Paul N. Gardner Company

USER MANUAL

Information and instructions for GARDCO distributed products.

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Operating Instructions



Minimum Film Forming Temperature MFFT

RHOPOINT
MFFT-90

Thank you for purchasing this Rhopoint product.

Please read these instructions carefully before operating this product and retain them for future reference. The images shown in this manual are for illustrative purposes only.

Manufactured by Rhopoint Instruments in the United Kingdom

This instruction manual contains important information about the setup and use of your Rhopoint MFFT. It is essential that the contents be read before powering up and operating the instrument.

If this instrument is passed to other users you must ensure that the instruction manual is supplied with the instrument. If you have any questions or require additional information about the Rhopoint MFFT please contact the Rhopoint Authorised Distributor for your region.

The technology and components used in the device are based on state-of-the art optic and electronics. As part of Rhopoint Instruments commitment to continually improving the technologies used in their products, they reserve the right to change information included in this document without prior notice.

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Contents

Specifications	4
Accessories	5
About the Minimum Film Forming Temperature MFFT	6
Labelled image / functional overview	7
Set-up	8
Instructions	11
Testing	11
Pigmented Emulsions	12
Cleaning	12
Replacing Fuses	12
Troubleshooting	13
EcoMini Chiller Installation	14

Specifications

Conforms to	ASTM D 2354, ISO 2115
Platen dimensions	483mm × 235mm (L × W)
Air	4 l min-1 @ 100 psig
Water	Mains pressure; gravity drain inlet temperature <15°C
Mains	110–120V AC or 220–240V AC
Order code	MFFT, -10˚C to 90˚C 230V - A1212-002 MFFT, -10˚C to 90˚C 115V - A1212-002/115
Dimensions	350mm × 550mm × 610mm (H × W × D)
Weight	38kg
Packed weight	53.7kg
Packed dimensions	590mm × 800mm × 690mm (H × W × D)
Commodity code	9027 8017

⚠ THIS INSTRUMENT MUST BE EARTHED.

Free extended 2 year warranty: Requires registration at www.rhopointinstruments.com within 28 days of purchase. Without registration, 1 year standard warranty applies.

Calibration and service: Fast and economic service via our global network of accredited calibration and service centres. Please visit www.rhopointinstruments.com for detailed information.

From Datasheet: 0852-03

Accessories

The MFFT is supplied complete with the following:

- MFFT instrument
- Mains cables
- Air connector
- Water connectors
- Cube applicator 75m x 1" cube
- Quantity desiccant
- Quantity indicator crystals
- Five hypodermic type dispensers
- Spare fuses
- Instructions

Optional Extras:

- Additional cube applicators
- Re-circulating water unit

About the MFFT

The “minimum film forming temperature” has been described as “the minimum temperature at which a water borne synthetic latex or emulsion will coalesce when laid on a substrate as a thin film. When this process occurs, in the absence of pigmentation or other opacifying materials, a clear transparent film is formed. At lower temperatures than the minimum, a white, powdery, cracked film will result”.

The minimum film forming temperature is usually closely related to the glass transition temperature (Tg) but not synonymous with it; whilst the Tg may be determined by predicted calculation, the minimumfilm forming temperature is best determined by the use of a MFFT Bar, the basic principles of which aredescribed in ASTM D2354. Early instruments were usually cumbersome, inaccurate and slow to achieve equilibrium.

Principle of operation

A nickel plated copper platen is electronically cooled at one end and warmed at the other end. Air or nitrogen is caused to flow over the surface, from cool end to warm end as a uniform blanket. To achieve the required degree of uniformity the air or gas is delivered via a carefully designed sintered distribution block; the design is such that freezing does not take place at the inlet.

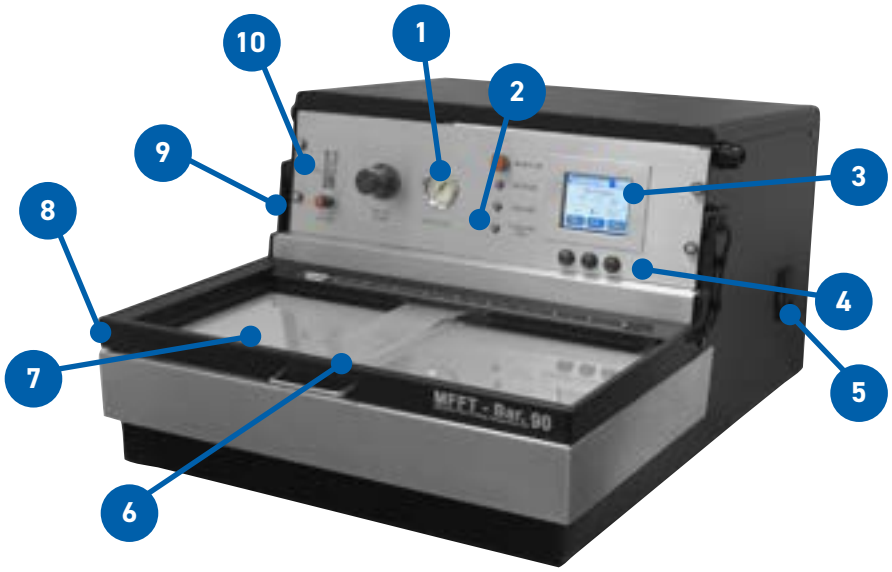
For use with air, a drying system is incorporated into the housing together with a flow controller. The air dryer contains indicator crystals, which are clearly visible in a transparent container. The complete air conditioning system is readily accessible at the side of the instrument.

Water at normal mains pressure removes the excess heat from the coolers. Quick release couplings are provided. Water is normally drawn from a laboratory tap and the outlet is run to drain by gravity. Alarms, both audible and visual are actuated in the event of cooling water supply failure.

Temperature sensors are mounted under the surface of the platen. These are used to control the temperature of the platen in accordance with the chosen range. They are also used in conjunction with the temperature cursor to indicate the platen temperature at the MFFT point.

A hinged clear plastic cover over the platen provides thermal insulation whilst allowing visual inspection of the determination as it progresses. The transparent temperature cursor is mounted on the cover to identify the exact film forming temperature.

Labelled image / Functional Overview



Label No.	Function
1	Pressure valve and dial
2	Mains on and indicator lamps
3	Operating screen
4	Test buttons
5	Mains input
6	Position slider
7	Test plate
8	Air drying crystals
9	Air/water input
10	Flow rate

Set-up

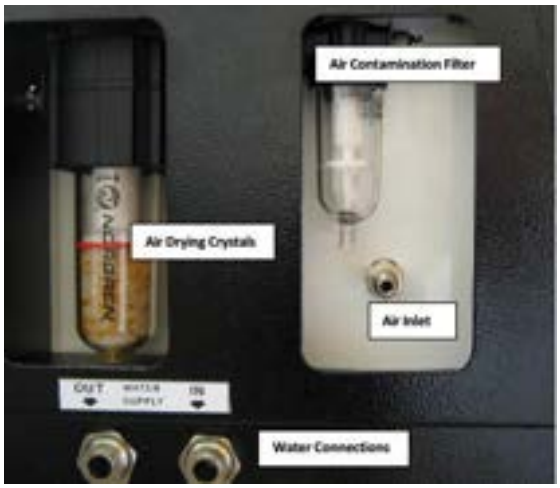
Set time and date / Adjust calibration

When powering up the instrument press and hold all three buttons on the front of the instrument to adjust time and date settings/ calibration constants. Contact authorised Rhopoint Instruments Agent for more information about instrument calibration.

⚠ CALIBRATION SHOULD ONLY BE ATTEMPTED BY AUTHORISED CALIBRATION PERSONNEL.

Operating instructions

- Check that the platen is clean and free from grease
- Check that air dryer indicator crystals are orange. If green, change crystals; unscrew transparent container, empty refill with activated alumina and gel indicating crystals. Spare air-drying crystals are supplied with the instrument. Additional parts are available from Rhopoint
- Connect airline via coupler on right hand side of air control panel



When powering up the instrument press and hold all three buttons on the front of the instrument to adjust it

- Connect cold mains water and gravity water drain

⚠ ONLY MAINS OR DE-IONISED WATER CAN BE USED AS A COOLING FLUID.

If using a recirculating water chiller please see the Anex of this document for connection details.

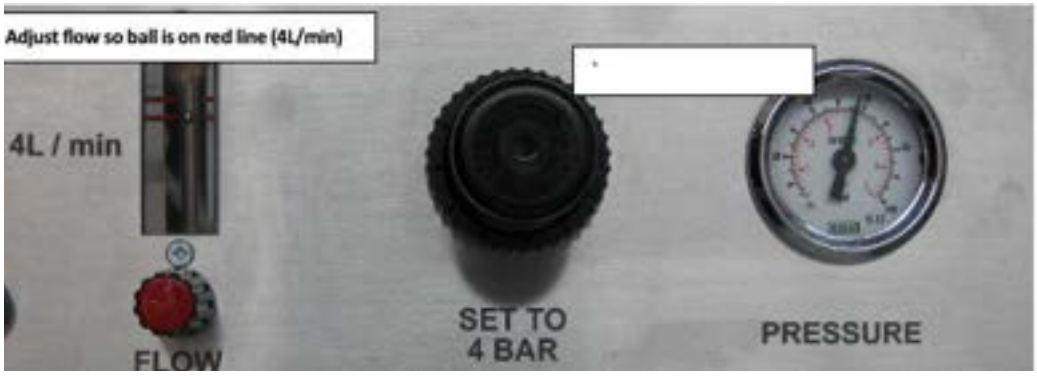
- Water in is right spigot, left spigot is Water out



- Ensure the cover on the test plate is closed
- Turn on the mains water supply

⚠ DO NOT RESTRICT THE FLOW OF WATER THROUGH THE INSTRUMENT AS THIS CAN LEAD TO FAILURE OF THE COOLING CELLS. THE INSTRUMENT HAS A BUILT-IN PRESSURE REGULATOR AND WATER VALVE TO REDUCE WASTE WATER. IF WATER CONSUMPTION IS A CONCERN, A RECIRCULATING CHILLER IS AVAILABLE.

- Turn on air supply. Use the black valve to adjust the pressure to 4bar. To adjust the pressure, pull the black knob out and then twist. Once the desired pressure is obtained push the knob back in to lock in position
- Flow rate should be set to 4 litres/minute using flow indicator. Use the flow rate adjust valve to set the float between the two red lines



- Plug in mains 240V 50Hz or 115V 60Hz dependent on model

- Switch the unit on by pressing the MAINS ON button



- The unit will power up, the first screen details the serial number and firmware loaded onto the MFFT instrument. Press the next button to progress to the main operating screen
- Use the up and down buttons to or the buttons below the screen to select desired temperature range. Press next to start the temperature stabilization process



Use up and down buttons to select range



Wait for instrument to stabilise



An audible "chirp" will indicate readiness

- Instrument will indicate when equilibrium is reached; an audible "chirp" will sound. **<Ready>** button is available. Press the **<Ready>** button.

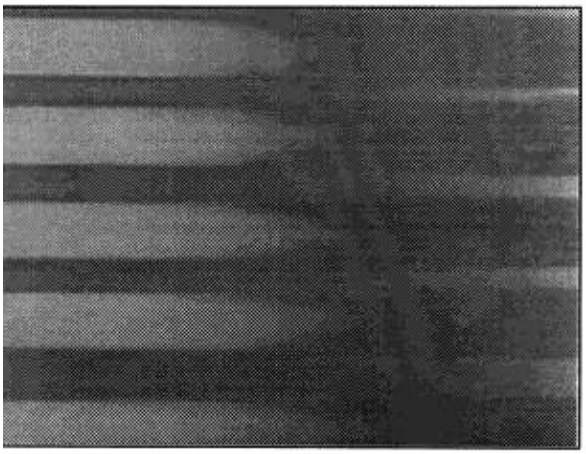
Performing a test

- Apply emulsion using 75 micron cube applicator from warm end right to cold end left, or in U-Shaped form starting and finishing right hand side



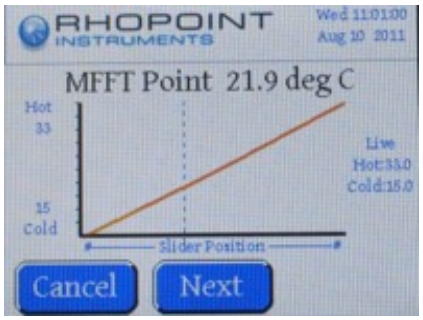
- It is useful to apply a control strip using emulsion of known MFFT. Up to 10 single tracks can be applied
- All coatings should be applied within ten minutes. If there is a delay in applying a track, close the cover to prevent ice formation, reopening the cover as soon as the next coating material is ready
- The use of several applicators is recommended if more than one emulsion is to be applied. Pre-fill hypodermic type dispensers with emulsion to further reduce preparation time
- Close the Perspex cover
- Periodically check the films, film formation time depends on temperature but all films should be formed in approximately 1 hour
- When films have formed (see illustration) set the temperature cursor to read point on track where the film has coalesced over 90% of the track width





MFFT point indicated on five identical films.

- Press next to show a results summary page



Move the slider to the MFFT point



Print optional results label



Pigmented Emulsions

The MFFT bar is sometimes used for tests on pigmented emulsion, where the MFFT determination is more difficult because there is no clearly defined change in “colour” of the coalesced film.

There is, however, a slight change in the shininess of the surface and using a wooden spatula, lightly scraped on the surface, it is easy to define where the coalesced film stops and where the remaining film is poorly integrated and heavily cracked with very poor adhesion.

Cleaning

- Immediately after use the platen should be cleaned; the most common method is to use a diluted detergent applied with a soft cloth
- Solvents to the particular coating can be used
- Some users apply the coatings to self-adhesive plastic tape or film which has been laid on the platen.

The temperature error due to the intervening layer is said to be about 0.1 °C. Cleaning is accomplished very quickly the method commends itself when the MFFT bar is used for production control

- Other users lay aluminium foil over the platen before testing. A few drops of glycerine placed between the foil and platen ensure good thermodynamic contact and allow the foil to be smoothed out evenly

Replacing Fuses

- The MFFT is protected from drawing too much current by two fuses, situated in a compartment above the mains input
- With the instrument unplugged, use a tool such as a flat head screwdriver to open the compartment. There are two fuse holders with white arrows on to indicate the direction. Slide these out, and test the fuses with a multimeter
- If the fuses have blown, replace them with the spares provided
- If the instrument still does not power up, or the fuses blow again, please contact your supplier for support.

Troubleshooting

A loud alarm is emitted from the instrument and the screen flashes	• The instrument has overheated. There are two overheat sensors on the MFFT instrument. Turn off the MFFT instrument. Check that the coolant water supply is turned on and that the used water is free to drain. • If using a chiller check that there are no air locks in the system. • Once the instrument has cooled back to normal operating temperature it can be used again as normal. If the problem persists contact your local service centre.
A chirping alarm is emitted from the instrument	• The instrument has failed to reach temperature within the normal time period. Turn off the MFFT instrument. Check that the coolant water supply is turned on and that the used water is free to drain. If using a chiller check that there are no air locks in the system.
There is frost on the test plate	• Check that the air supply is connected and that it is adjusted to 4l per min. • Check that the drying crystals are not saturated. There are indicator crystals for visual checking.
The temperature will not stabilise	• Check that the water temperature is cool enough to achieve the desired range. If using range 0 then the coolant temperature needs to be less then 10deg C. • Check that the mains supply to the instrument has a good earth. The MFFT instrument must be used with an earthed supply.
The results printer is not working	• The printer must be purchased from Rhopoint. It is loaded with the correct templates and settings to work with your MFFT instrument. • Check the unit is on and that the correct consumables are loaded. For further trouble shooting please refer to the printer manual.
The instrument will not power on	• Refer to the section, replacing fuses.
The time and date is wrong	• Refer to section, SET TIME AND DATE/ ADJUST CALIBRATION (p8) to adjust the time and date.
The touch screen does not respond	• Refer to section, SET TIME AND DATE/ ADJUST CALIBRATION (p8) to re-calibrate the touch screen.

EcoMini Chiller Installation Proceduce

- Refer to the EcoMini manual for general installation instructions
- The below will guide you through the installation of the EcoMini to the MFFT instrument
- For best performance, the chiller should be installed on the same bench as the MFFT instrument
- Remove 2x plastic bolts blocking the inlet and outlet connectors on the front panel of the chiller.



- Connect 2x fluid line (supplied with chiller) they are push fit
- Red hose should be connecter to the outlet connector and blue to inlet



• Connect other end of the hoses to the Water Supply connectors on the left had side of the MFFT.
Red hose should be connected to IN and blue to OUT connector.



Chiller filling procedure

Remove the cap from the tank lid on the top of the chiller

• Fill the tank to leave 10-20mm (0.4-0.8”) of air between water line and where the lid seals. It is recommended that the chiller is used with deionized water

Turn your attention to the power inlet rocker switch on the back of the chiller

• Immediately after switching this on, the chiller will begin to pump water

Turn on the MFFT instrument and set the operating range to 1

• Leave the chiller running until the water line drops to just above the lower outlet port, then turn it off, this may take a few minutes as the valve inside the MFFT needs to open. The water is able to flow freely and there is air in the system. When the water level drops turn off the chiller. Refill the tank back to original level, repeat until the level no longer drops when the pump is run

Start the chiller by once again toggling the mains inlet rocker switch on the back of the chiller

• Leave the cap off the tank for >30mins to allow air to escape, or very loosely screwed on to prevent water splashing out of the tank

Check the application and tubing for signs of leaks whilst the chiller is running

- Replace the tank lid fully when satisfied the system is full and bled of air

Adjusting the temperature set-point

- Press the key P then release it and the display will show **"SP"**



- Alternating with the set value. To change it press the UP key to increase the value or DOWN to decrease it. The set point for use with the Rhopoint MFFT should be **+10deg C**
- The speed dial controls the duty of the compressor within the chiller. This directly translates to how hard the chiller works at cooling. For operation with the MFFT **set the dial to 8**



RHOPOINT INSTRUMENTS

Certificate of Conformity

This is to certify that device known as

Rhopoint-Hanatek
Minimum Film Forming Temperature - MFFT

has been tested and found to satisfy and comply with the
CE Marking requirements of the relevant parts and portions
of the specifications listed below.

Tested By:



Marc Dekenah (on behalf of Rhopoint Instruments) Date: 27 February 2012

Accepted and Logged By:



Tony Burrows (Managing Director, Rhopoint Instruments) Date: 23 January 2014

BS EN 61010-1:2010 Clause 6
BS EN 61000-4-2:2009
BS EN 61000-6-3:2007
BS EN 61000-6-1:2007

CE

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EU Directive 2002/96/EC on WEEE (Waste Electrical & Electronic Equipment) and RoHS (Restriction of the use of certain Hazardous Substances).

The European Union's Directive on Restriction of the use of certain Hazardous Substances in electrical and electronic equipment (ROHS) defines each of 10 categories of electrical and electronic equipment in Annex I.

Category 9 is defined as follows:

- Monitoring and control instrument
- Smoke detector
- Heating regulators
- Thermostats
- Measuring, weighing, or adjusting appliances for household or as laboratory equipment
- Other monitoring and control instruments used in industrial installations (e.g. in control panels)

The RoHS Directive defines the scope of restrictions in Article 2 as follows:

"1. Without prejudice to Article 6, this Directive shall apply to electrical and electronic equipment falling under the categories I, 2, 3, 4, 5, 6, 7 and 10 set out in Annex IA to Directive No 2002/96/EC (WEEE) and to electric light bulbs, and luminaires in households."

This product is supplied as a Monitoring and Control instrument and as such falls within category 9 of the EU directive 2002/96/EC and so is excluded from restrictions under the scope of the RoHS Directive.

The Waste Electrical and Electronic Equipment Directive is intended to reduce the amount of harmful substances that are added to the environment by the inappropriate disposal of these products through municipal waste.

Some of the materials contained in electrical and electronic products can damage the environment and are potentially hazardous to human health; for this reason the products are marked with the crossed out wheelie bin symbol which indicates that they must not be disposed of via unsorted municipal waste.

Rhopoint Instruments Ltd have arranged a means for our customers to have products that have reached the end of their useful life safely recycled. We encourage all end users to us at the end of the product's life to return their purchase to as for recycling as per Article 9 of the WEEE Directive.

Please contact us on +44 (0) 1424-739622 and we will advise on the process for returning these waste products so we can all contribute to the safe recycling of these materials.

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