

MX-500

W



Test Equipment Depot - 800.517.8431 - 99 Washington Street Melrose, MA 02176

TestEquipmentDepot.com



METCAL

1. SYSTEM SPECIFICATIONS

Ambient Operating Temperature	10 - 40°C
Maximum Enclosure Temperature	55°C
Input Line Voltage	100 - 240 VAC, grounded circuit
Input Line Frequency	50/60 Hz
Output Power (Max.)	40 Watts max. Per channel at 22°C ambient temperature
Output Frequency	13.56 MHz
Power Cord 3-Wire	183cm (18/3") SJT
Dimensions w x d x h	12.1cm (4.8") x 12.1cm (4.8") x 22.2cm (8.8")
Certification / Marking	cNRTLus, CE
Surface Resistivity	$10^5 - 10^9 \Omega/\text{in}$
Tip-to-Ground Potential	<2mV
Tip-to-Ground Resistance	<2 ohms
Idle Temperature Stability	$\pm 1.1^\circ\text{C}$ in still air
Hand-piece Cable Length	L=183cm (72"), burn proof, ESD safe
Hand-piece Connector	F connector

2. SYSTEM DESIGN AND TECHNOLOGY OVERVIEW

The MX-500 Series is a precision, high-power soldering system with dual switchable ports. It is the newest design of the market leading Metcal soldering systems. It adds new ergonomic hand-pieces, a new built in power meter, 40 watts of power and includes SmartHeat[®] Technology for quick response and precise control.

a. SMARTHEAT[®] TECHNOLOGY

No Calibration Required

Each cartridge is equipped with a self-regulating heater which 'senses' its own temperature and closely maintains its pre-set idle temperature for the life of the heater-tip; all controlled by OK International's proprietary SmartHeat[®] Technology. The tip temperature is determined by the inherent metallurgical properties of the heater; **no external adjustment or equipment is required.** This eliminates spikes and transients associated with electrically switched elements found in conventional soldering irons. The integrated power indication meter actively monitors power delivered to the tip as it varies in direct response to the thermal load. The power indication meter **requires no calibration**, because it is monitoring an active feedback loop. Please feel free to contact your OK International representative with any questions.

Those companies or individuals requiring periodic verification of system performance may do so in the following ways:

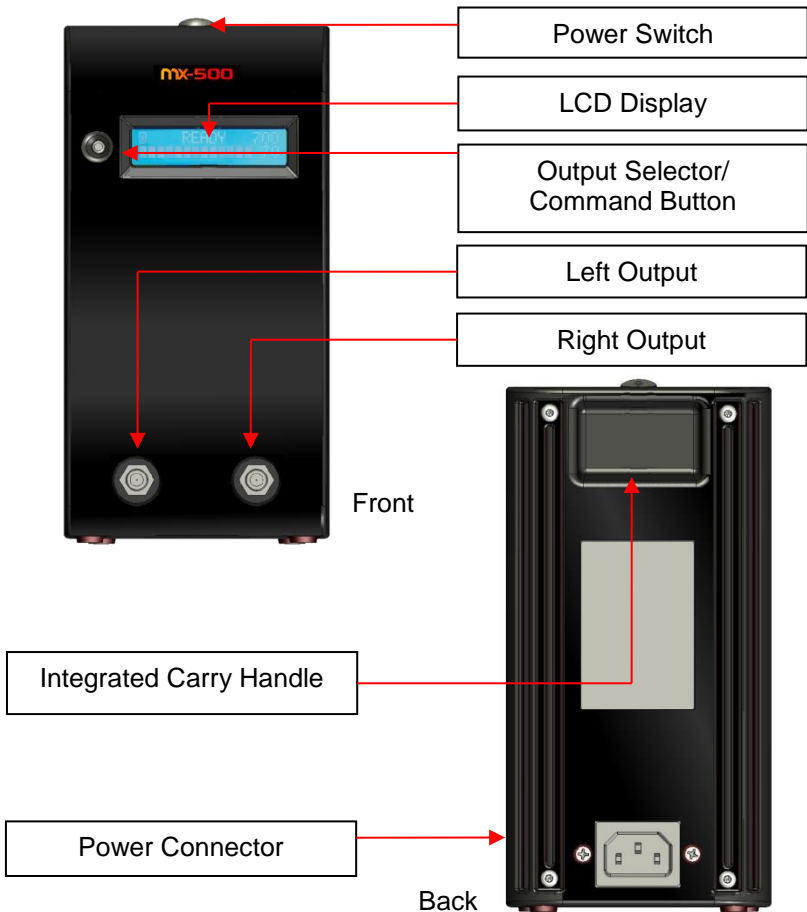
- Measure the performance of the system in 'time required to solder a defined number of loads', or
- Observe start up and idle power with the integrated Power Indication Meter, or
- Measure tip idle temperature as it equates to this performance.

3. POWER SUPPLY OVERVIEW
a. POWER SUPPLY FEATURES

LCD Display

The MX-500 Series utilizes a built in LCD which displays system information including:

- **Integrated Power Indication Meter**
The MX-500 Series has a built in power indication meter which will display a graphical and numerical representation of the power.
- **User Programmable PowerSave Mode**
The MX-500 Series has a user programmable PowerSave Mode. The time to enter PowerSave Mode is adjustable from 10 to 120 minutes.
- **Universal Power Supply**
The MX-500 Series automatically senses the input line voltage and adjusts accordingly, which allows for worldwide operation without adaptors or a change in performance.



POWER SUPPLY MODE OVERVIEW



READY MODE

1. Hand-piece removed from workstand.
2. System is ready for use.

SLEEP MODE

1. Hand-piece in workstand.
2. Power to the hand-piece is reduced.



POWER MODE

1. Hand-piece removed from stand.
2. System is in use. Power Meter displays power at tip.



POWERSAVE MODE

1. Hand-piece in workstand.
2. Power to the hand-piece is off.
3. LCD Display flashes.
4. Press Command Button to reset.

4. HAND-PIECE OVERVIEW

The MX-500 Series offers users a choice of hand-pieces to meet the customer's application needs. Each hand-piece has its own range of cartridges with many choices available for tip geometry and temperature.

5. CARTRIDGE OVERVIEW

a. About Metcal Cartridges

The soldering and rework cartridges are constructed with a tip, heater, coil, connector and shaft. This assembly is designed for precision and long life provided that the proper tip care procedures are followed. (See Section 8)

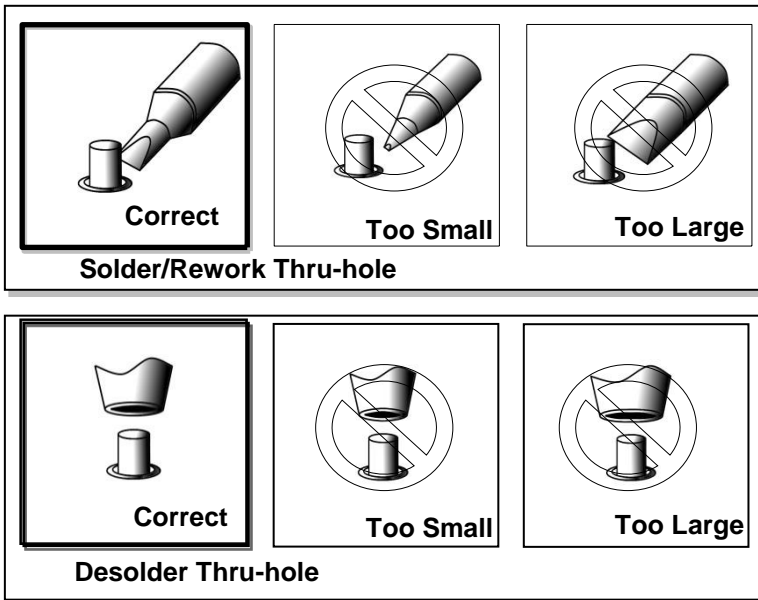
Selecting a cartridge depends on the following variables

- Need for access
- Type of solder
- Size and mass of load
- Component type

The correct choice of cartridge will result in an optimized soldering process. Here are some of the considerations for selecting the soldering or rework cartridge.

b. Choosing the Correct Tip Geometry

Metcal cartridges come in a wide variety of tip geometries and temperature ranges. These tip geometries cover a broad range of tasks from delicate precision work to heavy ground plane soldering.

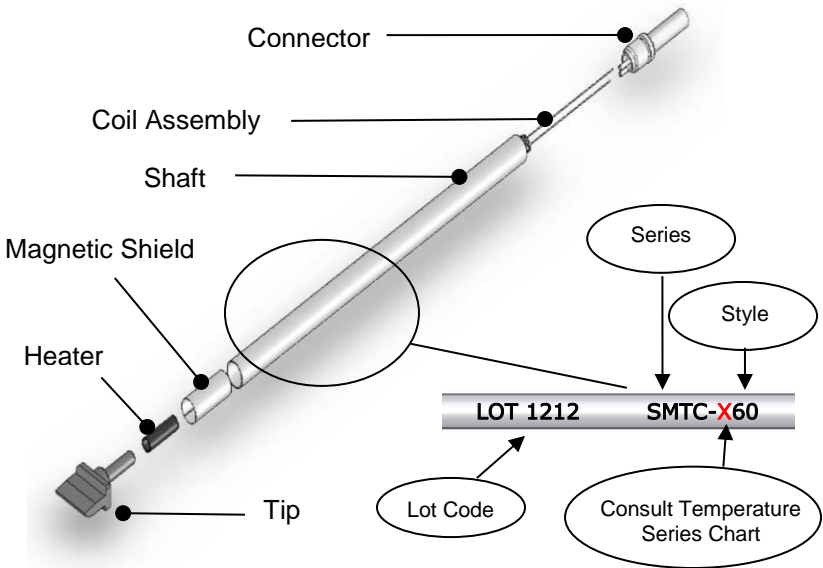


1. Pick a tip that **maximizes contact area** between the solder joint and tip. Maximizing contact area gives the most efficient heat transfer, producing high quality solder joints quickly.
2. Pick a tip that allows good access to the solder joint. Shorter tip lengths allow quicker response. Longer or angled tips may be needed for soldering densely populated boards.
3. Pick the lowest temperature tip cartridge that will accomplish the task. This minimizes the potential for thermal damage. The temperature series is marked on the shaft of the Heater Tip. (See page 8 for more information)

c. Choosing the Correct Temperature Series

Each cartridge is specially designed for high power delivery, which means that you can often solder with a Metcal cartridge at a temperature 100°F (40°C) or more lower than with a conventional soldering iron. Since Metcal tip cartridges sense thermal loads and respond to them, you need only approximate the size of the loads you will be working with. Start with a lower temperature, going to a higher temperature only when necessary.

CARTRIDGE CONSTRUCTION AND IDENTIFICATION



d. Temperature Series Chart

Application	X-Series	STTC	SMTC	UFTC	PTTC	TATC	STDC
High Thermal Sensitivity	500 Series	5	5			5	
Moderate Thermal Sensitivity	600 Series	0	0		6	6	0
Moderate Thermal Mass	700 Series	1	1	F	7		1
High Thermal Mass	800 Series	8	8		8		8

6. OPERATION

a. INITIAL SETUP

1. Connect hand-piece(s) to power unit output connector(s).
2. Insert your selected cartridge into the hand-piece.
3. Push the cartridge all the way until it seats.
 - For TATC cartridges, align the flat side of the cartridge shaft with the opening in the handle. Push in the cartridge until it seats. The cartridge is fully seated when the insertion mark is flush with the handle. Do not push past this mark. Repeat for second cartridge.
4. Place hand-piece(s) into associated workstand(s).
5. Add **distilled water** to workstand sponge (sulfur free) if equipped.
6. Plug the power cord into a grounded wall socket of the rated input line voltage.
7. To turn the unit "ON", push the power switch. **NOTE:** Unit must be grounded, otherwise it will not work. Unit will not work in an electrical network where an isolation transformer has been used.
8. Select the desired output using the output selector/command button. The active output will display an animated box cursor (□) to the left or right of the screen, respectively, to indicate the active output.

b. REPLACING ALL TIP CARTRIDGES

1. Make sure the system is turned off.
2. Pull out the cartridge using the Cartridge Removal Pad (MX-CP1). **NOTE: THE TIP CARTRIDGE MAY BE HOT. DO NOT USE METAL TOOLS (PLIERS, ETC) TO REMOVE CARTRIDGES!**
3. Push a new cartridge into the handle.
4. Place hand-piece(s) into associated work stand(s).
5. Push the power switch "ON". The new cartridge will heat up to temperature quickly.

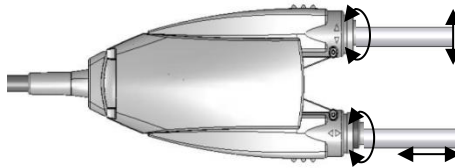
c. MX-PTZ AND TALON OPERATION

1. Clean, and then tin tips well once heated.
2. Ensure tips contact all leads on device, either the bevel or straight portion of the tip can be used. Use solder across the leads to create a Thermal Bridge.
3. Squeeze tool. Wait for all leads to reflow.
4. Maintaining pressure, lift component.



Thermal Bridge

d. MX-PTZ TIP ALIGNMENT



e. USER PROGRAMMABLE POWERSAVE MODE ADJUSTMENT

1. With the system in the Ready or Power Modes, press and hold the Output Selector/Command Button for 3 seconds until the time flashes.
2. Release the Output Selector/Command Button.
3. Press the Output Selector/Command Button until the desired time is achieved. The time will increment by 10 minutes with each press of the button.
4. Press and hold the Output Selector/Command button for 3 seconds to return to operation.

f. USER SELECTABLE POWER GRAPH

1. With the system in the Ready or Power Modes, press and hold the Output Selector/Command Button for 3 seconds until the time flashes
2. Release the Output Selector/Command Button.
3. Press and hold the Output Selector/Command button for 3 seconds.
4. Release the Output Selector/Command Button.
5. Press the Output Selector/Command Button until the desired bar graph is displayed; Standard or UltraFine.
6. Press and hold the Output Selector/Command button for 3 seconds to return to operation.

7. APPLICATION NOTES:

a. EXTENDING TIP LIFE

1. Each day, remove, inspect, and clean the cartridge shaft and handle using denatured alcohol and a clean cloth. Stubborn flux deposits on the shaft (and on the entire SMTc, PTTC & TATC tip) can be removed using a brass brush.
2. After you turn on the system, and each time you return the tip to the holder, apply solder to the tinned surfaces of the tip. The solder protects the tip from oxidation and prolongs the life of the tip.
3. Select the lowest temperature series tip cartridge that will do the job. Lower temperatures decrease tip oxidation and are easier on the components being joined.
4. Use fine point tips only when necessary. The plating on fine precision tips is less durable than the plating on larger tips.
5. Do not use the tip as a prying tool. Bending the tip can cause the plating to crack, shortening tip life.
6. Use the minimum activation flux, appropriate to solder type, as necessary to do the job. Higher activation flux is more corrosive to the tip plating.
7. When making a solder connection, apply fresh solder to the items being joined, **not** to the hot soldering tip.
8. Switch the system off when not in use.
9. Do not apply pressure to the tip. More pressure does not equal more heat. To improve heat transfer, use solder to form a thermal bridge between the tip and the solder joint.
10. Clean the tip on a clean, damp sponge or a coiled brass cleaner -- not on a rag or dirty, dry sponge.

b. DETINNED TIPS

If a tip is not wetting with solder then it is detinned. This exposes the plating to oxidation and substantially degrades the heat transfer efficiency of the tip. Detinning is caused by:

- Failure to keep the tip covered with fresh solder during idling periods.
- High tip temperatures.
- Lack of sufficient flux in soldering operations.
- Wiping the tip on dirty or dry sponges and rags. (Always use a clean, damp, industrial grade, sulfur-free sponge or brass sponge)
- Impurities in the solder or on the surfaces to be soldered.

NOTE: Detinned tips are preventable with proper daily care!

c. CHOOSING THE CORRECT TIP CARTRIDGE AND GEOMETRY

MULTI-LEAD PACKAGES

Multi-lead components can be drag soldered using Metcal hoof-tip cartridges. Tin the working face of the tip with solder and gently drag it across the array of leads.

SMT REMOVAL

First, measure the dimensions of your component, then, use the SMTc charts that are available from Metcal's web page to match component and tip dimension.

8. BASIC TROUBLESHOOTING GUIDE

Problem: LCD displays 'Open Source'.

1. Ensure cartridge is properly seated.
2. Ensure animated box cursor (□) is on desired output connector.
3. Tighten hand-piece connector to output connector.

Problem: Solder hand-piece tip cartridge does not heat up.

1. Replace tip cartridge.
2. If problem persists, replace hand-piece with known good hand-piece and insert new cartridge.
3. If cartridge heats up, replace non-functioning hand-piece.

Problem: Low power operation of the unit.

Check input power to the unit. The unit can draw up to 10A of current at 110V.

Do not plug into power sources such as power strips that are rated less than 10A.

Multiple high current devices plugged into the same electrical circuit can cause low power operation, distribute high current devices among multiple circuits or increase the electrical circuit capacity.

Problem: Non-Conforming Cartridge Detected

When the system detects any cartridge that exceeds its' predefined allowable power draw on the soldering unit, the following messages will appear on the screen.



9. Safety



WARNING

With power applied, the tip temperature can be $> 300^{\circ}\text{C}$. Failure to observe the following precautions may lead to injury to users or damage the equipment:

- Do not touch any metallic parts of the hand-piece
- Do not use near flammable items
- Do not use unit for any function other than described in this manual
- Use only genuine Metcal replacement parts
- Use in a well ventilated area or with fume extraction
- Do not use the equipment with wet hands
- Connect only to properly grounded outlets to prevent risk of electric shock.
- Always place hand-piece back into the work stand to prevent accidental burning of oneself or surrounding objects.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Children should be supervised to ensure that they do not play with the appliance.

Although the systems offer superior EOS (Electrical Overstress) protection, periodic checks of the instrument cord should be incorporated into standard operator maintenance procedures.

Waste Electrical and Electronic Equipment Directive - WEEE (2002/96/EC).

When this product is no longer required, if it cannot be re-used, we ask our customers not to dispose of it as unsorted municipal waste but to appropriately recycle the product.

