MSO
MET STATION ONE
OPERATION MANUAL

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Met Station One Operation Manual

Technical Support

Should you require support, please consult your printed documentation or our website www.metone.com to resolve your problem. If you are still experiencing difficulty, you may contact a Technical Service representative during normal business hours;

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1. Measurements

1.1. Wind Speed and Wind Direction

The Met Station One (MSO) uses a three cup anemometer and lightweight vane tail to accurately measure the speed and direction of the wind. The rotation of the cups and vane are converted to electrical signals which are directly proportional to Wind Speed and Direction. The basic operation is based on the proven 014/024 Wind Sensors.

- Wind Speed Range 0 – 50 m/sec
- Wind Speed Resolution 0.1 m/sec
- Wind Speed Accuracy ± 2%
- Wind Direction Range 0 – 360°
- Wind Direction Resolution 1°
- Wind Direction Accuracy ± 5°
- Threshold, both Speed & Direction 1 m/sec

1.2. Temperature and Humidity

The Platinum Temperature and Capacitive Humidity sensors are built into the temperature shield at the bottom of the sensor. The integral shield limits errors due to solar radiation. The sensing elements are enclosed in an IP65 protective membrane.

- Temperature Range -40°C to +60°C
- Temperature Resolution 0.1°C
- Temperature Accuracy ± 0.4°C
- Relative Humidity Range 0-100%
- Relative Humidity Resolution 1%
- Relative Humidity Accuracy ± 4%

1.3. Barometric Pressure

A solid state pressure sensor provides an accurate measurement of barometric pressure changes over a wide range. Electronic temperature compensation is included for highest accuracy over the operating temperature of the sensor.

- Measurement Range 500 – 1100 mbars
- Measurement Resolution 0.1 mbar
- Measurement Accuracy ± 2 mbars

1.4. External Rain Gauge Input

A contact closure rain gauge such as the Met One 360 or 370 can be connected to the MSO; the measurement is then integrated into the MSO serial data.

- Rain Gauge Resolution 0.25mm or 0.01 in of rain per tip

2. INSTALLATION (See FIGURE 2-1)

NOTE: Save all sensor packaging. Use during shipment for recommended factory servicing.

FIGURE 2-1

2.1. SENSOR INSTALLATION ON HORIZONTAL BOOM/ARM

a) Horizontal mounting arm must be level, and aligned East/West so the sensor can be correctly aligned to North/South.

b) Install u-bolts into sensor mounting plate vertically (see Figure 2-1).

c) Install sensor on mounting arm. Tighten u-bolt nuts, making sure sensor is level.

d) With shoulder alignment screw installed in sensor wind vane, use a transit or compass to ensure sensor is aligned to True North/South. Correct for magnetic declination.

e) Remove and retain the shoulder screw from the vane hub. Check to see that the vane assembly rotates freely.

f) Route the sensor cable to the data recording device. Secure the cable with cable ties or tape. The cable assembly contains 6 wires. Typical wiring is shown in Section 2.4.

2.2. SENSOR INSTALLATION ON VERTICAL MAST (picture)

a) Ensure vertical mast is vertically level.

b) Install u-bolts into sensor mounting plate horizontally (see fig 2-2)

c) Install sensor on mounting mast. Tighten u-bolt nuts, making sure sensor is level.

d) With shoulder alignment screw installed in vane hub, use a transit or compass to ensure sensor and vane is aligned to North/South. Correct for magnetic declination.

e) Remove and retain the shoulder screw from the vane hub. Check to see that the vane assembly rotates freely.

f) Route the sensor cable to the data recording device. Secure the cable with cable ties or tape. The cable assembly contains 6 wires. Typical wiring is shown in Section 2.4.

2.3. LIGHTNING AND TRANSIENT PROTECTION

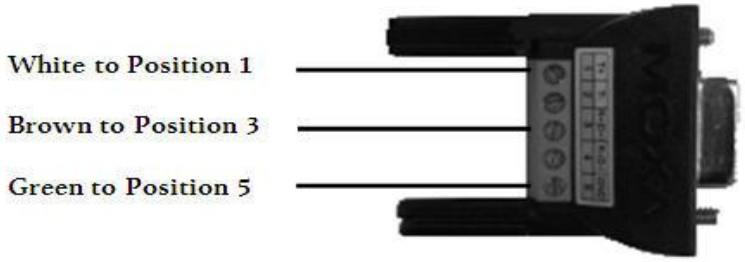
Weather sensors are sensitive to direct or nearby lightning strikes. A well-grounded metal rod or frame should be placed above the sensor installation. In addition, the shield on the signal cable leading to the recording electronics must be connected to a good earth ground at the recorder end. The cable route should not be vulnerable to lightning.

2.4. WIRING

RED	+8 TO +36 VOLTS DC, 10mA @ 12V typical
BLK	POWER COMMON
WHT	RS-232 TX (MSO-232) OR RS-485 + (MSO-485)
BRN	RS-232 RX (MSO-232) OR RS-485 – (MSO-485)
GRN	SIGNAL COMMON
BLU	SDI-12
ORN	EXTERNAL RAIN GAUGE INPUT
WHT/BRN	SHIELD (must be grounded for transient protection to function)

2.4.1. DB-9 Serial Adaptor Connections

- The included DB-9 adaptor can be used to connect the RS-232 or RS-485 signal to a compatible computer or logger.



3. Simple Serial Connections

The Met Station One platform provides several serial output formats for ease of data recovery:

3.1. MSO-232 provides RS-232 and SDI-12 outputs.

3.1.1. RS-232 Format

- Serial configuration is: 9600,8,N,1, with no flow control
- Default data output is 1 / second

3.1.2. SDI-12 Format

- Data is provided only when requested
- Default sensor address is ‘0’
- Conforms to SDI-12 V1.3

3.2. MSO-485 provides RS-485 and SDI-12 outputs.

3.2.1. RS-485 Format

- Serial configuration is: 9600,8,N,1, with no flow control
- Data is provided only when requested
- Default sensor address is ‘1’

3.2.2. SDI-12 Format

- Data is provided only when requested
- Default sensor address is ‘0’
- Conforms to SDI-12 V1.3

3.3. Output String Format:

SSS.S,DDD,+TTT.T,HHH,PPPP.P,RRR.RR,XXXX,VV.V,M0,*CCCCC<CR><LF>

- SSS.S = Wind Speed
- DDD = Wind Direction
- +TTT.T = Temperature
- HHH = Relative Humidity
- PPPP.P = Barometric Pressure
- RRR.RR = Rain Input
- XXXX = (Future Optional Field)
- VV.V = Battery Voltage
- M0 = Configuration & Status Bytes
- *CCCCC = Message Checksum

4. OPERATIONAL CHECK-OUT AND CALIBATION

4.1. Wind Speed and Direction Sensor Check-Out

A. Rotating the vane in a clockwise direction as viewed from above will increase the output up to the 360 Degree point and it will start over at 0 Degree.

B. Spinning the anemometer cup assembly will produce a wind speed reading. Spin slowly and monitor output signal. A wind speed calibrator may be used to check operation at different RPM points. The vane and counter weight must both removed for connection to the calibrator motor drive.

C. The 034B wind sensor should be inspected periodically for physical damage to the vane assembly and cable connections. Inspect all vane assembly parts for security and damage. Inspect the cup assembly for loose cup arms or other damage. The cup assembly cannot change calibration unless a mechanical part has loosened or has been bent or broken.

5. MAINTENANCE AND TROUBLESHOOTING

5.1. General Maintenance Schedule

6-12 month intervals:

A. Inspect the sensor for proper operation per Section 3.0

B. Replacement of Wind Speed Sensor bearing in extremely adverse environments.

12-24 month intervals:

A. Replacement of Wind Speed Sensor bearings.

24-36 month intervals:

A. Recommended complete factory overhaul of sensor.

*Schedule is based on average to adverse environments.

TABLE 4.1

TROUBLESHOOTING TABLE

Symptom	Possible Cause	Remedy
No WS Sensor output	Faulty bearings	Replace bearings
No WD Sensor output	Faulty pot assy.	Replace pot assy.
No WS Sensor output	Faulty reed switch	Replace reed switch
No Temp or RH output	Faulty T/RH sensor	Replace T/RH sensor
No BP output	Faulty circuit board	Replace MSO circuit board

6. SERIAL 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

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H,h,? - This Help Menu
DC  - Calibrate Direction Sensor
ID  - View / Set Instrument ID
OI  - Set Output Interval
PU  - Set Pressure Units
SA  - SDI Address
ST  - Set Serial Trigger Address
SU  - Set Speed Units
TU  - Set Temperature Units
RV  - Display Firmware Version Number
RU  - Rain Units
ME  - Metric or English Units
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.

DC – Calibrate Direction Sensor

Calibrate the Wind Direction

COMMAND	RESULT
DC<cr>	Displays Options: DC - Calibrate Direction Sensor DC<cr> Report Direction Offset DC1<cr> Set Direction Offset
DC1<cr>	Set the Wind Direction Offset by positioning the Wind Vane: Move direction sensor to the 180 degree point. Are you sure you want to continue? : Y

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)

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)

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)

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)

SU - Speed Units

Read or Set this serial port's output units for Wind Speed

COMMAND	RESULT
SU<cr>	Report Units setting
SU0<cr>	Speed Units m/s
SU1<cr>	Speed Units mph

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

RV - Software Version Number

Report the current firmware version number

COMMAND	RESULT
RV<cr>	Current firmware version

RU - Rain Units

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

COMMAND	RESULT
RU<cr>	Report Units setting
RU0<cr>	Units mm (Default)
RU1<cr>	Units in (inch)

ME – Force Metric or English Units

Force Engineering Units as Metric or English

COMMAND	RESULT
ME<cr>	Report Units setting
ME0<cr>	All Units Metric (Default)
ME1<cr>	All Units English

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 = MSO status)

SDI-12 Commands

NAME	SDI-12 COMMAND	SENSOR RESPONSE
Address Query	?!	*a*<CR><LF> Where *a* = address
Acknowledge Active	*a*!	*a*<CR><LF> Where *a* = address
Send Identification	*a*I!	*a*13Met One 10463-1.0 0A*xxxxx*<CR><LF> Where *a*=address and *xxxxx* = S/N
Change Address	*a*A*b*!	*b*<CR><LF> Where *b* = new address
Start Measurement	*a*MC!	*a*0008<CR><LF> Where *a* = address
Send Data	*a*D0!	*a+bbb.b+ccc+ddd.d+eee*<CR><LF> Where *a* = address, *bbb.b* = wind speed, c*cc.c* = wind direction, dddd.d = temperature, and *eee* = relative humidity
Send Data	*a*D1!	*a+bbbb.b+ccc.cc+dddd+ee.ee*<CR><LF> Where *a* = address, *bbb.b* = barometric pressure, c*cc.c* = rainfall, dddd.d = spare, and *ee.ee* = battery voltage
Start Concurrent Measurement	*a*C!	*a*00008<CR><LF> Where *a* = address
Start Concurrent Measurement with CRC	*a*CC!	*a*00008<CR><LF> Where *a* = address
Continuous Measurements	*a*R0!	*a+bbb.b+ccc+ddd.d+eee<CR><LF>* *Where a = address, bbb.b = wind speed, ccc.c = wind direction, dddd.d = temperature, and eee = relative humidity*
Continuous Measurements	*a*R1!	*a+bbbb.b+ccc.cc+dddd+ee.ee<CR><LF>* *Where a = address, bbb.b = barometric pressure, ccc.c = rainfall, dddd.d = spare, and ee.ee = battery voltage*

NAME	SDI-12 COMMAND	SENSOR RESPONSE
Continuous Measurements with CRC	*a*RC0!	*a+bbb.b+ccc+ddd.d+eee{crc}<CR><LF> Where a = address, bbb.b = wind speed, ccc.c = wind direction, dddd.d = temperature, eee = relative humidity,* and {crc} = CRC
Continuous Measurements with CRC	*a*RC1!	*a+bbbb.b+ccc.cc+dddd+ee.ee{crc}<CR><LF > Where a = address, bbb.b = barometric pressure, ccc.c = rainfall, dddd.d = spare, ee.ee = battery voltage,* and {crc} = CRC
Report Temperature Units	*a*XTU!	*a*XTU*d*<CR><LF> Where *a* = address, and *d* = 0 for Celsius (default), or 1 for Fahrenheit
Set Temperature Units	*a*XTU*d*!	
Report Pressure Units	*a*XPU!	*a*XPU*f*<CR><LF> Where *a* = address, and *f* = 0 for Millibars (default), or 1 for Inches of Mercury, or 2 for mmHg
Set Pressure Units	*a*XPU*f*!	
Report Version Number	*a*XRV!	*a*XVN*xx.x*<CR><LF> Where *a* = address and *xx.x* = firmware version
Report Rain Units	*a*XRU!	*a*XRU*f*<CR><LF> Where *a* = address, and *f* = 0 for mm (default), or 1 for Inches
Set Rain Units		
Report Wind Speed Units	*aXSU!*	*aXSUd<CR><LF>* *Where a = address, and* *d = 0 for Mps (default), or* *1 for Mph*
Set Wind Speed Units	*aXSUd!*	