

# ***FLEX-MATE<sup>®</sup> K500***



## **USER'S MANUAL**

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***KLC*** Services, Inc.

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215 US Rte 42 NE  
London, OH 43140

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Toll Free: (866) 532-3534

# **FLEX-MATE K500**

## **USER'S MANUAL**

### **IMPORTANT SAFEGUARDS**

When using electrical products, especially when children are present, basic safety precautions should always be followed, including the following:

### **READ ALL INSTRUCTIONS AND WARNINGS PRIOR TO OPERATION.**

**DANGER: TO REDUCE THE RISK OF ELECTROCUTION:**

Always unplug this product immediately after using.

Do not use while bathing.

Do not place or store product where it can fall or be pulled into a tub or sink.

Do not place in or drop into water or other liquid.

Do not reach for a product that has fallen into water. Unplug immediately.

**WARNING: TO REDUCE THE RISK OF BURNS, ELECTROCUTION, FIRE, OR INJURY TO PERSONS:**

A product should never be left unattended when plugged in.

Close supervision is necessary when this product is used by, on, or near children or invalids.

Use this product only for its intended use as described in this manual. Do not use attachments not recommended by the manufacturer.

Never operate this product if it has a damaged cord or plug. If it is not working properly, if it has been dropped or damaged, or dropped into water. Return this product to a service center for examination and repair.

Keep the cord away from heated surfaces.

Never use while sleeping or drowsy.

Never drop or insert any object into any opening.

Do not use outdoors or operate where aerosol (spray) products are being used or where oxygen is being administered.

Connect this product to a properly grounded outlet only. See grounding instructions.

**CAUTION:** This equipment may cause electromagnetic or other interference between other devices. If this occurs, move the device away from the affected equipment.

**CAUTION:** Federal law restricts this device to sale by or on the order of a licensed health care practitioner.

**CAUTION:** Work in a range of motion as instructed by your healthcare practitioner.

**CAUTION:** If you experience increased pain, swelling, or any adverse reactions while using this product, immediately consult your health care practitioner.

**WARNING:** Set up and use of this equipment should be in a low traffic location and away from children and pets.

**WARNING:** Pinch points exist during assembly; use caution and assemble pursuant to the instructions.

**WARNING:** Make sure the hand control is accessible to the operator before starting this equipment. The stop button on the hand control is the only way of stopping the motion for disabled patients or children using the unit.

**WARNING:** Maximum rated load is 45 lbs.

**CONTRAINDICATIONS:**

USE OF CPM THERAPY IN GENERAL SHOULD BE AVOIDED OR DISCONTINUED, AT LEAST TEMPORARILY, IF SIGNS OF HYPERTHERMIA, IRRITATION, SWELLING, BLEEDING, OR INCREASED OR PERSISTENT PAIN ARE OBSERVED. ACUTE INFLAMMATORY CONDITIONS, SUCH AS ACUTE ARTHRITIS, OR DESTRUCTIVE BONE OR JOINT DISEASES, SHOULD NOT BE TREATED WITH CPM. PRODUCT IS LATEX FREE.

**CAUTION:** It is important to install and use this equipment in accordance with the instructions, to prevent harmful interference to other devices in the vicinity. If this equipment does cause harmful interference to other devices, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the other device(s).
- Increase the separation between the equipment.
- Connect this equipment into an outlet on a circuit different from that to which the other device(s) are connected.
- Consult the manufacturer or field service technician for help.



**SAVE THESE INSTRUCTIONS**




## Product Description:

The purpose of the FLEX-MATE®K500 is to provide continuous passive motion to the knee or hip joint to increase circulation, range of motion, and to prevent scarring in the joint. The FLEX-MATE®K500 is an anatomically aligned CPM which mirrors the path of the knee as it goes through its range of motion from full—or hyper-extension through full flexion.

## Safety Precautions:

- Use only manufacturer approved parts and maintenance procedures to service the unit. Refer to the FLEX-MATE®K500 Service Manual.
- Read and adhere to all warnings and instructions listed on the FLEX-MATE®K500 and this Users Manual.
- If you suspect the FLEX-MATE®K500 is not working properly, unplug the unit and refer to the Service Manual.
- If you detect a flaw of any type in the power cord, immediately unplug the transformer from wall.
- Use only the external power supply provided with the FLEX-MATE®K500.

**Table 1. Symbols used on the FLEX-MATE® K500**

Symbol	Description
	Direct Current
	Attention: Consult User's manual before use.
	Class I, Type B, Continuous Operation. Not suitable with flammable anesthetics.

**Table 2. Physical and Electrical Specifications**

<b>Size Setup for Use:</b>	
Length	39"
Width	13"
Height	22"
<b>Weight:</b>	
Without accessories	26 lbs.
With accessories	27 lbs.
Fully packaged	34 lbs.
<b>Electrical Specifications:</b>	
Input	120 VAC 60Hz 25 W
<b>Environmental Requirements:</b>	
Temperature:	
Operating	50°F to 95°F (10°C to 35°C)
Transport & Storage	-40°F to 158°F (-40°C to 70°C)
Humidity:	
Operating	30 – 75% R.H.
Transport & Storage	10 – 100% R.H., non-condensing
Atmospheric Pressure:	700 hPa to 1060 hPa

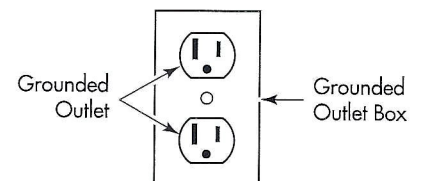
## Grounding Instructions:

This product should be grounded. In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current. This product is equipped with a cord having a grounding wire with a grounding plug. The plug must be plugged into an outlet that is properly installed and grounded.

**DANGER**—Improper use of the grounding plug can result in a risk of electric shock.

Check with a qualified electrician or serviceman if the grounding instructions are not completely understood, or if in doubt as to whether the product is properly grounded.

This product is factory equipped with a specific power supply to permit connection to a proper electric circuit. Make sure that the product is connected to an outlet having the same configuration as the plug. No adaptor should be used with this product. Do not modify the plug provided—if it will not fit the outlet, have the proper outlet installed by a qualified electrician.



## Package Contents:

- 1 FLEX-MATE®K500
- 1 Users Manual
- 1 Service Manual
- 1 Package of soft goods
- 1 Tape measure

**KLC** Services, Inc.

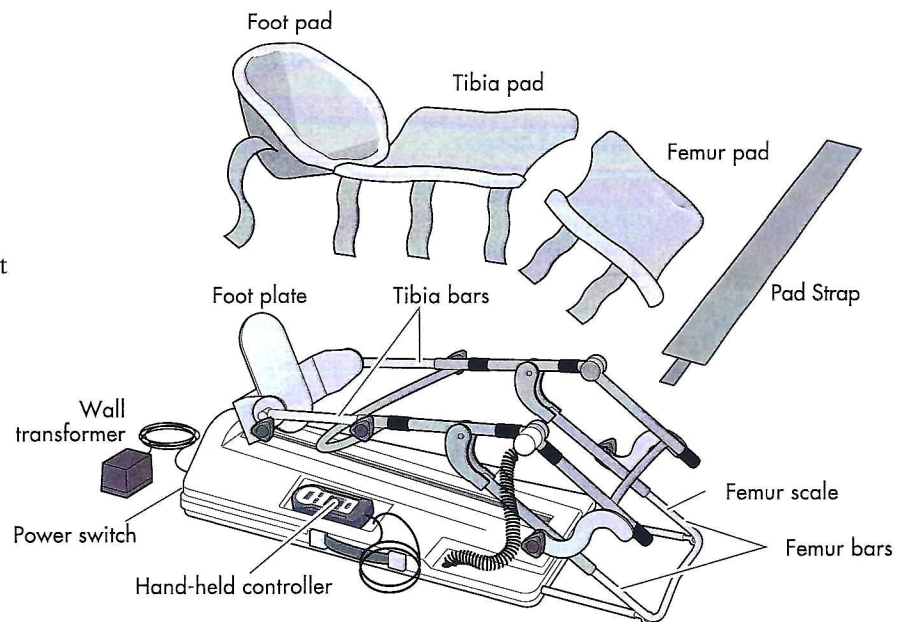
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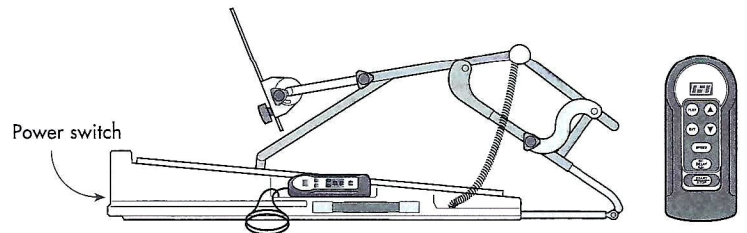


## Set Up Instructions

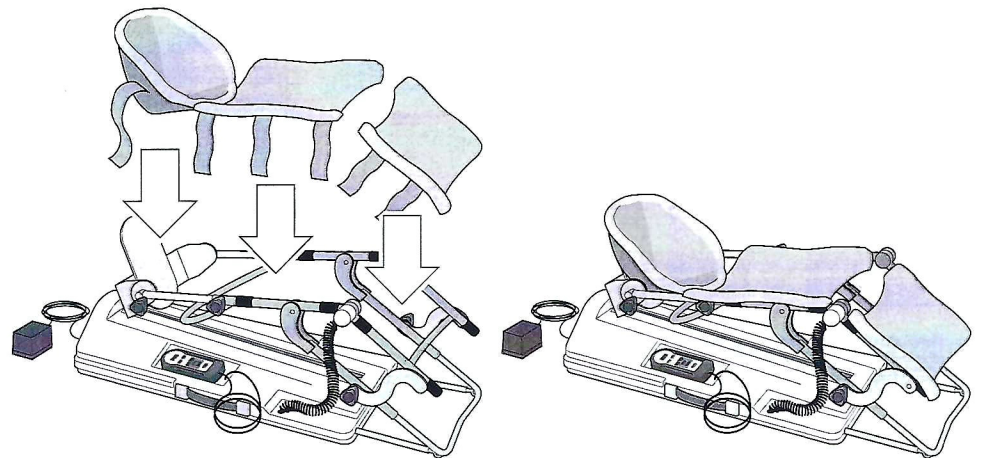
1. Open the shipping container and set aside the soft goods bag. Lift the FLEX-MATE K500 from the box and place it where it is to be used.



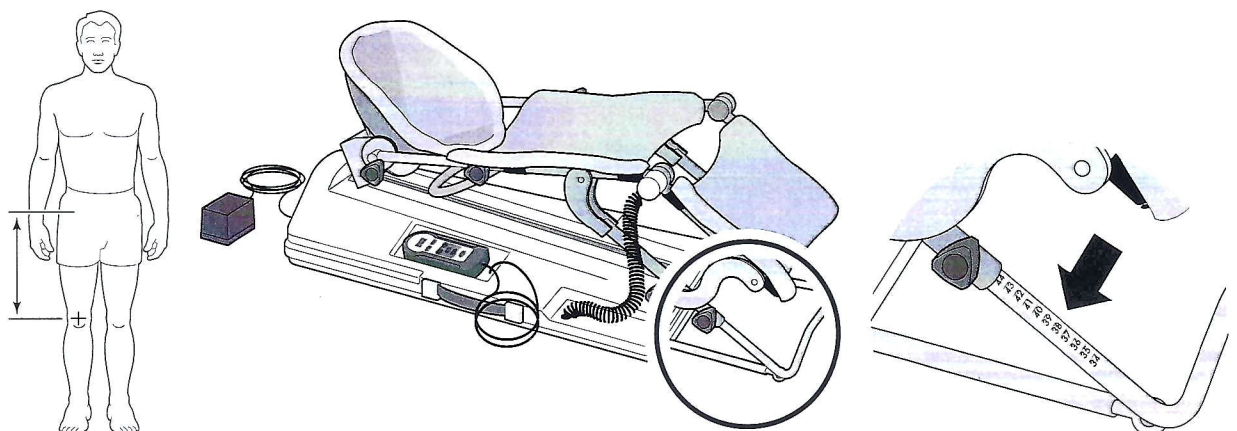
2. Plug the wall transformer into a 110/120V AC wall outlet close to the machine. Locate the power switch and press the "On" position. Using the hand-held controller, bring the machine to between 45° and 90°. See Hand-held Controller Operation instructions.



3. Secure the patient pads to the machine. The Foot Pad has a pocket that slips over the Foot Plate. The Tibia and Femur Pads have straps that secure to the black velcro pads.



4. Measure the patient's involved leg in centimeters from the hip joint to the midline of the knee joint, set the femur scale to this measurement, and retighten knobs.





# **FLEX-MATE** *K500*

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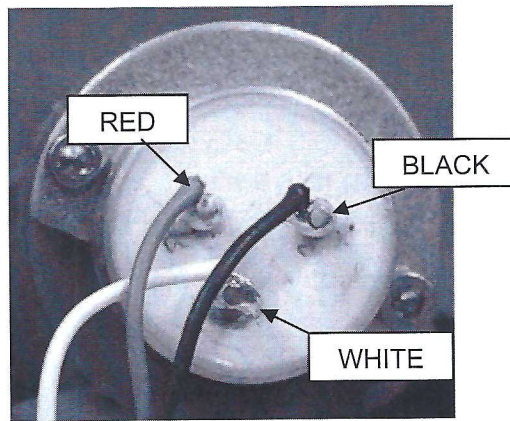
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Fax: (614) 921-8877  
Toll Free: (866) 532-3534

<b>71485</b>	<b>HOUSING REPLACEMENT KIT (TOP COVER ONLY) - Heyco</b>
<b>71490</b>	<b>HOUSING REPLACEMENT KIT (TOP COVER ONLY) - Molded</b>
<b>73616</b>	<b>ELECTRONICS UPGRADE KIT</b>
<b>76520</b>	<b>TRANSFORMER REPL KIT K500 (Molded)</b>
<b>76521</b>	<b>HOUSING REPL KIT K500 (Molded)</b>
<b>76522</b>	<b>CONTROLLER ASSY REPL KIT K500 (Molded)</b>
<b>76523</b>	<b>MOTOR PCB REPL KIT K500</b>
<b>76524</b>	<b>POTENTIOMETER REPL KIT K500 (Molded)</b>
<b>76525</b>	<b>NON SKID PAD KIT (10 ea.)</b>
<b>76526</b>	<b>MAIN PCB REPLACEMENT KIT</b>
<b>78463</b>	<b>POTENTIOMETER CAP (QTY. 6/ea.)</b>

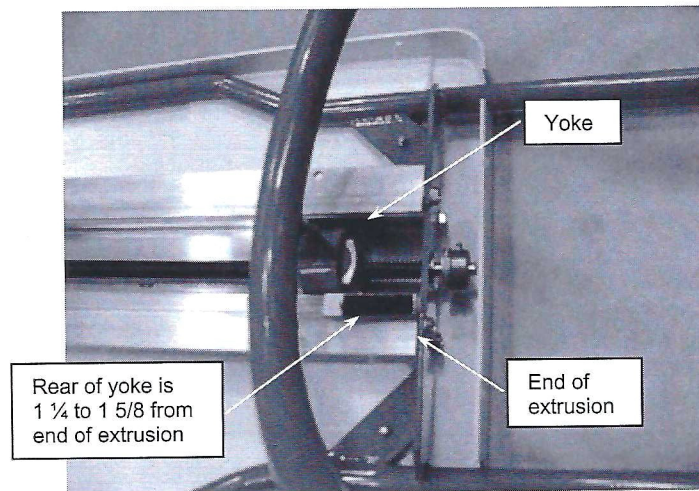


**SPARE PARTS LIST:**

<b>03555</b>	<b>HOSPITAL BED CLAMP</b>
<b>06490</b>	<b>SOFT GOODS, PAD SET</b>
<b>70004</b>	<b>FOOT PLATE HARDWARE KIT</b>
<b>70005</b>	<b>MALE KNOB REPLACEMENT KIT</b>
<b>70006</b>	<b>BELT REPLACEMENT KIT</b>
<b>70007</b>	<b>OLD BELT REPLACEMENT KIT</b>
<b>70016</b>	<b>LARGE PULLEY ASSY</b>
<b>70034</b>	<b>HOSPITAL BED STRAP</b>
<b>70039</b>	<b>CPM OILER LUBRICANT</b>
<b>70077</b>	<b>CABLE, CONTROLLER, K500 UL (Molded)</b>
<b>70078</b>	<b>CABLE, CONTROLLER, K500 NON UL (Heyco)</b>
<b>71160</b>	<b>TIMING PULLEY / BELT ASSY KIT</b>
<b>71170</b>	<b>BEARING ASSY REPLACEMENT KIT</b>
<b>71180</b>	<b>PUSH RIVET KIT (24 QTY)</b>
<b>71190</b>	<b>POTENTIOMETER ASSY KIT (NON UL) (Heyco)</b>
<b>71200</b>	<b>LEAD SCREW W/NUT ASSY KIT</b>
<b>71205</b>	<b>NUT HOUSING ASSY</b>
<b>71206</b>	<b>LEAD SCREW NUT ONLY</b>
<b>71210</b>	<b>BOX W/CUSTOM PACKING FOAM</b>
<b>71220</b>	<b>MEMBRANE SWITCH KIT</b>
<b>71230</b>	<b>ROD END BALL JOINT KIT</b>
<b>71240</b>	<b>BRUSH / ROD ASSY KIT</b>
<b>71250</b>	<b>FLEXMATE HANDLE ASSY KIT</b>
<b>71270</b>	<b>OPTICAL SENSOR ASSY KIT</b>
<b>71280</b>	<b>MOTOR ASSY KIT</b>
<b>71290</b>	<b>TRANSFORMER REPLACEMENT KIT (Heyco)</b>
<b>71300</b>	<b>CONTROLLER ASSY REPL KIT (Heyco)</b>
<b>71310</b>	<b>POWER SWITCH REPLACEMENT KIT</b>
<b>71330</b>	<b>FOOT PLATE ASSY REPLACEMENT KIT</b>
<b>71480</b>	<b>CPM HOUSING REPLACEMENT KIT (Heyco)</b>

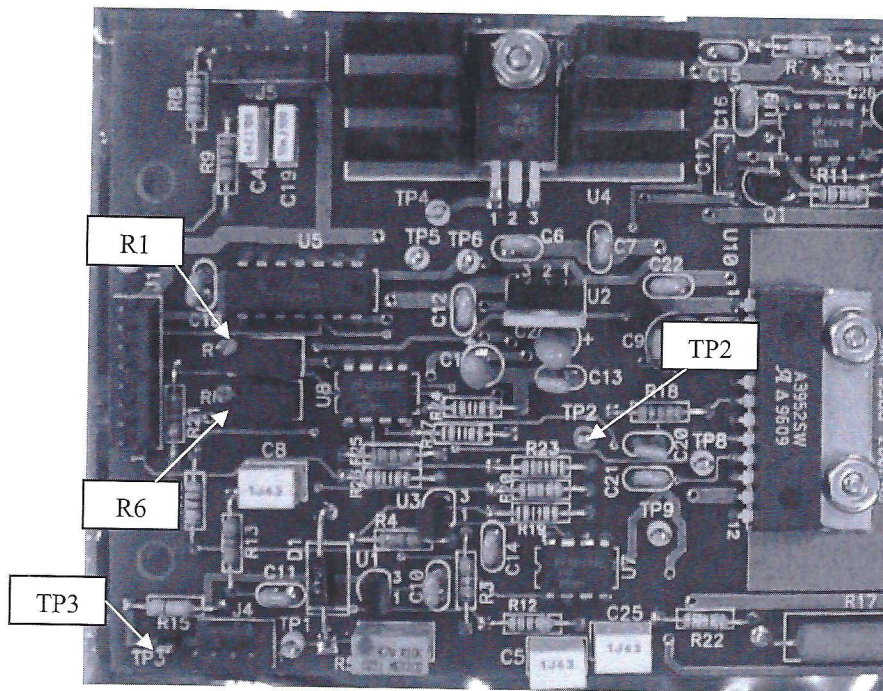


- C) On the joint coupling, remove the first setscrew and tighten the second one, then replace the first setscrew. This will insure the coupling is tight to the shaft.
- D) Using the control pendant, move the leg carriage until the thigh and calf support bars on either side of the hinges align in a straight line. This can be checked visually or with a straight edge.
- E) Loosen the 2 screws, using a 3/32" Allen wrench that hold the Goniometer in position. Rotate the Goniometer until the control pendant displays reads 0°. Tighten the 2 screws.
- F) Start the CPM in flexion and stop it when the rear of the calf support nut yoke is between 1 1/4" and 1 5/8" from the rear end of the extrusion.



- G) Check the control pendant display, if it does not read 120° then adjust R5 on the Motor PCB with a small screwdriver until it does.
- H) Make sure all screws and set screws are tight and replace the Goniometer cover.
- I) Check -10° again, if it does not read -10° change the Motor PCB.





- C) Attach the positive lead of a Voltmeter to TP2 and the negative lead to TP3.
  - D) Press the Start/Stop key on the keypad to start the motor.
  - E) Stop the unit by pressing the Start/Stop key when the unit is extending and  $-8^\circ$  has been reached. Adjust R6 so that the voltage on the Voltmeter reads  $0.125 \pm 0.002$  Volt.
  - F) Press Start/Stop button again to turn on the motor. The unit will start flexing. Stop the motor and start again. The unit will start extending and when it reaches  $-10^\circ$  it will reverse and begin flexing. When the unit is flexing and  $-8^\circ$  appears on the keypad, stop the motor. Adjust R1 so that the Voltmeter shows a reading of  $0.425 \pm 0.002$  Volt.
  - G) With these adjustments, CPM must cycle without reversal when loaded with a 40 pound weight.
  - H) Do not re-adjust these limits if reversal occurs. Be sure the unit is properly aligned since misalignment would cause excessive surge currents during start-ups and result in motor reversal. Also, make sure the track is properly oiled. Excessive friction may also cause motor reversal.
- 2) **RANGE OF MOTION (CONTROLLER DISPLAY READS LESS THAN  $-10^\circ$ )**
- A) Remove the 3 Goniometer cover screws and cover.
  - B) Check the rear of the Goniometer for any broken wires.



Remove Drive Housing. Remove the three round belts first. Then remove the motor belt(s), clean the pulleys with a damp cloth and replace the old belt(s). Check the round belts for wear and replace if necessary.

**MOTOR REPLACEMENT:**

Follow the instructions provided with the motor. See MOTOR REPLACEMENT INSTRUCTIONS FOR THE FLEXMATE K500. Instruction sheet P/N 1.14930.

**CONTROL PENDANT REPLACEMENT:**

Follow the instructions provided with the Controller. See CONTROLLER REPLACEMENT INSTRUCTIONS FOR THE FLEXMATE K500. Instruction sheet P/N 1.14950.

**P.C. BOARD REPLACEMENT:**

Follow the instructions provided with the PC Board. See PC BOARD DRIVE REPLACEMENT INSTRUCTIONS FOR THE FLEXMATE K500. Instruction sheet P/N 1.14970.

**POWER SWITCH REPLACEMENT:**

Follow the instructions provided with the Power Switch. See POWER SWITCH REPLACEMENT INSTRUCTIONS FOR THE FLEXMATE K500. Instruction sheet P/N 1.14960.

**TRANSFORMER REPLACEMENT:**

Follow the instructions provided with the Transformer. See TRANSFORMER REPLACEMENT INSTRUCTIONS FOR THE FLEXMATE K500. Instruction sheet P/N 1.14940.

**REVERSING LOAD/RANGE OF MOTION CALIBRATION:**

The power must be turned on to perform these calibrations.

**1) LIMITS OF REVERSING LOAD**

- A) Set the Extension Limit at -10° position and Flexion Limit at 120° position.
- B) Find TP2, TP3, R1, and R6 on the Motor PCB.

	<p>switch:</p> <p>If no voltage before switch, replace transformer.</p> <p>If voltage before but not after switch, replace switch.</p> <p>If voltage after switch, check all P.C. Board and pendant connections.</p> <p>If still no display, replace pendant.</p> <p>If still no display, replace P.C. Board. (Note: If this solves the problem, test the original pendant; it may be okay.)</p>
Pendant adjustments inoperative, but display is on.	<p>Check all connections at the P.C. Board.</p> <p>Replace pendant.</p> <p>If still no display, replace P.C. Board. (Note: If this solves the problem, test the original pendant; it may be okay.)</p>
Unit will not start, or it starts then stops.	<p>Check pendant settings.</p> <p>Check belts.</p> <p>Rotate pulleys by hand with power off and verify motor moves.</p> <p>Remove the Motor Connector from J3 on the Motor PCB. Using a knife blade carefully push the red and black wires deeper into the connector. Reattach connector and turn on power.</p> <p>Use a multi-meter to test voltage at motor after pressing the Start/Stop button.</p> <p>If there is voltage to the motor, but the motor is not running, replace motor.</p> <p>If there is no voltage to the motor, replace P.C. Board.</p> <p>If still no voltage to the motor, replace the pendant. (Note: If this solves the problem, test the original P.C. Board, it may be okay.)</p>
Cannot change pendant settings.	<p>Refer to Operating Instructions regarding locking feature.</p> <p>If unlocking does not work, replace pendant.</p> <p>If this still does not work, replace the P.C. Board (Note: If this solves the problem, test the original pendant; it may be okay.)</p>
Angle does not appear to read correctly on pendant.	<p>Start unit. Set extension limit to 0°. Stop unit when 0° is displayed on the pendant. Visually check to see that the Leg Carriage is perfectly straight. If not, calibrate the range of motion.</p>
All other problems.	Call KLC service.

### REMOVAL OF DRIVE HOUSING:

Follow the instructions provided with the Housing. See HOUSING REPLACEMENT INSTRUCTIONS FOR THE FLEXMATE K500. Instruction sheet P/N 1.09420.

### BELT REPLACEMENT:

		bearings are sealed and do not require oiling
Cleaning	Clean housing & leg carriage with a mild soap solution and dry thoroughly	Wipe the belt(s) & both pulleys with clean damp cloth

1. Christo-Lube grease from Lubrication Technology, Inc., 310 Morton Street, Jackson, Ohio 45640, (740) 286-2644.
2. 3-in-1 Oil or equivalent sewing machine oil.

### **BASIC TROUBLESHOOTING DURING WARRANTY PERIOD**

No pendant display.	Check that the wall outlet has power. Check power switch-on.
Pendant displays "Err".	Turn power off, wait 5 seconds, and turn power back on.
Pendant adjustments inoperative, but display is on.	Check all connections at the P.C. Board.
Unit will not start, or it starts then stops.	Check pendant settings. Check belts.
Cannot change pendant settings.	Refer to User's Manual regarding locking feature.
If the above solutions do not work or for other problems not listed, call KLC service. Any actions taken other than those listed above will void the Warranty.	

### **TROUBLESHOOTING OUT OF WARRANTY PERIOD**

No pendant display.	Check that the wall outlet has power. Check power switch-on. Use a multi-meter to check voltage before and after
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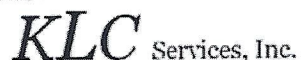
## FLEX-MATE K500 WARRANTY

KLC Services, Inc. warrants the Flex-Mate K500 to be free from defects in materials and workmanship under normal and proper use under the direct supervision of a licensed health care practitioner during the warranty period of two years, commencing from the date of purchase. Date of Purchase will be the date your payment is processed by our Bank and funds are received by KLC Services, Inc. This warranty extends only to the original purchaser and is not transferable to anyone who subsequently purchases, leases or otherwise obtains the K500 from the original purchaser. This Warranty is void if within the warranty period, the K500 has been serviced, parts removed, tampered with or replaced or any other actions taken beyond the scope of Routine Maintenance and Basic Troubleshooting as specified in the service manual by any party other than KLC. In the event the K500 exhibits a defect in material or workmanship during the warranty period, KLC will at no additional charge repair or replace defective parts or the entire unit at KLC's option.

Except for the warranties and conditions set forth herein, KLC disclaims all other warranties, express or implied, or statutory, including but not limited to the implied warranties of merchantability or fitness for a particular purpose. Any implied warranties that may be imposed by applicable law are limited to the terms of this limited warranty. No other warranties, express or implied, are given and no affirmation of or by KLC by words or action, will constitute a warranty. In no event shall KLC be liable for any incidental, special or consequential damages, including but not limited to loss of business, revenue, profits, data or use, whether in an action in contract or tort or based on a warranty arising out of or in connection with the use or performance of the K500 or any software supplied by KLC that accompanies the K500, even if KLC has been advised of the possibility of such damages. Purchaser understands, acknowledges and agrees that repair or replacement, as applicable; under the warranty services described herein are your sole and exclusive remedies with respect to any breach of the warranty set forth herein.

## ROUTINE MAINTENANCE SCHEDULE

	<b>Every Month –</b> <i>To be performed by user or service personnel</i>	<b>Every 3 Months –</b> <i>To be performed by authorized service personnel</i>
Inspections	General condition	Frayed power cord Housing integrity Check belt wear
Grease Lubrication		Grease <sup>1</sup> the outside edges of Thrust Bearing at lower end of Drive Screw. Use a white lithium based grease
Oil Lubrication  <b>NOTE:</b> Never lubricate any belts or pulleys with oil.		Using oil <sup>2</sup> provided add three drops to hole on top of Nut Housing and a drop to the Knee Joints, Rod Ends, 'S' Brackets and Clevis connections. The



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## **FLEX-MATE K500 SERVICE MANUAL WARRANTY**

### **SERVICEABILITY LIMITATIONS**

Field service limited to the following areas only:

Warranty Information	Page 2
Routine Maintenance Schedule	Page 2
Basic Troubleshooting During Warranty Period	Page 3
Troubleshooting Out of Warranty Period	Page 4
Drive Housing Removal	Page 5
Belt Replacement	Page 5
Motor Replacement	Page 5
Control Pendant Replacement	Page 5
P.C. Board Replacement	Page 5
Power Switch Replacement	Page 5
Transformer Replacement	Page 5
Range of Motion Calibration	Page 5
Spare Parts List	Page 8

06500 Flexmate K500 (domestic)

Primary (input): 120VAC 60Hz 25W

The FLEXMATE K500 is a CLASS 1 device based on its type of protection against electric shock. It is a TYPE B APPLIED PART device based on the degree of protection against electric shock. The degree of protection against ingress of water is ordinary. Its primary mode of use is continuous.

FLEXMATE K500 can be transported and stored in an environment of – 40°F to 158°F (–40°C to 70°C), with a relative humidity between 10% and 100% non-condensing. The FLEXMATE K500 can operate between 50°F to 95°F (10°C to 35°C) under the same humidity levels, and 700 hPa to 1060 hPa atmospheric pressure. Any service requirements beyond the scope of this service manual must be performed by the factory or an authorized service representative.