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IQC ISO 9001 : 2015 IND/QMS/NAB-C1978/2658

Ambient Air Parameters Transducer Operation and Installation Manual (RS-485 Modbus)
Model – MBMet-901A-B; MBMet-901B-A/B; MBMet-901C-A/B; MBMet-901D-A/B; MBMet-901E-B; MBMet-901F-B

Document Number: M4 015 010 010 01(R4)
Hardware Version: 102
Software Version: 104

Contents

1. Parts of Transducer.

Ambient Temperature Sensor RS-485 is shipped with the following components

1. Ambient Temperature Transducer – 1 No
2. Data Transmission Cable with Connector – 5Mtr
3. Solar Radiation Shield – 1 No
4. Pole Mount for Shield – 1 No
5. U Clamps with Nut, Screw, Washer and Spring Washer for pole mount – 2Set.

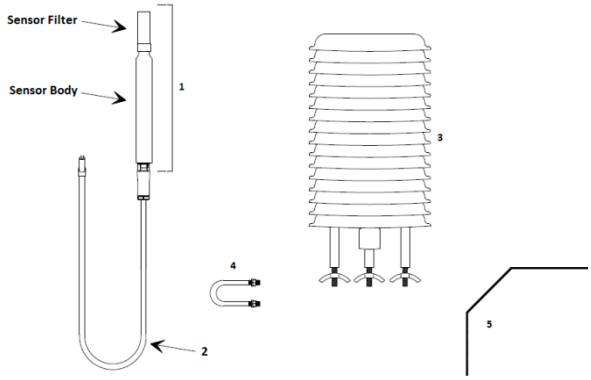

Fig 1.1 – Parts of Ambient Parameter transducer

2. Mounting Shield Mount Clamp on pole.

Mount the radiation shield mounting clam to the Pole (**Hole number Aof Fig 2.1).**

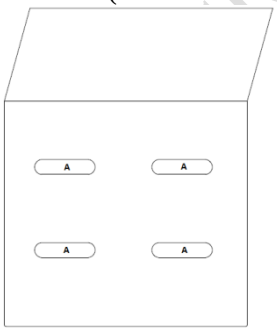

Fig 2.1 – Mounting Clamp (Pole Side)

Mount the Shield mounting plate with the U-Clamps provided as shown in fig 2.2

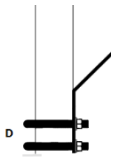

Fig 2.2 – Mounting Clamp connected in pole

3. Fixing the radiation shield to the Pole mount clamp.

Mount the radiation shield to the clamp (**Hole number Bof Fig 3.1).**

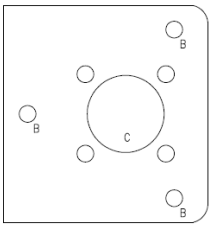

Fig 3.1: Mounting Clamp (Shield side)

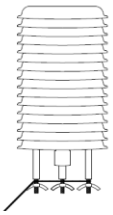

Fig 3.2: View of shield after fixing to Mounting Clamp

4. Fixing the Sensor to the radiation shield.

i) Loosen the Cable gland of the shield.

ii) Insert the Temperature probe inside the shield. Take care that the sensor sensing part is not blocked in any way.

iii) Tighten the cable gland so that the temperature probe does not fall off and connect the cable taking care that the alignment between male and female part is ok

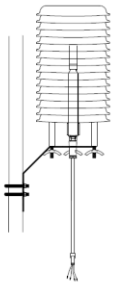

Fig 4.1 – Ambient temperature sensor inside shield

5. Sensor Connection for PLC/Data logger/RTU end.

Pin No	Wire Color	Connection to PCB Points
1	White Wire	+V (12V/24V DC)
2	Green Wire	+D RS-485
3	Yellow Wire	-D RS-485
4	Brown Wire	-V (12V/24V DC)

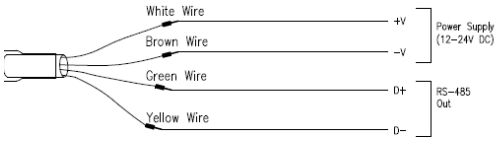

Fig 5.1 – Sensor Connection for MBMet-901A/B/C/D/E/F-B

Pin No	Wire Color	Connection to PCB Points
1	White Wire	+V (12V/24V DC)
2	Green Wire	Temperature (4-20mA)
3	Yellow Wire	Humidity (4-20mA)
4	Brown Wire	-V (12V/24V DC)

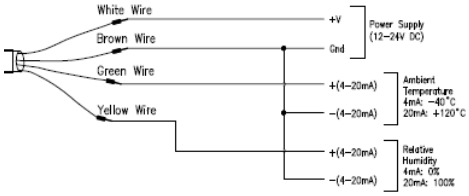

Fig 5.2 – Field wiring for MBMet-901B-A

Pin No	Wire Color	Connection to PCB Points
1	White Wire	+V (12V/24V DC)
2	Brown Wire	Temperature (4-20mA)
3	No connection	
4	No Connection	

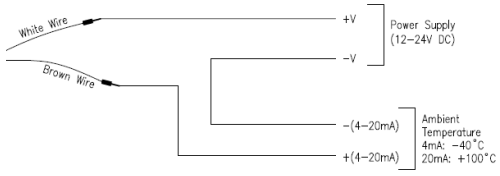

Fig 5.3 – Field wiring for MBMet-901C-A

Pin No	Wire Color	Connection to PCB Points
1	White Wire	+V (12V/24V DC)
2	Brown Wire	-V (12V/24V DC)
3	Yellow Wire	Humidity (4-20mA)
4	No Connection	

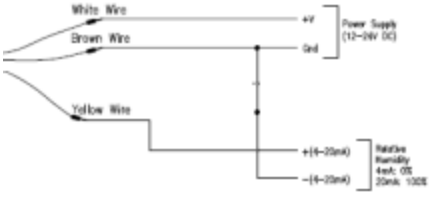

Fig 5.4 – Field wiring for MBMet-901D-A

6. Ambient AirParameters Transducer Specifications

Model / Parameters	MBMet-901A	MBMet-901B		MBMet-901C		MBMet-901D		MBMet-901E	MBMet-901F
Communication Output	-B RS-485 Modbus	-A 4-20mA	-B RS-485 Modbus	-A 4-20mA	-B RS-485 Modbus	-A 4-20mA	-B RS-485 Modbus	-B RS-485 Modbus	-B RS-485 Modbus
Sensor Type	Semi-conductor	Semiconductor		RTD	Semi-conductor	Semiconductor		Semi-conductor	Semi-conductor
Power Consumption	300mW	60mW	300mW	60mW	300mW	80mW	300mW	300mW	300mW
Ambient Temperature									
Measuring Rang	-40°C to +125°C	-40°C to +125°C		-40°C to +125°C		-		-	-40°C to +125°C
Resolution	0.1°C	0.1°C		0.1°C		-		-	0.1°C
Accuracy	±0.2°C (typical)	±0.3°C (0-90°C)	±0.2°C (typical)	±0.3°C (0-90°C)	±0.2°C (typical)	-		-	±0.2°C (typical)
Response Time	5-30s	5-30s		5-30s		-		-	5-30s
Stability	<0.02°C per year	<0.02°C per year		<0.02°C per yea		-		-	<0.02°C per year
Relative Humidity									
Measuring Rang	0 to 100% RH	0 to 100% RH		-		0 to 100% RH		-	0 to 100% RH
Resolution	0.1% RH	0.1% RH		-		0.1% RH		-	0.1% RH
Accuracy	±2% RH (10-80% RH)	±2% RH (0-90%)	±2% RH (10-80%)	-		±2% RH (0-90%)	±2% RH (10-80%)	-	±2% RH (10-80%)
Response Time	8-30s	8-30s		-		8-30s		-	8-30s
Stability	<0.25% RH per year	<0.25% RH per year		-		<0.25% RH per year		-	<0.25% RH per year
Dew Point									
Measuring Rang	-40°C to 105°C	-	-40°C to 105°C	-		-		-	-40°C to 105°C
Resolution	0.1°C	-	0.1°C	-		-		-	0.1°C
Accuracy	Calculated	-	Calculated	-		-		-	Calculated
Response Time	8-30s	-	8-30s	-		-		-	8-30s
Barometric Pressure									
Measuring Rang	300 to 1250 hPa	-		-		-		300 to 1250 hPa	300 to 1250 hPa
Resolution	0.01hPa	-		-		-		0.01hPa	0.01hPa
Accuracy	±1hPa	-		-		-		±0.4hPa	±0.4hPa
Response Time	0.1s	-		-		-		0.1s	0.1s
Stability	-1 hPa per year	-		-		-		-1 hPa per year	-1 hPa per year

Table No 6.1 – Ambient Parameter Transducer Specifications

7. Modbus Address for reading parameters - Data type: Integer

Modbus Register Addresses	Length	Parameters	Resolution	Register Type	Parameter Type
0	16 Bits	Ambient Air Temperature	0.1	Read only	Signed 16 Bits
1	16 Bits	Dew Point	0.1	Read only	Signed 16 Bits
2	32 Bits	Atmospheric Pressure in hPa (Low)*	0.01	Read only	Unsigned 32 Bits
3		Atmospheric Pressure in hPa (High)*			
4	16 Bits	Relative Humidity in %	0.1	Read only	Unsigned 16 Bits
5	16 Bits	Air Density in Kg/m^3	0.001	Read only	Unsigned 16 Bits

Table No 7.1 – Parameter Modbus Addresses

* Pressure is a 32Bit Parameter and should be read accordingly

8. Modbus Address for reading parameters – Data type: 32Bit Floating point

Modbus Register Addresses	Parameters	Symbol
20, 21	Ambient Air Temperature	^0C
22, 23	Dew Point	^0C
24, 25	Atmospheric Pressure	hPa
26, 27	Relative Humidity	%
28, 29	Air Density	Kg/m^3

Table No 7.2 – Parameter Modbus Addresses in floating point

9. Configuration of communication parameters

9.1. Default communication Parameters

Modbus ID: 1
Baud Rate: 9600
Parity: None
Stop Bit: 1
Temperature Unit: ^oC

9.2. Modbus register details for communication parameters

Modbus Register Addresses	Length (bits)	Parameters	Register Type	Parameter Type
100	16	MODBUS ID (Default:1) 1<ID<247	Read/Write	Unsigned 16 Bits
101	16	Baud rate (Default: 1) 0=4800; 1=9600; 2=19200	Read/Write	Unsigned 16 Bits
102	16	Parity (Default: 0) 0=None; 1=Odd; 2=Even	Read/Write	Unsigned 16 Bits
103	16	Stop bits (Default: 1) 1; 2	Read/Write	Unsigned 16 Bits
104	16	Temperature Units (Default: 0) 0 = ^oC; 1 = ^oK; 2 = ^oF	Read/Write	Unsigned 16 Bits
105	16	Save configured parameter (1 to save)	Write only	Unsigned 16 Bits

Table No 8.1 – Communication Modbus Addresses

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

9.3. Setting Required Communication Parameter

Let's take the example that the following communication parameters need to be set

Modbus ID: 10
Baud rate: 19200
Parity: Even
Stop Bit: 2
Temp: ^{o}C

Step-1 Connect the sensor to the Modbus Polling Software with the default settings.

Step-2 Set the following

Function: Write Multiple Registers
Starting Address: 100
Number of register: 6
Data Type: Integer

Step-3 Set the communication parameters as per your requirement

Modbus Register	Value with description
100	10 (Modbus ID=10)
101	2 (Baud Rate = 19200)
102	2 (Parity = Even)
103	2 (Stop Bit = 2)
104	0 (Temperature: ^{o}C)
105	1 (Save)**

Table No 8.2 – 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.

9.4. Re-setting Default Communication Parameter (to be done by experienced MBCS Engineer only)*

Step-1 Remove the sensor from the Radiation Shield but do not disconnect the cable.
Step-2 Open the Filter Cap of the sensor. Please be careful and do not soil the Filter.
Step-3 Locate the J1 Shorting points as shown in the fig 8.1.

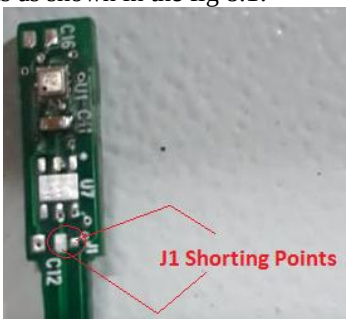

Fig: 8.1 Open top part of the sensor

Step-4 Short the two points carefully so that no other points are touched.
Step-5 Screw on the cap filter, Re-cycle the Power Supply and reinsert the sensor in the Radiation Shield. The sensor is set to it's factory default.

* Note : The feature is not available in Version-1 and 2 MBMet-901sensors. In case of V1 and V2 Sensors Communication parameters cannot be reset

9.5. Reading Communication Parameter in Modbus

Step-1 Connect the sensor as shown in Point number 5 of this manual.
Step-2 Open any Modbus Polling 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 register: 5
Data Type: Integer
Step-3 Start the communication

10. Ambient Air Parameters Transducer Hardware Information Modbus Addresses

Modbus Register Addresses	Length (bits)	Parameters	Register Type	Parameter Type
110	32	Device Model No	Read only	Unsigned 32 Bits
112	16	Hardware Version	Read only	Unsigned 16 Bits
113	16	Software Version	Read only	Unsigned 16 Bits
114	16	Manufacture Year	Read only	Unsigned 16 Bits
115	32	Device Sl No	Read only	Unsigned 32 Bits

Table No 9.1 – Hardware Information Modbus Addresses

11. Maintenance: Changing the Filter cap

Step-1 Power off the Sensor
Step-2 Disconnect the Sensor Cable.
Step-3 Loosen the Cable gland of the shield and take out the sensor.

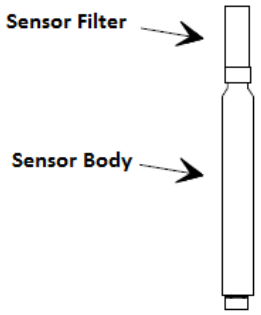

Fig 10.1 – Sensor after taking out of radiation shield

Step-4 Hold the sensor body in one hand firmly and the sensor filter cap with the help of index finger and thumb of the other hand and un-screw the cap rotating it in anti-clock direction. Care to be taken so that the sensing element inside the filter is untouched and undamaged.
Step-5 Hold the new filter cap carefully in the plastic part so that the filter doesn't soil.Rotate the cap in the clockwise direction.
Step-6 Insert the sensor in the shield and tighten the cable gland.
Step-7 Reconnect the cable to the sensor.
Step-8 Power on the sensor