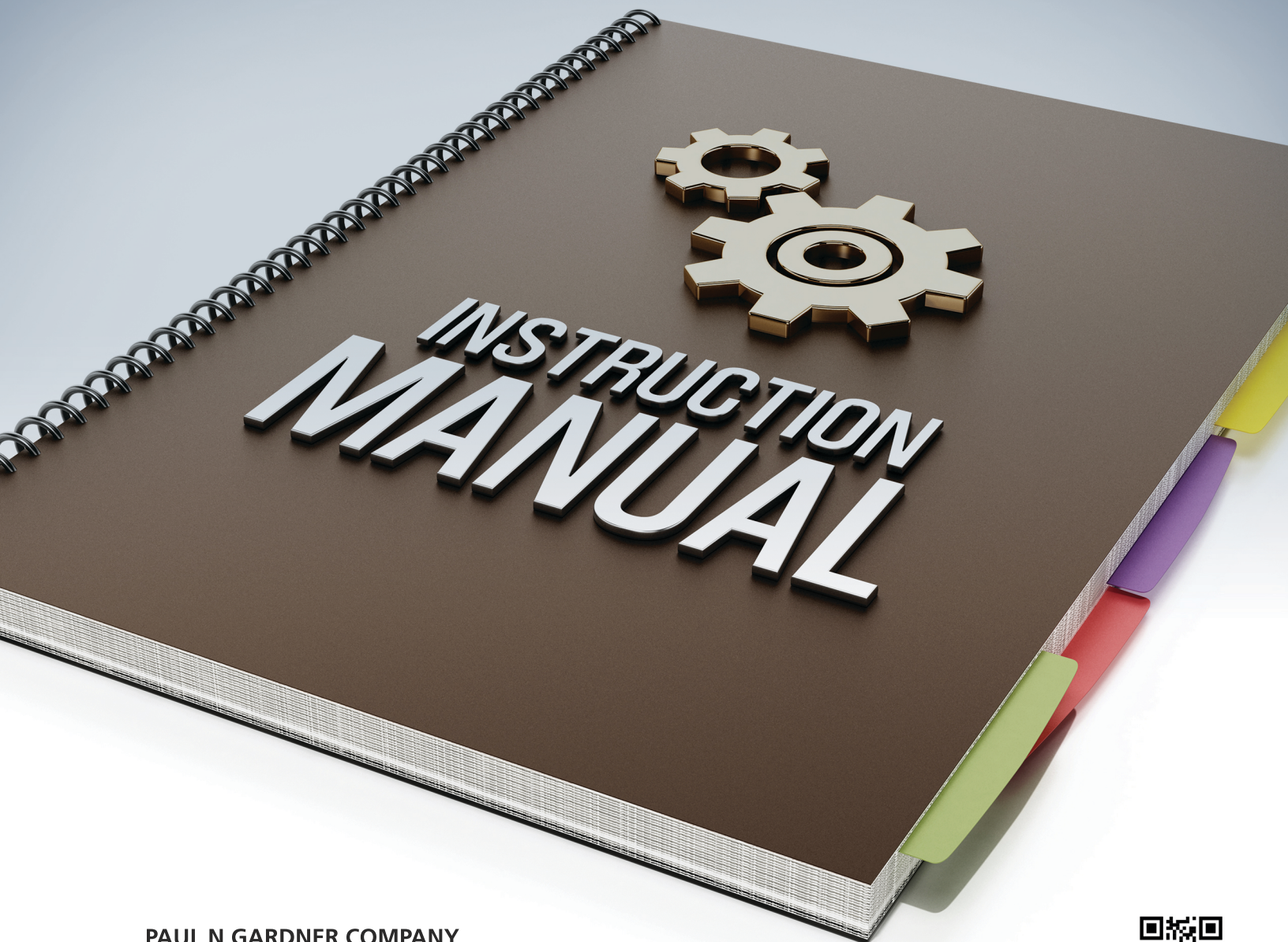




PAUL N GARDNER COMPANY
9104 GUILFORD ROAD, SUITE H
COLUMBIA, MD 21046 USA

EMAIL GARDCO@ALTANA.COM
PHONE +1-954-946-9454



INSTRUCTIONS

GARDCO DISTRIBUTED PRODUCTS



MINIMUM FILM FORMING TEMPERATURE BAR MFFT BAR II

Instrument Manual



MFFT BAR II Operation Manual

DRD1212-380 Revision J

September 2015

Table of Contents

SPECIFICATION.....1

SERVICES REQUIRED.....1

ACCESSORIES.....2

MINIMUM FILM FORMING TEMPERATURE BAR MFFT BAR II.....3

OPERATING INSTRUCTIONS.....5

TESTING INSTRUCTIONS.....5

PIGMENTED EMULSIONS.....8

CLEANING.....10

SPECIFICATION

Platen:	Copper, dull, nickel plated (other options available)
Platen Dimensions:	483mm x 235mm
Parallel Tracks:	Using 1" cube applicator (maximum 10)
Weight:	38kg (85lb)
Dimensions:	550mm wide x 350mm high x 610mm deep
Temperature:	Digital readout of temperature
Resolution:	0.1°C
Accuracy:	(-10°C to +70°C +/-0.1%) (70°C to 90°C -2.2%+0.3%)
Interface:	LED touch screen, temperature cursor
Output:	Optional results printer
Indication:	LED indicators – heating, cooling, coolant failure
Alarms:	Audible and visual for water flow failure

SERVICES REQUIRED

WARNING: THIS INSTRUMENT MUST BE EARTHED

Mains:

220 – 240 volts AC

110 – 120 volts AC

Air:

4 litres/min at 100 psi

Water:

Normal mains supply or recirculation unit

Water Temperature:

16°C maximum for lowest temperature range operation

Water Drain:

Gravity

ACCESSORIES

The MFFT BAR II is supplied with the following:

- MFFT BAR II Instrument
- Mains cable
- Air connector
- Water connectors
- Cube applicator 75µm x 1" cube
- Quantity – desiccant
- Five hypodermic type dispensers
- Spare fuses
- Instruction manual

OPTIONAL EXTRAS

- Additional cube applicators
- Re-circulating water unit

MINIMUM FILM FORMING TEMPERATURE MFFT BAR II

The “minimum film forming temperature bar” has been described as “the minimum 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 (T_g) but not synonymous with it; whilst the T_g may be determined by the use of a MFFT Bar II, the basic principles of which are described 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 so indicate the platen temperature at the MVVT point.

A hinged Perspex 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.

OPERATING RANGES

BASIC RANGES MTTF-60 AND MFFT-90

MFFT-60 MFFT 90	Operating Temperature °C						
	Range 0	Range 1	Range 2	Range 3	Ranger 4	Range 5	Range6
Cool End	-10	-5	0	+5	+15	+23	+33
Warm End	+8	+13	+18	+23	+33	+50	+60

ADDITIONAL RANGES MFFT-90

MFFT-90	Operating Temperature °C		
	Range 7	Range 8	Ranger 9
Cool End	+43	+53	+63
Warm End	+70	+80	+90

SET TIME AND DATE / ADJUST CALIBRATION

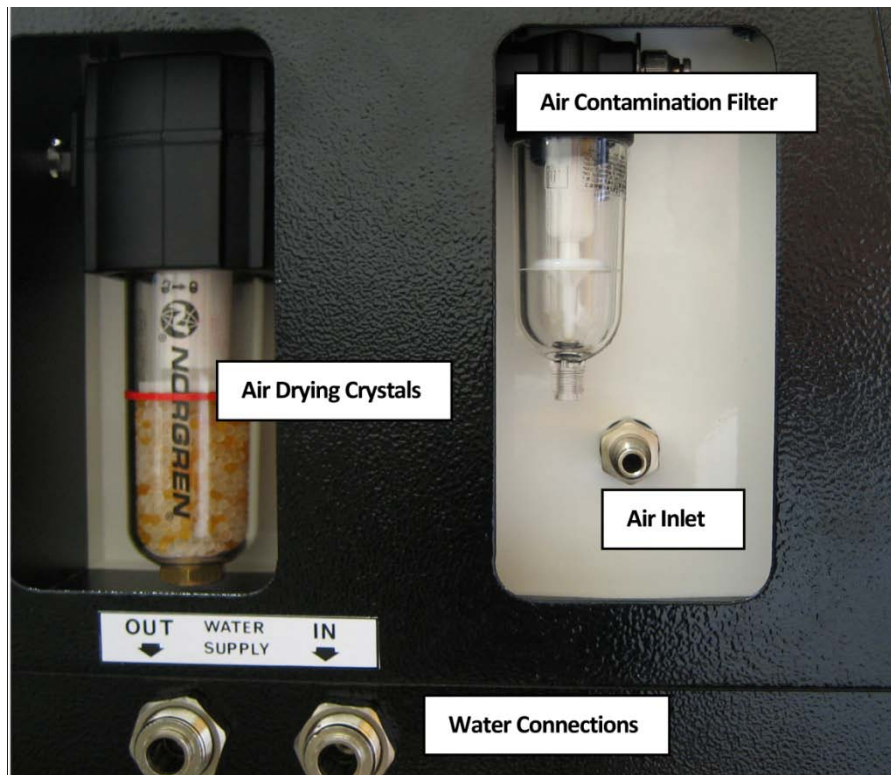
When powering up the instrument press and hold all three buttons on the front of the instrument to adjust the time and date settings / calibration constants.

Contact authorized Rhopoint Instrument Agent for more information about instrument calibration

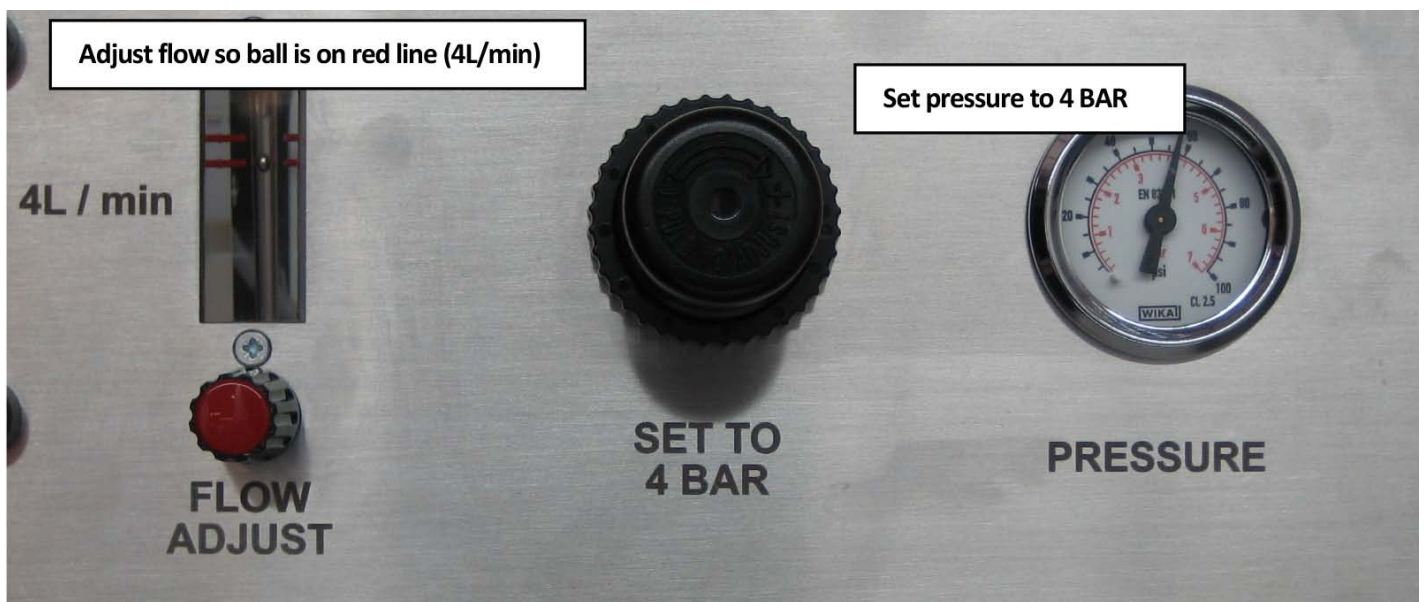
WARNING – CALIBRATION SHOULD ONLY BE ATTEMPTED BY AUTHORIZED CALIBRATION PERSONNEL. FAILURE TO ADHERE TO CALIBRATION ROUTINE MAY RESULT IN ERRONEOUS READINGS.

OPERATING INSTRUCTIONS

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



- Connect cold mains water and gravity water drain.
- WATER IN is right spigot, left spigot is WATER OUT.
- Close cover.
- Turn on water. A water valve ensures water only flows when cooling lamp is ON.
- Turn on air supply. Flow rate should be set to 4 litres/minute using flow indicator.



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

- Switch desired temperature range on touch screen.



Use up and down buttons to select range.



Wait for instrument to stabilise.

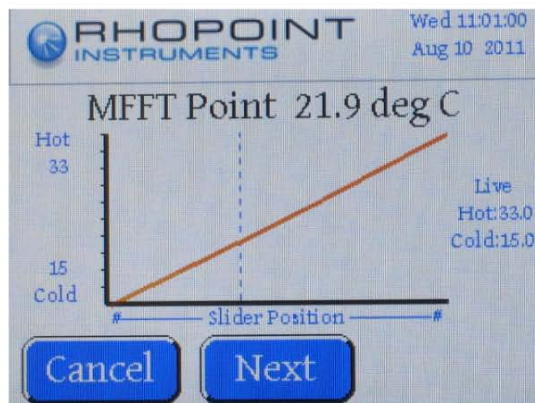


An audible "chirp" will indicate readiness.

- The touch screen will indicate when equilibrium is reached; an audible "chirp" will sound.

TESTING INSTRUCTIONS

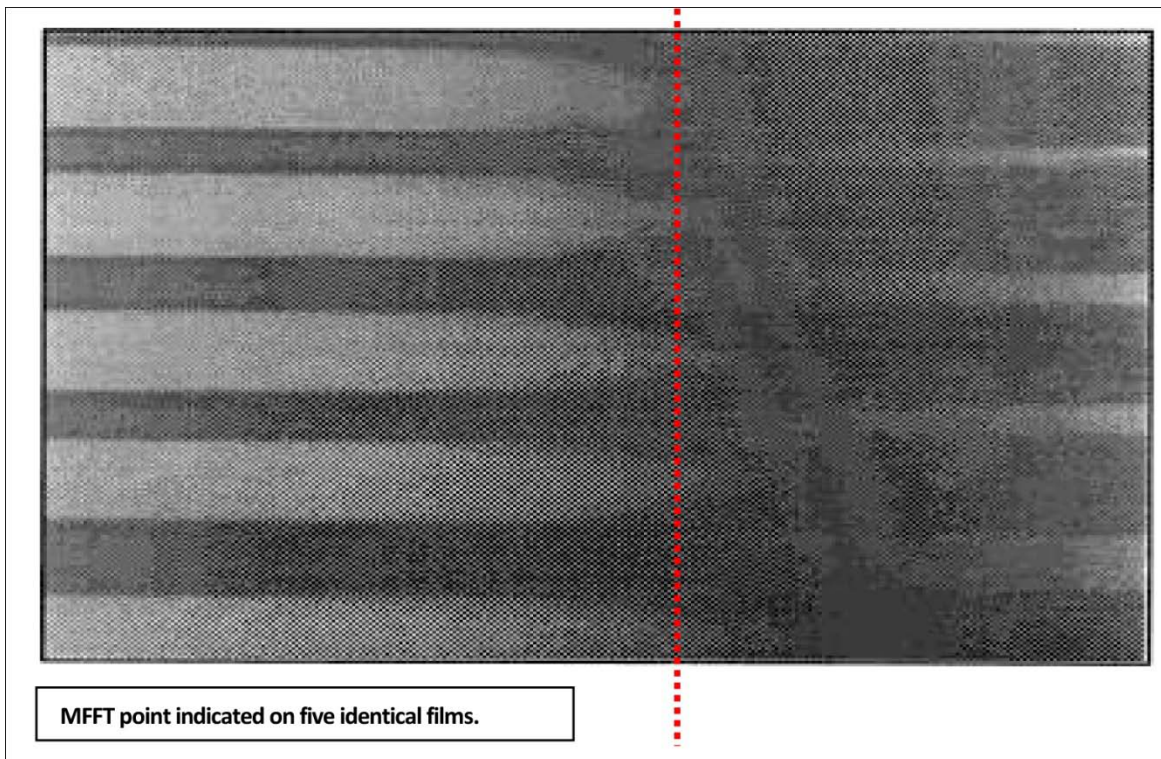
- Apply emulsion using 75 micron cube applicator from warm end right to cold end left, or in U-shaped form starting and finishing right hand side.
- Apply control strip using emulsion of known MFFT. Up to 10 single tracks can be applied.
- All coatings should be applied within ten minutes. If there is a delay in applying a track, close the cover to prevent ice formations, 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.



Move the slider to the MFFT point.



Print optional results label.



PIGMENTED EMULSIONS

The MFFT Bar II is sometimes used for tests on pigmented emulsion, where the MFFT determination is more difficult because there is no clearly defined change in “color” 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 nylon scouring pad.
- 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 II is used for production control.
- Other users lay aluminum foil over the platen before testing. A few drops of glycerin placed between the foil and the platen ensure good thermodynamic contact and allow the foil to be smoothed out evenly.

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 the 10 categories electrical and electronic equipment in Annex I. Category 9 is defines as follows

- 9. Monitoring and control instruments
 - Smoke detector
 - Heating regulators
 - Thermostats
 - Measuring, weighing, or adjusting appliances for household or as laborator 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 1,2,3,4,5,6,7 and 10 set out in Annex IA to Directive No 2002/96/EC (WEEE) and to electric light bulbs, and luminaries 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.

Paul N. Gardner Company, Inc have reached 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 use 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 is at 1 (800) 762-2478 and we will advise on the process for returning these waste products so we can all contribute to the safe recycling of these materials.

