

**TEMPERATURE CONTROL
CHAMBER**

MODELS 9300A

SOFTWARE MANUAL

9300A.SW Rev.2

2011-11-08

Approved By:

QA:

S/N:

Form MI 65, Rev. 1, dated 09-01-27 (QAP 19,App."M")

© Copyright 2009, 2011 Measurements International Limited
All rights reserved

TABLE OF CONTENTS

1	INTRODUCTION	1-1
2	Set Up	2-1
2.1	Hardware Requirements	2-1
2.2	Software Installation	2-1
3	DESCRIPTIONS OF USER GRAPHIC INTERFACE	3-1
3.1	Scope	3-1
3.2	Main Window	3-1
3.2.1	Main Menu	3-2
3.2.2	Set Temperature / Scale	3-2
3.2.3	Measured Temperature	3-2
3.2.4	Running Operations	3-2
3.2.5	Run Task Program	3-3
3.2.6	Operating Status	3-3
3.3	Set GPIB	3-4
3.4	Programmable Tasks	3-5
3.4.1	Elements Set	3-6
3.4.2	Program and Task Set	3-6
3.5	Task Sequence	3-7
4	OPERATION	4-1
4.1	Manual Operation	4-1
4.2	Automation Operation	4-1
4.3	Graph Show	4-1
5	9300A GPIB COMMANDS	5-1

LIST OF FIGURES

Figure 1	Flow Chart for 9300A Software _____	1-1
Figure 2	Main Control Windows _____	3-1
Figure 3	Set GBIP address _____	3-4
Figure 4	Programmable Task Setting Window _____	3-6
Figure 5	Response of the Temperature over whole range _____	4-2
Figure 6	Waveform of the Temperature Stability _____	4-2
Figure 7	Setting for the graph window _____	4-3

1 INTRODUCTION

The 9300A model has a remote operation feature through the GPIB bus. This manual describes the functionality of the software for controlling the temperature chamber.

9300A Graphic User Interface (GUI) is integrated in Visual Basic. The flow chart of the software is illustrated in Figure 1.

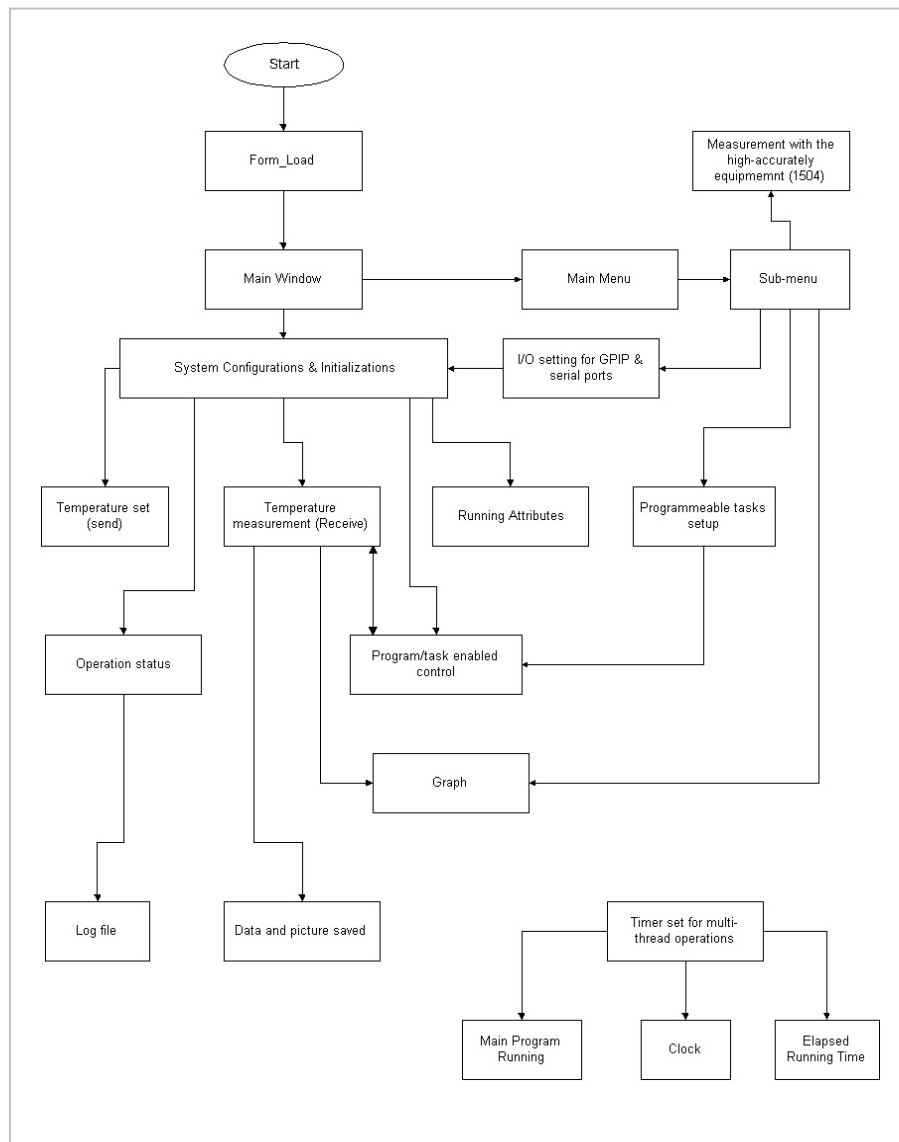


Figure 1 Flow Chart for 9300A Software

2 SET UP

2.1 Hardware Requirements

A computer with a minimum of a Pentium III processor, 32 MB RAM, running Windows 98 or better is recommended for using this software. The hard disk must have at least 2 MB of free space for the program before installation. The computer must have a National Instruments IEEE-488 interface card and drivers, to operate the 9300A remotely. GPIB cables are also required to connect the computer to the instruments used in the 9300A system.

2.2 Software Installation

Ensure that the IEEE 488 card is installed and working before installing the 9300A software. Follow the instructions that were provided by the card manufacturer. Insert the 9300A Software CD run the **setup.exe** file found in the root directory. The Setup Wizard will take you through the installation process. Once the software installation is complete, the message “9300A Software loaded successfully” will appear and an Icon will be created in the Windows Program Manager entitled “**Measurements International**”. To run the software, click the ‘Start’ button, and select ‘Measurements International’ and ‘**MI 9300A**’.

NOTE: if an error occurs with loading a specific file, that file may already exist for another application. To correct this problem renames that existing file and repeat 9300A software installation procedure.

3 DESCRIPTIONS OF USER GRAPHIC INTERFACE

3.1 Scope

The software provides an easy way for the user to control the air bath individually, through the GPIB interface. The following sections will describe the functionality and some restrictions and conventions in the GUI program in detail.

3.2 Main Window

The 9300A program with the name of **MI 9300A** is located in the program menu of Measurements International in the **Start** of MS Window.

The Main window contains five sections of the operation functions and a main menu with 5 optional menus on the top of the screen.

The following gives brief descriptions of the functions in each section. These keys are described in more detail in later sections.

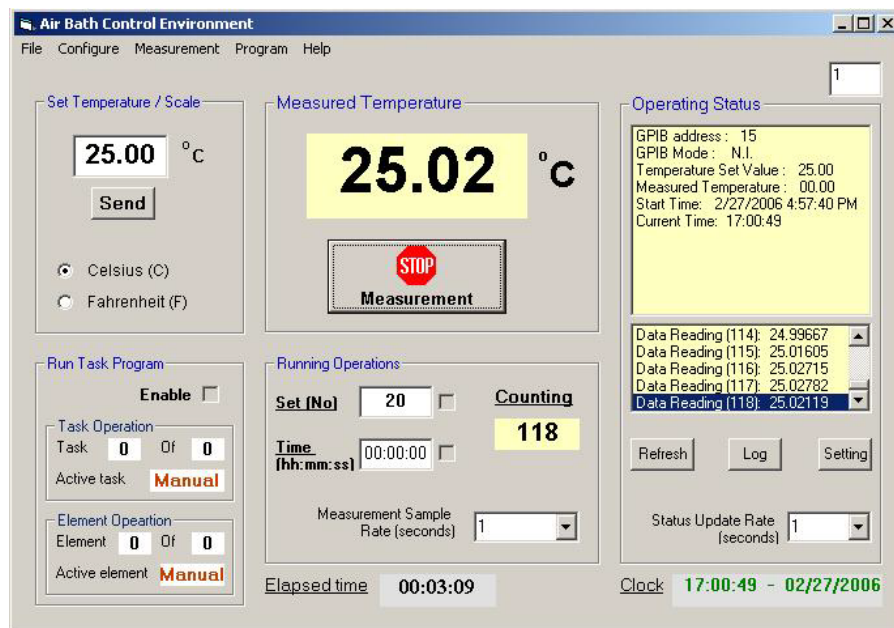


Figure 2 Main Control Windows

3.2.1 Main Menu

Five menus are included for the system configurations and data display and saving.

- File — with two options, **Print** to print the current control frame; **Exit** to quit the program out.
- Configure — set a serial port and set a GPIB address.
- Measurement — only support HS-1504 thermometer for the measurement.
- Program — with two options, **Tasks Setting** to access a process to setup the tasks for the measurements (Details in the Section 3.4), and **Save Data** to for enter a name of data file into the desired location.
- Help — to give the information about this software and MI Company.

3.2.2 Set Temperature / Scale

The required temperature (15°C to 40°C) and scale for the bath is setup in this section. The **Send** button is used to send the setting value to the 9300A unit over the GPIB bus.

3.2.3 Measured Temperature

This section is located in the central area. The **Start/Stop Measurement** button is used to start or stop the operation of the temperature measurement. Pressing the button if its status is on START (in green) will start the measurement. The current temperature in the bath is measured and displayed in the numerical box located above the control button.

3.2.4 Running Operations

This section is used to set the operating parameters – the number of the measurements, measurement time and display rate. Two option buttons are used to control the setting being enabled or disabled.

- 1) **Set (No):** enter the number of measurements needed and also enable (tick) the option box beside the number box. If the option box

is not enabled, the setting will not be available and the measurements will be continued forever.

- 2) **Time (hh:mm:ss)**: set the time for the period of the measurement. The setting format is hour-minute-second. The time setting is available only if the option box is enabled. Also the time is clocked down during the programmable operation.
- 3) When both are set (the number of the measurements and the time period), the processing of the measurement will be completed according to which one takes the shorter elapsed time.
- 4) **Measurement Sample Rate** – set a sample time for monitoring the measured temperature at this rate.
- 5) There is a **Counting** box where the number indicates the current accumulated number of measurements taken.

3.2.5 Run Task Program

This section is located in the lower left corner, where **Enable** option box is used to enable the programmable operation that has to be configured in the **Program** menu of the menu bar (see Sections 3.2.1 and 3.4). The programmable tasks are detailed in Section 3.4.

The rest of the boxes are used for indicating the information of the task settings and current status during the task running.

3.2.6 Operating Status

This section has two display windows. The upper indicates the information of the settings and operation. The lower displays and holds all of the measured temperature data.

On the bottom line, **Status Update Rate** input box can be set for the sample rate at which the information of the operating status is displayed in the upper window.

On the bottom area, there are three buttons to be used for handling the information for the upper window.

- 1) **Refresh** – clears all information in the upper window and display the update information. The setting information such as GPIB address and temperature set values will not be changed, but some such as the mean value and standard deviation of the temperature will be updated using the current measured data as the previous data.
- 2) **Log** – contains all the information of the current settings and measured temperature history.
- 3) **Setting** – click the button pop a sub window where some parameters can be re-set: the length of the filter (sampling number).
(not available in the version)

3.3 Set GPIB

The current version of the software is only supported to use the National Instrument IEEE-488 card. The GPIB address can be setup as any value from 1 to 31 in the **Configure** menu as shown in Figure 3.



Figure 3 Set GBIP address

3.4 PROGRAMMABLE TASKS

The programmable tasks provide an automatic procedure to control the temperature with a specified time period. The task setting procedure for the automation test can be configured from the **Program** menu. After clicking the submenu **Tasks Setting**, a window subtitled 'Measurement Task' will pop up as shown in Figure 4.

The Active Program that runs for controlling and measurement is set up with the following structure: The Program, Tasks and Setting Attributes (control elements).

The control elements consist of the **Temperature Setting Attributes** to set a temperature for each stage and the **Wait State Attribution** to set a period time. Wait States are used to create a delay between two measurements. They are either wait for a specified amount of time, or wait until a specified computer system time. (In the current revision, wait until is not available).

Once elements have been created, they can then be combined into Tasks. Tasks are a sequence of Elements that run to perform a certain job. These Tasks can in turn be constructed to create a Program that can be run from the main screen, such as an example of the program P1 which consists of the tasks of T1, T2 and T3.

Measurement Task

Program File **Active Program** P1

Programs

	1	2	3	4	5	6	7	8	9	10	11	12	
P1	T1	T2	T3										
P2	T2	T1											
P3	T3												

Tasks

	1	2	3	4	5	6	7	8	9	10	11	12	
T1	TS1	W1	TS2	W2	TS3	W3	TS4	W4	TS5	W5	TS6	W6	
T2	TS2	W6	TS5	W1									
T3	TS6	W1											

Wait State Attributes

Time (H:M)

☒ Wait For
☐ Wait Until

	Time	Type	
W1	00:01	Wait For	
W2	00:02	Wait For	
W3	00:03	Wait For	
W4	00:04	Wait For	
W5	00:05	Wait For	
W6	00:06	Wait For	
W7			
W8			
W9			
W10			
W11			

Temperature Setting Attributes

Set Values (C)

☒ Celsius (C)
☐ Fahrenheit (F)

	Value	Scale	
TS1	15.00	C	
TS2	20.00	C	
TS3	25.00	C	
TS4	30.00	C	
TS5	35.00	C	
TS6	40.00	C	
TS7			
TS8			
TS9			
TS10			
TS11			

Figure 4 Programmable Task Setting Window

3.4.1 Elements Set

Two fields in the bottom area are used to create wait time and temperature settings that will be combined to create Tasks.

A wait time is created using the 'Time (H:M)' combo box to set a desired time and using the 'Create State' button to create the time setting into the 'Time' grid in the 'Wait State Attributes' fields. The time for Wait States are in 24-hour clock format.

With a similar process, the desired values of the temperature are set from the 'Set Value' combo box and created into the 'Value' grid in the 'Temperature Setting Attributes', in Celsius or in Fahrenheit.

3.4.2 Program and Task Set

The 'Tasks' field allows the operator to create Tasks by combining the Elements of the temperature and wait states.

Elements can be combined into 'Tasks' by dragging the desired Temperature and Wait State. **It is important to make a right sequence of the temperature and time.** Otherwise the program will not run, giving an error message. (Refer to the Section 3.5).

To create a Program, drag a Task from the 'Tasks' grid to the desired 'Programs' grid row. Elements cannot be dragged directly into the 'Programs' grid. They must be put into a Task first.

To select a Program to be run from the main screen, double click the desired row in the 'Programs' grid and the Program designator will appear in the 'Active Program' box in the right-up corner (refer to Figure 4).

The Task Programs can be saved in the specific format, or loaded from the existing file of the Task Programs.

3.5 TASK SEQUENCE

The sequence of the task for the current version must meet the following conventions.

- One pair of the setting, Temperature and Wait Time
- Temperature setting (T) must be located before the Wait Time (WT), such the acceptable sequence as T1-WT1 & T2-WT2 ...T20-WT20.

4 OPERATION

The GUI software can be operated manually or automatically. In the manual operation, the user needs the several settings to be set. In the automation operation, one concerned matter is to set the tick-box Enabled in **Run Task Program**. (See Figure 2).

4.1 Manual Operation

The followings settings are needed for the manual operation:

- Disable the '**Run Task Program**' by empty the Enable Check box;
- Set a desired value of the temperature in C or in F;
- Set the number of the measurements or time period to be run according to the need;
- Enable one or both options by ticking the Check box or empty;
- If both activated, the measurements will be over when the shorter operating process stop;
- Press the START button to start the 9300A operation;
- Any termination can be made during the measurement.

4.2 Automation Operation

The following steps are needed for the automation operation

- Enable the '**Run Task Program**' by ticking the Enable Check box;
- Make sure the task programs is Activated;
- Press the START button to start the 9300A operation;

4.3 Show Graph

The graph window may be selected from the **Measurement** menu to show the temperature changes during the measurement. The typical waveforms of the temperature response are shown in Figure 5 and Figure 6. The waveforms actually are reflected the thermal changes of the thermistors which used as the sensors.

The properties of the graph can be set by double clicking in the Graph box, which will result in pop up window as shown in Figure 7. From the property

setting, the Axis and Grid, scale and so on can be configured to make the plot as a required size and showing.

Four buttons are used to handle the plots.

Refresh — the plot will start to create a new plot from the current temperature

Save — save the current plot to a specified file

Print — Print the current plot using the default print in the system

Exit — quit the graph window

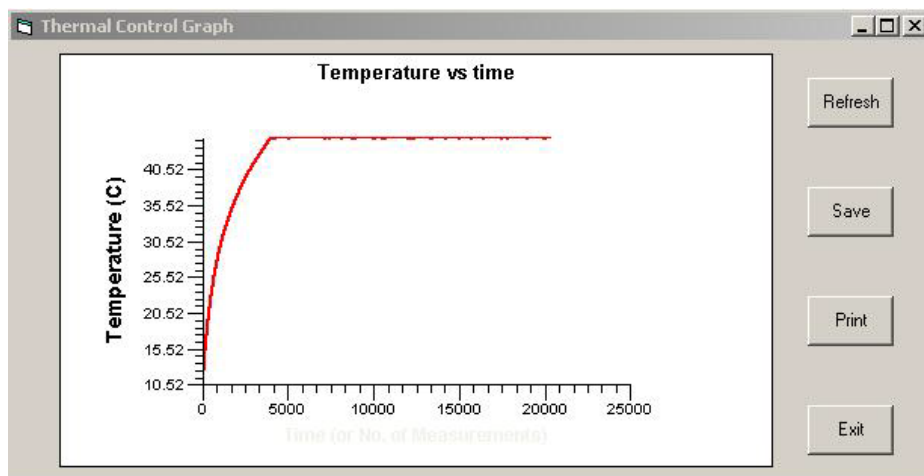


Figure 5 Response of the Temperature over whole range

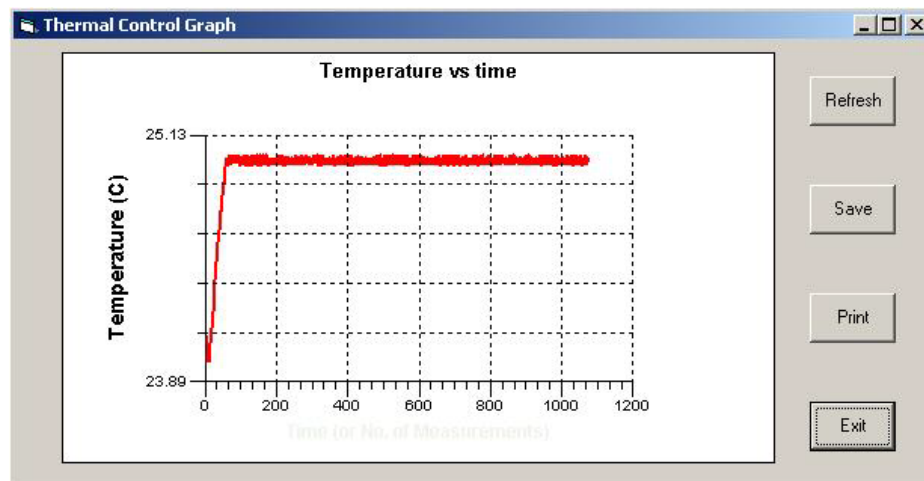


Figure 6 Waveform of the Temperature Stability



Figure 7 Setting for the graph window

5 9300A GPIB COMMANDS

The following commands are used for the communication of the GUI software and 9300A air bath.

- C:** set thermal scale from Fahrenheit to Celsius
- D:** Set sample period, for ADC sampling time and temperature display rate (“D1” to “D10”).
- F:** set thermal scale from Celsius to Fahrenheit
- K:** set the 9300A to Remote mode. This command sets the Local Lockout flag true. It locks the keyboard.
- L:** set the 9300A to local mode. It also sets the Local Lockout flag false.
- m:** receive the values of measured temperature from 9300A to PC.
- s:** receive a temperature setting from 9300A to PC
- T:** set a temperature value (“T15.00” to “T40.00”).
- U:** this command sets the Local Lockout flag false.