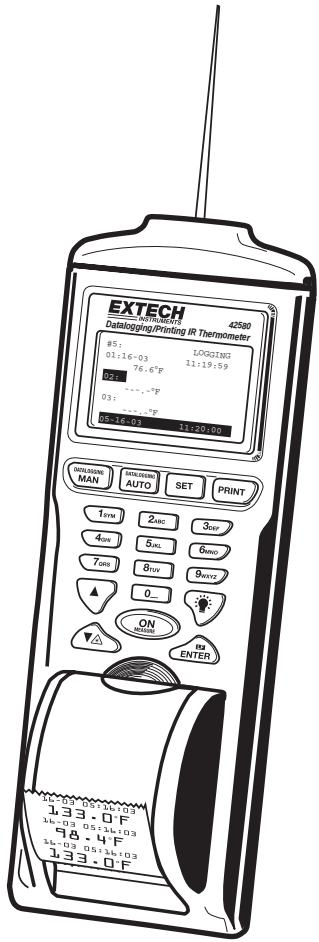
User's Guide

EXTECH INSTRUMENTS

# IR Thermometer Printer / Datalogger

## Model 42580



## *Introduction*

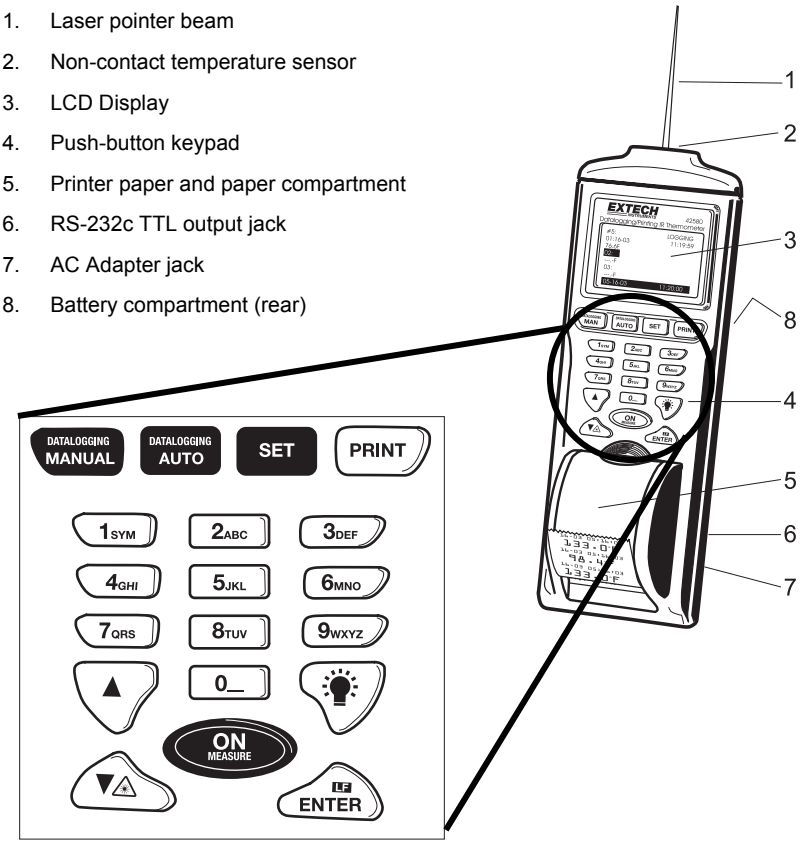
Congratulations on your purchase of the Extech 42580 IR Thermometer Printer-Datalogger. This device measures temperature using a non-contact IR sensor. The Datalogger feature stores up to 100 readings in each set (4 sets total) for a total of 400 readings. The Printer provides a hard copy of individual readings or entire data sets. PC software permits downloading of data for further analysis. Careful use of this meter will provide years of reliable service.

## *Specifications*

| | |
|---|---|
| Display | Backlit Multi-function LCD |
| IR Measurement ranges | -40 to 932°F (-40 to 500°C) |
| Accuracy: | -4 to 932ºF (-20 to 500°C); ±2% of reading or ±4ºF/2ºC (whichever is greater) |
| | -40 to -4ºF (-40 to 20°C); ±6ºF/3ºC |
| Resolution | 0.1° for displays <100°, otherwise 1° |
| Repeatability | ±1° |
| IR distance ratio | 8:1 |
| Response time | 0.2 seconds |
| Emissivity | Adjustable from 0.3 to 1.0 |
| Datalogger memory | 400 readings (0-99 readings in each of 4 sets) |
| Over range indication | "-------" appears on the LCD |
| Printer | 38mm Printer |
| PC Interface | RS-232C (TTL level) |
| Low battery indication | Battery symbol appears on the LCD |
| Power supply | Four (4) 1.5V 'AA" batteries or optional 6V (1000mA) adapter |
| Operating current | 500mA (printing), 6mA (IR active), 2mA (IR standby) |
| Auto Power OFF | After 10 seconds |
| Operating Temperature | 32 to 122°F (0 to 50°C) |
| Operating Humidity | 90% Relative Humidity max. |
| Dimensions/Weight | 8.2 x 2.8 x 2.1" (208 x 70 x 53mm) / 9.2 oz. (260g) with battery |

## *Meter Description*

1. Laser pointer beam
2. Non-contact temperature sensor
3. LCD Display
4. Push-button keypad
5. Printer paper and paper compartment
6. RS-232c TTL output jack
7. AC Adapter jack
8. Battery compartment (rear)




## *Safety*

- Use caution when the laser pointer beam is on
- Do not point the beam toward anyone's eye or allow the beam to strike the eye from a reflective surface
- Do not use the laser near explosive gases or in other potentially explosive areas

# Operation

## Setup

The Setup Screen provides access to the LCD Contrast, Printer Contrast, Emissivity setting, Temperature Units and setting of the date and time.

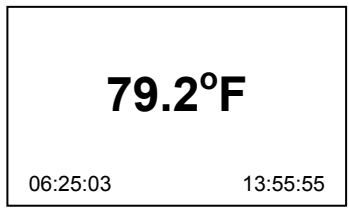
1. Press the SET button to access the setup screen.
2. Press the ▲ or ▼△ key to move the ▮ cursor to the desired position.
3. The programmable parameters are as follows:
   - LCD Cont: Adjust the LCD contrast (0-5) using the numeric keypad.
   - Prn Cont: Adjust the print contrast (0-9) using the numeric keypad.
   - Emi. Rate: Adjust the emissivity (0.0 to 1.0); Set to 0.95 if not sure of emissivity value for the surface under test.
   - Unit: Select temperature units (°C or°F) using the ENTER button.
   - Date: Select date format MM:DD:YY, DD:MM:YY, or YY:MM:DD using the ENTER button.
   - Set Clock: Set the current month, day, year, hour, minute, and second. Use the arrow keys to move from digit to digit. Use the numeric buttons to change the number.
4. Press ON to exit setup mode.

| | |
|---|---|
| LCD Cont: | 1 |
| Prn Cont: | 2 |
| Emi. Rate: | 0.95 |
| Unit: | F |
| Date: | MM:DD:YY |
| Set Clock: | |
| MM:DD:YY | hh:mm:ss |

**SETUP Screen**

## IR Measurements

1. Point the meter at the surface to be measured.
2. Press and Hold the ON button to measure the temperature.
3. The red laser pointer identifies the spot being measured. Aim the laser pointer at the center of the surface to be measured. While pressing the ON button, press the ▼△ button to enable or disable the pointer.
4. Release the ON button and the last measured value will remain in the display for approximately 8 seconds.



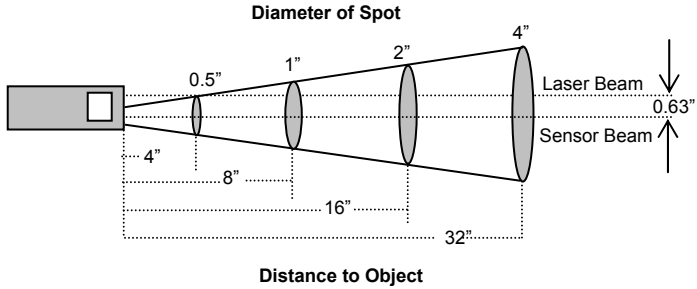

**IR Measurement Display**

## Printing IR Measurements

1. Perform the IR Measurement procedure.
2. After the ON button has been released and before 8 seconds have passed, press the PRINT button.
3. The printer will print the temperature, date and time.
4. Press the ENTER button to feed the paper.

### *Field of View*

The meter's field of view is 8:1, meaning that if the meter is 8 inches from the target, the diameter of the object under test must be at least 1 inch. Other distances are shown below in the field of view diagram. Refer to the chart printed on the meter for more information.




### *Measurement Notes*

1. The object under test should be larger than the spot (target) size calculated by the field of view diagram (see diagram on previous page or on side of the meter).
2. If the surface of the object under test is covered with frost, oil, grime, etc., clean before taking measurements.
3. If an object's surface is highly reflective apply masking tape or flat black paint before measuring.
4. The meter may not make accurate measurements through transparent surfaces such as glass.
5. Steam, dust, smoke, etc. will affect measurements.
6. The meter compensates for deviations in ambient temperature. It can, however, take up to 30 minutes for the meter to adjust to extremely wide ambient temperature changes.
7. To find a hot spot, aim the meter outside the area of interest then scan across (in an up and down motion) until the hot spot is located.

## *Datalogging*

### *Overview*

The Model 42580 has two datalogging modes of operation, Manual Datalogging and Automatic Datalogging. Each has 4 sets. Each set can hold 99 readings. Data sets can be printed in their entirety.:

- **Manual Datalogging**: Up to 99 readings can be stored in Sets 1, 2, 3, & 4. Data storage is performed manually by pressing ON followed by ENTER for each data point (detailed in subsequent sections).

- **Automatic Datalogging**: Up to 99 readings can be stored in Sets 5, 6, 7, & 8. In Automatic Datalogging mode, the user programs the recording start & stop date & time, and the recording interval. Automatic Datalogging.

## *Manual Data Storage Mode*

The Model 42580 can store 99 readings in each of 4 sets numbered #1 through #4. The function of the buttons in the Manual Datalogging mode are:

DATALOGGING MANUAL — Opens the manual data storage mode, Opens a set and clears the data.

SET — Selects the set # for recording or viewing.

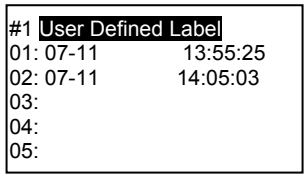
PRINT — Prints the stored records in a set.

▲ ▼ — Scroll up or down through the records in a set.

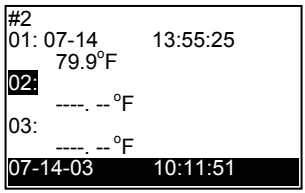
ENTER — Stores the temperature reading.

1 to Z — Alpha-numeric label entry (9 buttons).

1. Press the DATALOGGING MANUAL button to enter the manual data storage mode. A cursor ( ) will appear next to the selected set# with the label (if stored).
2. Press the SET button to scroll through and select one of the four sets.
3. If data is stored in the set, the label or the date and time will appear next to the record number.
4. Press DATALOGGING MANUAL again to open the selected set.
5. The Set Screen will open with the cursor on the first record number that does not contain any data. Data can now be viewed, printed or new data can be saved to the set.
6. Press the DATALOGGING MANUAL button a third time to EXIT the Manual logging mode.




Manual logging Screen




Manual logging Open Set Screen

**Storing Data**

1. Point the meter at the surface to be measured.
2. Press and Hold the ON button until a reading appears on the display in a box.
3. Release the ON button and press the ENTER button.
4. For each set up to 99 readings can be stored.

**Viewing Data**

Press the ▲ ▼ buttons to scroll through and view the stored data.

**Printing Data**

Press the PRINT button and the display will respond with Print?. Press the PRINT button a second time to confirm the print request. The printer will print all the records from record 01 to the last record that contains data.

**Erasing Data**

Press and HOLD the DATALOGGING MANUAL button for at least three seconds and the recorded data will be erased. To clear the date and time (or stored labels) Press and HOLD the DATALOGGING MANUAL button for at least three second while in the Manual logging Mode Main Screen.

## *Automatic Datalogging Mode*

In the Auto Datalogging mode the Model 42580 can automatically measure and store 99 readings at a programmed sample rate. Four separate sets, numbered 5 through 8, can hold 99 readings each. The function of the buttons in the LOG mode are:

| | |
|---|---|
| DATALOGGING AUTO | Opens the automatic data storage mode, opens a set and clears the data |
| SET | Selects the set # for recording or viewing. |
| PRINT | Prints the stored records in a set. |
| ▲ ▼ | Scroll up or down through the records in a set. |
| ENTER | Stores Start time, Stop time and Log rate. |
| 0… | Stops a logging session |
| 1 to Z | Alpha-numeric label entry (9 buttons). |

**Selecting the Datalog Set**

1. Press the DATALOGGING AUTO button. A data set Configure Screen will appear.
2. There are four sets available, numbered 5 through 8 (upper left hand corner).
3. Press the SET button to scroll through and select one of the four sets.

| | |
|---|---|
| #6 | |
| Begin: | 06-25-03 |
| End: | 06-25-03 |
| Start: | 13:55:00 |
| Suspend: | 14:00:00 |
| Rate: | 20 |
| Start now? | Yes |

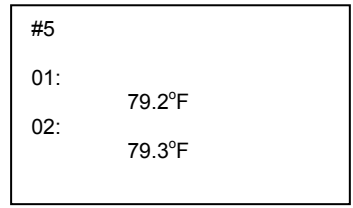
**Datalog Configure Screen**

**Configuring the Datalogger**

1. After selecting a set, use the ▲ ▼ buttons to move through the fields and use the alpha-numeric buttons to edit the parameters in the fields shown in the diagram.
2. The programmable fields are:.
   - Begin: Date when recording is to begin.
   - End: Date when recording will end.
   - Start: Time when recording will begin.
   - Suspend: Time when recording will end.
   - Rate: Interval of time between each reading (1 to 7200 seconds)
   - Start now? Press ENTER while YES is highlighted to start recording at the date and time programmed above.
     Note that the datalogger will automatically record from the START time to the SUSPEND time every day from the BEGIN day to the END day

**Recording Data in the Automatic Datalogging Mode**

1. After preparing a data set and configuring the datalogger, place the meter in position to take readings (tripod mount is provided on rear of instrument).
2. Recording will begin on the date and time programmed at the BEGIN and START lines in the 'Configure Screen'.
3. The Datalogger will record everyday from the START time to the SUSPEND time. The last day is the date programmed in the END line.
4. To stop the datalogger before the programmed SUSPEND time, press the 0 button.
5. To view the data recorded, press the DATALOGGING AUTO key twice. The data will be listed as shown in the 'Measure Screen' diagram at right.




**Mode Measure Screen**

6. Use the numeric keys to move quickly through the data list. Pressing the '1' key calls up data point '01'; pressing the '2' key calls up data point '21', and so on.
7. To print data from the list, press the PRINT button. Press PRINT again when the PRINT? display appears.
8. To clear (erase) the recorded data, press and hold the DATALOGGING AUTO button for 2-3 seconds with the data list shown on the display.

**Backlight button**

Press to activate the meter's display backlight.

**Editing Names and Labels:**

The 42580 has the capability of storing a 14 character label with each set or record.

The label can be entered either through the numeric keypad or the optional software. (See the software section for instructions on entering labels via the software)

To create a label, with the ( ) cursor next to the set# or record, press ENTER to switch to a single character cursor ( ).

Press any button repeatedly to scroll through the available characters.

If the button is not active for a short period of time the character selected will be written to the screen.

Press the ▲ or ▼ buttons to scroll forward or backwards.

For example, to select the letter 'T', press the '8' key five times. The meter will move the cursor to the next digit place automatically. Note that the '1' button has special characters in addition to the numeral '1'. The '0' key has a blank space in addition to the numeral '0'. Press ENTER to store the name.

## *Maintenance*

**Cleaning**

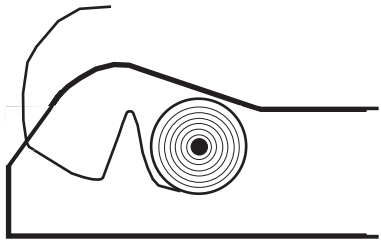
Wipe instrument with damp cloth as needed. Do not apply solvents or abrasives to the meter. Store in a cool dry place with the batteries removed.

**Battery Replacement**

When the batteries weaken, the LCD display will dim or go completely blank. To replace the batteries, open the rear battery compartment and insert four (4) new 1.5V 'AA' batteries with correct polarity position.

**Paper roll replacement**

When the paper roll is depleted, flip up the paper compartment, drop in a new roll, and feed the paper using the LF button. New paper rolls are available through Extech instruments and Extech distributors.



## *Emissivity Considerations*

The amount of IR energy emitted by an object is proportional to an object's temperature and its ability to emit energy. This ability is known as emissivity and is based upon the material of the object and its surface finish. Emissivity values range from 0.1 for a very reflective object to 1.00 for a flat black finish. The 42580 senses IR energy and calculates the temperature based upon the amount of IR energy it receives using a factory default emissivity setting of 0.95 (this setting covers 90% of applications).

Most organic materials and painted or oxidized surfaces have an emissivity factor of 0.95. Inaccurate readings will result from measuring shiny or polished metal surfaces which have emissivity factors other than 0.95. To compensate for polished/shiny surfaces, cover the surface with masking tape or flat black paint. Allow time, before measuring, for the tape to reach the same temperature as the material underneath it.

**Emissivity Factors for Common Materials**

| Material under test | Emissivity | Material under test | Emissivity |
|---|---|---|---|
| Asphalt | 0.90 to 0.98 | Cloth (black) | 0.98 |
| Concrete | 0.94 | Skin (human) | 0.98 |
| Cement | 0.96 | Lather | 0.75 to 0.80 |
| Sand | 0.90 | Charcoal (powder) | 0.96 |
| Soil | 0.92 to 0.96 | Lacquer | 0.80 to 0.95 |
| Water | 0.92 to 0.96 | Lacquer (matt) | 0.97 |
| Ice | 0.96 to 0.98 | Rubber (black) | 0.94 |
| Snow | 0.83 | Plastic | 0.85 to 0.95 |
| Glass | 0.90 to 0.95 | Timber | 0.90 |
| Ceramic | 0.90 to 0.94 | Paper | 0.70 to 0.94 |
| Marble | 0.94 | Chromium Oxides | 0.81 |
| Plaster | 0.80 to 0.90 | Copper Oxides | 0.78 |
| Mortar | 0.89 to 0.91 | Iron Oxides | 0.78 to 0.82 |
| Brick | 0.93 to 0.96 | Textiles | 0.90 |

# Software

### System Requirements

- Hardware Requirements: 486 PC or better with COM 1 and COM 2 Serial ports
- Operating System Compatibility: Windows™ 95/98/NT/2000/XP

### Hardware Connection

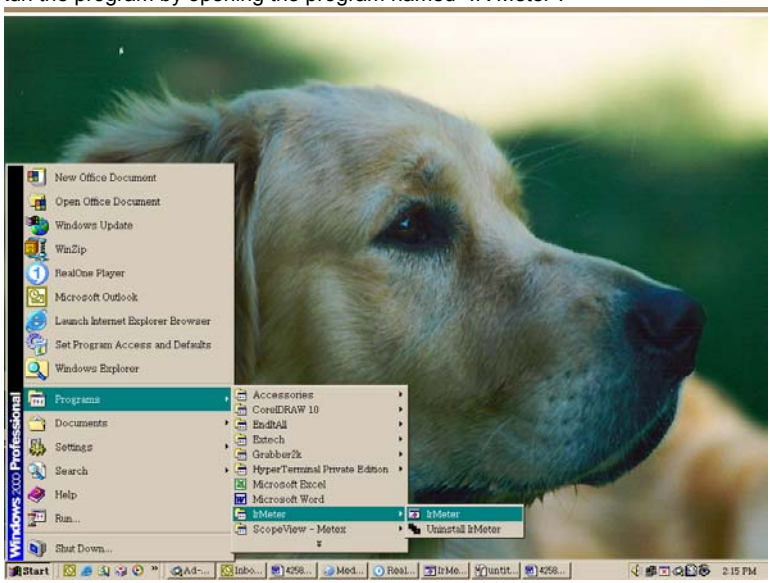
The IR Thermometer connects to a PC with the supplied DB-9 to 3.5mm mini-plug (mono) interface cable. The DB-9 end connects to the PC serial com port. The mini-plug end connects to the IR Thermometer.

### Software Installation

The instructions on how to install the optional software are printed on the Software CD label. After reading the label's directions, load the software CD in the PC CD-ROM drive.

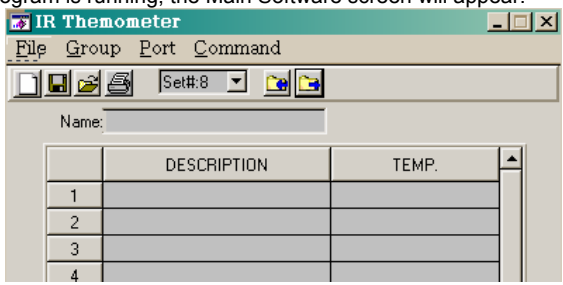
## Starting the Software

Run the program by opening the program named "IR Meter".



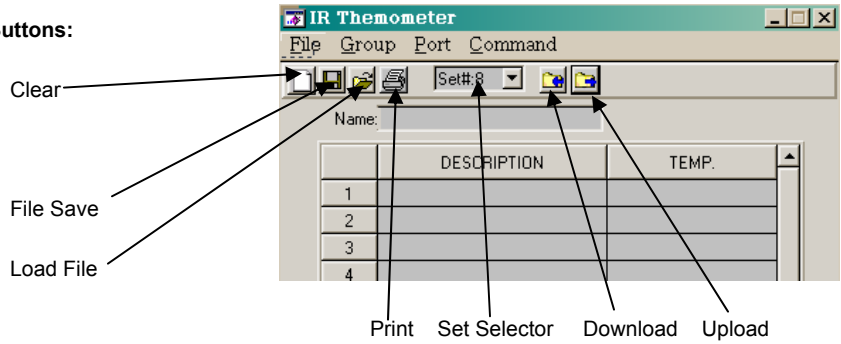

This program is located in the programs folder of the Windows Start Menu.

Once the program is running, the Main Software screen will appear.



When the program is started the meter and PC begin communicating. The main software screen appears.

**Buttons:**

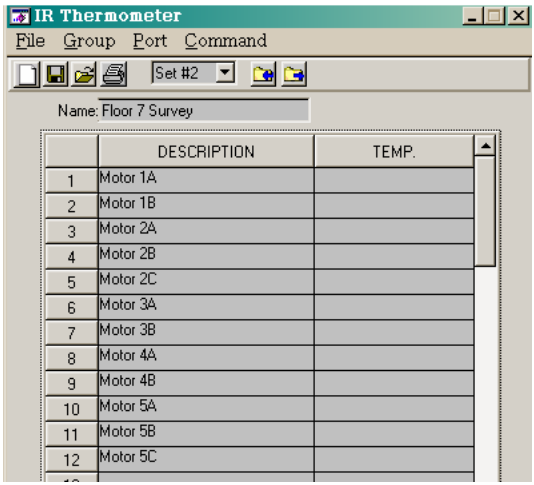



**Entering Descriptions for Manual Recordings**

The 42580 has the capability of storing a 14 character label with each record to help in organizing the data collected. The label can be entered either before or after the readings are made. If no label is entered the default description is the Date and Time Stamp of the reading. (Please note that labels for automatic readings cannot be changed and will always be the Date and Time Stamp)

**To enter labels for uploading**

1. On the toolbar click on the clear button
2. Click on the set selector drop down screen and select the desired set (1 to 4 for manual)
3. Enter desired labels
4. Click on upload button. Data transfer will begin. The meter will display PC MODE in the screen until transfer is completed.



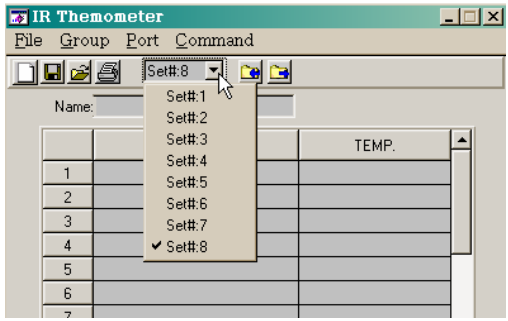
**Downloading Sets from the Meter**

Sets previously recorded by the IR Meter can be downloaded individually or as a group.

With the meter connected to the PC and the software running

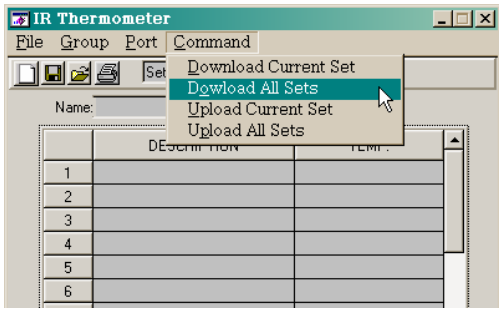
To download an individual set:

1. On the toolbar Click on the set selector drop down screen
2. Click on a set
3. Click on the download button

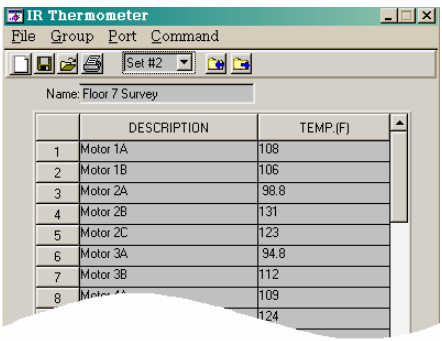



To download all sets simultaneously:

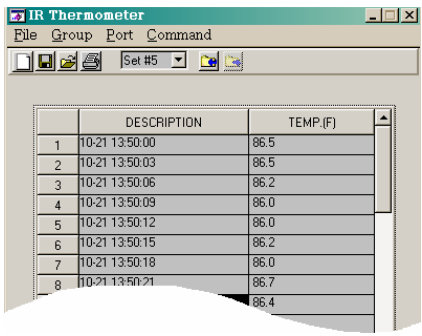
1. On the Menu Bar Click on Command
2. Click on Download All Sets




Data will then transfer from the meter to the PC



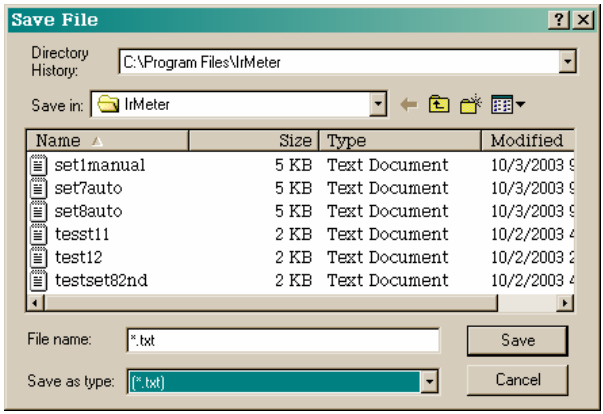

Manual Readings with user defined labels




Auto Logging with Date and Time Stamp

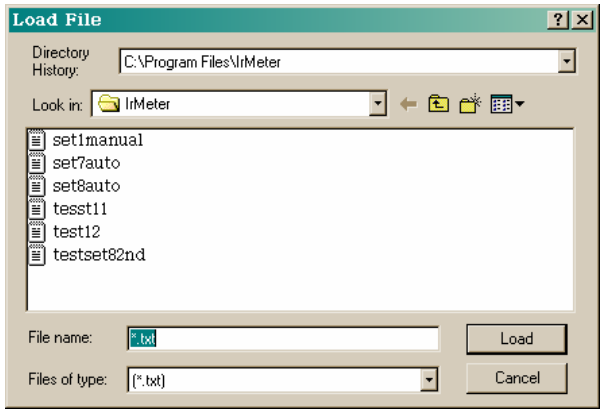
**Save File**

The SAVE FILE icon is the second icon on the left (floppy disk symbol). Click on this icon to save recorded data as a text file. When clicked, the PC will prompt for a filename and location. Once saved, this file can be opened in other programs such as spreadsheets, word processors, and databases.




**Load File**

The OPEN FILE icon is located third from left. Double Click to open a file that has already been saved. Please note that in order to view, the file must be viewed in the same set location (i.e. If a file was recorded as Set 2 it can only be viewed with Set 2 selected in the set selector drop down menu.)

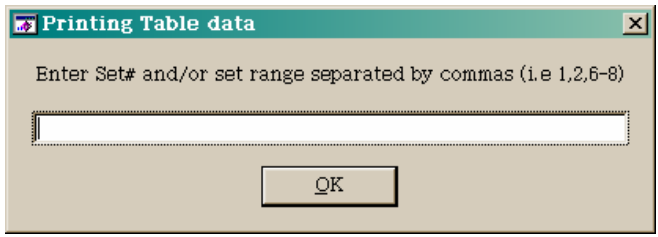



**Erase Data**

The ERASE icon is the first icon on the left. Click to clear data from the screen.

**Print**

The PRINT icon is the fourth icon from the left. Click to print. When prompted, enter the desired set(s) and click OK to begin printing.



## *Warranty*

EXTECH INSTRUMENTS CORPORATION warrants this instrument to be free of defects in parts and workmanship for one year from date of shipment (a six month limited warranty applies on sensors and cables). If it should become necessary to return the instrument for service during or beyond the warranty period, contact the Customer Service Department at (781) 890-7440 ext. 210 for authorization or visit our website at www.extech.com (click on 'Contact Extech' and go to 'Service Department' to request an RA number). A Return Authorization (RA) number must be issued before any product is returned to Extech. The sender is responsible for shipping charges, freight, insurance and proper packaging to prevent damage in transit. This warranty does not apply to defects resulting from action of the user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification. Extech specifically disclaims any implied warranties or merchantability or fitness for a specific purpose and will not be liable for any direct, indirect, incidental or consequential damages. Extech's total liability is limited to repair or replacement of the product. The warranty set forth above is inclusive and no other warranty, whether written or oral, is expressed or implied.

## *Calibration and Repair Services*

Extech offers repair and calibration services for the products we sell. Extech also provides NIST certification for most products. Call the Customer Service Department for information on calibration services available for this product. Extech recommends that annual calibrations be performed to verify meter performance and accuracy.


**Support Hotline (781) 890-7440**
Tech support: Ext. 200; Email:
support@extech.com
Repair/Returns: Ext. 210; Email:
repair@extech.com Website: www.extech.com