MODEL BX-597A
Temperature / Relative Humidity / Barometric Pressure Sensor

Operation Manual
Document No. BX-597A-9800 Rev C

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Model BX-597A Relative Humidity / Temperature / Barometric Pressure Sensor Manual.

Technical Support

Should you require support, please consult your printed documentation to resolve your problem. If you are still experiencing difficulty, you may contact a Technical Service representative during normal business hours—7:30 a.m. to 4:00 p.m. Pacific Standard Time, Monday through Friday.

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Safety Notice

The contents of this manual have been checked against the hardware and software described herein. Since deviations cannot be prevented entirely, we cannot guarantee full agreement. However, the data in this manual is reviewed regularly and any necessary corrections included in subsequent editions.

Faultless and safe operation of the product presupposes proper transportation, storage, and installation as well as careful operation and maintenance. The seller of this equipment cannot foresee all possible modes of operation in which the user may attempt to utilize this instrumentation. The user assumes all liability associated with the use of this instrumentation. The seller further disclaims any responsibility for consequential damages.

Table of Contents

1. Introduction

The Model BX-597A multi-parameter weather sensor is an "All-in-One" device that measures ambient temperature, relative humidity, and barometric pressure. Sensor performance complies with guidelines establish by the World Meteorological Organization (WMO) and the US Environmental Protection Agency (EPA). The sensor is supplied with mounting hardware and an integrated radiation shield and can be easily attached to lattice tower legs and instruments masts up to 2 inches (IPS) in diameter.

2. Cautionary Statements

- The sensor's relative humidity output is referenced to saturated water vapor pressure above liquid water. When the air temperature is below freezing, the sensor's maximum theoretical measurement range is limited.

- To minimize exposure to direct sunlight, install the sensor facing to the north in the northern hemisphere and south in the southern hemisphere. This orientation will help shield the sensor from direct sunlight and reduce temperature measurement errors.

3. Initial Inspection

- Upon receipt of the Model BX-597A, inspect the packaging and contents for damage. If the packaging has arrived in a damaged condition file a claim with the shipping company and contact Met One Instruments, Inc. to arrange for repair or replacement.

- The model number and cable length are printed on a label at the connection end of the cable. Check this information against the shipping documents to ensure the correct product and cable length has been received.

4. Product Overview

The BX-597A ships from Met One Instruments pre-wired for digital output signals including RS-232 and RS-485. The BX-597A also includes voltage outputs for AT/RH/BP, and an ID voltage used by some Met One monitors and dataloggers to identify the sensor. The voltage outputs are 0-2.5VDC default and can be changed to 0-1VDC or 0-5VDC.

The BX-597A uses a piezoresistive pressure sensor, a microprocessor-controlled relative humidity module, and a platinum RTD temperature sensing element. The response of each element is linear with negligible hysteresis. Each sensor element in the BX-597A is controlled using an on-board microcontroller, which contains an analog-to-digital converter and non-volatile memory for storage of factory-determined calibration coefficients. The microcontroller polls the sensor module once per second. Measurements are temperature corrected, the calibration coefficients applied, and the processed measurement sent out via serial communication.

All wiring terminals on the BX-597A are protected from static-surge damage by transzorbs and current-limiting resistors.

5. Installation

5.1.   Mounting

The BX-597A is designed for outdoor use and is supplied with an integrated solar radiation shield and U-bolts. Install the radiation shield with the U-bolts on any vertical or horizontal pipe up to 2 inches (IPS) in diameter. To minimize exposure to direct sunlight, install the sensor facing north in the northern hemisphere and south in the southern hemisphere.

5.2.   Siting

Install the sensor over an open, level area at least 9 m (EPA) in diameter. The surface should be covered with short grass or a natural earth surface where grass does not grow. Locate sensors away from objects at a distance equal to four times the height of the objects, and at least 30 m (EPA) from large, paved areas. Protect sensors from thermal radiation and ensure adequate ventilation.

Standard installation heights:
- 1.5 m (AASC)

- 1.25 to 2.0 m (WMO)

- 2.0 m (EPA)

5.3.   Wiring

The BX-597A may be ordered with a 10547 analog output cable assembly, or 10548 digital output cable assembly (sold separately) for connection (Individual wire leads) of the BX-597A to a data logger, signal conditioner, or programmable logic controller. A detailed wiring diagram for each cable assembly is provided in Section 10: Wiring Diagrams.

BX-597A sensor cables for specific Met One monitors (e.g. BAM-1020 N, BAM 1022, BC-1054, etc.) are included in accessory kits sold with the monitors. Replacement sensor cables may also be ordered separately.

6. Specifications

TEMPERATURE
- Range: -50 °C to +70 °C (-58 °F to +158 °F)
- Accuracy[1]:   Digital: ±0.2 °C

  Analog: ±0.2 °C, +/-1 mV
- Resolution: 0.01 °C

RELATIVE HUMIDITY
- Range: 0 to 100 %
- Accuracy[1]:   Digital: ±2 %

  Analog: ±2 %, +/-1 mV
- Resolution: 0.1 %

PRESSURE
- Range: 500 to 1100 mbar (14.8 inHg to 32.5 inHg)
- Accuracy[1]:   Digital: ±0.5 mbar

  Analog: ±0.5 mbar, +/-1 mV
- Resolution: 0.01 mbar

ELECTRICAL
- Measurement Rate: 1 Hz
- Data Storage: None
- Standard Signal Output: RS-232, RS-485, 0-2.5 VDC
- Optional Signal Output: 0-1 VDC, 0-5 VDC
- Power Supply: 9-36 VDC, 25 mA typical @ 12 VDC

ENVIRONMENTAL
- Temperature: -50 °C to +70 °C
- Humidity: 0 to 100 %

PHYSICAL
- Diameter: 7 in (178 mm)
- Length: 8 in (203 mm)
- Weight: 5 lb (2.3 kg)

(1) At 25°C

7. Sensor Verification

To verify correct wiring and test the basic sensor operation, blow on the sensor. The warmth and moisture in your breath should cause the temperature and relative humidity reading to rise. The output signals can also be checked against calibrated relative humidity, temperature, and pressure devices. Please note that relative humidity can be expected to vary significantly over short distances and in brief periods of time.

8.   Serial Communications

Serial Data Output

The output of the BX-597A is a fixed length, comma delimited, serial data stream. The serial output is factory set for 9600 baud, no parity, 8 data bits, with 1 stop bit (N, 8, 1). Please see appendix E for a list of supported serial commands.

Output Format Detail

The BX-597A will support only one output format. This format will use fixed length fields but also include commas to accommodate both standard CSV formatting and legacy programs that expect fixed length fields.

The parameter order is shown in the table below.

Field	Parameter
01	Ambient Temperature
02	Relative Humidity
03	Barometric Pressure
04	Config. & Status
05	Check Sum

The BX-597A will report data typically once per second. An example output string is shown below.

```
+023.6,022.1,0974.3,ʊ0,*nnnn
```

Note: when displaying the pressure in in/Hg, there will be an extra leading zero character but the fixed length of the field will not change.

A check sum parameter will be added to the end of the message (*nnnn). The check sum is the addition of all the characters from the start of the message through the first character preceding the asterisk (*). The check sum is expressed as a decimal number. This is a 16-bit sum and should not overflow past 4 digits, given the number of characters in the output string.

Polled Data Mode (RS232 or RS485)

The sensor can be set for polled data mode instead of continuous serial output, by setting the serial trigger string while in terminal mode (see Section 12 for command details).

9. Maintenance

General Maintenance Schedule

6 – 12 Month Intervals:
Inspect the sensor for proper operation per Section 7.

12 - 24 Month Interval:
Return the sensor to Met One Instruments, Inc. for factory inspection and calibration.

10. Service

The BX-597A is not field repairable and should be returned to the factory for service.

Detailed calibration & service information and pricing are available from the Met One Instruments, Inc. Service department at service@metone.com and 541-471-7111.

11. Wiring Diagrams

Wiring Instructions (PN 10547; Analog Output)

PIN NO	WIRE COLOR	WIRE LABEL	DESCRIPTION
1	Red	+12VDC	+9 to +36 VDC
2	Black	Gnd	Signal Ground
3	Orange	Ana Gnd	Analog Ground
4	Brown	RH	RH Analog Output
5	Green	ID	ID Voltage
6	White	BP	BP Analog Output
7	Blue	AT	AT Analog Output
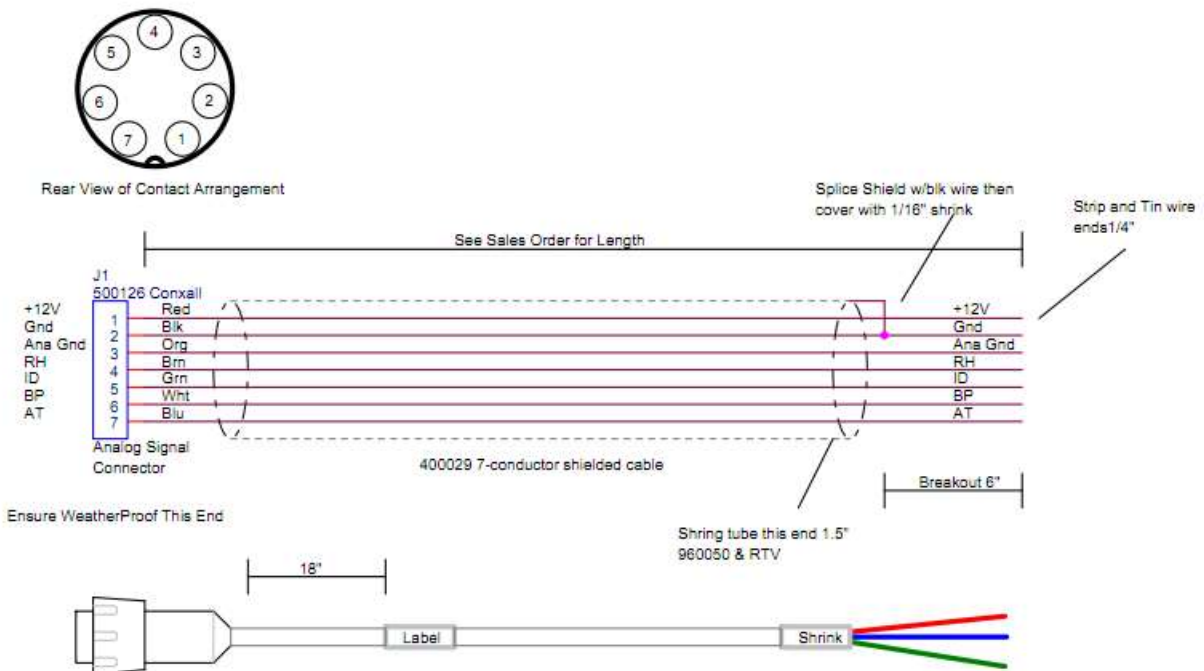
Wiring Instructions (PN 10548; Digital Output)

PIN NO	WIRE COLOR	WIRE LABEL	DESCRIPTION
1	Black	PWR GND	Power Ground
2	Red	+ Vin	+9 to +36 VDC
3	Blue	No Connection	Unused
4	Green	SIG GND	Signal Ground
5	White	RS-232 Tx	RS-232 Transmit
6	Brown	RS-232 Rx	RS-232 Receive
7	Orange	RS-485 -	RS-485 signal -
8	Yellow	RS-485 +	RS-485 signal +
	White/Brown	Shield	Earth Ground
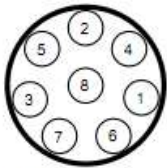
Rear View of Contact Arrangement

SEE SALES ORDER FOR LENGTH

MOI # 400029

6 inch break out strip and tin 3/16"

J1

1	Black	PWR GND
2	Red	+V IN
3	Blue	SDI-12
4	Green	SIG GND
5	White	RS-232 TX
6	Brown	RS-232 RX
7	Orange	RS485-
8	Yellow	RS485+
	White/Brown	SHIELD

MOI # 500155

solder 980510 Wht/Brn wire to shield cover with 960050 + 960041

18"

Label

Shrink
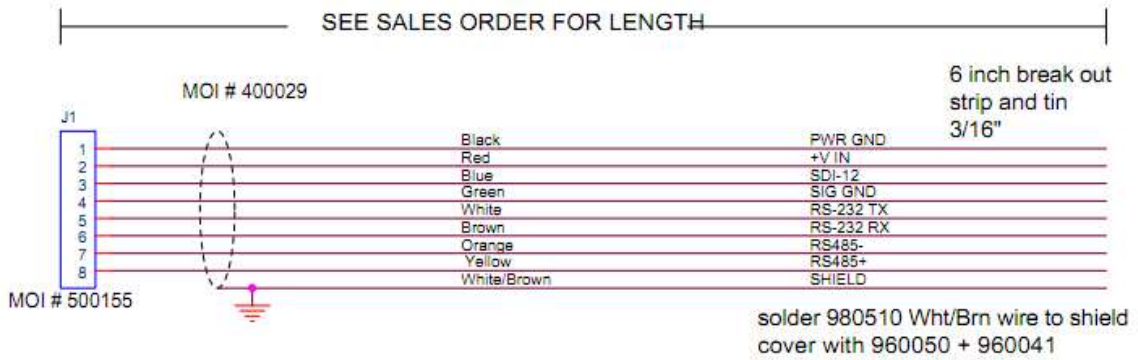
12. Terminal Mode Commands

RS232 / RS485 Terminal Mode Commands

Terminal mode is activated by entering three carriage return characters within a 2 second period.

Note: Terminal mode times-out after 2 minutes of inactivity.

Successful entry into Terminal Mode will return an asterisk prompt. Typing H,h, or ? will return a help menu:

H,h,? - Display Help Menu

```
H,h,? - This Help Menu
1      - Report Settings
OI     - Set Output Interval
QH     - Report Data Record Header
RV     - Report Model/Part/Revision
RQ     - Report Current Readings
PU     - Pressure Units
TU     - Temperature Units
Q      - Quit command mode and save any changes
```

NOTE: The commands noted in this appendix will change both the RS232 and RS485 outputs.

1 – Report Settings

Command	Description
1	Report the settings.

Response
| ```
597A Settings Report

      Firmware, 10893, R1.0.0
 Serial Number, I0002
       Unit ID, 1
     Baud Rate, 9600
       AT Unit, C
       BP Unit, mbar
``` |

ID – Request or Set the Location ID

Command	Description
ID	Request the Location ID.
ID id	Set the Location ID. This is an 3 digit numeric value in the range 1-999.

Response	Description
ID id	id – The location ID.

Example
ID<cr> ID 001<cr><lf> ID 03<cr> ID 003<cr><lf>

OI – Request or Set the Output Interval

Command	Description
OI i	Set Output Interval in seconds.. Where i is the Interval. 0=No volunteered output, 1=Output every Second. No averaging.

Response	Description
OI i	On or Off

Example
OI<cr> OI 1<cr><lf> OI 0<cr> OI 0<cr><lf>

PU - Pressure Units

Command	Description
PU	Request the Pressure units.
PU e	Set the pressure units. Where 'e' is the enumerator 0-mbar,1-inHg,2-mmHg,3-Pa

Response	Description
PU e-units	e – Concentration Units enumerator. units – Units name string.

Example
PU<cr> PU 0-mbar<cr><lf> PU 1<cr> PU 1-inHg<cr><lf>

TU - Temperature Units

Command	Description
TU	Request the Temperature Units.
TU e	Set the Temperature Units. e – Temperature Units 0-C,1-F.

Response	Description
TU e-U	e – Temperature Unit enumerator. u – Unit description

Example
TU<cr> TU 0-CIN<cr><lf> TU 1<cr> TU 1-F<cr><lf>

RQ – Request Last Record

Command	Description
RQ	Request the instantaneous measurement record.

Response:
Field 1 Ambient Temperature (AT). Field 2 Relative Humidity (RH). Field 3 Barometric Pressure (BP). Field 4 Status

Example:
RQ<cr> +29.9,034.4,0969.1,00,*01085

RV - Report Model, Firmware, Revision

Command	Description
RV	Request the model number, firmware part number, and revision string. Instruments with more than one processor or programmable devices will include more than one part number and revision on the next subsequent lines.

Response	Description
m, p, r	m – Device model name. p – Firmware part number. r – Firmware revision.

Example
RV<cr> 597A, 10893, R1.0.0<cr><lf>

QH – Display Record Header

Command	Description

QH	Report data record header.

Response
`AT(C),RH(%),BP(mbar),Status`