

# Metcal MX-5000

Soldering, Desoldering and Rework System

## User Guide



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### Warranty

OK International warrants the MX-5000 System against any defects in materials or workmanship for five (5) years from the date of purchase by the original owner. This Warranty excludes normal maintenance and shall not apply to any opened, misused, abused, altered or damaged items. If the product should become defective within the warranty period, OK International will repair or replace it free of charge at its sole option. The repaired or replacement item will be shipped, freight prepaid, to the original purchaser. The warranty period will start from the date of purchase. If the date of purchase cannot be substantiated the date of manufacture will be used as the start of the warranty period.

## 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
Power Consumption	125W
Output Power (Max.)	80 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	12.1 cm (4.8") x 13.0cm (5.1") x 23.5cm (9.3")
Certification / Marking	cTUVus, 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=122cm (48"), burn proof, ESD safe
Hand-piece Connector	F connector
Workstand Dimensions w x d x h	8.6 cm (3.4") x 19.1 cm (7.5") x 8.3 cm (3.3")

## 2. SYSTEM DESIGN AND TECHNOLOGY OVERVIEW

The MX-5000 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, 80 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.

**b. SYSTEMS, UPGRADE KITS & ACCESSORIES GUIDE**

The MX-5000 Series offers users a choice of systems, upgrade kits and accessories.

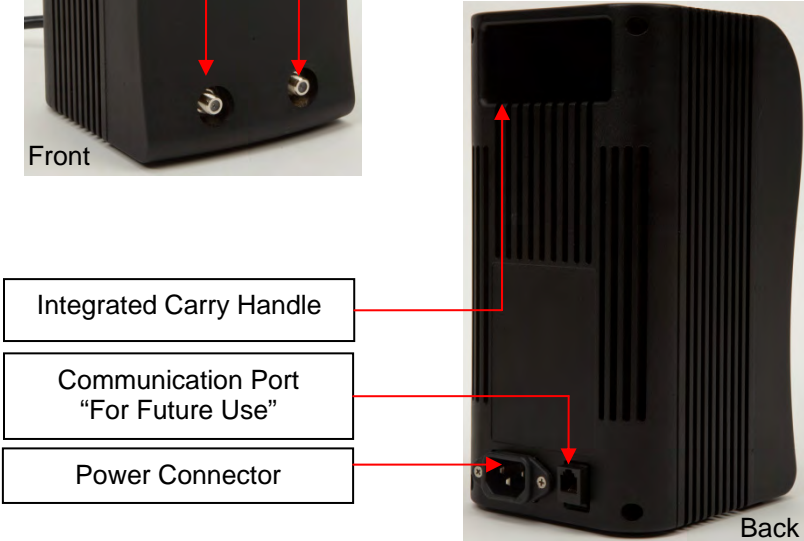
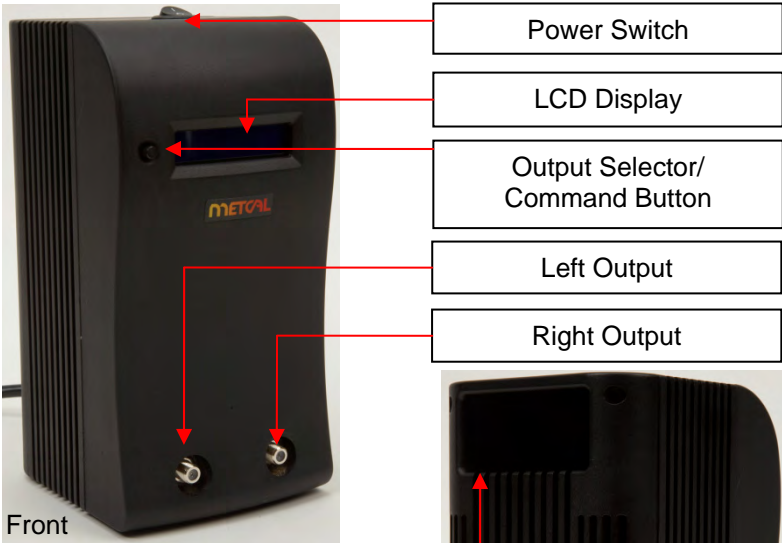
Systems	Description	MX-H1-AV	MX-H2-UF	MX-PTZ	MX-DS1
MX-5010	MX-PS5000 Power Supply, Metcal Advanced™ Soldering hand-piece (MX-H1-AV), TipSaver™ workstand (MX-W1AV)	✓			
MX-5020	MX-PS5000 Power Supply, UltraFine soldering hand-piece (MX-H2-UF), TipSaver workstand (MX-W1AV)		✓		
MX-5050	MX-PS5000 Power Supply, MX-DS1 desoldering hand-piece, workstand (MX-WS5DS)				✓
MX-5041	MX-PS5000 Power Supply, MX-PTZ tweezers hand-piece, Metcal Advanced Soldering hand-piece (MX-H1-AV), TipSaver workstand (MX-W4PT), TipSaver workstand (MX-W1AV)		✓	✓	
MX-5051	MX-PS5000 Power Supply, MX-DS1 desoldering hand-piece Metcal Advanced Soldering hand-piece (MX-H1-AV), workstand (MX-WS5DS), workstand (MX-W1AV)		✓		✓
Upgrades					
MX-UK1	Metcal Advanced Hand-piece & TipSaver workstand	✓			
MX-UK2	UltraFine hand-piece & TipSaver workstand		✓		
MX-UK4	Precision Tweezers hand-piece & TipSaver workstand			✓	
MX-UK5	MX-DS1 hand-piece & TipSaver workstand				✓
Accessories					
MX-H1GR	Grip, Metcal Advanced hand-piece, Ring pattern	✓			
MX-H1GK	Grip, Metcal Advanced hand-piece, Knob pattern	✓			
MX-H1GS	Grip, Metcal Advanced hand-piece, Scallop pattern	✓			
MX-H2GR	Grip, UltraFine hand-piece, Ring pattern		✓		
MX-H2GK	Grip, UltraFine hand-piece, Knob pattern		✓		
MX-H2GS	Grip, UltraFine hand-piece, Scallop pattern		✓		
MX-H1-GSR-5	Sleeve, green for Metcal Advanced hand-piece grip, ring pattern, set of 5	✓			
MX-H2-GSR-5	Sleeve, green for Metcal UltraFine hand-piece grip, ring pattern, set of 5		✓		
MX-CP1	Cartridge removal pad, Metcal Logo	✓	✓	✓	✓
AC-BP	Brass Pad, package of 10	✓	✓	✓	✓
AC-Y10	Yellow Sponge, package of 10	✓	✓	✓	✓

**3. POWER SUPPLY OVERVIEW**  
**a. POWER SUPPLY FEATURES**

**LCD Display**

The MX-5000 Series utilizes a built in LCD which displays system information including:

- **Integrated Power Indication Meter**  
The MX-5000 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-5000 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-5000 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-5000 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.

**a. Hand-piece Selection Guide**

<b>MX-H1-AV</b> 	 <b>STTC</b>
	<b>SMTC</b>
<b>MX-H2-UF</b> 	 <b>UFTC</b>
<b>MX-PTZ</b> 	 <b>PTTC</b>
<b>TALON</b> 	 <b>TATC</b>
<b>MX-DS1</b> 	 <b>STDC</b>

NOTE: This is only a small sample of tip styles available for each of the hand-pieces.

## 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)

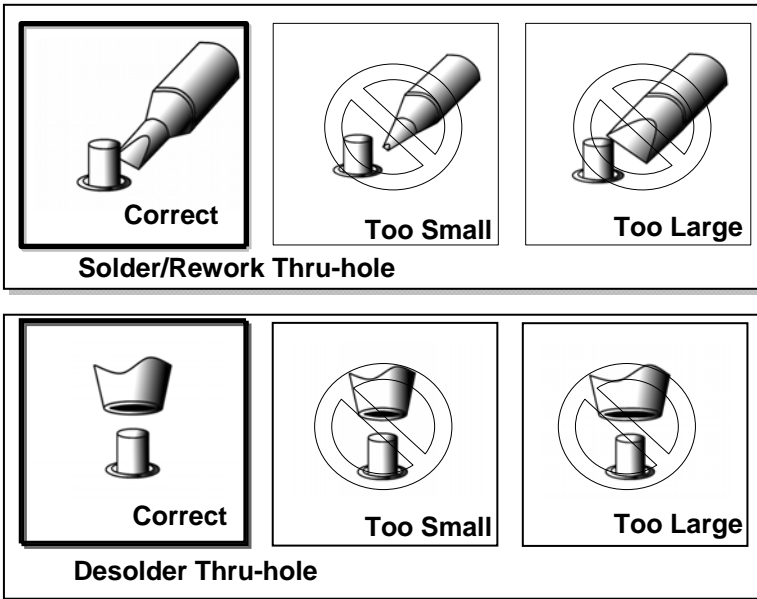
Selecting a cartridge depends on the following variables

- 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 (for a complete up to date listing, visit [www.metcal.com](http://www.metcal.com) for more information). These tip geometries cover a broad range of tasks from delicate precision work to heavy ground plane soldering.



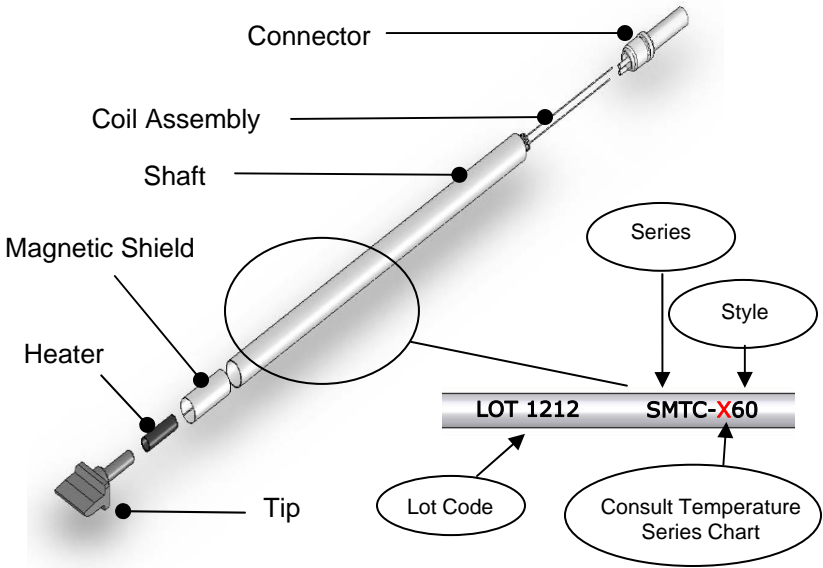
1. Pick a tip that **maximizes contact area** between the solder joint and tip. Maximizing contact area gives the most efficient heat transfer, producing high quality solder joints quickly.
2. Pick a tip that allows good access to the solder joint. Shorter tip lengths allow quicker response. Longer or 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**



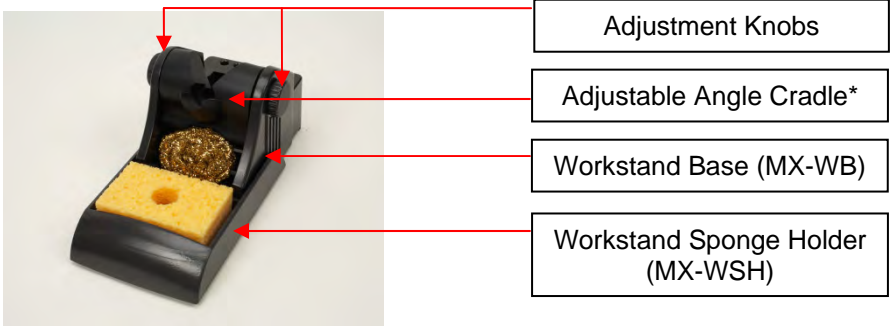
**d. Temperature Series Chart**

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

**Note:** Not all temperature series available for some styles.

## 6. TIPSAVER WORKSTAND OVERVIEW

### a. TipSaver Workstand Features



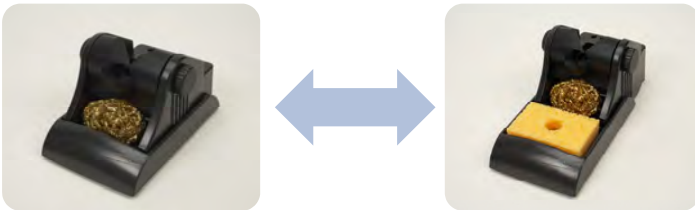
### b. Adjustable Angle Cradle Guide\*

Workstand	Cradle	Description
MX-W1AV	MX-W1CR	TipSaver cradle, Advanced hand-piece, includes knobs
MX-W1AV	MX-W1CR	TipSaver cradle, UltraFine hand-piece, includes knobs
MX-W4PT	MX-W4CR	TipSaver cradle, MX-PTZ hand-piece, includes knobs
MX-W5DS	MX-W5CR	TipSaver cradle, MX-DS1, includes knobs

### c. TipSaver Workstand Configurations

The TipSaver Workstand is designed to accommodate different configurations in a minimal footprint. To change the configuration;

1. Remove the two screws from the underside of the workstand base (MX-WB).
2. Move the Workstand Sponge Holder (MX-WSH) into the desired position.
3. Replace the two screws into the underside of the workstand base.



**Coiled Brass Cleaner or Coiled Brass Cleaner with Sponge**

### d. Cradle Positioning

The TipSaver Workstand incorporates an adjustable angle cradle allowing the insertion angle for the hand-piece to be adjusted for the comfort of the operator. To adjust the angle of the cradle;

1. Loosen the knobs counterclockwise.
2. Adjust the cradle to the desired angle.
3. Tighten the knobs clockwise.



## 7. 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.

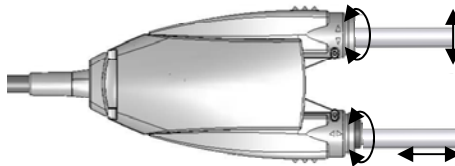
### c. MX-PTZ AND TALON OPERATION

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.

**8. 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 [www.metcal.com](#) to match component and tip dimension.

## 9. 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.

## 10. Safety



### WARNING

With power applied, the tip temperature can be > 300°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. In Europe, please contact your OK International distributor who can advise the recycling options available.

**INHALT**

