

## Solder Paste Softeners – SPS-x



Unlike hand mixing, the *Malcom SPS Solder Paste Mixer* is a non contaminating mixer which utilizes pseudo planetary motion to stir the solder paste. The SPS-1 provides uniform paste consistency regardless of operator skill. The paste temperature rises due to friction, enabling control over the solder paste viscosity. Now a solder paste can be pulled from the refrigerator and ready on the stencil, in less than 15 minutes!

The SPS employs a pseudo-planetary motion whereas the solder paste container rotates slowly at the end of an arm which spins rapidly. The resulting centrifuge force causes the solder paste within the container to repeatedly fold over itself, thereby mixing and softening itself.

There are three models available:

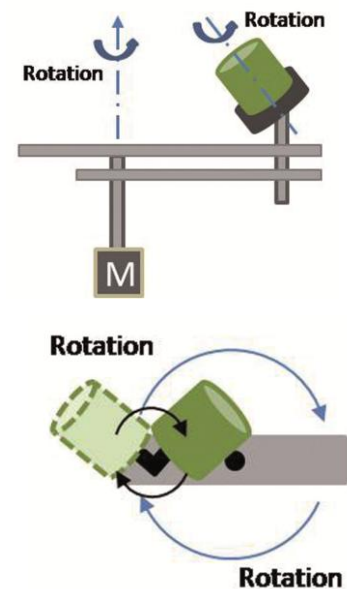
- SPS-1: Single paste jar softener
- SPS-2: Dual paste jar softener
- SPS-5: Dual paste cartridge softener

### FEATURES & BENEFITS

- Uses airtight containers so oxidation and humidity are no longer a concern.
- Automated operation assures gentle softening, and unlike hand mixing, provides even consistency.
- From refrigerator to screen printer in less than 15 minutes.
- Centrifuge is self-balancing and has an off balance safety detector.

### SPECIFICATIONS

Mixing method	Pseudo-Planetary Motion
centrifuge stress	under 0.5 kgf/sqcm
Built in timer	Settable from 1 to 99 minutes
Paste temperature rise	0 to 25 C in less than 15 minutes
Paste container sizes	SPS-1: 500g, 1kg, or etc. SPS-2: Up to 1kg SPS-5: Up to 2kg cartridge
Balance	SPS-1: Auto-balancing SPS_2: Dual Jars SPS-5: Dual Cartridge
Safety interlocks	Door switch and lock Unbalanced motion detector
Power	100VAC, 110VAC or 220Vac 30W 50/60Hz
Battery power	Four(4) X AA batteries for Auto-balancer (SPS-1)
Weight	SPS-1: 20kg SPS-2: 20kg SPS-5: 40Kg
Dimensions	SPS-1: 15"(L) X 15"(W) X 15"(H) SPS-2: 15"(L) X 15"(W) X 15"(H) SPS-5: 22"(L) X 22"(W) X 25"(H)



\* Specifications subject to change without notice.

## Viscometers - PCx



PC-10 A



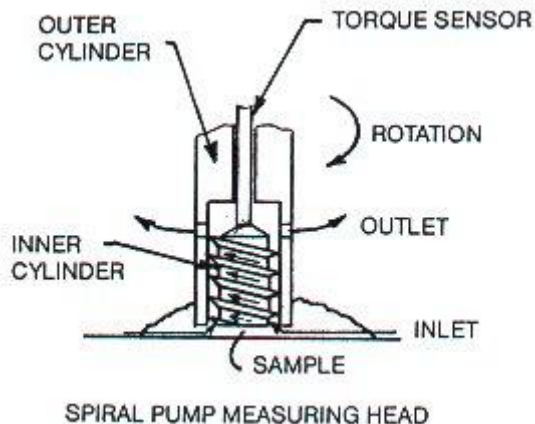
PCU-205

When speaking of solder paste, one parameter that is often discussed is viscosity. Viscosity is important as a paste that is too thick (high viscosity) may lead to a bad print in the form of an insufficient fillet. A paste that is too thin (low viscosity) may lead to the fillet slumping. In order to test that a paste has the proper thickness for optimal printing, the paste's viscosity should be checked with an accurate and repeatable viscometer.

It is important to bear in mind that there are basically two components to solder paste viscosity measurement. They are the static viscosity and dynamic viscosity. Static viscosity is the viscosity of the solder paste as it is dispensed off of a tube or syringe onto a screen printer. The dynamic viscosity, on the other hand gives the variation in the thixotropic behavior of the solder paste during the course of the screen printing process. It is important to know the dynamic viscosity of a paste in order to predict its printing characteristics.

Dynamic viscosity is gained by adding shear to solder paste. Shear is what the solder paste encounters on a screen printer. By understanding how shear affects solder paste viscosity is critical as its understanding may help to limit printing problems.

The Malcom PC-1TL and PCU-200: Spiral Viscometers by design are able to measure not only the static viscosity of solder paste at low rpm, but it can more importantly measure the dynamic viscosity. This is due to the fact that Malcom applies a true shear force onto the solder paste, simulating the forces that act on the paste on a screen printer. By varying the rpm, one can find the shear sensitivity and thixotropic index of the solder paste, something that could not accurately be done with most other viscometers. Thus with a Malcom viscometer, the user can not only measure batch to batch variation, but can also predict how the solder paste will perform on the screen printer.



## Principle of Spiral Viscometers

The Malcom Viscometers utilizes a patented double cylinder spiral pump method. Malcom Viscometers takes the double cylinder method step better. The inner cylinder has spiral flutes making it resemble a screw. It is attached to a torque sensor. The outer cylinder has an inlet scoop and exhaust openings. This rotates at a constant speed. Due to the geometry of the two cylinders, the assembly is a type of pump. When in operation, the paste is scooped into the gap between the cylinders, and slowly the pump speed becomes constant, the length of the flutes are consistent, it follows both the shear rate and shear time are constant. Knowing these two values and the torque enable one to find: the viscosity of the thixotropy, the adhesive force, and the viscoelasticity; properties necessary for proper and successful screen printing.

## Table-Top Spiral Viscometer – PC 10A

### FEATURES & BENEFITS

- Unique spiral-pump design for faster, easier, more accurate viscosity measurement.
- Fixed shear rate and shear time - no complicated calculations required.
- Eliminates multiple measurements and averaging.
- +/- 2% repeatability - not user dependant.
- More consistent than conventional methods.
- Measure a wide range of viscosities and fluids by exchange of 3 different spiral cylinders, including solder paste, adhesives, solder masks, thick-film, etc.
- Analyse data through exclusive software program by USB connection



### Specifications

Model	PC-10 A B or C
Viscosity range	10 – 800 mPa·s depending on spindle type A, B or C
Sample amount	5 - 60 cc
Measuring Accuracy	5% of designated value
Repeatable Accuracy	2%
Measuring Temperature	0 – 100°C (Resolution 0.1°C)
Digital Display	Viscosity, Temperature and RPM
Output	Analog Viscosity, Temperature, Digital RS232C
Power Supply	AC 100V – AC230V

\* Specifications subject to change without notice.

## Laboratory Digital Spiral Viscometer – PCU-20x

### FEATURES & BENEFITS

- Patented spiral-pump sensor provides quick, easy, repeatable measurements.
- Elimination of misprints due to incorrect paste conditions.
- Continuous measurement of newtonian and non-newtonian fluids with constant shear rate and shear time.
- Automatic control of measurement according to JIS standards (PCU-203,205) regardless of operator skill.
- Acquisition of viscosity data for rheological analysis.
- Built in dot matrix printer allows logging of acquired measurements.
- Fully automatic temperature control of sample.
- Satisfies international standards.
- Application includes solder pastes, thick film pastes, solder resists, liquid resists, inks, etc.

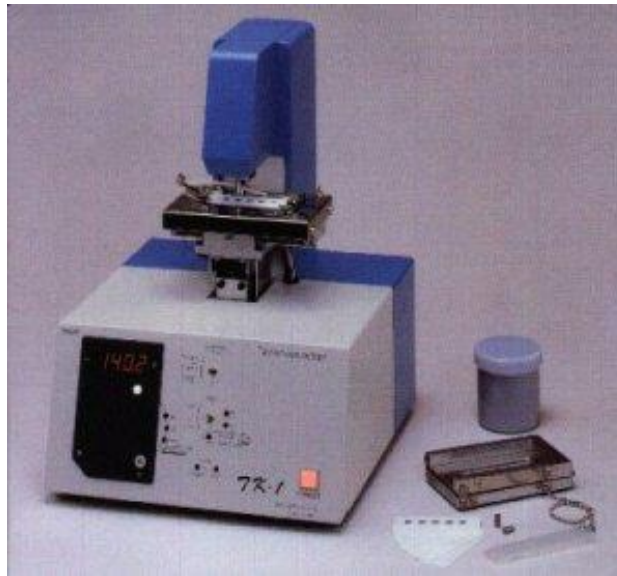


SPECIFICATIONS			
ITEM	SPECIFICATION		
Model number	PCU-201	PCU-203	PCU-205
Sample Size	100cc, 300cc containers (500g, 1500g solder paste)		
Sensor	Malcom spiral-pump type		
Measurement Range	5.0Pa·s-999.9Pa·s		
Speed Range	1-50 RPM		
Shear Rate (sec <sup>-1</sup> )	0.6×RPM		
Measurement Accuracy	±5% of indicated value		
Speed Accuracy	±2% of set point (encoder controlled)		
Repeatability	±0.5%		
Temp. Control Range	15-30°C (±5°C of room temperature)		
Recorder Output	Viscosity : 1mV/Pa·s, Temperature : 10mV/°C		
Printer Displays	Temperature, Viscosity, Shear Rate, RPM, Date, Time	Same as PCU-201, plus JIS Standard	
Automatic Measurement	JIS Standard method		JIS plus On-line method*
Interface	RS-232C		
Power Requirements	100, 110, 220 or 240VAC (50/60Hz), 70VA		

\* Note: The PCU-205 requires a PC-compatible computer and optional on-line software for extended operation.

\* Specifications subject to change without notice.

## Tackiness Tester – TK-1



The Malcom TK-1 Tackiness Tester is widely used to help our customers predict solder paste tack time, limiting the potential for dropped components, using either the IPC, Depth Method, or JIS Standard Test. These three convenient testing methods for tackiness allows you to determine component drop time to loss of adhesion, and thus avoiding costly rework. Tackiness refers to combined force of the cohesion and adhesion. In many cases, chip parts are held on the board by the paste's tackiness during reflow. It is at this time that defects occur from chips falling off the board; or being displaced by the vibration of the chip mounter after some time has elapsed, since printing or when tackiness is reduced by reflow heat.

### FEATURES & BENEFITS

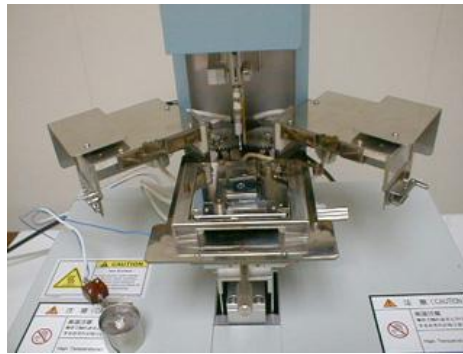
- Quantifies solder-paste tackiness.
- Determines component drop-time, thus reducing costly rework.
- Three testing methods available.
- User-variable measurement conditions (time, preload, depth, and speed).
- Digital display of measured tackiness, real preload, and real insertion depth.
- Online computing capable with included PC software.

### SPECIFICATIONS

Sensor range	0 - 500 gf
Sensor resolution	1 gf
Measurement methods	Continuous preload, JIS Point Preload, IPC Insertion depth
Parameters measured	Tackiness: 0 - 500 gf Preload: 0 - 500 gf Insert depth: 0 - 200 mu meters
Preset ranges	Preload: 20 - 500 gf Time: 0.1 - 99.9 sec Speed: 0.1 - 10.0 mm/sec 0.2 - 9.9 mm/min Depth: 20 - 200 mu meters
Outputs	Analog: 1 gf/10mV Digital: RS-232C
Accessories	Hand printer with 0.2 mm mask test piece, 5.1-mm dia. probe control and data analysis software

\* Specifications subject to change without notice.

## Wetting Tester SP-2



The Malcom SP-2 Wetting Tester helps to test the wettability of solder paste and components while actually simulating the SMT mounting and reflow process. The SP-2 simulates the actual temperature that solder paste undergoes during preheat and reflow, letting you easily identify any deficiencies in flux activity or components wettability. Measurement of the solder paste wettability, components wettability, printed board wettability, wettability on temperature rise, and wettability on preheating time. By actual simulation of the SMT mounting and reflow process with standard variable, it is possible to develop an accurate, repeatable evaluation method to determine a solder paste's solderability.

### FEATURES & BENEFITS

- Qualification / test from wettability of solder paste and optionally from solder wire and wetting force of SMT/THT components, PWB's, also measurement of wetting balance
- Ultra-sensitive detection of the most minute forces.
- Digital displays show load, depth, and temperature.
- Built-in heater's programmable thermoprofile is similar to that of actual reflow oven.
- Built-in heater can also be adjusted to find the optimum reflow profile for maximum wetting of a given solder paste.
- Allows measurement of miniature-sized components.
- The system can also be used for testing the wettability of not only solder paste, but also components and PCB substrate pads.
- The system software allows the user to compare up to six wetting curves at a time.
- Cost reduction via exclusive using qualified paste, components and PWB's
- No / much lower repair and touch up
- All wetting processes can be observed from glass window
- Real reflow oven profiles with hot air and nitrogen can be simulate
- Analyse wetting time and force with special Windows Software
- RS232 Interface with USB-Adapter
- Evaluation of solder paste, component leads and PWB's
- Optional measurement of surface tension, wetting balance, and also wetting force of solder wire
- Optional a "Quick Heating System", Microscope, N<sub>2</sub> Flow Meter and a Video Camera Capture System is available

### Specifications

Sensor Technology	Electro-balance
Sensor Limits	-5.00 gf - +10.00 gf
Sensor accuracy	+/- 0.01 gf for 1 gf range +/- 0.05 gf for 10 gf range
Heater range	Room temperature - 300 degrees C
Heater atmosphere	Room air or N2 purge
Parameters displayed	Load, depth, and temperature
Temperature profile settings	Preheat rate: high, med, low Preheat temp: 0 - 300 C Preheat time: 0 - 300 sec Ramp-up speed: 0 - 4.0 C/sec Melting point: 0 - 300 C
Other presets	Range select: 1gf or 10 gf Table speed: fast, med, slow
Outputs	Digital: RS-232C
Power	115 VAC, 50/60 Hz, 650 W
Accessories	Manual printer with SUS mask Copper substrates and tubes SMT component adapter Microscope Cooling Fan SPIN-2 data analysis software
Option	Meniscograph adapter set

\* Specifications subject to change without notice.



# TMR SYSTEM volume 1

## REFLOW CHECKER SERIES

Malcom Moves you! Total Quality of Reflow Oven Process

Wireless LAN Connection Launch!



**RCR-60** Wireless LAN TRM-System (Total Reflow Monitoring) Profilers

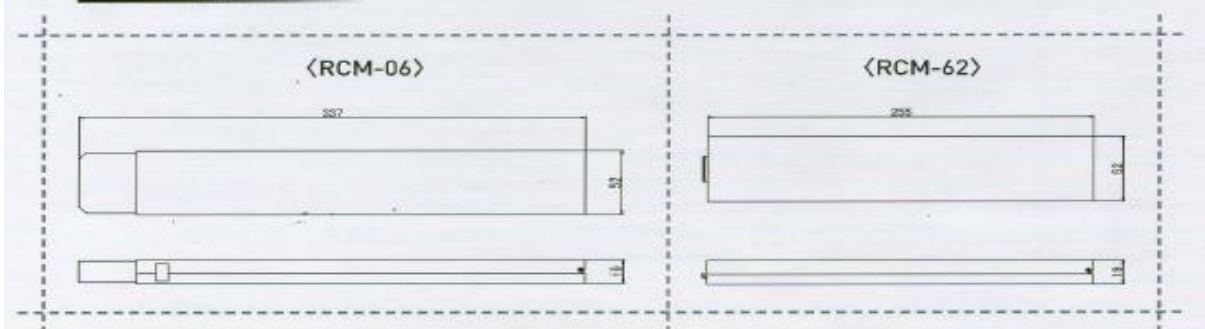
**RCP-600** USB TRM-System Profiler

### Specifications

Model	RCR-60	RCP-600
Memory Unit	RCR-06	RCM-62
Measuring Temp. Range	0~500°C #1	
Max. Measuring Time	Approx. 60 min. #1	Approx. 90 min.
Sampling Time	0.05・0.1・0.2・0.5・1.0・2.0・4.0&8.0(Arbitrary set up possible)	
Temperature Accuracy	±1 °C #2	
Measuring Points	1~6 Points	
Heat Resistant Connector	Miniature Connector	
Input	Thermocouple JIS-K 110 Qmax	
Power Supply	Lithium Polymer Chargeable Battery (from Mini USB-B port of Memory Unit)	
Data Transmission Method	Wireless LAN / USB LAN(IEEE802.11g)	USB
Outer Dimensions (Memory Unit)	W52 × D377 × H19 (mm)	W52 × D255 × H19 (mm)
Weight (Memory Unit)	Approx. 700 g	Approx. 500 g
OS	Windows 2000 / XP	
Conveyor Attachment System	65 ~ 130mm (standard Type)	

\*1 It differs from the warranty value of heatproof. \*2 Thermocouples itself error is excluded.  
\*The above specifications are subject to change without notice.

### Dimensions



## Reflow Simulators RDT and SRS - Series

malcom

Table Top Module Reflow Oven

# RDT SERIES

Easily you can get the temperature profile of Reflow Soldering with Lead Free. By the exclusive software, you can variously set up temperature of each heater, and analyze measuring temperature profile.



SRS-2



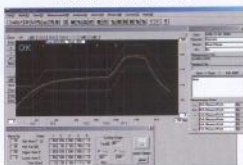
### SPECIFICATIONS

Applicable Circuit Board	Up to 250 (W)×330 (D)×15 (H) mm
Dimension	830 (W)×557 (D)×523 (H) mm 830 (W)×853 (D)×523 (H) (Rapid Cooling Function)
Heating Method	Upper-face : Extreme infrared radiation with hot air Lower-face : Extreme infrared radiation
Cooling Method	Exhaust damper continuous operation by flowing air or N <sub>2</sub> air (with flow adjustable valve)
Power Supply	200V 50/60 Hz 18KVA 3 Phase
Air	0.3~0.5 MPa 100 liter/min. (Maximum)
O <sub>2</sub> Concentration in Furnace (when using N <sub>2</sub> )	100ppm minimum
PCB Installation	Net system or Carrier system (Selectable on request)
Upper-Heater	Extreme infrared radiation heater : 7.2 KW (240W×30 block) Hot air heater : 8 KW (2KW×4)
Lower-Heater	Extreme infrared radiation heater : approx. 2.0 KW (330 W×6)
Temp. Accuracy	Room temp. ~80°C : ±3 °C / 80°C ~330°C : ±2°C
Measurement Temp.	Room temp. ~ 330°C
Measurement Point	6 points
N <sub>2</sub> Gas Supply Function	100 liter/min. with flow regulating valve during operation
Control	Exclusive software <RDT-250S>
Weight	Approx. 110 kg / Approx. 120 kg (Rapid Cooling Function)

### RDT-S & RDT-250S Software

- Receive the data from RDT-1 or RDT-250C in real time and show the temperature profile on PC.
- Easy to check the time and Temperature of the specified point by moving the cursor.
- Can view the specified range as enlarged.
- Display the data "OK" or "NG" by inputting the standard graph.
- Can print out the displayed temperature profile as it is or as processed.

Measurement Profile



Setting for Upper Heater



### VDM-1

#### Video Camera Capture System



Solder Ball

Solder Bridge

### SPECIFICATIONS

#### VDM-1 MAIN UNIT

Image Mixing Function	Black blanking composition, 4-division display, Picture-in-picture
Data Display Position Control	Sets the positions and sizes of time, temp. data and temp. graph freely.
Scale Function	Displays a scale in an image input from the camera A or B to allow the user to measure the length, area etc.
Dimensions	330 (H)×250 (D)×50 (W) mm
Weight	3kg
Power Supply	90 to 250 VAC, 50 or 60 Hz, 1000 W (Fuse : 10 A)

#### CAMERA

TV Method	NTSC method basis
Effective Number of Pixels	768 (H)×494 (V), 380,000 pixels
Power Supply	+12 VDC ±10% Approx. 200 mA

## Paste Print Inspection System – TD-6A



For measuring height, area, volume, and misprinting of printed solder paste.

### FEATURES & BENEFITS

Active Slit-Laser scans the board and displays a full 3D image

Multi-colored LED illuminates using 16 million colors, making it possible to measure various kinds of PC Boards accurately

Gerber data program allows for speedy data inspection

SPC data analysis of the automated measurement data (optional)

### SPECIFICATIONS Inspection:

Inspection Object	Height, Area, Misprinting, Volume (3D image)
Measurement Range	5.85 mm (W), 4.39 mm (D), 50-300 $\mu$ m (H)
Resolution	Approx. 56.2 $\mu$ m
Approval/Rejection Function	Automatically determines if paste meets user-specified standards using color image processing
Inspection Data Testing Method	Teaching, Gerber data conversion program
PCB Dimension	Min.: 50 x 50 mm Max.: 250 x 330 mm Thickness: 0.5 - 3.0 mm
Measurement Range Possible	240 x 320

### Optics:

Light Source 1	Overhead RGB LED (16.77 million colors)
Light Source 2	Angled RGB LED (16.77 million colors)
Light Source 3	Laser
Camera	High-speed & High-resolution color camera
Height Measurement Principle	45° Slit-laser method
Area Measurement Principle	Color image processing
Slit-Laser	Laser: 8 mm (H) x 10 $\mu$ m

### Main Unit:

System	High-speed image processing computer system
Interface	Input: Keyboard, Mouse, Monitor
Power Supply	AC 100-240V 50-60Hz 450VA
Weight	Approx. 45 kg

\* Specifications subject to change without notice.



## Manual Laser Paste Print Inspection System – TD-4M



Easy setting to measurement solders paste printed area for 2D and 3D.

### FEATURES & BENEFITS

- No special tool required.
- Color CCD camera shows clear image.
- Slit laser measures paste print height.
- Computer build in system with flash memory to save data.

### TD-4M system includes:

- Windows operating software with TD-4D system operation software build ,In. 15" LED monitor including.
- SPC Management data software
- 2D, 3D inspection data and graph
- PCB holding bracket.

### SPECIFICATIONS

Measurement	Solder paste print area and height
Measurement range	2mm x 3mm 50-350 $\mu$ m
Measurement resolution	8 $\mu$ m
Measurement data	Teaching 150 locations/p.c.b
P.C.B. size	Min 50mm x 50mm Max 250mm x 300 mm
P.C.B thickness	0.5mm-2.0mm
Measurement source	Class 2 laser, Bright white LED Bright red LED
Camera	1/4-Inch Color CCD
Laser slit	20 $\mu$ m x 10mm

\* Specifications subject to change without notice.

## Solder Impurity Tester – STA-2



Soldering is now lead-free. Reflow soldering quality with solder paste can be maintained by controlling the furnace temperature or determining the temperature profile on condition that the solder paste material is decided and the materials, surface treatment, or surface conditions during storage of parts and PCB patterns are kept clean. In the case of dip soldering, on the other hand, work is sequentially flown into molten solder, so that copper as a PCB pattern material and palladium, silver lead, and other various components employed for the surface treatment of part leads melt into solder to cause the solder composition to change.

If lead and bismuth are molten into solder, the melting start temperature of solder lowers rapidly. Extremely speaking, solder does not become solid easily to cause a soldering failure. Since the component ratio of copper and tin changes unavoidably, it must be monitored by a certain method. Periodical analysis is desirable. However, X-ray fluorescent analysis, atomic absorption spectrophotometry, and chemical analysis are time-consuming and expensive. They are also difficult as a control method in a factory. Due to these circumstances, we offer a method of measuring a component change of these materials at soldering site.

### FEATURES & BENEFITS

- Pb measurement range: 0 - 0.2% accuracy: +/- 0.015%
- Cu Measurement range: 0.3 - 0.9% accuracy: +/- 0.1%
- Easy test lead contents (%) of solder pot at production site
- Quick testing (about 40 minutes)
- Small sample (0.5oz)
- Low Cost
- Computer control, software data collection
- Table top model

## Wetting Balance Tester – SWB-2



Wetting Balance Tester for through-hole component leads.

### FEATURES & BENEFITS

- Accurately tests the Lead and Copper content of your solder sample.
- Analyzing wetting balance method for ANSI J-STD-003, MIL-STD 883, ISO 9455-16, and JIS Z 3198.
- Easy to change flux and solder.
- Computer control auto measurement analyzing test data.
- On-site testing done in under 1 hour.
- Easy-to-use analysis software.

### SPECIFICATIONS

#### LOAD SENSOR

Principle	Electro balance sensor (EBS)
Measurement ranges	100mN - 50mN
Measurement accuracy	$\pm (0.1\text{mN} + 1 \text{ digit})$
Resolution	$> 9\text{mN} : 0.01\text{mN} < 9\text{mN} : 0.0\text{mN}$

#### TEMPERATURE SENSOR

Measurement ranges	0 - 350 °C
Measurement accuracy	$\pm 3 \text{ }^{\circ}\text{C}$
Infiltration time	1 - 200 second
Infiltration depth	0.01 - 20.00 mm, 0.01 mm step
Infiltration speed	0.1 - 30 mm/sec
Solder pot temperature	room temperature - 330 °C
Nitrogen (N2) Measurement	Option 02 concentration: $> 500\text{ppm}$
Data communication	USB port
Operation software	Windows 2000, XP
Power source	AC 115V 60 Hz
Dimensions	400 mm (W) x 370 mm (D) x 550 mm (H)
Weight	30 kg
Computer & Monitor	not included

\* Specifications subject to change without notice (November 18, 2004).

The Malcom SWB-2 meets international wetting balance test standards