

# **TACMET II, RLST OPERATION MANUAL P/N 102352**



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## Technical Support

Should you require support, please consult your printed documentation or our website [www.metone.com](http://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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## **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 are reviewed regularly and any necessary corrections are 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.

## **Electrical & Safety Conformity**

The manufacturer certifies that this product operates in compliance with the following standards and regulations:

FDA/CDRH This product is tested and complies with 21 CFR, Subchapter J, of the Health and Safety Act of 1968

US 21 CFR 1040.10

## **Warranty**

All instruments are warranted against defects in parts or workmanship for a period of one (1) year from the date of shipment. Should any instrument or part prove to be defective within the warranty period, upon written notice and return of the unit (freight prepaid), Met One Instruments, Inc. will, at its option, repair or replace the defective unit, and return it, transportation prepaid via surface transportation.

Equipment abused, modified, or altered may cause cancellation of this warranty.

The above warranty applies only to items manufactured by Met One Instruments, Inc. Items not manufactured by Met One Instruments, Inc. are warranted only to the extent and in the manner warranted by the manufacturer of such items. Should emergency warranty repair be required at a customer's facility, Met One will provide such repairs and charge only the portal-to-portal Field Service rates and actual expenses in accordance with our published rates then in effect. Expendable supplies and wear items, such as bearings and lightning-related damages, are not covered under this warranty.

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## 1.0 Safety

### 1.1 Safety

This manual may include a **CAUTION** and a **WARNING** indication. Familiarize yourself with the following definitions for the meanings of these indicators.

A **CAUTION** indicates a hazard and calls attention to a procedure that if not correctly followed could result in damage to the instrument. Do not proceed beyond a caution indicator without understanding the hazard.

A **WARNING** indicates a hazard to you and calls attention to a procedure that if not correctly followed could result in injury or even death. Do not proceed beyond a warning without understanding the hazard.

## 2.0 Introduction & Overview – TACMET II, RLST Weather Station

### 2.1 Overview

Met One's TACMET II, RLST Weather system (P/N 102352) is rugged, stand alone weather station to provide accurate measurements of wind speed, wind direction, temperature, relative humidity, and barometric pressure. An internal flux-gate compass automatically orients the wind direction to magnetic north. The TACMET II, RLST has no moving parts and is ideally suited for use wherever rugged, reliable, maintenance free operation over a wide operating range under adverse operating conditions is required. The TACMET II, RLST is painted CARC Green 383 per military specifications.

### 2.2 Specifications

#### **PERFORMANCE**

##### Wind Speed:

Range: 0-65 m/s (0-145 mph)  
Accuracy \*:  $\pm 0.5$  m/s (1.1 mph) or 5%  
Resolution: 0.1

##### Wind Direction:

Range: 0-360°  
Accuracy \*:  $\pm 3^\circ$  @ wind speeds > 2.2 m/s (5 mph)  
Resolution: .01

##### Optional Compass:

Accuracy:  $\pm 2^\circ$

##### Temperature:

Range: -40° to +60°C (-40° to 140°F)  
Accuracy:  $\pm 2.0^\circ\text{C}$  ( $\pm 3.6^\circ\text{F}$ ) @ WS > 2.0 m/s (4.5 mph)  
Resolution: 0.1

##### Relative Humidity:

Range: 0 to 100%  
Accuracy:  $\pm 3\%$   
Resolution: 0.1

##### Pressure:

Range: 500-1200 hPa (14.76-35.44 InHg)  
Accuracy:  $\pm 0.4$  hPa  
Resolution: 0.1 hPa (.01 InHg)

#### **ELECTRICAL**

Measurement Format: Two orthogonal axes, North-South and East-West

Measurement Rate: Approx. 2 Hz each axis

Operating Frequency: 40 kHz

Signal Output: RS-232C @19200 BPS, N/8/1

Power Requirements: 9.0 – 36.0 Vdc, <50 mA @ 12 Vdc

#### **PHYSICAL**

Size: 311 mm (12.25 inches) X 101.6 mm (4 inches) dia.

Weight: 2.5 kg (5.5 lbs)

Mounting: P/N 102287 RLST mount, MS3102R18-1P connector, or P/N 102621 Quick Mount, sensor mount to  $\frac{3}{4}$  inch IPS vertical pipe stub

*\* This accuracy is maintained when the sensor is within  $\pm 10$  degrees of vertical.*

### 3.0 Installation

Be sure to mount the sensor in a clear, open area to minimize any turbulent effects caused by local obstructions (e.g., trees, buildings, etc.). The sensor mounts on the prewired sensor mount, P/N 102287. The connector key is matched to the keyway on its mate and secured by turning the connector's collar until tight.

If using the 102621 Quick Mount, attach the sensor to the mount by inserting the sensor into the top of the mount, attaching the latch springs to the clips on the bottom of the sensor and snapping them down to lock the sensor in place. It may be necessary to rotate the sensor 180° to allow the keyway to seat properly.

On the 102621 mount, loosen the thumb screws in the bottom of the mount that attach it to your vertical 3/4 inch pipe, rotate the sensor to North, then retighten the thumb screws. The connector keyways assure correct alignment if the sensor is removed and re-installed at any time.

Please refer to Figures 1 and 2 for reference.

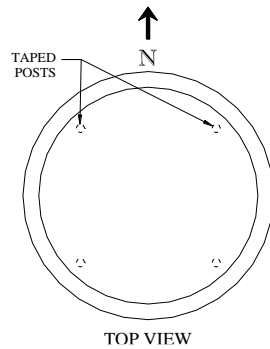


Figure 1

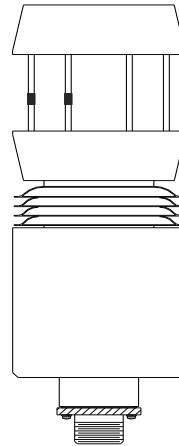


Figure 2

### 4.0 Input/Output Connections

The sensors' pin designations are as follows:

<u>PIN</u>	<u>FUNCTION</u>
A	Power Ground
B	9.0 – 36.0 Vdc
C	N/C
D	N/C
E	N/C
F	N/C
G	Receive Data RS-232C
H	Transmit Data RS-232C
I	N/C
J	N/C



## 5.0 User Interface

The output of the TACMET II, RLST is a serial data stream at 19.2k baud (N/8/1). An example of the output format is shown below:

```
01+D008. 02+006.8 03+063.2 04+075.2 05+015.1 06+30.26
```

The first parameter is the ID number of the sensor (D008), the second parameter is the wind speed (in mph), the third parameter is the wind direction(in °), the fourth parameter is the temperature (in °F), the fifth parameter is the relative humidity (in %) and the sixth parameter is the barometric pressure (in Hg). All parameters have fixed decimal points with leading zeroes.

**Note:** *With the flux gate compass in the sensor package, the wind direction output is oriented relative to magnetic north.*

## 6.0 Calibration

The sensor requires a wind tunnel for calibration. Recommended calibration is once every two years. Please contact Service for pricing.

## 7.0 Maintenance

Because the sensor has no moving parts to wear out, the sensor does not require periodic maintenance. In extremely corrosive environments, the condition of the connector used to mount the sensor should be checked. In harsh environments, the transducer screens should be checked for dust/sand buildup. To clean the transducer screens, hold the unit upright and brush the transducer screens with an acid brush. There are no adjustments or user repairable parts located inside the sensor.

## Appendix A Terminal Mode Commands

Terminal mode is activated by entering three carriage return characters within a 2 second period. Terminal mode times-out after 2 minutes of inactivity.

Successful entry into Terminal Mode will return the prompt:

**Command (HE for Help, QU to Quit):**

### HE - Display Help Menu

<b>HE</b>	<p>Display the Help menu Command: HE&lt;cr&gt;</p> <p>HE - This Help Menu            BV - Battery Voltage Printout Toggle On/Off            CV - Compass Heading Printout Toggle On/Off            MD - Set Magnetic Declination            OI - Set Output Interval            PU - Set Pressure Units            QU - Quit command mode and save any changes            SB - Set Baud rate            SP - Sign-on Prompt Toggle On/Off            ST - Set Serial Trigger Address            SU - Set Speed Units            TU - Set Temperature Units            VN - Display Firmware Version Number</p>
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### SU - Wind Speed Units

Read or Set output Units for Wind Speed.

COMMAND	RESULT
SU<cr>	Report Units setting
SU0<cr>	M/S
SU1<cr>	MPH
SU2<cr>	Knots
SU3<cr>	KPH

### TU - Temperature Units

Read or Set output Units for Temperature.

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

### PU - Pressure Units

Read or Set output Units for Pressure

COMMAND	RESULT
PU<cr>	Report Units setting
PU0<cr>	Millibars (Default)
PU1<cr>	Inches of Mercury

### SB - Serial Baud Rate

Read or Set Baud Rate

Note: This command is not supported by Tracker Output.

Tracker output is fixed at 9600 Baud.

COMMAND	RESULT
SB<cr>	Report Baud Rate setting
SB1<cr>	1200 baud
SB2<cr>	2400 baud
SB3<cr>	4800 baud
SB4<cr>	9600 baud
SB5<cr>	19200 baud

Baud rate changes take effect after cycling power to the sensor.

### BV - Toggle Battery Voltage Printout in data string

Read or Set the Battery Voltage output option

COMMAND	RESULT
BV<cr>	Report option setting
BV0<cr>	Battery Voltage printout Disabled (Default)
BV1<cr>	Battery Voltage printout Enabled

### CV - Toggle Compass Heading Printout in data string

Read or Set the Compass Heading output option

COMMAND	RESULT
CV<cr>	Report option setting
CV0<cr>	Compass Heading printout Disabled (Default)
CV1<cr>	Compass Heading printout Enabled

### MD - Magnetic Declination

Read or Set the Magnetic Declination

COMMAND	RESULT
MD<cr>	Report Magnetic Declination setting
MDXX.X<cr>	Set Declination to XX.X Degrees

Note: West declination values are entered and reported as negative values.

### ST - Serial Trigger

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

Note: ST must be immediately followed by serial trigger. Do not add a space between command and trigger.

COMMAND	RESULT
ST<cr>	Report Serial Trigger string setting
STXXXXXX<cr>	Set Serial Trigger

### VN - Software Version Number

Report the current Software Version Number

COMMAND	RESULT
VN<cr>	Report current Software Version

### OI - Output Interval

Read or Set the Output Interval

Note: This command is not supported by CAMEO/ALOHA or Tracker Output.

COMMAND	RESULT
OI<cr>	Report Output Interval setting
OI1<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

### SP - Sign-On Prompt

Read or Set the Sign-On Prompt output option at power-up

COMMAND	RESULT
SP<cr>	Report option setting
SP0<cr>	Sign-On Prompt Disabled (Default)
SP1<cr>	Sign-On Prompt Enabled

### QU - Quit

**Exit the command mode and query to save any changes.**

Command (HE for Help, QU to Quit): QU<cr>

To save changes type 'Y' : N<cr>

No changes were made

Restarting

## **Appendix B**

### **Theory of Operation**

#### **Winds**

Met One's sonic anemometer operates on the principal that the speed of the wind affects the time it takes for sound to travel from one point to a second point. If the sound is traveling in the direction of the wind then the transit time is decreased. If the sound is traveling in a direction opposite the wind then the transit time is increased. This principal is well known and is the basis of most sonic anemometers.

#### **Temperature/Humidity**

The temperature sensor in the P/N 102352 TACMET II uses a precision single-element thermistor. This provides a highly accurate and stable temperature reading. The resistance value is 10K ohms at 25°C. The TACMET II interfaces directly with the temperature sensor without additional electronics; sensor compensation is handled through software.

The relative humidity sensor is a capacitive element sensor. It has a linear voltage output, which is connected directly to the TACMET II microprocessor. The humidity sensor element's construction provides excellent resistance to wetting, dust, dirt, oils, and common environmental chemicals. A heavy contaminant layer of dirt will slow down the sensor's response time because it will take longer for water vapor to equilibrate in the sensor.

#### **Barometric Pressure**

The P/N 102555 barometer uses proven silicon sensor technology with microprocessor-based signal compensation, eliminating the need to insulate or temperature-regulate the barometer. The P/N 102555 has a pressure range of 500 to 1200 hPa. The P/N 102555 has a TTL output that lowers the power consumption of the barometer to 33 mW. The accuracy of the sensor is  $\pm 0.4$  hPa (0.01 inHg).

#### **Fluxgate Compass**

The internal fluxgate compass is low power and compact, and is a complete compass or magnetic sensor module that integrates easily into the TACMET II. The internal fluxgate compass uses two magneto-inductive sensors, which change inductance with different applied magnetic field strengths, to sense magnetic fields.

The TACMET II microprocessor measures the output of the internal fluxgate compass and then corrects the wind direction data for the orientation of the sensor. The output of the TACMET II wind direction is relative to magnetic North when a compass module has been specified.