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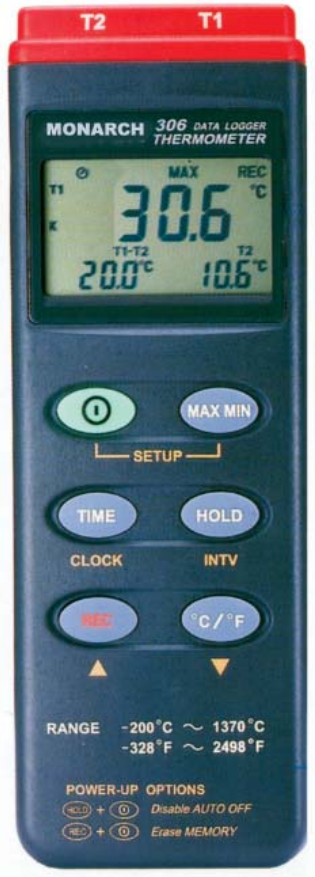
MONARCH INSTRUMENT

Instruction Manual



Monarch 306

Datalogging Dual Channel Thermometer

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Fax: (603) 886-3300
E-mail: support@monarchinstrument.com
Website: www.monarchinstrument.com

Safeguards and Precautions

1. **Read and follow all instructions in this manual carefully, and retain this manual for future reference.**

2. **Do not use this instrument in any manner inconsistent with these operating instructions or under any conditions that exceed the environmental specifications stated.**

3. **Making measurements of high or low temperature can be dangerous. Keep the hand holding the temperature probe well away from the object being measured.**

4. **This instrument is not user serviceable. For technical assistance, contact the sales organization from which you purchased the product or Monarch Instrument directly.**

LIMITED WARRANTY

SELLER warrants hardware products to be free from any defect in materials or workmanship for a period of one (1) year from date of shipment to BUYER. SELLER's entire liability and BUYER's sole and exclusive remedy resulting from any defect in workmanship or material in the hardware product covered by this limited warranty shall be limited to and fully discharged by the SELLER's option of replacement or repair of such item without charge. The limited warranty provided in this clause is in lieu of all other warranties, expressed or implied, arising by law or otherwise. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXCLUDED. This limited warranty shall not be modified except by an arrangement signed by both parties specifically referencing this clause.

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This limited warranty does not extend or apply to consumables (including, but not limited to, lamps and batteries, if applicable) or equipment, instruments or accessories which are warranted separately by the original manufacturer of these items.

DECLARATION OF CONFORMITY

Monarch Instrument
Division of Monarch International Inc.
15 Columbia Drive, Amherst NH 03031 USA

declares that the product:

Name: **Thermometer, Dual Channel, Type K**
Model: **Monarch 306**

to which this declaration relates is in conformity with the following standards:

EMC: **EN55011/1991**
EN50081-1/1992
EN50082-1/1997 / EN61000-4

and therefore conforms in accordance with 89/336/EEC-EMC Directive. The testing of this product was performed by GesTek EMC Lab. in October of 1999. (Ref. No. 99A011E).

21st October 1999
Importer (Amherst, NH)

Alan Woolfson, VP Engineering (Authorized Signature)

Table of Contents

1.0 Introduction:

This instrument is a dual channel, recording digital thermometer for use with any Type K thermocouple as a temperature sensor. Temperature indication complies with the NIST and IEC584 temperature/voltage tables for Type K thermocouples. Its internal memory can store up to 16312 records in any number of recording intervals. It is equipped with a RS232 interface for bi-directional communication with a PC.

2.0 Specifications:

Measurement Range: -200°C - 1370°C -328°F - 2498°F

Accuracy: (At ambient of 23 ± 5°C)

Range	Accuracy
-200°C - 200°C	±(0.2% reading + 1°C)
200°C - 400°C	±(0.5% reading + 1°C)
400°C - 1370°C	±(0.2% reading + 1°C)
-328°F - -200°F	±(0.5% reading + 2°F)
-200°F - 200°F	±(0.2% reading + 2°F)
200°F - 2498°F	±(0.3% reading + 2°F)

Temperature Coefficient:

For ambient temperatures from 0°C - 18°C and 28°C - 50°C, for each °C ambient below 18°C or above 28°C, add the following tolerance into the accuracy spec.
0.01% of reading + 0.03°C
(0.01% of reading + 0.06°F)

⚠ Note:

The basic accuracy specification does not include the error of the probe. Please refer to the probe accuracy specification for additional details.

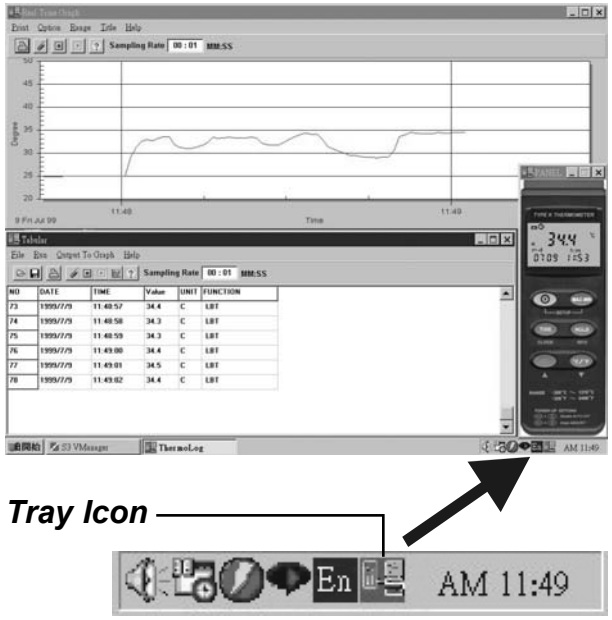
Resolution: -200°C - 200°C: 0.1°C; 200°C -1370°C: 1°C
-200°F - 200°F: 0.1°F; outside this range: 1°F
Number of Sensor Inputs: Two Type K Thermocouples
Input Protection at Thermocouple Input: 60V DC or 24Vrms AC
Display: Three 4 Digit Temperature Displays plus Indicators, see Section 3.0
Switchable backlight
Sample Rate: 1.25 times per second
Time Function: Real time clock, see Section 4.6
Datalogging Capacity: 16,312 records
Recording Interval: User adjustable, see Section 4.7
Digital Output: Bi-directional RS232; Software and Cable included
Power requirement: 9 Volt Battery, NEDA 1604 or JIS 006P or IEC6F22
Battery Life: Approx. 100 hours with alkaline battery; Low battery indication
Operating Conditions:

- Operating Temperature and Humidity: 0°C - 50°C (32°F - 122°F); 0 - 80% RH
- Storage Temperature and Humidity: -10°C - 60°C (14°F - 140°F); 0 - 80% RH
- Altitude: Up to 2000 meters (6500 feet).

Dimensions: 184×64×30 mm (7.3×2.5×1.2 in)
Weight: Approx. 210g (7.4 oz)
Accessories: Two Type K Wire Thermocouple Probes, Battery, Carrying Case, Instruction Manual, Software, RS232 Cable
Option : AC Adapter: 9VDC ±15%; 100mA: Plug Diameter: 3.5mm×1.35mm

MODEL 306 DUAL CHANNEL DATALOGGING THERMOMETER

5. **Exit:**
   Terminates ThermoLog program.
6. **Help:**
   On-line help for ThermoLog.
7. **DataLogger:**
   The DataLogger window controls the loading of recorded data from thermometer.
8. **Tabular:**
   The Tabular window displays the present data from the thermometer in a scrolling table. Data can be stored as a file, or the table can be copied to other software, such as EXCEL, for further analysis.
9. **Tray Icon:**
   When ThermoLog is running, an icon appears in the Windows Tray area (see figure below), to display a pop-up menu.



5.0 Setup ThermoLog (Thermo DataLogger) - RS232 Interface Software:

The ThermoLog package contains:

1. Two 3.5" diskettes
2. Custom designed RS232 cable for ThermoLog

System Requirements:

Windows 95, Windows 98 or Windows NT 4.0

Minimum Hardware Required:

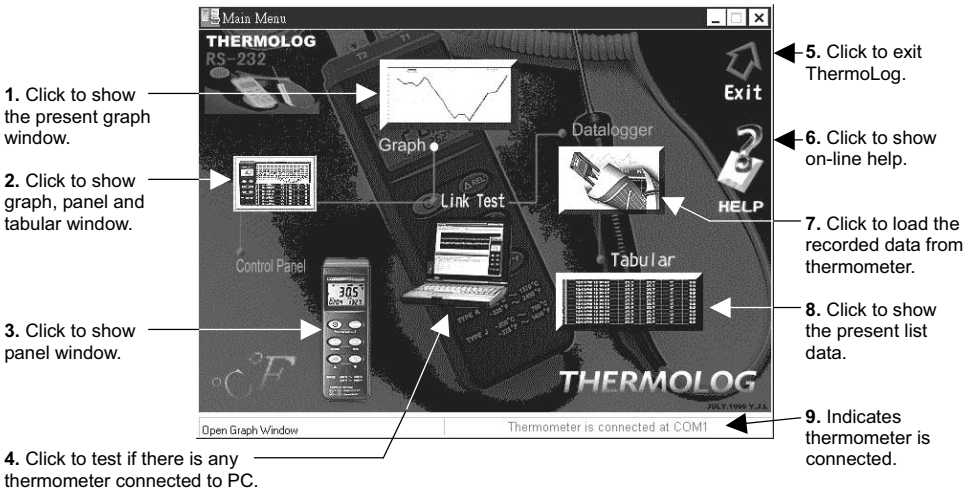
- 486-100 MHz PC, 16 MB RAM
- At least 5 MB hard disk space available to install ThermoLog program
- Recommended display resolution is 800x600.

Install ThermoLog:

1. Close all other applications before installing ThermoLog software.
2. Insert setup diskette 1 in floppy disk drive.
3. Choose the Start button on the Taskbar and select Run.
4. Type a:\setup and choose OK to copy ThermoLog.exe (executable file) and Help file to your hard disk (default is c:\program files\thermolog).

For further operating instructions, please refer to the online help while executing ThermoLog.

6.0 ThermoLog Main Menu



1. **Graph:**
   The Real-Time Graph window displays present data in graphical format.
2. **Universal Display:**
   The Universal Display window displays both graphical and tabular information plus the control panel in one complete presentation.
3. **Control Panel:**
   The Control Panel Window emulates the thermometer panel to control the connected thermometer via the buttons in this window.
4. **Link Test:**
   Open the Link Test window to search for a thermometer connected to the PC. Upon startup of ThermoLog, this window appears while searching for a thermometer. Results are shown in the text box.

3.0 Symbol Definitions and Feature Locations:

: Low battery indication. Battery voltage is not sufficient for proper operation.

: Indicates 'Auto Power Off' is enabled

: Indicates that the display data is being held

MAX : The Maximum value is now being displayed

MIN : The Minimum value is now being displayed

REC : Indicates that the instrument is recording. When flashing, the memory is full.

T1, T2, T1-T2 : Indicates location of thermocouple being displayed and differential display.

– : Negative temperature indication

y : Indicates year is displayed in the main window

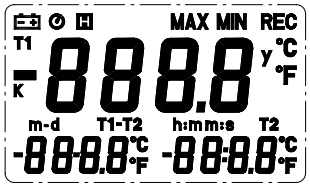
°C°F : Centigrade or Fahrenheit indication

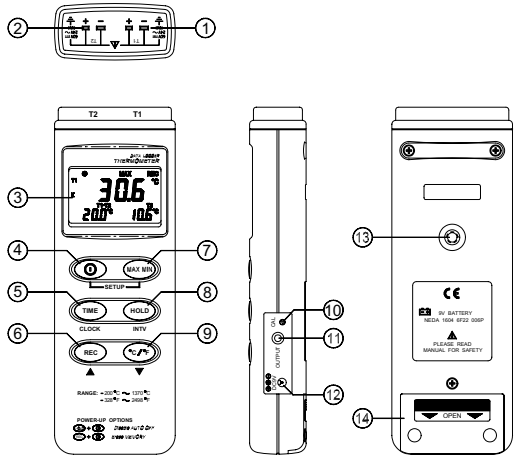
K : Thermocouple type indication

m-d : Indicates the value below is month and day

h:m : Indicates the value below is hour and minute

m:s : Indicates the value below is minute and second





Feature Locations:

1) T1 Type K temperature sensor connector
2) T2 Type K temperature sensor connector
3) LCD display
4) ON/OFF button
5) Time display button
6) Record button
7) MAX MIN function control button
8) HOLD button
9) °C, °F control button
10) Offset calibration screw
11) Digital output connector (RS232)
12) AC power adapter connector
13) Tripod connector
14) Battery cabinet cover

4.0 Operating Instructions:

4.1 Preparation for Measurement

Plug the first thermocouple into the socket marked **T1**, taking care to observe the polarity of the thermocouple pins. If dual sensors are being used, plug the second thermocouple into the socket marked **T2**.

4.2 Power

Press the ⏻ button to turn the thermometer ON or OFF.

When first powered on, the LCD will show how much memory space is available for use.

Example: Display at right indicates 16,000 records of available memory.

4.3 Selecting the Temperature Scale

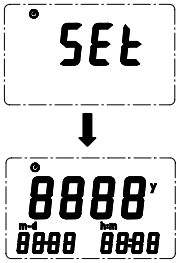
When first turned on, the instrument defaults to reading in Celsius (°C). The instrument toggles between Celsius (°C) and Fahrenheit (°F) each time the **°C/°F** button is pressed. The instrument remembers the scale setting when last turned off and powers on in that setting the next time.

4.4 Data-Hold Function

The present reading is held on the display by pressing the **HOLD** button. Pressing the **HOLD** button again releases the hold function and returns the instrument to continuous reading.

In the **HOLD** mode, the **TIME**, **MAX MIN** and **°C/°F** buttons are disabled, as indicated by two consecutive beeps when pressed.

4.5 Clock Setup



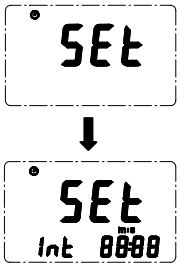
To set the real time clock:

1. Press and hold the **MAX MIN** button and then power on the meter.
2. Press **TIME** (clock).
3. Press **REC** (↑) or **°C/°F** (↓) to increase or decrease the number.
4. Press **TIME** to move to the next item. The adjusting order is: year; month; day; hour; minute.
5. Press **TIME** again after the last setting to complete the process. To abort during a setup process, press the ⏻ button.

4.6 Time Function

Once set up, pressing the **TIME** button displays time as follows: top of the LCD – year; bottom left of the LCD - month and day; bottom right of the LCD - hour and minute. Press the **TIME** button or any other button to exit this mode. This operation will not interrupt the recording and MAX/MIN operation.

4.7 Recording Interval Setup



To set the recording interval:

1. Press and hold the **MAX MIN** button and then power on the meter.
2. Press **HOLD**.
3. Press **REC** (↑) or **°C/°F** (↓) to increase or decrease the number.
4. Press **HOLD** to advance to the next item.
5. Press **HOLD** again after the last setting to complete the process. To abort during a setup process, press the ⏻ button.

4.8 Recording Data

Each momentary press of the **REC** button will alternately start and stop recording. To clear the memory, power off the meter, press and hold the **REC** button followed by the ⏻ button, holding both on simultaneously for at least 2 seconds. Then release both buttons. The display will show "CLR" (as shown to the right) indicating that the memory has been cleared.

4.9 MAX/MIN Operation

Press the **MAX MIN** button to enter the MAX/MIN mode. In this mode, both the maximum and minimum values are simultaneously retained in memory and updated with every new data sample. The instrument first enters the MAX mode, and the **MAX** symbol and value are both displayed. Pressing **MAX MIN** again advances the display to the **MIN** symbol and value. The next press of the **MAX MIN** button will cause both the **MAX** and **MIN** symbols to flash. This indicates that the maximum and minimum values have been updated in memory and the displayed reading is the present temperature. Each successive press of the **MAX MIN** button circulates the display mode among these options. To exit the MAX/MIN mode, press and hold the **MAX MIN** button for two seconds. In the MAX/MIN mode, the **°C/°F** button is disabled, as indicated by two consecutive beeps if pressed.

4.10 Auto Power Off

By default, the instrument powers on in the 'Auto Power Off' mode and will automatically shut off 30 minutes after the last key operation or RS232 communication.

To disable this feature, press and hold the **HOLD** button and then power on the meter. Two successive beeps will indicate that 'Auto Power Off' is disabled, and the ⏻ will not be displayed.

4.11 Low Battery Condition

When the battery voltage is at or below the minimum for proper operation, the 🔋 symbol will show on the LCD indicating that the battery must be replaced.

4.12 Calibration

Calibration is conducted by adjusting the following potentiometers to within the tolerances shown.

(Ambient Temperature: 23 ± 3°C)

Input	Adjust VR	Tolerance
0 °C	VR1	± 0.1 °C
190 °C	VR2	± 0.1 °C
1000 °C	VR3	± 1 °C
1900 °F	VR4	± 1 °F

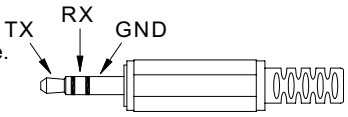
A simple single point calibration may be performed by adjusting VR1 to 0 °C with thermally stabilized ice water.

4.13 Digital Output

The Digital Output is a 9600 bps N 81 serial interface.

RX is a 5V normally high input port.

TX is a 5V normally high output port.



Appendix: Thermocouple Probe Specifications

Model	Range	Tolerances	Description
TP-K01 Wire probe	-50°C to 200°C -58°F to 392°F	±2.2°C or ±0.75% ±3.6°F or ±0.75%	Teflon insulation. Maximum insulation temperature: 260°C (500°F)

TP-K01:

Probe for general condition measurements, especially for complex and hard to reach places.