Makers of metal-reinforced catheter shafts require a reliable way to identify damaged product after manufacturing processes such as extrusion and centerless grinding. Even in the most controlled lines, bits of wire braid or spring wire may protrude through the jacket, or minute pinholes in the coating can occur.

The Clinton Model CT-15AC performs a fast, repeatable high voltage pass/fail test that identifies damaged lengths of catheter shafts, even when the flaws are microscopic. Manufacturers are quickly alerted to problems in critical processes and can prevent bad product from moving to the next assembly step.

Equipped with multiple input and output signals, the CT-15AC Catheter Shaft Tester may be purchased as a fully automatic system with feeder and sorter. Electrode test voltage and ground tubes are internally monitored; a test may not proceed if voltage and grounding are not functional.
CT-15AC PRELIMINARY SPECIFICATIONS

Test Product Diameters.........4 Fr (1.3 mm / .05 in.) to 13 Fr (4.3 mm / .17 in.).
For additional sizes, consult factory.

Test Product Lengths ..........8” (203 mm) or longer, all colors.

Line Speeds ......................2.5 to 101.6 cm/sec (1-40 inches/sec).

High Voltage Test Output......1 kV to 5kV.

Display .........................7-inch wide color TFT Touch Screen.

Output Current..................4 mA Resistive, 40 mA Capacitive.

Dimensions (manual tester).13.9”H x 11.0” W x 15.0” D.

Weight (manual tester) ........37.5 lbs./17.0 kg.

Power Requirements ..........100-120 volts AC, 50/60 Hz, 2 amps, or 200-240 volts AC, 50/60 Hz, 1 amp.

CT-15AC Automated System Dimensions (typ.)
(for testing 12-24” long catheter shafts)

CT-15AC Manual Feed Tester

CT-15AC PRELIMINARY SPECIFICATIONS

Please consult factory for help in choosing equipment for specific applications.
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Safety

Danger! High Voltage Safety Hazards

Caution.

The CT-15AC employs high voltage to locate coating defects in reinforced catheter shafts. It is imperative that only personnel trained in the dangers of high voltage operate this equipment. Please read and understand the manual prior to operating this equipment.

High Voltage Facts

The commonly accepted maximum values of 60 Hz. current passing through the human adult body which permit a subject to let go of electrodes are nine milliamperes for males and six milliamperes for females. At 3000 Hz. this value increases to about 22 milliamperes for men or 15 milliamperes for women. DC currents do not present the same let–go problems, but a subject can readily let go at a level of 60 milliamperes. A continuous 60 Hz. current above 18 milliamperes stops breathing for the duration of the shock only. Ventricular fibrillation may occur above a level of 67 milliamperes. The reaction current level of 60 Hz. is about .5 milliamperes. Above this level a muscular reaction can occur which can cause a secondary accident. The DC and 3 kHz. levels are probably considerably higher.

Capacitor discharge energy of 50 Joules (watt–seconds) is regarded as hazardous.


Safety Symbols

The symbols depicted below are safety symbols placed on the spark test equipment. It is important to understand the meaning of each.

The Caution symbol found in the instruction manual calls attention to a procedure, practice, or the like, which if not correctly performed or adhered to, could result in personal injury or damage to or destruction of part or all of the product. Do not proceed beyond a Caution symbol until the indicated conditions are fully understood and met.

Risk of electric shock symbol.
Environmental Conditions

The Model CT-15AC Catheter Shaft Tester is designed to be safe under the following conditions:

- Indoor use.
- Altitude to 2000 m.
- Temperatures from 5°C to 40°C.
- Humidity to 80% R.H. at 31°C, decreasing linearly to 50% R.H. at 40°C.

The Clinton Instrument Company certifies that this equipment met its published specifications at the time of shipment. Clinton further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology to the extent allowed by the Institute’s calibration facility. For customer service or technical assistance with this equipment, please contact:

The Clinton Instrument Company  
295 East Main Street, Clinton, CT 06413 USA  
Telephone: 860-669-7548  Fax: 860-669-3825  
Website: www.clintoninstrument.com  
email: support@clintoninstrument.com.
Installation

Unpacking

The following items are included in the shipment:

- Catheter Shaft Feeder
- Feeder Extension, for catheter shaft lengths 26” to 61” long
- Feeder Hard Stops for each product range
- Feeder Pick Tools for each product range
- Feeder Front Alignment Plates for each product range
- CT-15AC Catheter Shaft Tester
- Additional electrodes, if ordered, for each product range
- Catheter Shaft Sorter
- 3 power cords
- 2 connecting cables with twist-lock connectors
- An instruction manual

Remove the Feeder, CT-15AC Catheter Shaft Tester, Sorter, and accessories from the cartons. Retain the packing material in the event that the unit is returned for calibration or service at some future time.

**CAUTION:** The installation procedures listed below are to be performed by qualified service personnel only. Failure to follow these procedures may result in danger to personnel and damage to equipment.

Place the Equipment

Place the Catheter Shaft Feeder on a solid surface. Set the CT-15AC Catheter Tester to the right of the Feeder. Place the Catheter Sorter to the right of the CT-15AC. Line up the three units so that the sides are flush and the front and back edges are aligned. Looking down the trough of the feeder, you should be able to see the catheter path through the CT-15AC Catheter Shaft Tester.

Place the Feeder Extension (if ordered) to the left of the Feeder. Align the two alignment pins in the Extension with the corresponding holes on the Feeder. Slide the alignment pins into the Feeder until the two machines are flush with one another.

Set CT-15AC Operating Voltage

Note the CT-15’s operating voltage, which is marked on a label beneath
the ON/OFF switch on the back panel. If it does not match the power line voltage you will be using to energize the unit, you must change the CT-15AC’s operating voltage. To do so, see the section entitled, “Changing the Operating Voltage.”

**Ground the CT-15AC Chassis**

Locate the ground stud on the back panel of the unit. Remove the outer nut and crimp terminal. Crimp a 16 ga. (1, 29 mm², 1, 31 cross-section) stranded insulated wire (preferably green with a yellow stripe) to the crimp terminal. Fasten this to the ground stud and secure with the keps nut. Connect the other end to a safety ground system in accordance with EN 60204-1:1993, Section 5.2, Table 1.

**Install Compressed Air and Airhose**

Clean, compressed air, regulated at 80-100 psi, is required to advance the test product through the test system. You will need approximately 20 feet of 1/4” air hose (Clippard URHI-0804 or equivalent) and two plastic 1/4” y-union fittings for the air supply system. (Clinton Part No. 92001, SMC KQ2U07-00 or equivalent).

As shown in the photo of the back panels:

1. Run a length of hose from the air compressor to a y-union fitting.
2. Run two pieces of hose from the other end of the y-union fitting, one to the orange connector on the back of the sorter, the other to a second y-union fitting.
3. From the other end of the second y-union fitting, run a length of 1/4” hose to the regulator on the back panel of the CT-15AC Catheter Shaft Tester and another length to the regulator fitting on the back panel of the Catheter feeder.
4. To remove the hose from a fitting, first press on the fitting.

**Install Connecting Cables**

As shown in the photo to the left:

1. Using the 7-pin twist-lock connecting cable, part number 92022-6.5, connect the Sorter to the CT-15AC Catheter Shaft Tester.
2. Using the 9-pin twist-clock connecting cable, part number 92021, connect the Feeder to the CT-15AC Catheter Shaft Tester.
Connect Power Cords

Insert the three power cords into the ON/OFF switches on the back panels of the CT-15AC, the Feeder and the Sorter.

Check Air Pressure Settings

Verify that the air pressure regulators on the rear of each of the three units are set at factory-adjusted levels:

- Feeder: 25 psi
- CT-15AC Catheter Shaft Tester: 40 psi
- Sorter: 60 psi
Prepare System for the Selected Product Size

NOTE: This procedure should be performed whenever the Catheter Shaft product size changes. Turn power OFF before proceeding.

Install the Feeder Hard Stop

1. Select the appropriate Hard Stop for the catheter size being tested; the number on the back of the Hard Stop reflect the catheter size with which it should be used. The Hard Stop prevents overtravel of the gripping mechanism, protecting the catheter shaft.

2. Attach the Hard Stop to the Feeder gripping mechanism using two thumb screws, as shown. The size marking should face out. Before the screws are fully tight, manually close the gripper and hold while tightening the thumb screws. This centers the Hard Stop.

Install the Feeder Front Alignment Plate

1. Select the Front Alignment Plate appropriate to the catheter size being tested. Attach it to the front of the Pick Head with two screws. The label should face out.

Install the Feeder Pick Tool

1. Select the Pick Tool appropriate to the catheter size being tested; it is labelled with the catheter size.

2. Remove the Feeder trough.

3. Insert the short pin of the Pick Tool into the lifting mount.

4. Give the Pick Tool a light twist, and you will feel it key into the hole.

5. Push the Pick Tool down until the base of the cone touches the lifting mount.

6. To remove the tool, simply pull straight up.
Calibrate the Feeder Pick Sensor

For the CT-15AC Catheter Shaft Tester to operate properly, the Feeder gripping mechanism must feed it one catheter at a time. For this to happen, the Pick Sensor must be calibrated to recognize the catheter shaft diameter. To calibrate the Pick Sensor:

1. Place a catheter shaft in the gripping mechanism as shown. Keep the catheter shaft still and level.
2. Press and release the blue setup button. Do not hold the button down.
3. Wait 3 seconds, and the Pick Sensor will be calibrated.
4. Each time the catheter shaft diameter changes, the Pick Sensor must be recalibrated.

Install the CT-15AC Catheter Tester Electrode

1. If you have purchased two or more electrodes, select the correct electrode for your product size.
2. Open the clear cover.
3. Remove the two black thumb screws holding the current electrode block in place. Remove the black electrode block.
4. Install the new electrode block. It will fit either way.
CT-15AC Controls

Safety Cover

The clear safety cover protects the operator from the moving rollers and high voltage test area.

Electrode Block

Each electrode block is manufactured to accommodate a particular catheter shaft size. Confirm that the electrode block you install is the correct unit. Insert the block into the slot beneath the clear safety cover. When the CT-15AC is ON and the START button is pressed, the tester will monitor for the presence of the ground tube and for cylinder movement, and then briefly apply voltage to the electrode to verify that the electrode block is correctly installed.

Front panel touch screen

The touch screen is used to set test parameters, run tests, and view test results. Never press the touch screen with a tool or sharp object.

Emergency Stop Switch

The emergency stop switch will immediately shut down the high voltage test and the Feeder. To resume testing, rotate the switch knob clockwise to release the switch.

Rollers

Two sets of pinch rollers advance the product through the electrode test area. Entrance is on the left; after the test is performed, good product exits to the right and is held so the operator can remove it. If a defect is found in the product, the tester will stop the part so that the defect remains in the electrode area. The operator can then estimate the location of the defect and remove the product manually from either side of the electrode.

ON/OFF Power Switch

The ON/OFF switch is located on the rear panel of the unit. A fuse is located in the top of the switch, and the power cable is inserted in the bottom.
Air Pressure Regulator

The air pressure regulator, located on the rear panel of the CT-15AC, monitors the compressed air used to advance the product through the electrode. The regulator should be set at 40 psi.

Ground connection

A 10-32 grounding stud located on the rear panel of the CT-15AC chassis. Wire to earth ground as directed in the “Installation” section.

Feeder Interface

A 9-pin connector, located on the back of the catheter tester, is provided as an interface to an optional feeder.

Sorter Interface

A 7-pin connector, located on the back of the catheter tester, is provided as an interface to an optional sorter, which separates good and bad parts after testing.
Test Setup

Test parameters are stored in the CT-15AC Test Setup screen. They are saved in memory even when the CT-15AC is OFF. Values may be viewed by pressing the TEST SETUP button on the main screen, but they can be changed only if the operator is logged onto the system.

To change test parameters:

1. Turn ON the CT-15AC with the ON/OFF switch, located on the back panel of the unit.
2. The CT-15AC will take a few moments to boot up. Do not touch the screen until the Clinton screen appears.
3. Press the LOGIN button and enter your password. The system will confirm that you are logged in.
4. Press the TEST SETUP button, and the current system values will display.
5. Change the value of any setting by pressing on the value. Press CLR to clear any entry, or ESC to cancel a change.

Test Voltage

This value is the voltage level applied to the product when it enters the electrode. For help in determining the correct test voltage, refer to the chapter entitled, "Choosing the Correct Test Voltage."

Test Speed

This parameter is the speed at which the catheter shaft enters the electrode. Consult the factory regarding the recommended speed for your particular product.

Eject Speed

Eject speed is the speed at which the catheter shaft is ejected from the electrode. This value must not be less than the Test Speed.

Sorter Installed

A check mark indicates that a sorter is attached to the tester. Good parts will automatically be fed to one bin of the sorter and bad parts to the other. An X indicates that no sorter is installed.
Feeder Installed

A check mark indicates that a feeder is attached to the tester. When testing is started, the feeder will load parts into the tester until the feeder is empty. An X indicates that no feeder is installed.
1. Turn ON the system with the three ON/OFF switches, located on the back panel of each unit.

2. Place catheter shafts (no more than 50) in the feeder trough. Place them so that they are flush against the right side of the trough.

3. Wait a few moments. The CT-15AC Tester touch screen will appear.

4. Press the TEST SETUP button to view the Voltage Setting, Test Speed and Eject Speed. If these settings are not appropriate for the product you will be testing, log in to the system to change them.

5. Press START on the front panel touch screen to begin the test. In the background, the tester will monitor for the presence of the ground tube and for cylinder movement, and then briefly apply voltage to the electrode to verify that the electrode block is in place.

6. The feeder will move a part to the tester, and the pinch rollers will seize it and advance it to the electrode test area. The voltage level previously set on the touch screen will be applied.

7. The part will pass through the electrode and will be ejected into the sorter. If the part is good, the sorter will deposit it into the “pass” bin. “Last Test Result” will display “PASS.” The “Passed” counter under “Parts Tested” will increment by one.

8. If there is a fault in the part, the sorter will deposit it into the “failed” bin. “Last Test Result” will display “FAIL.” The “Failed” counter under “Parts Tested” will increment by one. To continue testing, press START.

9. The counts under “Parts Tested” can be cleared to 0 by pressing the CLEAR COUNTS button.

10. Test Validation should be a part of an operator’s standard operating procedures. Refer to the section entitled, “Test Validation,” for information on this process.
Choosing the Correct Test Voltage

It is imperative that you test your product at a proper test voltage. If the voltage is too low, defects may pass through undetected. If the voltage is too high, damage to the product is possible. The correct test voltage is a function of the product size, coating composition and wall thickness, as well as the air gap between the product OD and the electrode ID.

If samples are provided, Clinton is happy to provide assistance in finding the correct test voltage for your range of products or to verify your testing at no charge.

To determine the correct test voltage for your product, two tests must be performed. First there is a dielectric breakdown test, which determines how much good material will withstand before the voltage ruptures it. The second test is to find a minimum effective voltage, the lowest voltage that will reliably detect a known fault.

The Dielectric Breakdown Test

1. Log in, press the System Info button, and press DEBUG to enter the Debug mode.
2. Press BREAKDOWN TEST to enter the Dielectric Breakdown Test mode.
3. Choose the electrode based on the French size of the test product. If the diameter is unusual, choose the next larger size.
4. Thread a part through the electrode manually.
5. Choose a starting voltage of 2.0 kV.
6. Choose a Ramp Time (the length of time it will take to achieve that voltage) of 1 second (1,000 ms), and a Hold Time (the amount of time the unit will stay at that voltage) of 1 second.
7. Press Start. The CT-15AC will indicate Pass or Fail.
8. If the part passes the test, move the part ½-inch to expose fresh material to the electrode and increase the voltage by 500 volts.
9. Repeat steps 7 and 8 until the part fails, or until the applied test voltage exceeds 5000 volts (at this point the specific breakdown value is moot). When the part fails, the breakdown voltage will be displayed.

The only cause for concern is if the breakdown voltage is less than 3500 volts. At that point an effective test voltage (with the electrode clearances you have) might over-stress the coating.
The Minimum Effective Voltage Test

1. Make a defect in the coating that is definitely through to the braid. A needle point through the wall or a knife cut works best. Adjust the test voltage to 2.0 kV and return to normal test mode. Perform a test on the product. If the unit doesn’t catch the fault, raise the voltage in 500 volt increments until it does.

2. Once you believe the unit is at a reasonable voltage, using a fresh part with a defect, run the part through a number of times, say 25. It must count every time. If it misses one, raise the voltage 500 volts. Use a new part repeat until you catch all 25. As long as you don’t get to the breakdown value, you are alright.

Note: Test voltages can get very close (500 volts) to the breakdown value (as determined with the above method) without harm because in the breakdown test the product is stationary and in the pinhole test the product is moving. Time is a significant factor in dielectric failure and a moving product can withstand considerably more than a stationary one.
Password Protection

The CT-15AC offers password protection that can prevent unauthorized individuals from changing voltage settings and test parameters in the TEST SETUP menu.

To change the password:

1. Press the LOGIN button in the upper righthand corner of the main screen. Enter the current password (the factory default is 1111). The touch screen will indicate if the password is incorrect.

2. After you have logged in successfully, press the SYSTEM INFO button in the lower left corner of the screen. The CHANGE PASSWORD option will appear in the center of the screen.

3. Enter a new 4-digit password twice.

If the new password should be lost, contact the factory.

WARNING TO SUPERVISORS: Parts tests may be run while the operator is logged into the system. The voltage level and other settings can be changed at this time. Supervisors should log out when final test settings are chosen to avoid the possibility of changes to settings by unauthorized personnel.
Changing the Operating Voltage

**CAUTION:** The procedure listed below is to be performed by qualified service personnel only. Failure to follow this procedure may result in danger to personnel and equipment damage.

1. Turn OFF the CT-15AC.
2. Disconnect the CT-15AC from its power source before continuing.
3. Remove the back panel of the CT-15AC to expose the mains power transformer.
4. Rearrange the transformer jumper connections to the correct test voltage as shown in the drawings below.
5. Reattach the back panel and change the operating voltage displayed on the back panel label near the ON/OFF switch.

6. Change the fuse inside the ON/OFF power switch. At operating voltages of 100 or 120V, use a 2 Amp 250VAC 5x20mm low breaking time delay fuse, CIC part number 02606. If the spark tester operating voltage is 200 or 240V, use a 1 Amp 250AC 5x20mm low breaking time delay fuse, CIC part number 02603. This fuse is located in the ON/OFF power switch and is accessible with a flathead screwdriver as shown in the Maintenance section of this manual.
System Info

System Info provides information about the current code level of the equipment. You may be asked for this information by the factory if troubleshooting is required.
CT-15AC Voltage Calibration

An HF-CAL High Frequency Spark Test Calibrator consisting of a 3kHz Voltage Divider and an AC voltmeter, and a Calibration Electrode Block (CEB) are required to calibrate the CT-15AC. These items may be purchased from the factory.

Caution.
It is imperative that only personnel trained in the dangers of high voltage operate this equipment.

Connect the CT-15AC to the HF-CAL

1. Turn OFF the CT-15AC. Insert the banana plug on the green colored ground wire into the ground terminal on the HF-CAL, and clip the other end to the ground stud on the back of the CT-15AC.

2. Turn ON the CT-15AC. After a few moments, press the LOGIN button. Enter your password and press OK.

3. Press the Calibration button, located in the bottom left corner of the touchscreen. The Calibration screen will appear.

4. Replace the electrode block with the Calibration Electrode Block (CEB). Refer to the “Installation” section for instructions.

5. Plug one end of the cable provided with the Calibration Electrode Block (CEB) into the High Voltage Input terminal on the HF-CAL, and the other end into the CEB.

6. Press the right arrow on the touchscreen. The Check Calibration screen will appear.

Check Calibration

7. To check the calibration of the CT-15AC, enter the voltage at which you operate the unit (for example, 4.0 kV). Press 0.0 under Set Point, enter 4.0 using the touchscreen keyboard and press OK. The touchscreen will display 4.0 under Voltage Reading. Compare this number to the actual output voltage displayed on the HF-CAL voltmeter.

8. The CT-15AC is within factory specifications if the actual output voltage displayed on the HF-CAL voltmeter is within 2% of the Voltage Reading displayed on the CT-15AC. Additional set points may be entered to check calibration, for example, at 1kV, 2kV, 3kV, and 5kV.
9. If the calibration is within specification, exit the calibration mode and Log Out. If the calibration is not within specification, press the arrow on the right. The Adjust Voltage Out screen will appear.

Adjust Voltage Out

10. View the voltage output reading on the HF-CAL voltmeter. Use the up and down arrows on the touch screen so that the HF-CAL voltmeter displays 1.0 kV (within 2% or +/- 20 volts). Press NEXT.

11. A new screen will appear. View the reading on the HF-CAL voltmeter. If necessary, use the up and down arrows on the touch screen until the HF-CAL voltmeter displays 5.0 kV (+/- 2% or 100 volts). Press the right arrow. If adjustments were made, you will be returned to the Adjust Voltage Out 1kV screen.

12. Repeat steps 10 and 11 until the HF-CAL voltmeter reads 5.0 kV without further adjustment from the touch screen. Press the right arrow. The Adjust Voltage Reading screen will appear.

Adjust Voltage Reading

13. As directed on the touch screen, use the up and down arrows so that the Voltage Reading on the touch screen displays 1.0 kV. Press the right arrow to advance to the next screen.

14. If the Voltage Reading on the touch screen is not 5.0 kV, use the up and down arrows until the Voltage Reading on the touch screen is 5.0 kV. Press the right arrow. If adjustments were made, you will be returned to the Adjust Voltage Reading 1.0kV screen.

15. Repeat steps 13 and 14 until the Voltage Reading on the touch screen reads within 2% of 5.0 kV without further adjustment. Press the right arrow.

16. To check an alternate calibration point, press the Voltage Reading number to access a keypad. Enter a new Voltage Reading (a number from .5kV to 20.0kV) and press OK. Record the voltage output on the multimeter. A number within 2% of the Voltage Reading is within factory tolerance. Repeat as necessary.

17. Press NEXT. The calibration is complete. Press the right arrow to exit Calibration.
Test Validation

Clinton recommends regular validation of your parts test. For example, an operator may, at the beginning of a shift or after each electrode change, test 10 parts, 2 with known failures, to insure that the tester is operating properly. A known failure can be created by knicking the insulation.

Parts with known failures should be used a maximum of five times before replacement. Overuse can result in carbon buildup at the fault site, sometimes preventing the tester from recognizing the fault.

Test voltage calibration on a yearly basis is recommended.
Maintenance

Fuses

The fuses in this equipment are not expected to fail in normal operation. Their failure may be an indication of equipment malfunction requiring qualified repair personnel.

A fuse is located in the ON/OFF power switch. To replace it, disconnect the power cord from power. Use a flathead screwdriver to gain access to it, as seen in the pictures below.

Rollers

The rollers advance product to the test area. For optimum operation, rollers must be clean and in good condition. Inspect them periodically. Clean or replace when necessary.

Electrode Blocks

Electrode blocks should be cleaned out with compressed air to remove any dust that may collect during parts testing.
Troubleshooting

- The Feeder tries 3 times and does not pick a part or picks more than one part 3 times in a row.
  If the trough is empty or has less than 5 catheter shafts, add more catheter shafts and close the cover. The machine will restart.
  If there are many catheter shafts in the Feeder, open the cover and manually adjust the shafts over the Pick Tool hole. Close the cover. The machine will restart.
  Insure that the shafts are as straight as possible.

- Catheter shafts are not entering the CT-15AC Tester properly.
  Though factory set, it may become necessary to adjust the position of the gripping mechanism if the shafts are not entering the Tester properly.
  There are two pairs of two machine screws where the gripping mechanism attaches to the machine. Fine vertical and horizontal adjustments can be made by loosening the screws (shown in the photos to the left), repositioning the gripping mechanism, and re-tightening them. To check alignment, hold the grippers closed manually and look through the hole between them where a shaft would be gripped. Proper alignment is achieved if the hole in the CT-15AC Tester is centered, or slightly below, the hole between the grippers.

- The CT-15AC Tester indicates that no part is present.
  Open the cover on the Feeder and remove any shafts that are partially in the CT-15AC Tester. Close the cover and restart the CT-15AC. If the problem persists, reposition the CT-15AC with respect to the Feeder as described in “Place the Equipment.”

- Product jams during a test.
  Check rollers for wear or residue. Clean or replace as necessary.

- Defects are not detected.
  Check test voltage.

- “Both ground tubes cannot be detected.”
  The electrode is not installed properly.
Replacement Parts

Note: Printed circuit boards are carefully constructed and calibrated at the factory. Components are not supplied for field repair of boards. Please return faulty circuit boards to the factory for repair and calibration.

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<td>Idler Roller</td>
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<td>91705</td>
<td>Stepper Motor M Drive 17</td>
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<th>Description</th>
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<tbody>
<tr>
<td>12101-0027</td>
<td>Removable Trough</td>
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<tr>
<td>12101-0022</td>
<td>Front Gripper</td>
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<tr>
<td>12101-0023</td>
<td>Rear Gripper</td>
</tr>
<tr>
<td>12101-0029</td>
<td>5 Fr Hard Stop</td>
</tr>
<tr>
<td>12101-2029</td>
<td>6 &amp; 7 Fr Hard Stop</td>
</tr>
<tr>
<td>12101-1006</td>
<td>5 Fr Pick Tool</td>
</tr>
<tr>
<td>12101-0006</td>
<td>6 &amp; 7 Fr Pick Tool</td>
</tr>
<tr>
<td>12101-8000</td>
<td>6 &amp; 7 Fr Guide Plate</td>
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<tr>
<td>12101-8002</td>
<td>5 &amp; 6 Fr Guide Plate</td>
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Optional Accessories

<table>
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<tr>
<th>Part Number</th>
<th>Description</th>
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<tr>
<td>91669-4F</td>
<td>Electrode Block for 4 Fr product</td>
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<tr>
<td>91669-5F</td>
<td>Electrode Block for 5 Fr product</td>
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<tr>
<td>91669-7F</td>
<td>Electrode Block for 7 Fr product</td>
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<tr>
<td>91669-9F</td>
<td>Electrode Block for 9 Fr product</td>
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</table>
Warranty

The information contained in this document is subject to change without notice. The Clinton Instrument Company makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties or merchantability and fitness for a particular purpose.

The Clinton Instrument Company shall not be liable for errors contained herein or for incidental damages in connection with the furnishing, performance, or use of this material.

We warrant to the original purchaser that the equipment described herein is free from defects in materials and workmanship for a period of one year from the date of invoice, our obligation under this warranty being limited to repair or replacement of the defective parts. This warranty does not apply to fuses, lamps, or any normally expendable parts. Any part appearing to have defects in material or workmanship, upon our examination only and as determined by us, and providing the equipment has not been subject to abuse, misuse, or alteration, will be repaired or replaced at no charge for materials and labor, either upon receipt of the defective part or equipment, transportation charges prepaid, at our plant or at the equipment location, as selected by us. No parts or equipment shall be returned without our prior permission. Any parts replaced under this warranty shall be warranted until the expiration date of the original warranty.

The warranties herein are in lieu of all other warranties, expressed or implied, and of all other obligations or liabilities on our part concerning this equipment.