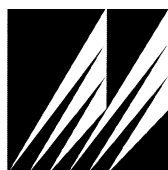




MODEL 597A
Temperature / Relative Humidity /
Barometric Pressure Sensor

Operation Manual
Document No. 597A-9800 Rev A



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

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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.

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1. Introduction

The Model 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 established 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. The Model 597A is supplied with output terminals that digital output signals in several formats.

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 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 597A ships from Met One Instruments pre-wired for digital output signals including RS-232, RS-485 and SDI-12. The 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 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 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 597A are protected from static-surge damage by transzorb and current-limiting resistors.



5. Installation

5.1. Mounting

The 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 597A is ordered with a 10547 analog output cable assembly, or 10548 digital output cable assembly (sold separately). Individual wire leads connect the 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.

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-232C, SDI-12, 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 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 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 597A will report data at a rate set using the “OI” user command (see Section 12 for command details), and is typically set to one second. An example output string is shown below.

+023.61,022.1,0974.31,U0,*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).

SDI-12 Interface

In addition to the above communications methods, the sensor can be polled for data by an SDI-12 Master Station. This operates completely independent of the RS232 or RS485 communications and can be used in conjunction with those methods. Data are polled using a series of SDI-12 commands. Please see appendix E for a list of supported SDI commands. The default SDI Address for the 597A is zero.

Please consult your data-logger manual for more information on SDI interfaces or call Met One for additional help.

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

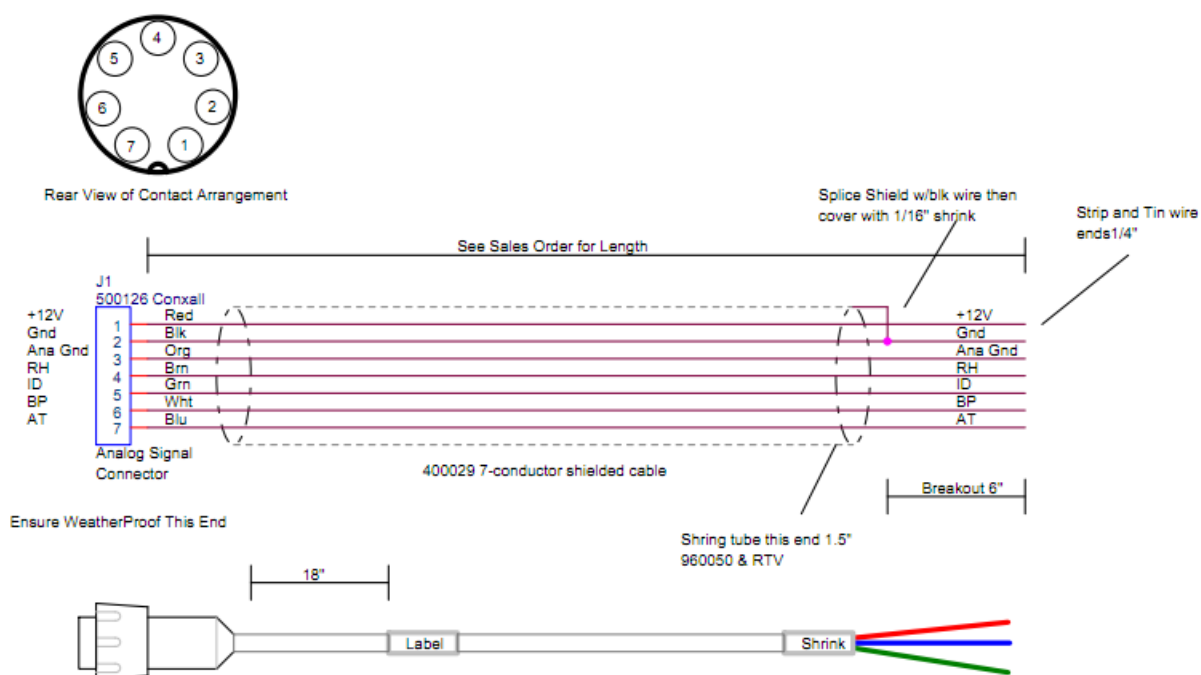
The 597A is not field repairable and should be returned to the factory for service.

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

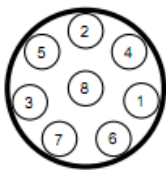
Wiring Instructions (PN 10547; Analog Output)

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

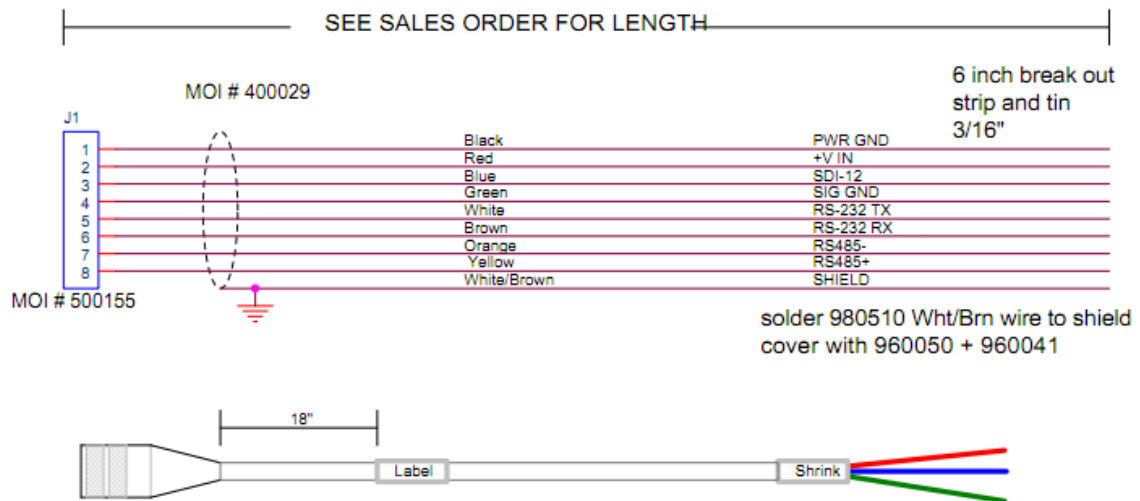


Wiring Instructions (PN 10548; Digital Output)

PIN NO	WIRE COLOR	WIRE LABEL	DESCRIPTION
1	Black	PWR GND	Power Ground
2	Red	+ Vin	+9 to +36 VDC
3	Blue	SDI-12	SDI-12 Output
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



12. Terminal Mode and SDI 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
DR    - Display Range Switch Setting for Analog Output
ID    - View / Set Instrument ID
LC    - Display Last Calibration information
OI    - Set Output Interval
PU    - Set Pressure Units
TU    - Set Temperature Units
SA    - SDI Address
ST    - Set Serial Trigger Address
RV    - Display Firmware Version Number
QH    - Display Record Header

Q      - Quit command mode and save any changes
```

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

See the section below for SDI-12 commands.

DR – Display Range Switch Setting

Display the range switch settings for PB and analog output voltage

COMMAND	RESULT
DR<cr>	500 to 1100 mbar (Range 16) = 0 – 2.5 Volt on Analog Output

ID – Read or Set the Instrument ID

Read or Set the instrument ID

COMMAND	RESULT
ID<cr>	Instrument ID = nn (where n = id number from 1 to 99)
IDnn<cr>	Instrument ID is set to nn (where nn = 1 to 99, Default = 1)

LC – Read the last calibration information.

Read the serial number, last calibration date, and correction factor

COMMAND	RESULT
LC<cr>	Annnnnn-nnnnnn 10/15/12 0.00 (where n = serial number)

OI - Output Interval

Read or Set the Output Interval for this serial port

Note: This command is not supported by SDI-12.

COMMAND	RESULT
OI<cr>	Report Output Interval setting
OI<cr>	Sensor Output every 1 second (Default)
OI2<cr>	Sensor Output every 2 seconds
OI3<cr>	Sensor Output every 5 seconds
OI4<cr>	Sensor Output every 15 seconds
OI5<cr>	Sensor Output every 30 seconds
OI6<cr>	Sensor Output every 60 seconds

PU - Pressure Units

Read or Set this serial port's output units for Pressure

COMMAND	RESULT
PU<cr>	Report Units setting
PU0<cr>	Millibars (mbar Default)
PU1<cr>	Inches of Mercury (inHg)
PU2<cr>	Millimeters of Mercury (mmhg)

TU - Temperature Units

Read or Set this serial port's output units for Temperature

COMMAND	RESULT
TU<cr>	Report Units setting
TU0<cr>	Celsius (Default)
TU1<cr>	Fahrenheit

SA – SDI12 Address

Read or Set the SDI12 Address

COMMAND	RESULT
SA<cr>	SA = 0 (Default = 0)
SAn<cr>	SDI12 address is set to 'n' where 'n' is in the range [0-9] [A-Z] or [a-z] Case Sensitive

ST - Serial Trigger

Read or Set the Serial Trigger character string (Poll command)

COMMAND	RESULT
ST<cr>	Report Serial Trigger string setting (serial output provides help)
ST XXXXXX<cr>	Set Serial Trigger (Default = 1)

RV - Software Version Number

Report the current firmware version number

COMMAND	RESULT
RV<cr>	Current firmware version

QH – Display Record Header

Report the format of the record output for the current engineering unit settings.

COMMAND	RESULT
QH<cr>	AT(C),RH(%),BP(mbar),ST (ST = 597A status)

SDI-12 Commands

NAME	SDI-12 COMMAND	SENSOR RESPONSE
Address Query	?!	<i>a</i> <CR><LF> Where <i>a</i> = address
Acknowledge Active	<i>a</i> !	<i>a</i> <CR><LF> Where <i>a</i> = address
Send Identification	<i>a</i> !	<i>a</i> 13METONE 597A 0.1 0Axxxxx<CR><LF> Where <i>a</i> =address and xxxxx = S/N
Change Address	<i>aAb</i> !	<i>b</i> <CR><LF> Where <i>b</i> = new address
Start Measurement	<i>a</i> MC!	<i>a</i> 0003<CR><LF> Where <i>a</i> = address
Send Data	<i>a</i> D0!	<i>a</i> + <i>bbb.bb</i> + <i>ccc.c</i> + <i>ddd.dd</i> <CR><LF> Where <i>a</i> = address, <i>bbb.bb</i> = temperature, <i>ccc.c</i> = relative humidity and Send Data <i>dddd.dd</i> = barometric pressure
Start Concurrent Measurement	<i>a</i> C!	<i>a</i> 00003<CR><LF> Where <i>a</i> = address
Start Concurrent Measurement with CRC	<i>a</i> CC!	<i>a</i> 00003<CR><LF> Where <i>a</i> = address
Continuous Measurements	<i>a</i> R0!	<i>a</i> + <i>bbb.bb</i> + <i>ccc.c</i> + <i>ddd.dd</i> <CR><LF> Where <i>a</i> = address, <i>bbb.bb</i> = temperature, <i>ccc.c</i> = relative humidity and Send Data <i>dddd.dd</i> = barometric pressure
Continuous Measurements with CRC	<i>a</i> RC0!	<i>a</i> + <i>bbb.b</i> + <i>ccc.c</i> + <i>ddd.d</i> <CR><LF> Where <i>a</i> = address, <i>bbb.b</i> = temperature, <i>ccc.c</i> = relative humidity and Send Data <i>dddd.d</i> = barometric pressure, and {crc} = CRC
Report Temperature Units	<i>a</i> XTU!	<i>a</i> XTU <i>d</i> <CR><LF> Where <i>a</i> = address, and <i>d</i> = 0 for Celsius (default), or 1 for Fahrenheit
Set Temperature Units	<i>a</i> XTU <i>d</i> !	



NAME	SDI-12 COMMAND	SENSOR RESPONSE
Report Pressure Units	$aXPU!$	$aXPUf<CR><LF>$ Where a = address, and $f = 0$ for Millibars (default), or 1 for Inches of Mercury
Set Pressure Units	$aXPUf!$	
Report Version Number	$aXRV!$	$aXVNxx.x<CR><LF>$ Where a = address and $xx.x$ = firmware version