



**Temperature Sensor TMP04
Guide for TT87XX-Series**

**SkyPatrol Temperature Sensor Guide for
TT87XX-Series Devices**

Revision 1.1

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1 General Description

The TMP04 is a digital temperature meter with serial output, for the terrestrial transport industries.

This high-tech device is designed to accept two sensors. It is easy to install and maintenance-free.

The TMP04 is made out of strong flame retardant ABS plastic.

The TMP04 is based in high performance microcontroller for robustness, high accuracy and linearity as well as long term stability.

The low power, high voltage range electronics of the TMP04 is optimized for use in automotive applications.

The flash memory microcontroller used in the TMP04, allows user to configure the report parameters and to do in field firmware upgrades.

2 Key Features

Temperature range:	-22 to +212 °F (-30 to +100 °C)
Accuracy:	±2.7 °F (±1.5 °C)
Probes:	Two semiconductor sensors
Supply voltage:	8 to 32 VDC
Low power:	15 mA
Serial output:	9600,8,n,1
Output format:	°F or °C user selectable
Small size:	2" x 2" x 0.75"

- Probes included
- RS-232 interface
- Fully calibrated
- New added in field recalibration
- Easy to install
- Fully compatible with SkyPatrol units

3 Installation

Select a suitable installation position for the TMP04 temperature meter near the GPS unit and locate the probes inside the controlled area.

Connect the TMP04 wires to the GSP unit as follows:

TMP04		GPS
Signal	Wire Color	Signal
Main Power	Red	Main Power
Ground	Black	Ground
TX	Yellow	RX
RX	Brown	TX

4 Message Format

The message sent from the sensor has the following format:

<header><sensor1 value>,<status1>,<sensor2 value>,<status2>,<unit>,<device id><footer>

Where:

<header>	Is a parameter defined by the user
<sensor1 value>	Temperature at sensor 1
<status1>	Normal (0), low (1) or high (2) temperature of sensor 1
<sensor2 value>	Temperature at sensor 2
<status2>	Normal (0), low (1) or high (2) temperature of sensor 2
<unit>	Unit of measure (°F or °C)
<device id>	Is a parameter defined by the user
<footer>	Is a parameter defined by the user

Message example:

AT\$SEND,+034,1,-005,0,C,QSV236-END

<header>	AT\$SEND,
<sensor1 value>	+034
<status1>	2 (High temperature)
<sensor2 value>	-005
<status2>	0 (In range)
<unit>	C
<device id>	QSV236
<footer>	-END

5 Operation

The TMP04 temperature meter can be handled and setup by the followings commands:

5.1 Header

The message header allows to send a control command to the GPS unit like *AT\$MSGSD=2,"* or something similar.

Function	Define the Header of the message
Syntax	AT\$HEADER=<header>
Parameter	<header> is a string with a maximum of 40 characters
Default	Nothing
Response	HeaderOK ERROR,IdFooter

5.2 Footer

To send an end of message command

Function	Define the Footer of the message
Syntax	AT\$FOOTER=<footer>
Parameter	<footer> is a string with a maximum of 20 characters
Default	Nothing
Response	HeaderOK ERROR,IdFooter

5.3 Units

Unit of measure, use **F** for Fahrenheit or **C** for Centigrade, the setting automatically adjust the alarm set points to the corresponding values.

Function	Define the units for the temperature report
Syntax	AT\$UNIT=<unit>
Parameter	<unit> one character, it should be F or C
Default	F
Response	HeaderOK ERROR,IdFooter

5.4 Device Id

To set a unique device identification.

Function	Define the device ID of the temperature meter
Syntax	AT\$ID=<id>
Parameter	<id> is a string with a maximum of 20 characters
Default	TMP04 serial number
Response	HeaderOK ERROR,IdFooter

5.5 Low Temperature Set Point

If the reading of temperature drops below this point, a temperature report message is issued.

Allowed values -022 to +212 °F (-030 to +100 °C).

Function	Define the low temperature alarm report point
Syntax	AT\$SETLO=<sensor>,<sign><value>
Parameter 1	<sensor> 1 or 2
Parameter 2	<sign> + or -
Parameter 3	<value> 3 digits with leading zeros
Default	-020 °F (-029 °C)
Response	HeaderOK ERROR,IdFooter

5.6 High Temperature Set Point

If the sensed temperature rises above this point, a temperature report message is issued.

Allowed values -022 to +212 °F (-030 to +100 °C).

Function	Define the high temperature alarm report point
Syntax	AT\$SETHI=<sensor>,<sign><value>
Parameter 1	<sensor> 1 or 2
Parameter 2	<sign> + or -
Parameter 3	<value> 3 digits with leading zeros
Default	+122 °F (+050 °C)
Response	HeaderOK ERROR,IdFooter

5.7 Periodic Report Time

Sets the time between automatic reports, values allowed 0 (disable) to 250 minutes.

Function	Define the time between periodic reports
Syntax	AT\$TIME=<time>
Parameter	<time> time in minutes, 3 digits with leading zeros
Default	015
Response	HeaderOK ERROR,IdFooter

5.8 Temperature Reading Adjustment

Although the temperature meter is calibrated, sometimes is necessary to make small adjustments to meet the infield conditions.

Function	Adjust the sensor temperature reading
Syntax	AT\$CALIB=<sensor>,<sign><value>
Parameter 1	<sensor> 1 or 2
Parameter 2	<sign> + or -
Parameter 3	<value > actual temperature, 3 digits with leading zeros
Default	Factory calibration
Response	HeaderOK ERROR,IdFooter

5.9 Temperature Reading Reset

Function	To set the adjust point to factory calibration
Syntax	AT\$CALIB=0
Response	HeaderOK ERROR,IdFooter

5.10 Probe Select

Function	To select one or two sensors to report
Syntax	AT\$PROBE=1 2
Response	HeaderOK ERROR,IdFooter

5.11 Query Temperature

Function	To query the current temperature at the sensors
Syntax	AT\$QRYTMP
Response	Message (see message format section)

5.12 Query Set Points

Function	To query the alarm set points
Syntax	AT\$SET?
Response	HeaderSensor1-low,sensor1-high,sensor2-low,

5.13 Query Report Time

Function	To query the periodic report time setting
Syntax	AT\$TIME?
Response	Header,time,IdFooter

5.14 Query Firmware Version

Function	To query the firmware version
Syntax	AT\$VER?
Response	Header,version,IdFooter

5.15 Firmware Upgrade

Used to upgrade the TMP04's firmware by means of software supplied by SkyPatrol. It is not an "over-the-air" command like all others are.

6 Notes

- The time between a command and the response is 2 seconds to allow the GPS unit to process the message.
- The Header, Footer and ID can contain any combination of upper and lower case letters, numbers, symbols and punctuation marks.
- All the commands must be typed in upper case.
- The cable from the TMP04 to the sensors should not exceed 50 meters with AWG 22 wire.