xpRt50®

Software Instructions

Model 50 Rheometer

Version 1.5 and above

Part No. 101524144  Rev. E
1. Introduction

This copyrighted software was written specifically to operate FANN® Model 50 Rehometers with either the Remote Control Option (RCO) or National Instruments I/O system. This manual is written for versions 1.5 and newer.

The software design allows a Windows® XP computer to control up to two FANN® Model 50 Rheometers. The rheometers are controlled digitally, using RS-485 serial communications or a USB connection. A “JOG” button is located on the unit at the rheometer, which allows a low speed rotation of the rotor to facilitate loading the sample. The computer controls motor speed, bath temperature, and (if the bath is raised) sample temperature. Control of the bath may be manual or automatic (if the unit is properly equipped).

This software is designed to operate Windows XP Professional environment.

The software allows the user to:
- Control up to two rheometers simultaneously.
- Control Bath/Sample Temperature (Heating & Cooling), Shear Rate, and Head Cooling.
- Design automatic test procedures.
- Run automatic and manual tests.
- View graphical presentations of the results
- View real time graphical presentations of running tests.
- Calibrate the rheometers.
- Output results during and after the test.
- Automatically Email test results when a test is completed
- Manually Email test results at any time.
- Define custom Bob, Rotor, and Spring geometries.

2. Hardware Requirements

Minimum computer requirements:
- Pentium 4, 1.5 GHz with Windows XP Professional with Microsoft .NET Framework version 1.1 installed.
- 512 Megabytes RAM (Memory), 40 GB hard drive
- 2 USB 2.0 Ports
- xpRt50® software version 1.5 or above

The software is intended for use with a National Instruments USB to RS-485 converter (NI-USB-485/2) for connecting to RCO units, and a direct USB connection to units using the National Instruments I/O system.
3. Installation

3.1. Software Installation

The distribution CD will contain a “readme.txt” file with the most recent instructions for installing the software. Generally, the software is available on self installing CD. Follow the prompts of the installer. It is suggested to use the default settings of the installer for reliable operation of the software. After installation, the system may need to be configured to accommodate the specific machines you are operating. The default configuration is for two RCO units, but any combination of two machines can be accommodated. The configuration is accomplished by editing one or more of the “.INI” files that store the system configuration. Refer to Appendix II for details about setting up your machine.

Note: This means that once the machine is configured and calibrated, these “.INI” files should be backed up to a safe location. If such a backup is done after each calibration, the system computer can be replaced with minimal down time and no loss of system setup or calibration.

Note: Please read and understand the software manual before installing this software.

3.1.1. Place the CD in the CD drive. The CD should run automatically. If it does no run automatically, Browse to the CD drive and double click "setup.exe". Two separate installations will begin.

3.1.2. Read any license agreements that are presented. You must accept them for the installation to proceed.
3.1.3. Follow the installer instructions, including restarting the machine after the install.

3.1.4. Make the required changes to the INI files. See Appendix II.

3.1.5. If you are using one or more RCO based Model 50s, connect your USB to RS485 converter and let the system find and install the new hardware. Follow the installation instructions that appear on the screen.

3.1.6. If you are using one or more USB based Model 50s, connect the first unit to the USB port and let the system find and install the new hardware. Follow the installation instructions that appear on the screen. Repeat for the second unit.
Setup

Start Installation
Review the following summary before continuing.

Adding or Changing
- MSE Files

Click the Next button to begin installation. Click the Back button to change the installation settings.

Setup

Overall Progress

Currently installing MSE - Part 1 of 1.

Copying files...

Setup

Installation Complete

The installer has finished updating your system.
Please run a Fluid Calibration to verify the machine is functioning correctly.

3.2. Basic Directory Structure

All of the files are installed to the <drive>\Program Files\Fann\.

<drive>\Program Files\Fann\ should contain:

3.2.1. EmailLists
3.2.2. Default information for sending email from the program
3.2.3. Model 50
   ■ The Program Executables
   ■ The “.INI” files for program setup
   ■ Directories for specific information (TestReports etc.)
   ■ (Optionally) SaveINI
3.2.4. A copy of the “.INI” and “.TXT” files used by the program. This copy is made by a utility included on the installation disk.

3.3. RS-485 Hardware Installation

The RS485 serial adapter should be installed using the manufacturer’s instructions. The device may require additional configuration as follows
3.3.1. Using Device Manager (Start, Control Panel, System, Hardware tab, Device Manager), select the device to which you wish to attach to the first RCO.

![Advanced Settings for COM3](image)

3.3.2. Using the Properties | Advanced menu, set that to COM15, and “Two Wire Auto” (COM port may be any free COM port, but the software defaults to COM15 for the first RCO). Select “Yes” to continue.

3.3.3. Using Device Manager, select the device to which you wish to attach to the second RCO.

3.3.4. Using the Properties | Advanced menu, set that to COM14, and “Two Wire Auto” (COM port may be any free COM port, but the software defaults to COM14 for the second RCO).

3.4. Direct USB Hardware Installation

Connect the USB cable from the computer to the RS-485 jack on back of the RCO. Continue with the new hardware wizard until it is completely installed. On some machines this may take longer than expected due to Anti-Virus software. The software assumes that the first USB unit plugged into the PC is the first Model 50.

Transfer the existing cable (if any) between the RCO and the RS-485 card in computer to the USB to Serial Adapter Box. A DB9 FxF adapter is required. The RS-485 card in the computer must be removed.
4. Using the Program

The basic philosophy of the software is to allow an experienced user to configure the machine in a way that is best suited to their situation. At the same time the default configuration will allow a less experienced user to get meaningful results with a minimum effort. When changing the operational parameters of the device, it is important to understand that it is the responsibility of the user to ensure the safe operation of the machine.

In order to keep this manual concise, it is assumed that the user of this equipment will have a basic understanding of Windows® XP and the computer. The skills that are expected are as follows:

1) The ability to run programs using the “Start” button, desktop shortcuts, and other means.
2) A basic familiarity with the PC, Keyboard, and mouse.
3) The ability to find, copy, edit and delete files using the windows operating system
4) A basic understanding of Microsoft Excel® for editing test profiles, and reviewing test results.

All of the information that the program needs to function is saved in the following 3 ways.

1) “.INI” files. These contain information about the configuration of the machine and its various functions. The program typically stores and retrieves data from these files without user intervention. They are intended to be edited only by factory service technicians and experienced users. Minor editing errors in these files can cause the machine to run improperly, or ignore safety features. Do not edit these files directly if you have any doubt about your understanding of the consequences.
2) “.CSV” Files. These contain information such as test sequences and calibration fluid data. It is a good idea for the user to become familiar with editing these types of files. Microsoft Excel is a good choice for editing these files, but any text editor may be used.
3) “.TXT” Files. These files contain information such as default test header information, default email addresses and other similar information. These may be edited using Windows Notepad or any suitable text editor.

4.1. Simulation Mode

Starting the software without an RCO connected produces the following warning message.

Selecting Continue three consecutive times allows the software to operate in Simulation Mode for training and other purposes. ERROR appears in a red bar at the top of the control screens when in Simulation Mode.
4.2. The Basic User Interface

The basic user interface consists of two (nearly) identical programs, M50_Unit_1 and M50_Unit_2. Each of these programs controls one Model 50. We shall use M50_Unit_1 for the following examples.

There are seven tabs that set the focus of an area of interest. The most useful tabs for most users are Status and Digital Status. The functionality of each of the seven areas shall be explained in the next section.

4.2.1. Status – The Status tab shows you the test at a glance. This tab is useful from the perspective of seeing test results and following what the machine is doing. You can view the following information easily…

4.2.1.1. General Machine Status
4.2.1.2. A running plot of temperatures, speed, viscosity, shear stress etc.
4.2.1.3. Cursor and Zoom functions for focusing on an area of interest.
4.2.1.4. Ability to change plot properties such as color, style etc.
4.2.2. **Digital Status** – The Digital Status shows you the current reading of parameters as machine is measuring them. Use this tab to quickly glance all the values as they are happening in real time.
4.2.3. **Auto Test** – The Auto Test tab is used to setup an automated sequence of steps which basically forms the Test for the fluids. The user can do one of the following functions:

4.2.3.1. Recall, Display, Edit or Create a Test Sequence.
4.2.3.2. Set/Display current test step and wait conditions.
4.2.3.3. Manipulating and/or Abort tests in progress.
4.2.3.4. Email Results.
4.2.3.5. View a history of Files saved.

4.2.4. **N and K** – This tab shows test results for non-Newtonian fluids and Power Law analysis.
Click this button to enter technician mode and edit the protected parameters. The software will prompt for a password in order to grant access in the technician mode.
4.2.5. **Setup** - The Setup tab is used to set machine parameters. Most of the setup parameters are pre-configured and adequate to run the machine normally. These parameters cannot be accessed and changed until the user enters a password to enable editing. Please contact your service technician, if some of these parameters need to be changed. The user can only access and edit the following items.

4.2.5.1. Units of measurement.
4.2.5.2. Bob, Rotor and Spring Settings.
4.2.5.3. Preheat settings
4.2.5.4. Data Storage And Template Path and Email settings
4.2.5.5. Custom report settings.
4.2.5.6. PID loop tuning parameters for speed and temperature.
4.2.5.7. Safety and Performance items.

The last two items above can only be accessed in Technician Mode.

Under normal operating conditions, the PID parameters are derived from a lookup table. These lookup tables are in CSV format and can be modified for each Model 50 to adjust and account for manufacturing differences. Based on the set Temperature, The PID tuning parameters are derived from the lookup table.

The “Use Table” button forces the program to use the lookup tables. If the user desires to enter their own PID values, turn OFF the “UseTable” button and enter the values for PID parameters. Alternatively the user can make their own lookup table and let the machine use these user values in setting the PID parameters. It is best that these values should not be changed. Contact Fann Technical Support if the PID tuning is suspect or user needs to change the lookup table.
4.2.6. **Calibration** – The Calibration tab is used to setup the machine to known speed, torque and pressure. The data from this process is used to correct for all the non linearity’s of the machine. Use this tab to do one of the following.

4.2.6.1. Fluid Calibration
4.2.6.2. Static Torque Calibration
4.2.6.3. Pressure Calibration
4.2.6.4. Custom calibration report setup
The Custom Calibration Report is setup by selecting the columns from the available columns (See above). If the Sequence no in front of available column is '0', that column is excluded from the report. If the sequence has a unique integer digit in front of it then the columns are sorted in ascending order of this sequence.

User defined column names can now be added to all the columns selected by the sequence.

4.2.7. Raw Data – The raw data tab shows the actual readings as obtained from the machine. The data is raw as no scaling, correction or calibration factors have been applied. This tab is useful for trouble shooting or used by technician to exercise the various control components individually.