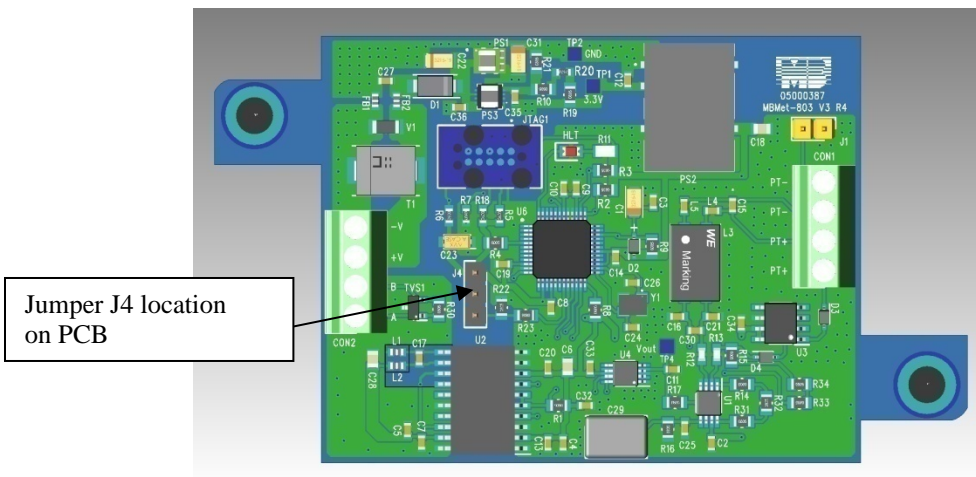
Fig- 8.4.1: Position of Jumper-J4 in board

Jumper position factory setting
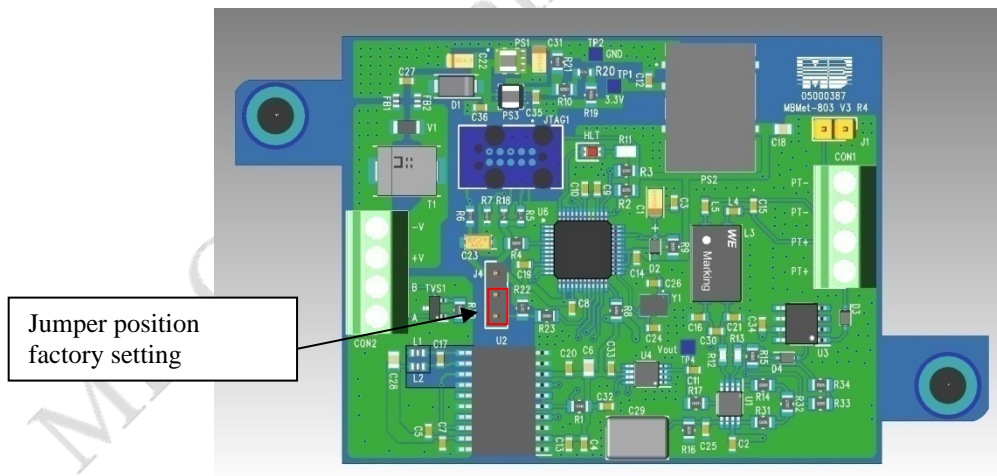
Fig-8.4.2: Jumper position (factory setting)

Step-4:   Change the jumper position from Fig-8.4.1 to Fig-8.4.2
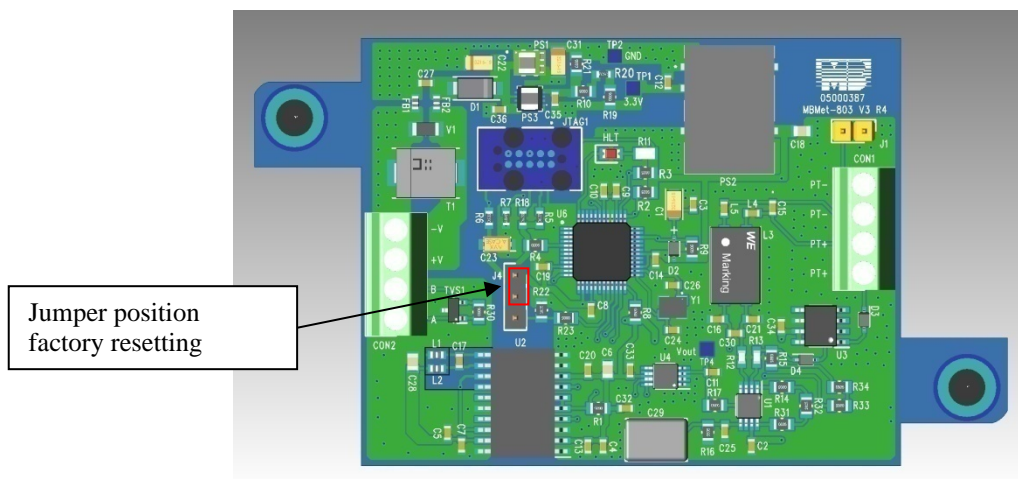
Fig-8.4.3: Jumper position (for factory resetting)

Step-5:   Switch On power supply, wait for 30 sec and switch off the power supply
Step-6:   Reconnect the jumper in the original factory position as in Fig 8.2
Step-7:   Close the transducer cover securely.

The transducer is reset to it's factory settings. It can now be reconfigured according to requirement.

7.5   Reading Communication Parameter in Modbus

Step-1:   Connect the sensor as shown in Point number 4 of this manual.
Step-2:   Open any Modbus Master software and do the following settings.
      i.   Set the communication parameters viz. Modbus ID, Baud rate, Parity and Stop Bit.
      ii.   Set the following
            Function: Read Holding register
            Starting Address: 100
            Number of registers: 5
            Data Type: Integer
Step-3   Start the communication

8.   PV Module Temperature Transducer Hardware Information Modbus Addresses:

Modbus Register Addresses	Length (bits)	Parameters	Register Type	Parameter Type
110	16	Device Model No	Read only	Unsigned 16 Bits
111	16	Hardware Version	Read only	Unsigned 16 Bits
112	16	Software Version	Read only	Unsigned 16 Bits
113	16	Manufacture Year	Read only	Unsigned 16 Bits
114	16	Device serial number	Read only	Unsigned 16 Bits

Table No-9: Hardware Information Modbus Addresses

9.   Configuring with MBSSC application

9.1   Interfacing Device

Step-1: Download the MBSSC application from the link:
https://drive.google.com/file/d/1amgZaWlHHGjyNJ1JAY3bf4CWchFkMYLR/view?usp=sharing

Step-2: Install the application as per Installation guide.
Link: https://drive.google.com/file/d/1j_gW1zT_1QxuD1R2VhP8hNBo358AQv-7/view?usp=sharing

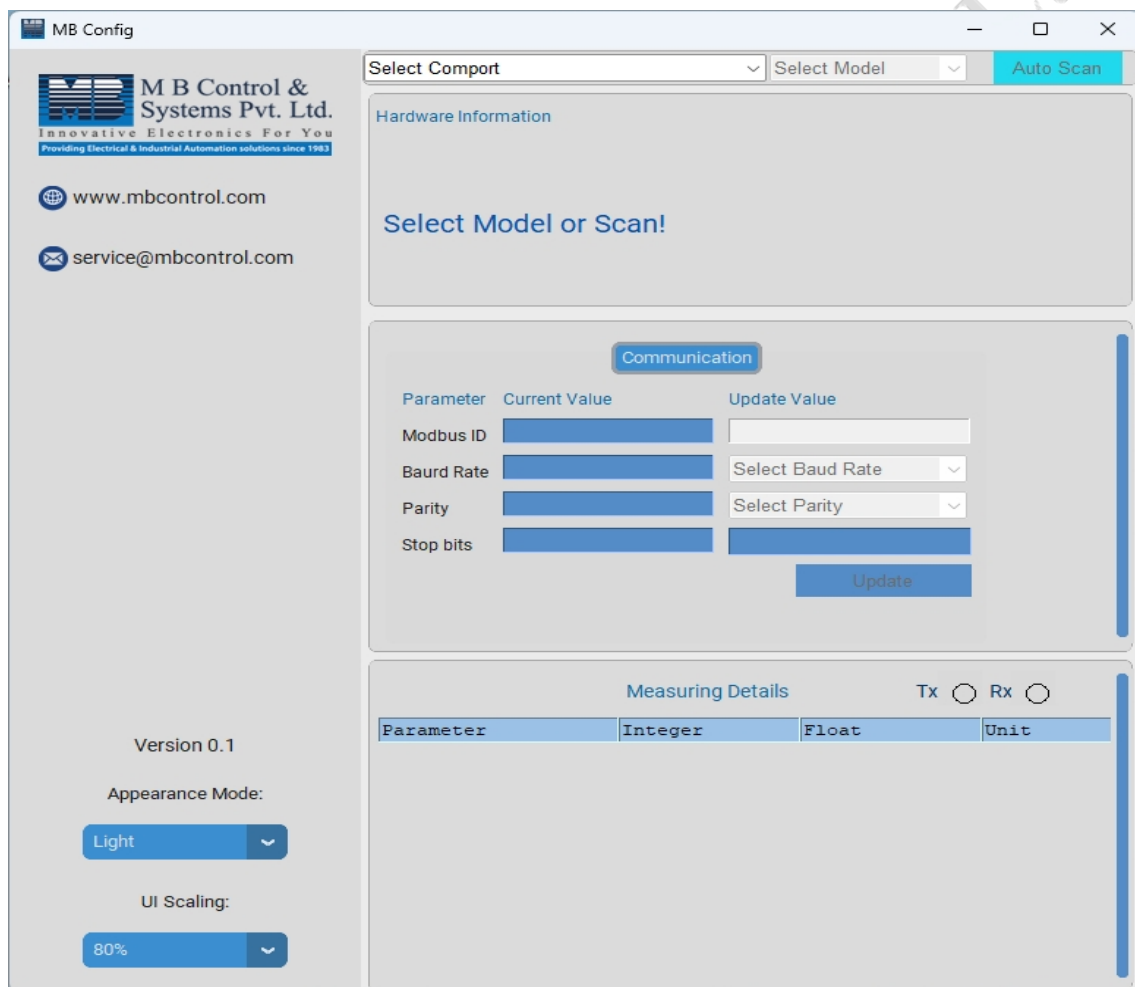Step-3: Now double click on MBSSC icon and a window will appear as below.

Fig – 7.2.1: User interface of MBSSC application

Step-4:   There are two options for communicating with the sensor.
          it mandatory to select comport first then active these two options.

1.   Auto Scan
2.   Select Model

If use Select Model then show the below screen and select model which connected your PC or Auto Scan.
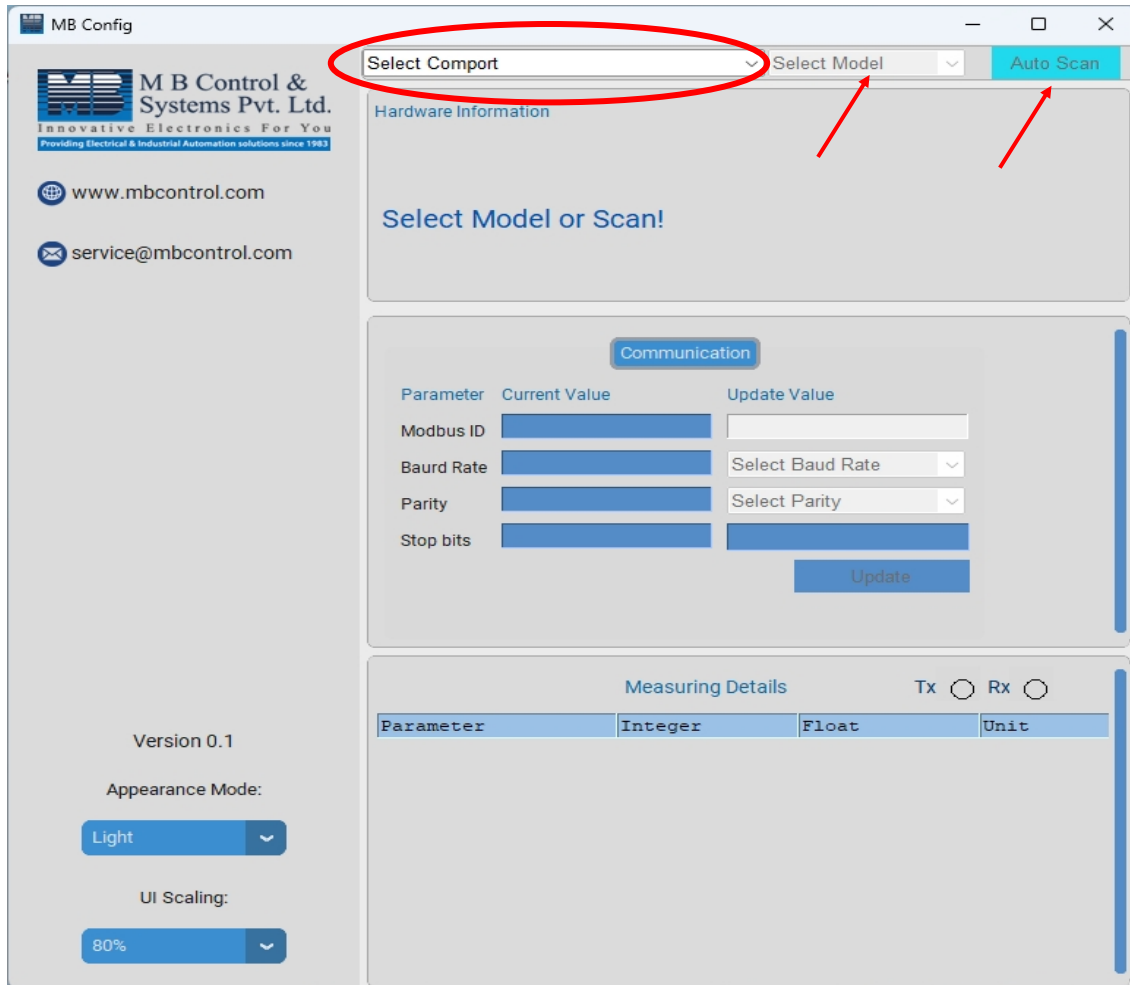
Fig-7.2.2: Options for communicating with Sensor

Step-5:   After Auto Scan or Select Model, this screen will appear.
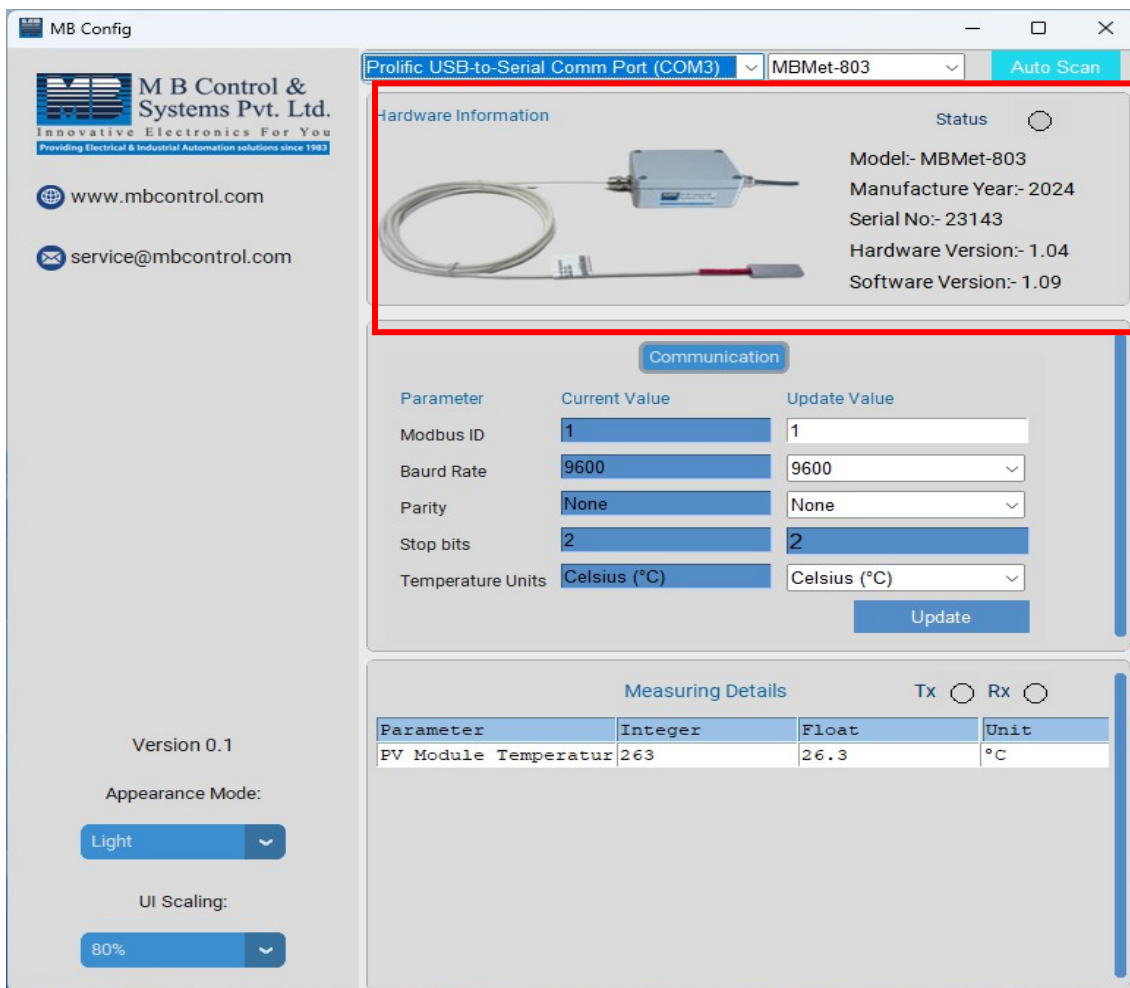
Fig-7.2.3: Successful communication

9.1 Configure communication parameter

Step-1: Put the value of Modbus ID in 'Update Value' column. (If required)
Choose Baud Rate from dropdown list.
Choose Parity from dropdown list.
Choose Temperature Unit from dropdown list.

Fig-7.3.1: Configure communication parameter

Step-2: Click on the 'Update' button for updating the parameters.

Fig-7.3.2: Update communication parameter