

Tinius Olsen MP 600 Melt Indexer

Location of Machine: Composites Lab, RFM 1218

Location of SOP and Machine Operating & Safety Manual: Composites Lab website under resources; Composites Lab TRACS site; and Hardcopy near machine.

Emergency Contact:

- Call 911
- Call EHS & Risk Management at 512-245-3616
- Call Head Lab Technician, Dr. Ray Cook (office 512-245-2050)
- Call Dr. Jitendra S Tate (office 512-245-4872)

Before using this machine:

- You must have permission from Dr. Tate.
- You must have received formal training from technician or, trained research student (designated by Dr. Tate) related to machine safety and operation.
- You must read and understand **SOP**.
- You must use this machine under direct supervision of Dr. Tate or, Dr. Cook or, trained research student (designated by Dr. Tate).
- You must have signed “Lab Rules” document with Dr. Tate. This document must be signed every semester fall, spring, and summer (as applicable).
- If you do NOT follow above instructions you will be held responsible for your own safety and damages.

Safety Precautions:

Protective Equipment: Prior to performing this procedure, the following personal protective equipment must be obtained and ready for use: **Heat Gloves, Respirator Mask, Safety Goggles, and Lab Coat.**

Important Safeguards:

1. Accidental Spill: (In the event that a hazardous material spills during this procedure, be prepared to execute the following emergency procedure) **Clean with cleaner according to MSDS of material used**



General information

The MP600 is an advanced melt indexing system that allows easy, modular upgrading from its basic capabilities with accessory packages for more automated testing, including control of multiple units from a single PC and automatic flow rate measurements using up to three different loads in one test. All testing hardware is fully complemented by Tinius Olsen developed software that turns your hardware into a sophisticated quality analysis system.

- Conforms to ASTM 1238, D3364, ISO 1133, BS 2782, DIN 53735, JIS K7210 and other similar methods
- Building Block Approach means units are easily upgraded

The basic MP600 Extrusion Plastometer includes the operating tools, piston rod and orifices as standard equipment. Add weights as required and you are set for Procedure A type tests. Weights and reference thermometers are available for all standard and custom applications. Corrosion resistant components are available for testing fluoroplastic resins and fluorocarbon plastics.

The MP 600 microprocessor-based Controller/Timer is fully interactive with the operator. It features the latest digital technology, membrane keypad, high visibility 4-line vacuum fluorescent display, serial communications port, non-volatile memory for calibration and test parameter storage (with power-up in last used program), indicating LEDs, integral audio alarm, and other related features.

For more automated tests add the PPDT-600 Automatic Timing Switch for Procedure B - Automatically Timed Flow Rate-type tests and/or any of the other efficiency-boosting accessory packages for even greater automation.

In all cases the menu-driven user interface of the MP 600 Controller/Timer guides the operator through the test and calculates and displays the test results. And, its serial communications port, which is provided as standard, allows interfacing to a printer for test report generation or to a computer using Melt Flow for Windows software.

Specifications:

Conformance: ASTM D1238 and D3364, ISO 1133, BS 2782, DIN 53735, JIS K7210, and other similar methods

Operating Temperature: 450 C maximum

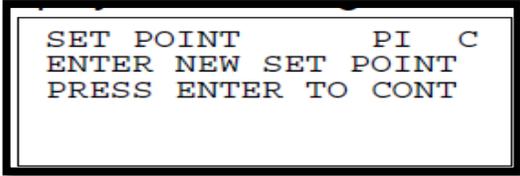
Temperature Control: ±0.1C

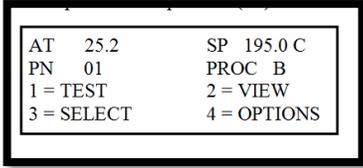
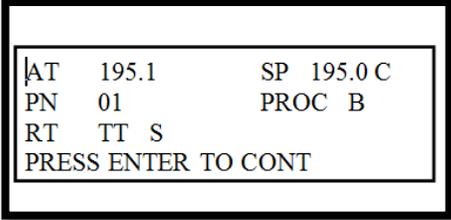
Weights: Stainless steels, ±0.5% tolerance

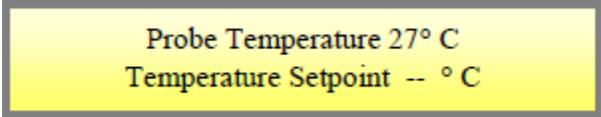
Overall Dimensions: 51 cm (20 in.) wide x 38 cm (15 in.) deep x 58 cm

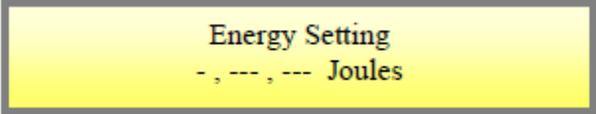
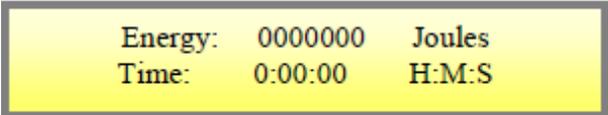
(24 in.) high for basic unit or 95 cm

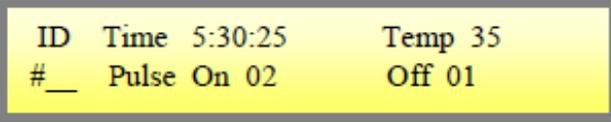
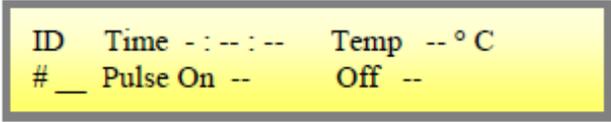
(38 in.) high for motorized unit

Operation Procedure according to ASTM D1238	
Introduction	
<ul style="list-style-type: none"> a. Study ASTM 1238. Copy of the standard is available through Library’s data base or printed copy in the lab b. Find or measure density of polymer in grams per cubic centimeter c. Obtain polymer to be tested and measure its weight 	
<ul style="list-style-type: none"> 1. Configuring MP600 Controller for Procedure B Testing 2. Turn on the unit <ul style="list-style-type: none"> a. MP600 will prompt to “ENTER NEW SET POINT”. Screen will display like this. 3. Use numeric keys to enter the desired test temperature 4. Press [ENTER] key 5. When MP600 prompts to enter the “TOP OFFSET”, enter the TOP calibration offset for the above entered test temperature. <ul style="list-style-type: none"> a. Refer to the MP600 Configuration/Calibration Setting Worksheet or refer the last page of the SOP 6. Press [ENTER] key 7. Display will prompt to enter 	

<p>“BOTTOM OFFSET”, enter the TOP calibration offset for the above entered test temperature.</p> <ol style="list-style-type: none"> a. Refer to the MP600 Configuration/Calibration Setting Worksheet or refer the last page of the SOP <p>8. Press [ENTER] key</p>	
<p>9. Idle Screen will appear, similar to the one shown here and MP600 will then begin to ramp the temperature up to Set Temperature (SP)</p> <ol style="list-style-type: none"> a. Actual Temperature (AT) and Program Number (PN) to the left b. Set Temperature (SP) and Test Type to the right. 	
<p>10. Once the temperature has stabilized at the ST, remove the orifice and thoroughly clean the inside of the cylinder and orifice.</p> <p>11. Insert the orifice into the cylinder</p> <p>12. Check that the piston rod assembly is clean and that the guide collar slides freely along the piston rod. Clean as needed and insert the piston into the cylinder.</p> <p>13. Allow machine to stabilize at the ST</p> <p>14. Press the [1] “Test” key</p> <ol style="list-style-type: none"> a. Test Mode Screen, similar to one here, will be displayed 	
<p>15. Press [ENTER] key</p> <p>16. MP600 will then prompt to enter “LOAD”. Use the numeric keys to enter the total test load in kilograms and press [ENTER]. Screen will display like this:</p>	

<p>17. MP600 will then prompt to enter “Cut-Off interval time”. Enter time according to ASTM standards. Screen will display like this:</p>	
<p>18. MP600 will then prompt to enter the “MELT DEN” (Melt Density). Use the numeric keys to enter the Melt Density of the resin in grams per cubic centimeter and press [ENTER] [If you want to calculate MFI in instrument itself.]</p> <p>19. MP600 then will prompt to enter the “Piston Travel – Cap (Capture) 1”. ASTM D1238 requires a piston travel of 6.35 mm for material with expected flow rates of up to 10 grams/minutes and 25.4 mm for higher flow rate materials. Use the numeric keys to enter the appropriate piston travel and press [ENTER].</p> <p>20. MP600 will then prompt to enter the “Release Time”. The release time is actually the preheat time. ASTM D1238 requires 7 +/- 0.5 minutes (can vary for different materials). Enter 420 seconds or other appropriate time.</p> <p>a. DO NOT PRESS [ENTER] AT THIS TIME</p>	
<p>21. Set TEMP. Temperature function prevents overheating of the sample by continuously monitoring the sample temperature. If the temperature must be monitored, then insert the optional temperature probe forcefully into the small jack on the rear panel. Press the TEMP key. Press CLEAR key to clear</p>	

<p>temperature set point displayed. Screen will display.</p>	
<p>22. Set ENERGY. The ultrasonic processor generator continuously monitors the amount of energy in joules that is being delivered to the probe. Press ENERGY key, screen will display.</p>	
<p>23. Using numeric keys, set the energy. Press ENTER key, screen will display.</p>	 <p style="text-align: center;">or</p> 
<p>24. REVIEW. This function provides a window on the process by displaying various parameters without process interruption. Pressing REVIEW/ENTER will consecutively display information that you have already set.</p>	

<p>25. SAVE. This function retains in memory up to 10 control parameters under a storage identification (ID) number. To store the parameters under an ID, press SAVE key. Screen will display:</p> <p>26. Using numeric keys enter ID number. Press SAVE key to store the control parameters under the assigned ID number. The indicator light on SAVE key will go out, and screen will display again the same parameters.</p> <p><u>Note: Energy and Amplitude cannot be saved into memory.</u></p>	
<p>27. RECALL. This function can retrieve from memory; any of the 10 stored control parameters for verification or usage. Press RECALL key, indicator light on it goes on and screen will display.</p> <p>a. Enter ID number, screen will display parameters saved under that ID number.</p>	
<p>28. To review all the information that has been stored, press keys 0 to 9 one at a time.</p> <p>Note: This procedure can be repeated as long as the wattmeter reads less than 20 watts with the probe out of the sample, when the AMPLITUDE control is set at 100. If the wattmeter reads over 20 watts the probe or replacable tip should be</p>	

replaced with a new one	
-------------------------	--

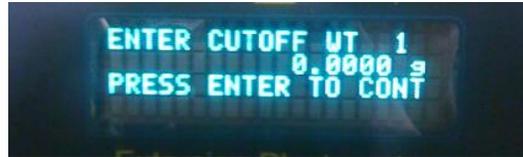
Test Procedure

1. Remove the piston and place it in the tool rack. Verify that the orifice is at the bottom of the cylinder.
2. Press [ENTER]. The display will prompt to enter "LOAD SAMPLE" while indicating "ET" (elapsed time).
3. Charge the cylinder with the material. Refer to ASTM D1238, Table 2, for the amount of polymer to use.
 - a. Insert the funnel into the cylinder
 - b. Slowly pour the material into the funnel
 - c. Tamp the material down with the charging tool
4. Reinsert the piston
 - a. Rotate the PPDT-600 clockwise so that the end of the arm is close to the piston rod
 - b. Place the appropriate weight on the piston
5. Press [ENTER] to start the test. Test Screen, similar to one below, will be displayed. The Elapsed Time (ET) display will reset to zero and begin to count up, in seconds.
 - d. Test can be aborted at any time by pressing the [EXIT] key

Actual Temperature	AT 194.9	SP 195.0 C	Set Temperature (SP)
Captured Time	C1 0.00	ET 0 s	Elapsed Time (ET)
Flow Rate	F RATE	0.000 g/10	
	PISTON HT	87.02 MM	

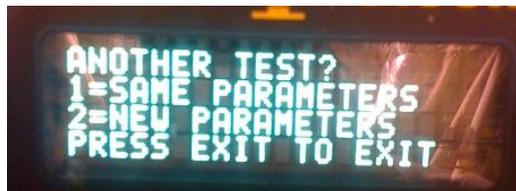
6. When you are not using the piston travel measurement assembly, measure the length of the piston travel manually.
7. When the ET reaches the RT, an alarm will sound
8. As soon as the alarm sounds cut the flow with cutoff tool and collect the extruded sample. This is extruded mass for Cut-Off interval time.
9. After this timer will automatically reset and begin counting for the next cut-off.
10. To reset the timer during the middle of experiment, press START. Otherwise press EXIT when cut-offs have been completed.
11. Then enter the weight of cut-off sample in grams using the numeric keys and press

ENTER key. The display will show the FLOW rate in grams per 10 minutes. Screen will display like this:



12. Allow the remaining material the purge from the cylinder when you finished with your experiment. Thoroughly clean the piston, cylinder and orifice with cleaning tool.

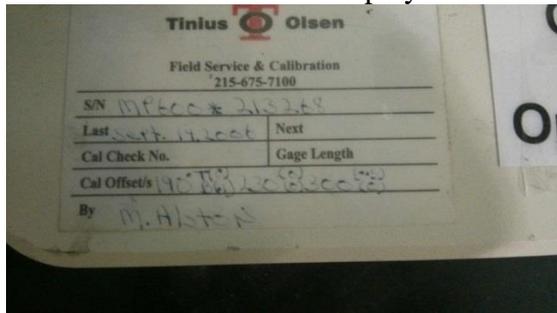
13. To prepare another test, press EXIT . Screen will display like this:



Select [1] if you have proceed with the same parameters. Or Select [2] to enter new parameters. Otherwise press EXIT again to Exit.

“OFFSET” Value

The offset values will be displayed on the left bottom corner of the machine



Temperature ° C	Top offset value	Bottom offset value
190	0	0.1
230	0	0
300	0.5	0

Note

The Piston foot may break when it is not screwed in to the piston rod properly (tight)

