

customer manual

ORIGINAL INSTRUCTIONS

1. INTRODUCTION	5
2. DESCRIPTION	6
2.1. By model	6
2.2. Functional	7
2.3. Electrical	9
2.4. Machine guard	10
3. RECEIVING INSPECTION AND INSTALLATION	12
3.1. Receiving inspection	12
3.2. Installation	12
3.3. Considerations affecting placement of bench machines	13
3.4. Electrical connection	15
4. OPERATION	16
4.1. Control panel	16
4.2. Membrane keypad and display screen	19
4.3. Mode selection	22
4.4. Adjusting motor speed	22
4.5. Applicator installation	23
4.6. Setup	23
4.7. Adjusting the crimp height	24
5. Die vision system	24
5.1. Power On and Initialization	24
5.2. Downloading and Installing DieQ Files	24
5.3. Part Selection	24
5.4. Reference Images	24
5.5. Die Serial Number	25
5.6. Terminal Position	26
5.7. Cable Diameter	28
5.8. Brush Position	29
5.9. Terminal Position Deviation	31
5.10. Camera Setup	32
5.11. Find Cameras	33
5.12. Focus Tool	33
6. PREVENTIVE MAINTENANCE	35
6.1. Cleaning	35
6.2. Lubrication	36
6.3. Safety system check	37
7. ADJUSTMENTS	39
7.1. Shut height	39
7.2. Guard insert	40

customer manual

8. MACHINE OPTIONS	41
8.1. Air feed valve kit (PN 2372210-1)	42
8.2. Vacuum system	45
8.3. Manual cable clamp	46
8.4. Automatic cable clamp	47
9. TROUBLESHOOTING	53
9.1. Error codes	53
9.2. Diagnostics	54
10. IDENTIFYING THE SOFTWARE VERSION	55
11. DISPOSAL	56
12. REPLACEMENT AND REPAIR	56
13. RESTRICTION ON HAZARDOUS SUBSTANCES (ROHS) INFORMATION	56
14. REVISION SUMMARY	56

ORIGINAL INSTRUCTIONS

SAFETY PRECAUTIONS — AVOID INJURY

Safeguards are designed into this application equipment to protect operators and maintenance personnel from most hazards during equipment operation. However, certain safety precautions must be taken by the operator and repair personnel to avoid personal injury, as well as damage to the equipment. For best results, application equipment must be operated in a dry, dust-free environment. Do not operate equipment in a gaseous or hazardous environment.

Carefully observe the following safety precautions before and during operation of the equipment:



Always wear approved eye protection while operating equipment.



Always wear appropriate ear protection while using equipment.



Moving parts can crush and cut. Always keep guard(s) in place during normal operation.



Always insert power plug into a properly grounded receptacle to avoid electrical shock.



Always turn off the main power switch and disconnect the electrical cord from the power source when performing repair or maintenance on the equipment.



Do not operate the equipment without guards in place.



Always use lifting points when moving equipment.



Never alter, modify, or misuse the equipment



Use caution when working with this equipment.



Never insert hands into installed equipment. Never wear loose clothing or jewelry that may catch in moving parts of the equipment.



Never place liquid containers on any surfaces of the machine. The containers may tip and result in machine damage.



Never enter the electrical enclosure immediately after turning off the machine power switch and disconnecting the electrical cord from the power source. High residual voltages may be present in the electrical enclosure. Read the warning label on the electrical enclosure before entering the enclosure.



Never stare at the bright light used for machine lighting. Bright light can damage the eye.



Never use the machine for other than what it is designed, which is crimping terminals to wire. Do not use the machine for crushing any items.

TOOLING ASSISTANCE CENTER

CALL TOLL FREE 1-800-722-1111 (CONTINENTAL UNITED STATES AND PUERTO RICO ONLY)

The **Tooling Assistance Center** offers a means of providing technical assistance when required. In addition, Field Service Specialists are available to provide assistance in the adjustment or repair of the application equipment when problems arise which your maintenance personnel are unable to correct.

INFORMATION REQUIRED WHEN CONTACTING THE TOOLING ASSISTANCE CENTER

When calling the Tooling Assistance Center regarding service to equipment, it is suggested that a person familiar with the device be present with a copy of the manual (and drawings) to receive instructions. Many difficulties can be avoided in this manner.

When calling the Tooling Assistance Center, be ready with the following information:

- Customer name
- Customer address
- Person to contact (name, title, telephone number, and extension)
- Person calling
- Equipment number (and serial number if applicable)
- Product part number (and serial number if applicable)
- Urgency of request
- Nature of problem
- Description of inoperative component(s)
- Additional information/comments that may be helpful

Figure 1: HF-20 and HV-20 terminators

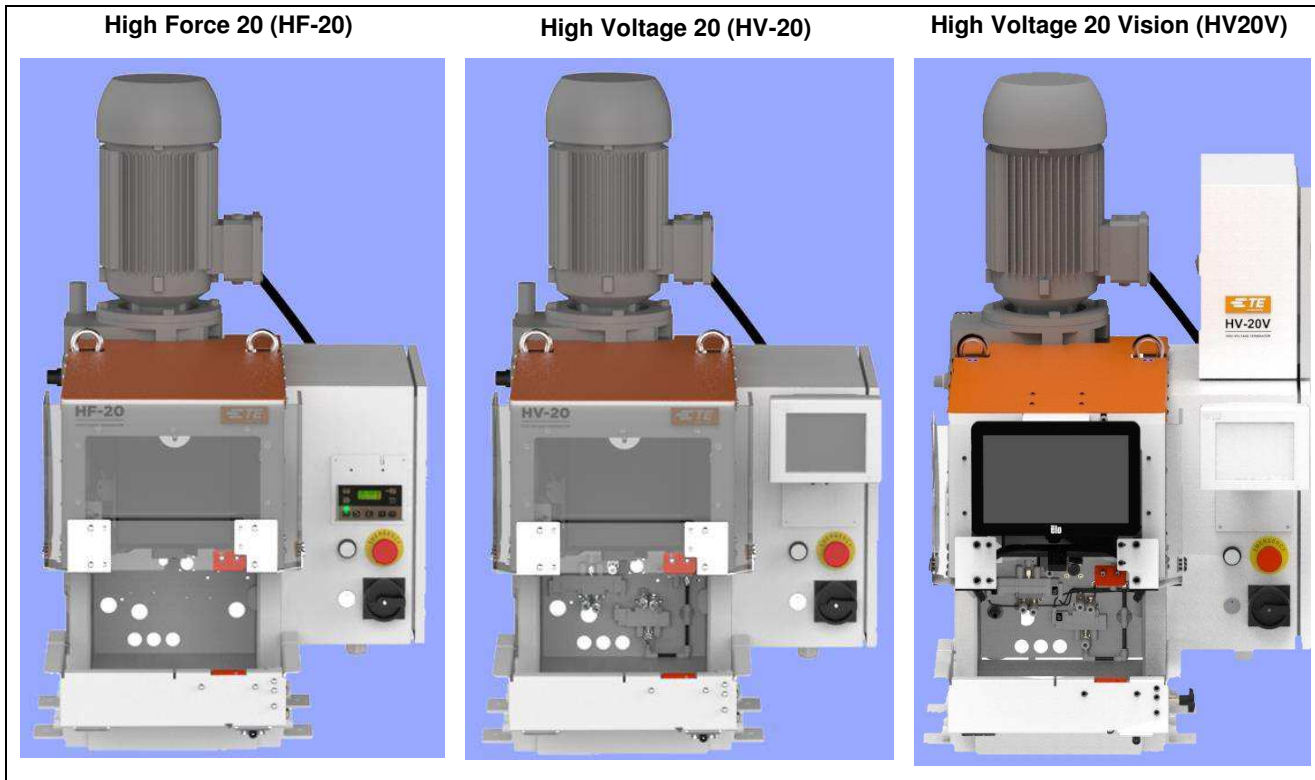


Table 1: Part numbers

Terminator part number	Description
2335500-1	High Force 20 terminator (400v)
2335500-2	High Force 20 terminator (200v)
2348822-1	High Voltage 20 terminator (400v)
2348822-2	High Voltage 20 terminator (200v)
2399816-1	High Voltage 20 Vision terminator (400V)
2399816-2	High Voltage 20 Vision terminator (200V)

1. INTRODUCTION



Read and understand the entire manual before using the equipment.

When reading this manual, pay special attention to DANGER, CAUTION, and NOTE statements.



DANGER

Denotes an imminent hazard that can result in moderate or severe injury.



CAUTION

Denotes a condition that can result in product or equipment damage.



NOTE

Highlights special or important information.

This manual contains information on the operation, preventive maintenance, and adjustments of the High Force 20 and High Voltage 20 Terminator Machines (Figure 1).

Descriptions in this manual pertain to the controls and adjustments on the High Force 20 and High Voltage 20 Terminator machines only.

The various applicators that can be used in the machines are covered in applicator instruction sheets packaged with each applicator. Applicator instruction sheets provide information on applicator installation, care, and adjustment.

The specifications and requirements for the High Force 20 and High Voltage 20 Terminator Machines are listed in Table 2.

Table 2: Specifications and requirements

Specification or requirement		Value
Max crimp force		178 kN (40,000 lb)
Nominal frame deflection		0.006 mm per 1000 newtons [.001 in. per 1,000 lb] crimp force
Noise		The emission sound pressure levels at the operator position are at the infeed < 69.3 dB(A), uncertainty K is 6.3 dB (A). The sound power level is 74.0 dB (A), uncertainty K, 7.4 dB (A). Operating conditions and procedures during noise testing are in accordance with EN 1218-4:2004 + A2:2009. Sound pressure level at the operator position have been measured in accordance with EN ISO 11202:2010. The sound power level has been determined in accordance with EN ISO 3746:2010. Uncertainty has been determined in accordance with EN ISO 4871:2009
Weight		390 kilograms [860 lbm]
Height		965 mm [38 in.] without reel supports
Electrical	-1 machine	380-420 VAC, 50/60 Hz, three phase current. Operating current is 5 amps
	-2 machine	208-240 VAC, 50/60 Hz, three phase current. Operating current is 10 amps
Air		620-760 kPa [90-100 psi], 2.83 liters/sec (6 standard cubic feet/min) when required for use with air-feed applicators
Physical environment	Temperature	4 to 40° C [40 to 104° F]
	Relative humidity	Less than 95% (non-condensing)
	Transportation and storage	Store in clean, dry environment after coating all surfaces lightly with rust-preventing oil

2. DESCRIPTION

2.1. By model

The High Force 20 and High Voltage 20 Terminator Machines were designed to be used as stand-alone semi-automatic bench units. They are assembled with metric hardware and accept a wide variety of large size applicators.

**NOTE**

Measurements are in metric units [followed by U.S. customary units in brackets] unless otherwise indicated. Some commercial items may contain non-metric hardware.

- High Force 20 (HF-20) Terminating Machines (PN 2335500-[])
- High Voltage 20 (HV-20) Terminating Machines (PN 2348822-[])
- High Voltage 20 Vision (HV-20V) Terminating Machines (PN 2399816-[])

**NOTE**

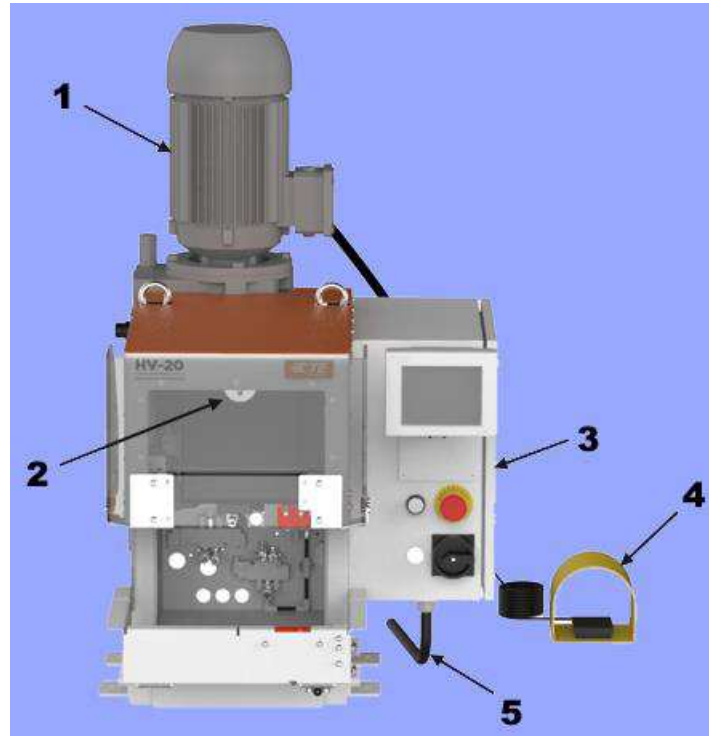
HV-20 Terminator 2348822-[] Revision D and HV-20V Terminator 2399816-[] are equipped with a pneumatic assembly and controls to allow the use of the automatic cable clamp of the HV Modular Die Holder 2305470-2. It does not work on the HF-20 Terminator 2335500-[] or the HV-20 Terminator 2348822-[] Revision C and earlier.

2.2. Functional

These machines provide the force required to crimp terminals in the applicator. A terminal is attached to the wire by placing the wire in the crimp area and pressing the foot switch. The machine consists of three functional areas:

- The **motor group** includes an AC motor that drives a crankshaft (Figure 2). The motor is activated each cycle and rotates the crankshaft one full revolution.

Figure 2: Motor and crankshaft-ram groups

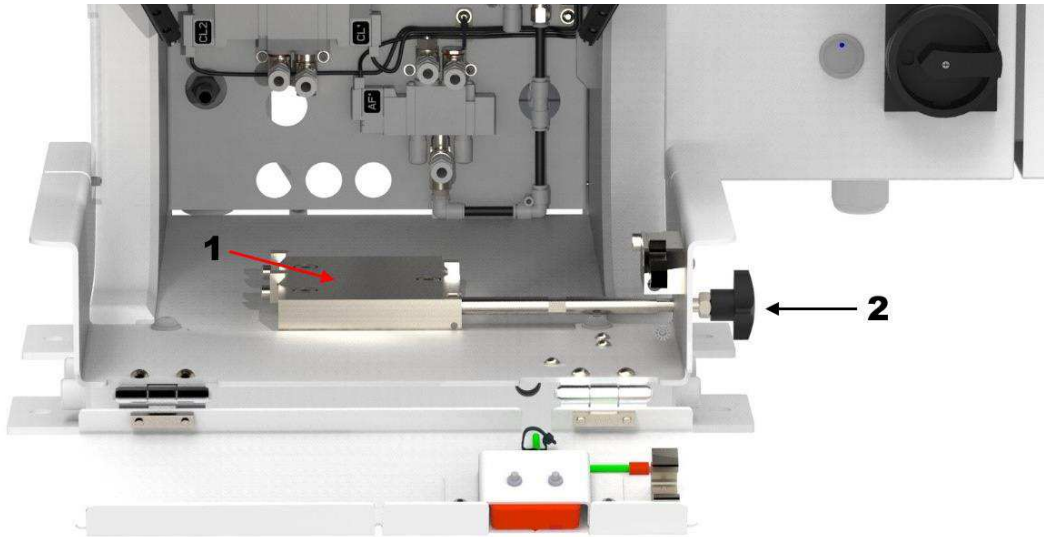


- 1 Motor group
- 2 Crankshaft-ram group
- 3 Electrical enclosure
- 4 Foot switch
- 5 AC power cord (customer supplied)

- The **crankshaft-ram group** converts the rotational output of the motor to the linear motion of the ram that cycles the applicator during the crimping operation.

- The **base plate** provides the mounting surface on which the applicator is installed. The external knob allows access to base plate locking feature for easy installation and removal of the applicator (Figure 3).

Figure 3: Base plate



- 1 Base plate
- 2 Applicator release knob

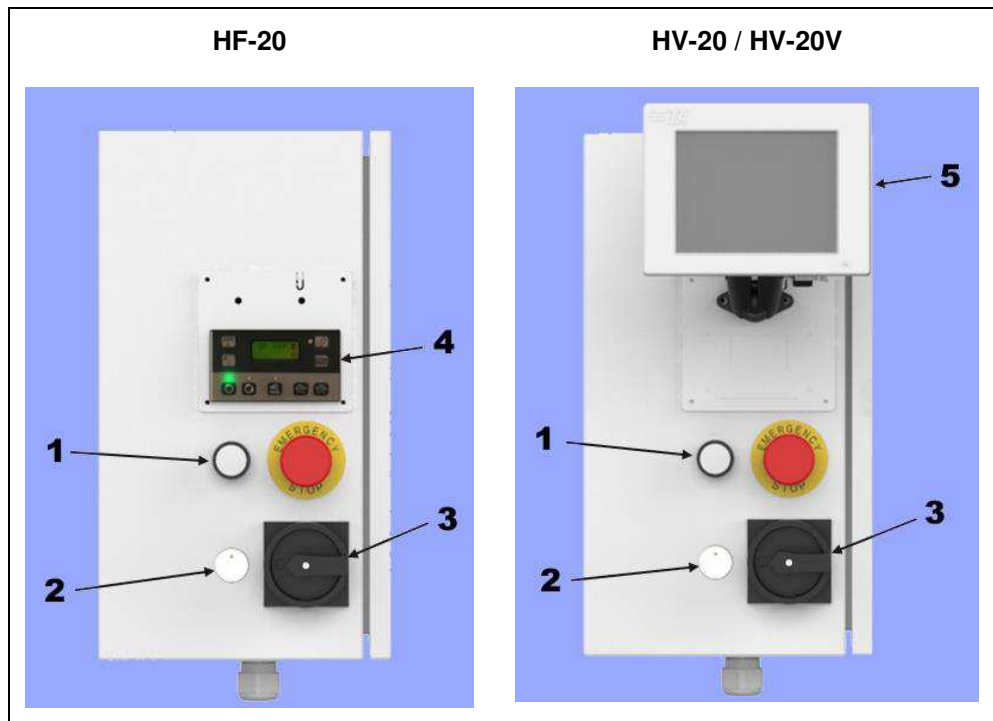
2.3. Electrical

The terminator has an electrical enclosure that contains the control system components for the machine. The enclosure also includes mounting of the operator interface controls.

The terminator is designed to operate on three-phase AC power. A customer-supplied power cable and plug must be connected to the machine (refer to Section 3.4. for details of the AC power connection). The machine is factory configured to operate on three-phase power at 208-240 VAC or 380-420 VAC, 50/60 Hz.

The operator control panel is mounted on the electrical enclosure. On High Force 20 Terminators, the control panel includes a membrane keypad and display screen. On High Voltage 20 Terminators, an LCD and touchscreen user interface are provided. Both machines include an AC power disconnect switch, a guard control button, an emergency stop push button, and a safety reset push button (Figure 4).

Figure 4: Electrical controls



- 1 Safety reset
- 2 Guard control
- 3 AC disconnect
- 4 Membrane keypad
- 5 LCD and touch screen

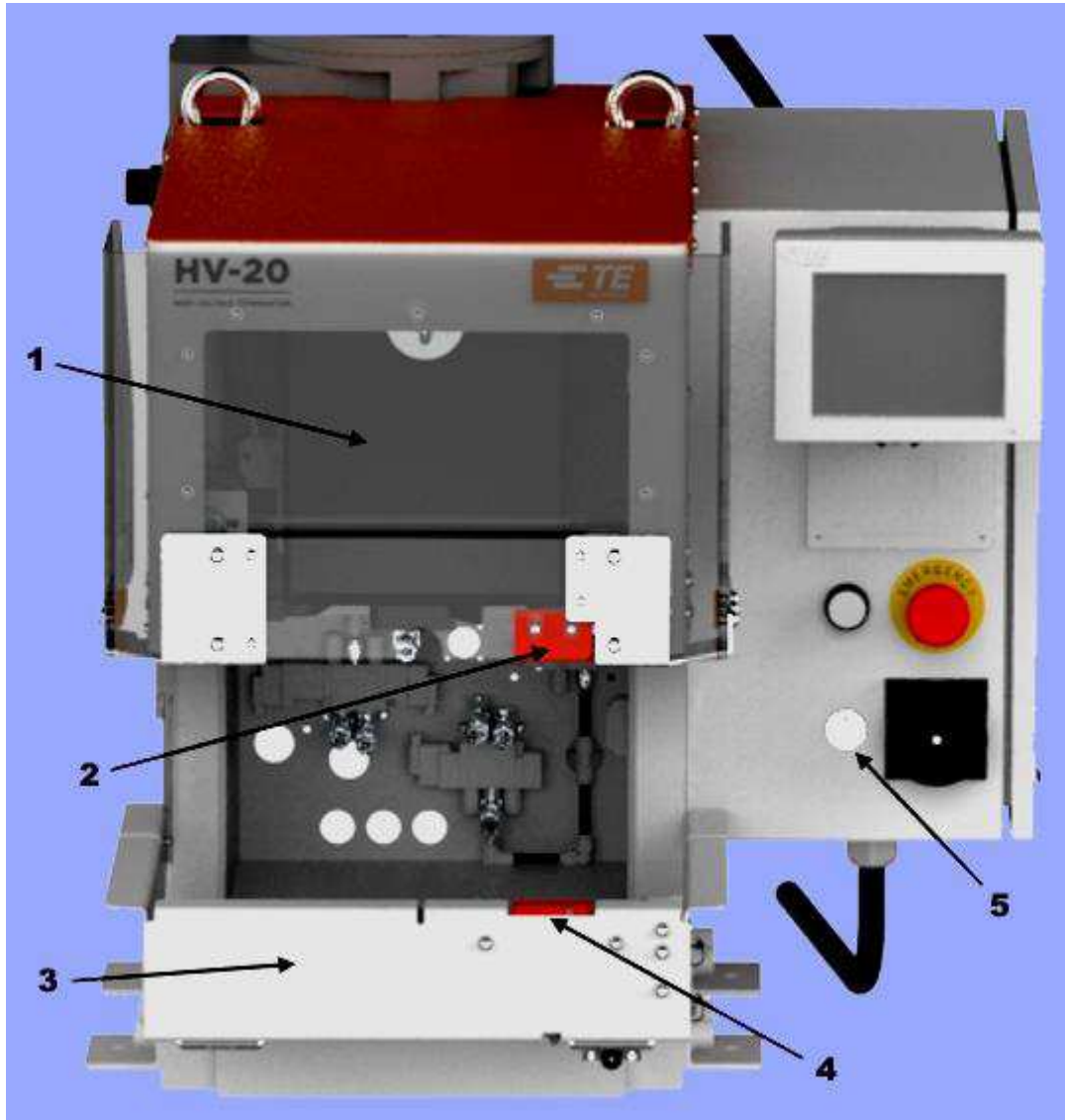
2.4. Machine guard

A guard system is installed to protect the operator while maintaining proper visibility of the work area. The guard system consists of two parts:

- An upper guard that opens vertically to provide access to load a terminal and wire or cable into the crimping area
- A lower guard that pivots open to allow access to change the tooling holder or applicator

The Guard Control push button opens or closes the upper guard (Figure 5). A safety interlock switch on the lower guard and a safety interlock actuator on the upper guard prevent machine operation if the guard door is open.

Figure 5: Guard system

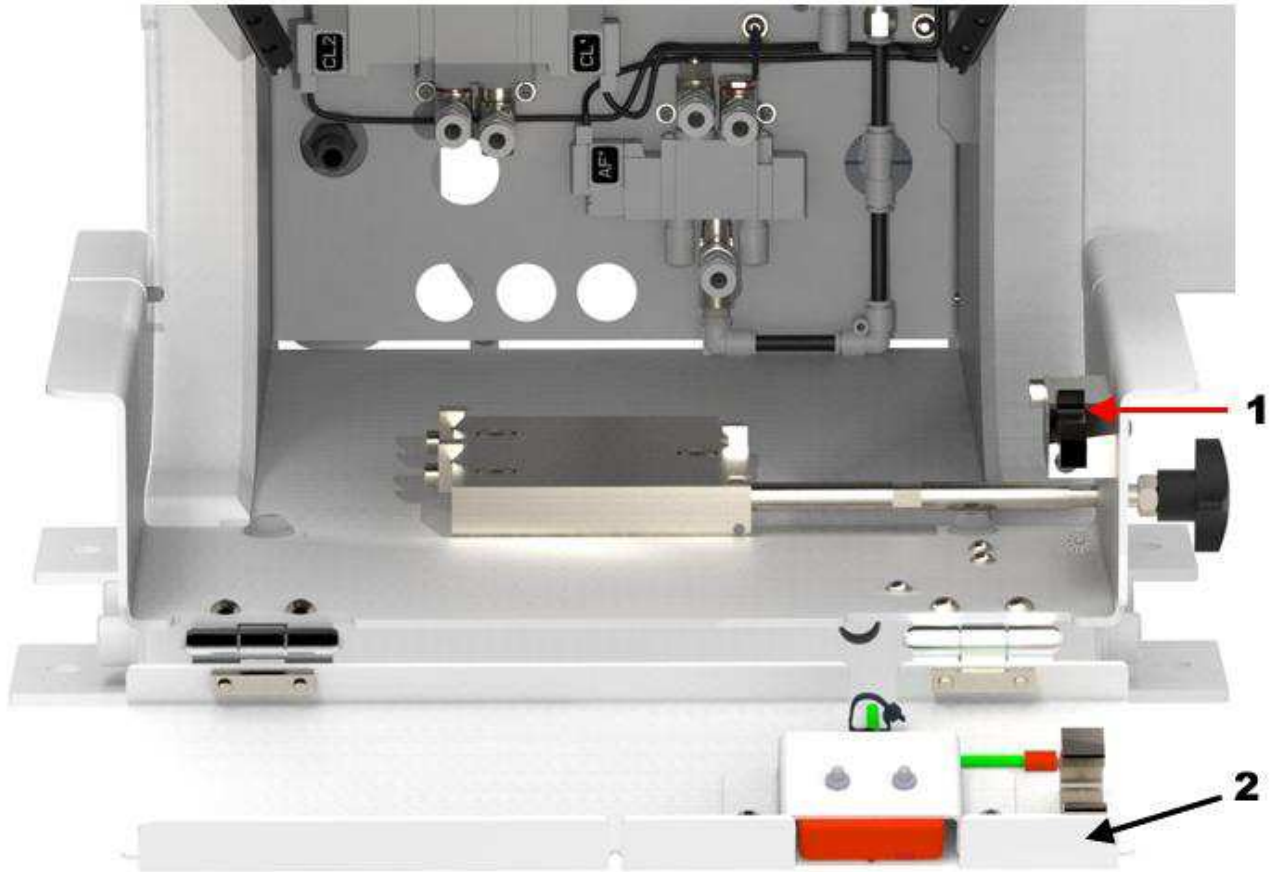


- 1 Upper guard
- 2 Safety interlock switch actuator
- 3 Lower guard
- 4 Guard control push button
- 5 Safety interlock switch

To open the lower guard, complete the following steps:

1. Open the upper guard.
2. Press the Lower Guard Release latch (Figure 6). A spring plunger pushes the lower guard open slightly.
3. Release the Lower Guard Release latch. The lower guard falls open. A rubber stop under the guard stops it at the bottom of its travel.

Figure 6: Lower guard



- 1 Lower guard release
- 2 Lower guard door

3. RECEIVING INSPECTION AND INSTALLATION

3.1. Receiving inspection

These machines are thoroughly inspected during and after assembly. A final series of inspections are made to insure the proper machine functioning before packaging and shipping.

Despite careful packaging, damage may occur during shipping. Upon receipt, remove the machine from the crate and carefully inspect for damage. If damage is evident, file a claim against the carrier and notify TE immediately.

3.2. Installation

Remove all mounting bolts securing the machine to the shipping pallet. The lifting points are located on the top of the machine (Figure 7).

i NOTE
Bow shackles are installed in the machine for use as lifting points. Reference TE PN 2337840-1 for replacement.

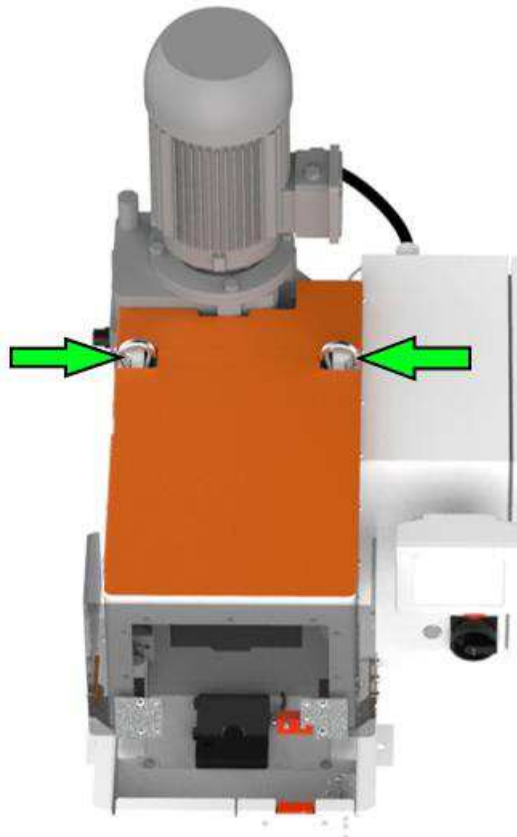
⚠ CAUTION
Always use lifting points when moving equipment.

⚠ CAUTION
Both lifting points must be used when lifting the machine.

⚠ CAUTION
The machine weighs 390 Kg [860 lbm]. The lifting equipment must have a safety factor of at least 1.5 - 2 times the weight of the machine.

Attach a suitable hoist to the lifting points, lift the machine, and place it in the selected operating location.

Figure 7: Lifting points



3.3. Considerations affecting placement of bench machines

The location of the machine in relation to the operator's position is extremely important in terms of both safety and maximum efficiency. Studies have repeatedly shown that operator fatigue is reduced, and greater efficiency achieved, if all of the following are true:

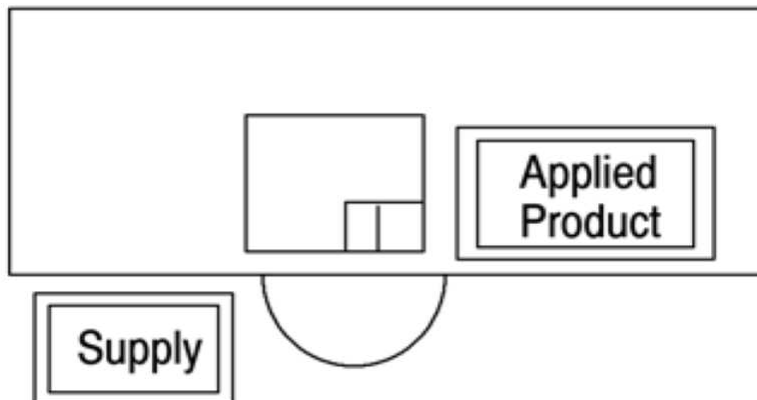
- The bench is of appropriate height, preferably with sound-deadening rubber mounts.
- The machine is properly located on the bench, with ample work areas on both sides to facilitate workflow.
- The operator uses a swivel chair with padded seat and back rest that are independently adjustable.
- The foot switch (on machines so equipped) is placed on a rubber mat to maintain its movability, while preventing it from sliding unintentionally.

Figure 8 and Figure 9 illustrates proper machine location, operator position, and recommended foot switch position.

Figure 8: Machine location and operator position



Figure 9: Materials locations (plan view)



A. Bench

The bench to be used should be of sturdy construction, preferably with rubber mounts to minimize noise. A height of 762 to 812 mm [30 to 32 in.] is the most suitable for operator comfort and convenience. This height allows the operator to rest both feet on the floor, providing for the shifting of weight and leg position.

B. Machine mounting and location on bench

Locate the machine near the front of the bench with the target area (tooling area where the product is applied) at least 50 mm [2 in.] from the front edge, but not more than 152 to 203 mm [6 to 8 in.]. This location eliminates unnecessary operator motion and helps to prevent back strain and fatigue.

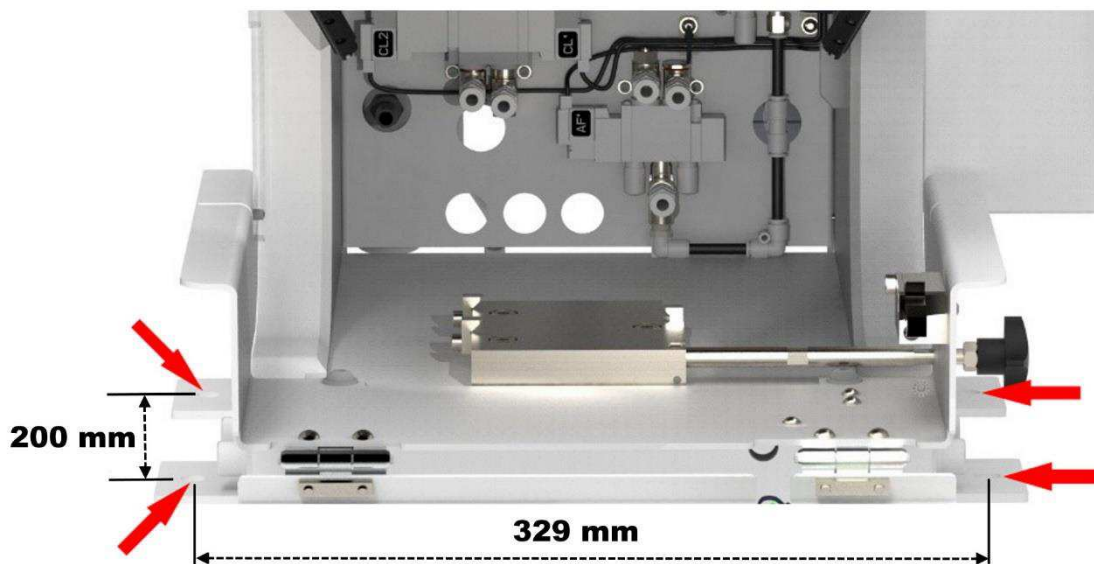
Orient the machine so that the target area faces the front of the bench and is parallel to the front edge. Access to the back of the machine **must** also be provided.



DANGER

Machines must be securely bolted (in 4 places) to the bench using the machine mounting holes shown in Figure 10. Hardware is customer-supplied. Use M12 bolts of grade 12.9. Choose bolt length based on bench or platform thickness. Bolts must be installed using a flat washer under the head, and a flat and lock washer with the nut. Do not deform the bolt during installation. At least one thread must protrude beyond the nut after tightening. Periodically inspect bolts for tightness. Machines must not extend beyond the footprint of the bench (200mm by 392mm).

Figure 10: Mounting holes



C. Operator's chair

The operator's chair should swivel and have independent seat height and back rest adjustments. The seat and back rest should be padded. The back rest should be large enough to provide support both above and below the waist line. In use, the chair should be far enough under the bench to permit the operator's back to remain straight and supported by the back rest.

D. Foot switch

When the operator is correctly positioned in front of a machine equipped with a foot switch, the foot should rest comfortably on the switch. The foot switch should be movable, so that its location can be readily changed when the operator shifts position to minimize fatigue. Placing the switch on a rubber mat keeps it movable while preventing unintentional sliding.

The preferred foot switch location varies to some extent among operators. Some operators prefer to locate the switch so that their foot rests on the switch when their feet are in the natural sitting position (calf of leg perpendicular to the foot). Others prefer the leg to be slightly in front of the natural position. The important thing to remember is that the foot should be at approximately 90° (right angle) to the calf when resting on the switch. Operators who prefer the foot switch slightly in front of the natural position might need to place a wedge-shaped block under it.

3.4. Electrical connection



DANGER

Electrical wiring to AC mains must be done by a qualified electrician. The electrical enclosure maintains high voltage for a short period of time after power has been removed. Disconnect the power source and wait 5 minutes before opening the electrical enclosure.



DANGER

Follow all appropriate electrical safety precautions and employ lockout/tagout techniques.

A customer-supplied power cable and plug must be connected to the machine. The cable must include three 2.08 mm² (14 AWG) phase wires and a ground wire. The machine does not require a neutral connection for operation.

The terminator must be connected to the proper three-phase AC supply voltage, as indicated on the label attached to the electrical enclosure door. The machine is factory-configured to operate on three-phase power at 208 - 240 VAC or 380 - 420 VAC, 50/60 Hz. **Do not connect the machine to any power source other than the source configured for your machine.** Connect the power cable to the power disconnect switch (Figure 11).

Figure 11: Power disconnect switch



4. OPERATION

4.1. Control panel

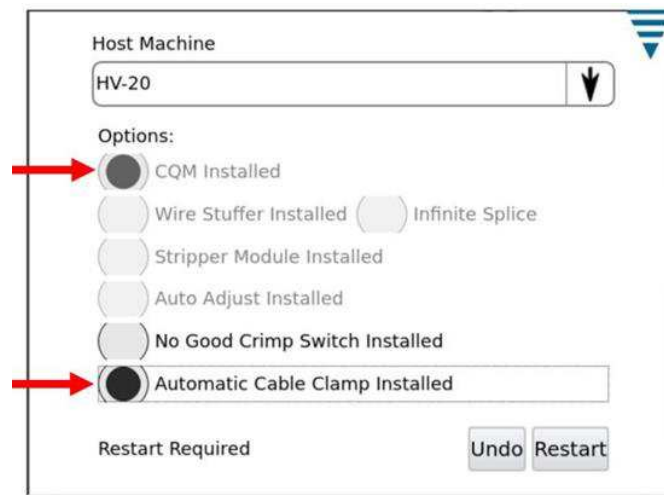
A. HF-20 Terminator

The HF-20 Terminator includes a membrane keypad and display screen for operator control of the terminator. Operation of the machine using the membrane keypad is described in section 4.2. On HF-20 terminators equipped with an optional Crimp Quality Monitor (CQM) kit, terminator operation is still controlled using the membrane keypad.

B. HV-20 Terminator

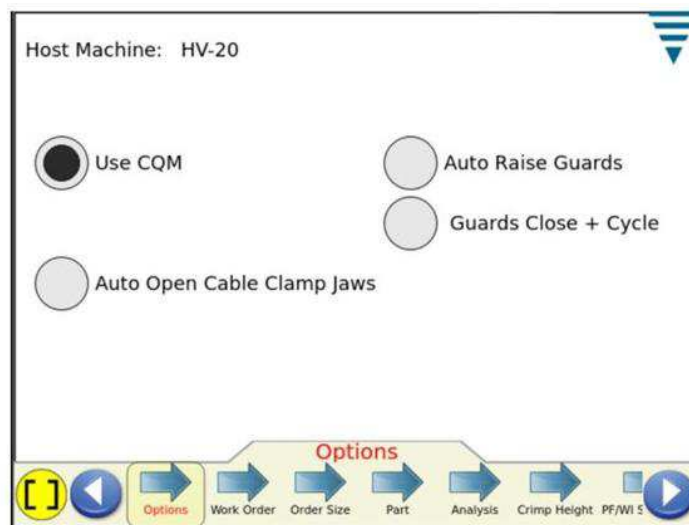
1. If a die holder with an automatic (pneumatically operated) cable clamp is to be used in the HV-20 terminator, select the Automatic Cable Clamp Installed button from the setup dialog (Figure 12).

Figure 12: Automatic Cable Clamp Installed button



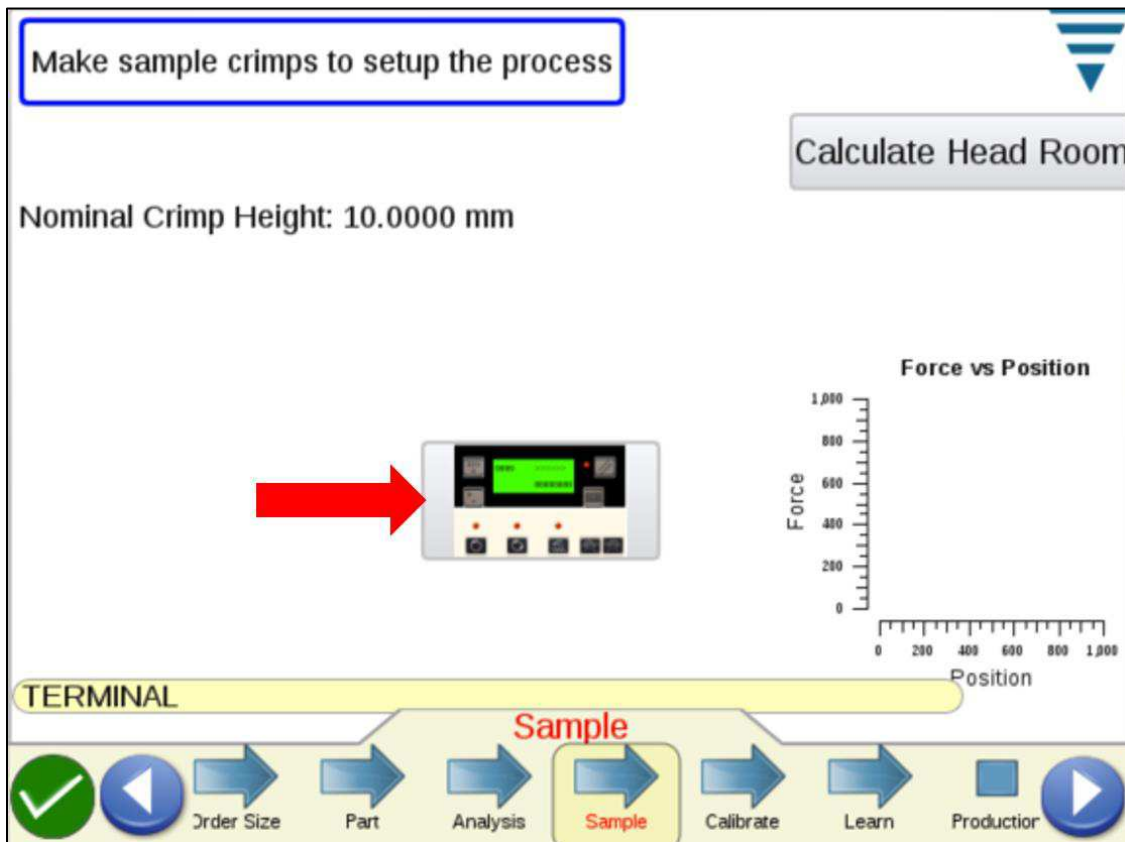
2. In the options dialog, enable or disable Crimp Quality Process Monitoring.
 - To enable CQM, select the **Use CQM** radio button (Figure 13).
 - To disable CQM, ensure that the **Use CQM** radio button is not selected.

Figure 13: Enabling Crimp Quality Process Monitoring



3. Configure the Cycle Options (Figure 13).
 - **Auto Raise Guards:** When this option is selected, the guards automatically open after a crimp cycle is completed. If CQM is in use and a defective crimp is detected, the guards don't open until the crimp error is cleared.
 - **Guards Close + Cycle:** When this option is selected, pressing the foot switch causes the guards to automatically close and the terminator to cycle to produce a crimp.
 - **Auto Open Cable Clamp Jaws:** This option is only available when the Automatic Cable Clamp Installed option is selected on the setup dialog. When this option is selected, the cable clamp jaws automatically open after the completion of a crimp. If CQM is in use and a defective crimp is detected, the jaws do not open until the crimp error is cleared.
4. The HV-20 Terminator provides a virtual keypad (Figure 14) in lieu of the membrane keypad for operator control of the terminator. The virtual keypad is accessible on the Sample screen if **Use CQM** is selected, or on the Production screen if **Use CQM** is not selected.
 - a. To view the virtual keypad, click the virtual keypad button in the dialog corresponding to whether you have selected to use or not use CQM.

Figure 14: Virtual keypad button

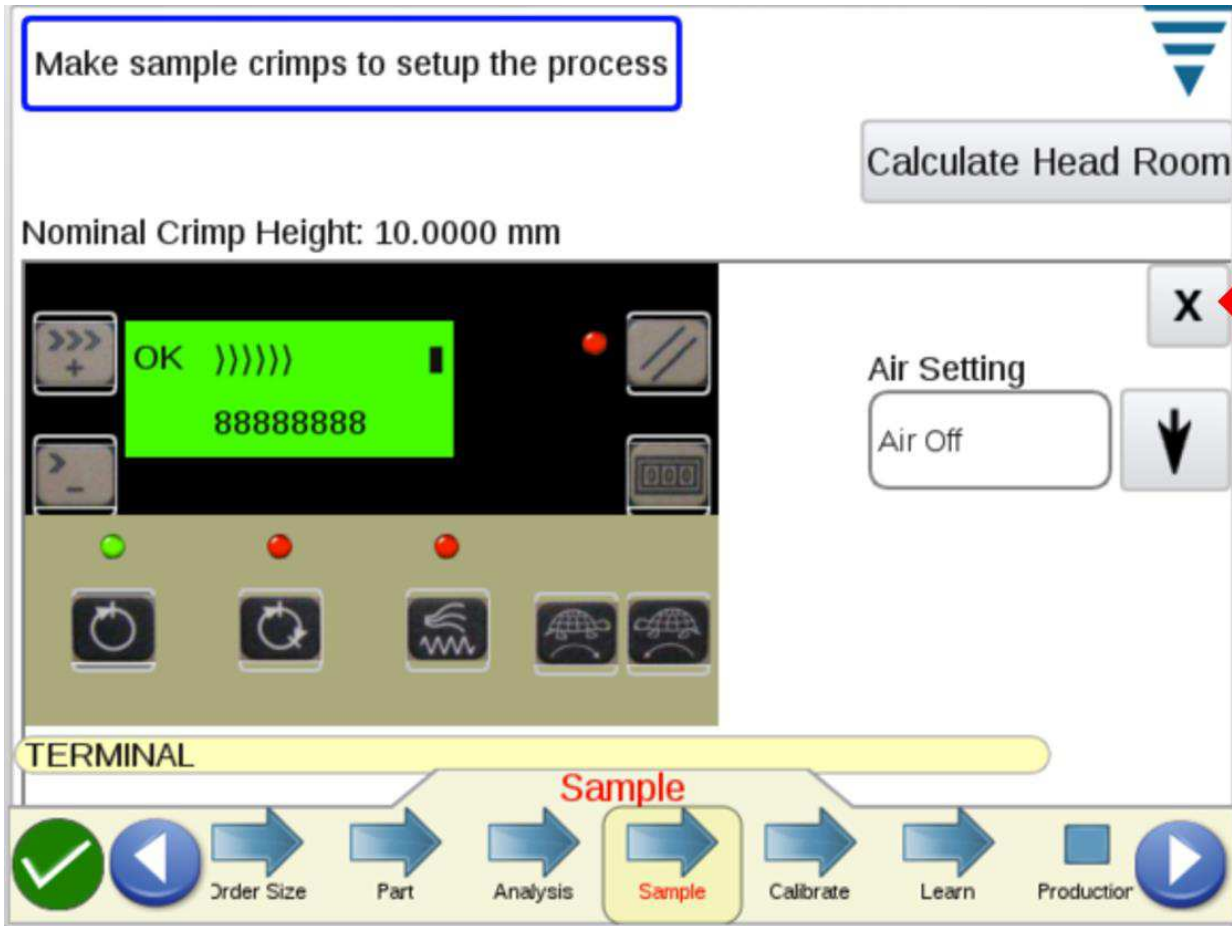


i **NOTE**
 Operation of the machine with the virtual keypad is identical to that of the membrane keypad, except where noted.

i **NOTE**
 Changes made with the virtual keypad are saved with the selected part if CQM is used.

- b. Dismiss the virtual keypad by pressing the X button (Figure 15).

Figure 15: Dismissing the virtual keypad



4.2. Membrane keypad and display screen

The membrane keypad (Figure 16) is used to set up and operate the machine. The buttons operate as described in Table 3.

Figure 16: Membrane keypad



Table 3: Membrane buttons

Button	Name	Description
	Decrease Speed	Decrease the motor speed* for normal cycle operations and for jogging.
	Increase Speed	Increase the motor speed* for normal cycle operations and for jogging.
	Error Reset	Clear the displayed error code.
	Count Reset	Reset the batch count to zero.
	Jog Forward	Rotate the motor forward at the jog speed set by the Decrease Speed and Increase Speed buttons.
	Jog Reverse	Rotate the motor in reverse at the jog speed set by the Decrease Speed and Increase Speed buttons.
	Air Feed	Toggle the air feed output on and off. The LED indicates the current setting.
	Full Cycle	Select Full Cycle mode. When the foot switch is pressed, the terminator will rotate one full cycle. The LED indicates that this mode is selected.
	Split Cycle	Select Split Cycle mode. On the first press of the foot switch, the terminator will rotate to the down position. On the second press of the foot switch, the terminator will complete the cycle. The LED indicates that this mode is selected.
<p>*Speed indication: Each > represents a portion of the full operation or jog speed setting. Values range from minimum speed (>) to maximum speed (>>>>>).</p>		

A. Machine status / error code display





Table 4: Membrane keypad status codes

Code	Meaning
OK	Machine is ready to cycle
**	Emergency Stop system is not ready. Twist and pull out the Emergency Stop button, then press the white safety reset push button.
--	Machine guards are open, or cycling is inhibited by the Crimp Quality Monitor (if attached).
ERRxxx	A machine error occurred. The specific error is indicated by a three-digit number xxx, as shown in Table 13 on page 53.

B. Guard status indicators

The status of the guards is indicated by icons displayed on the virtual keypad and (for the HV-20) the taskbar. Table 5 describes the meaning of each icon.

Table 5: Guard status indicators

Icon	Location	Meaning
	Virtual keypad	The guard and side feed guard (if attached) are closed.
		One of the interlocks is open. The motor cannot run.
	Taskbar (HV-20 only)	The guard and side feed guard (if attached) are closed.
		One of the interlocks is open. The motor cannot run.

C. Air setting (HV-20 only)

The HV-20 allows the following air settings to be defined:

- Air off
- Single (DEFAULT)
- Single delayed
- Double
- Long

D. Additional controls

Figure 17 shows the additional controls. The operation of the controls is described in Table 6.

Figure 17: Additional controls

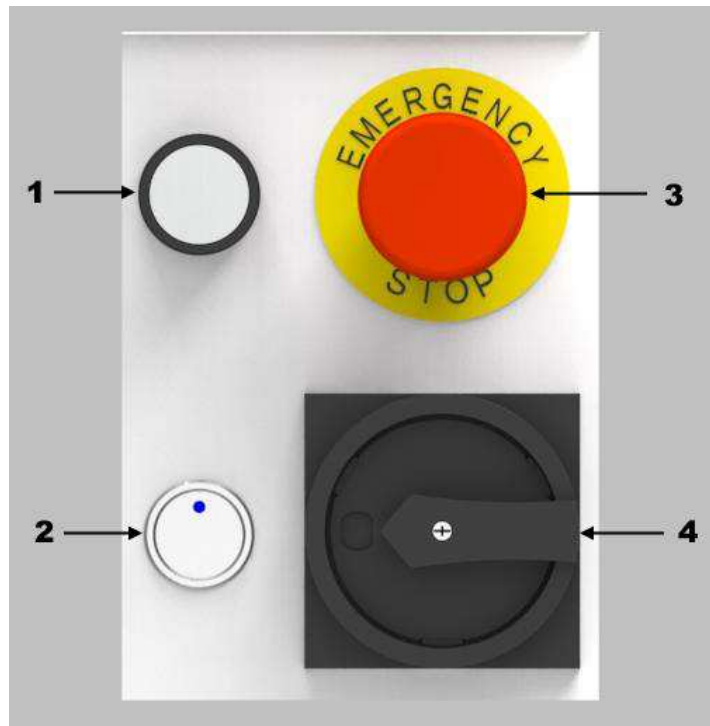


Table 6: Operation of additional controls

	Control	Operation
1	Safety reset	Push button/indicator. Press to turn on the safety circuit, enabling motor operation. The indicator shows that the safety circuit is active and motor operation can occur.
2	Guard control	Touch control for raising and lowering the front guard.
3	Emergency stop	Press to halt motor operation in an emergency. Twist and pull to release for normal operation.
4	AC disconnect	Main AC power switch for the machine.

4.3. Mode selection

Table 7 describes the three basic modes of operation for this machine. The buttons for selecting a mode are described in Table 3.

Table 7: Modes of operation

Mode	Description
Full cycle	Pressing the foot switch (with the guard closed) rotates the crankshaft (at a speed defined by the speed control buttons) through a complete revolution. This completes one full machine cycle.
Split cycle	Pressing the foot switch once (with the guard closed) rotates the crankshaft (at a speed defined by the speed control buttons) to the split cycle position. Depressing the foot switch a second time rotates the crankshaft through the bottom position and back to the top position to complete the machine cycle.
Jog	<p>Pressing either Jog button rotates the crankshaft at a reduced speed in the forward or reverse direction until the Jog button is released or the crankshaft completes the cycle. If the Jog button is released in mid-cycle and pressed again, the crankshaft continues to rotate in the forward or reverse direction at the reduced speed. If the machine does not complete the cycle, either adjust the speed control buttons (see section 4.4), or complete the cycle using the foot switch (at a speed determined by the speed control buttons) after the Jog button has been pressed and released.</p> <p>Holding the Jog button down for an extended period without completing the cycle causes an error. To clear the error, clear the problem area and then press the Error Reset button. If the motor is stalled, it may be necessary to manually cycle the machine to the home position. Refer to the CAUTION statement below for the proper manual cycling procedure.</p>



CAUTION

While in the jog mode, attempting to complete a crimp cycle with terminals and wire in the applicator can cause the motor to stall and create a jammed condition. **Do not attempt. Remove terminals and wire before jogging.** If a jam does occur, contact TE Field Engineering personnel for assistance.

4.4. Adjusting motor speed

The speed of the motor is adjusted using the **Decrease Speed** and **Increase Speed** buttons on the membrane keypad (reference Figure 14). The **Decrease** and **Increase** buttons are used to adjust the motor speed for Full-Cycle, Split Cycle, and Jog modes. The speed setting in Full and Split Cycle modes is independent of the speed setting used in the Jog mode. Both speed settings are retained in memory by the CPU / motor controller. During Full and Split Cycle modes, the last set motor speed is on the display. When the **Jog** button is pressed, the display changes to show the last set Jog mode speed. The Jog mode speed is displayed until the foot switch is pressed to change to Full or Split Cycle modes.

In Full and Split Cycle modes, a single > shown on the display indicates that the motor speed is set for 16% of the maximum operating speed value. Each additional > on the display increases the motor speed. Available speeds are listed in Table 8.

Table 8: Motor speeds in Full and Split Cycle modes

Indicator	Speed
>	16%
>>	28%
>>>	42%
>>>>	58%
>>>>>	77%
>>>>>>	100%

In Jog mode, a single > shown on the display indicates the motor speed is set for 5% of the maximum operating speed value. Each additional > shown increases the motor speed incrementally to a maximum jog speed of 25% of the maximum operating speed, as shown in Table 9.

Table 9: Motor speeds in Jog mode

Indicator	Speed
>	5%
>>	9%
>>>	13%
>>>>	17%
>>>>>	21%
>>>>>>	25%

4.5. Applicator installation

Install the proper applicator in the quick-change mounting base as follows:

1. Loosen the applicator release knob (Figure 3) and slide the applicator base clamp down.
2. Place the applicator on the quick-change base plate, then slide it back until the two notches in the applicator base engage the stops at the back of the quick-change base plate. At the same time, guide the ram post into the ram post adapter.
3. Slide the applicator base clamp UP and re-tighten the applicator release knob to secure the applicator in place.
4. Set the crimp height and insulation crimp discs so that the letters and numbers on the applicator pad align with the front pad on the ram post adapter.
5. If the applicator is an air-feed type, move the Air Supply Slide Valve to the Air OFF position. Connect the applicator airline to the appropriate air valve connection located under the right side guard (Figure 40).



NOTE

Quick Disconnect Coupling PN 23238-1 is required to run air-feed applicators.

6. Adjust the reel support for side-feed product, depending on the applicator being used.
7. Mount the terminal strip guide on the left sheet metal guard for side-feed product, depending on the applicator being used.
8. Mount the terminal reel on the reel support. Thread the terminal strip through the guard and into the applicator in accordance with the instruction sheet included with the applicator. If necessary, adjust the lubricator bowl.
9. Align the product reel to the applicator by adjusting the reel flanges.
10. Close the guard.
11. If the applicator is an air-feed type, move the Air Supply Slide Valve to the Air ON position.



NOTE

The guard door must be closed to enable machine operation (see section 2.4).

4.6. Setup

Install a miniature applicator and terminals in accordance with section 4.5.

1. Turn on the main power using the switch located on the front of the control panel.
2. Be sure the guard is closed.
3. Jog the machine (see Table 7) through a complete crimp cycle.



NOTE

Do not use wire during this step of the setup process.



NOTE

The HV-20 and HF-20 machines should be able to jog through the terminal at maximum jog speed.

4. Inspect the crimped terminal to verify that the terminal is being positioned properly within the applicator.
5. Correct for any positioning errors in accordance with the applicator instruction sheet.
6. Repeat steps 2 and 3 until a terminal is properly positioned.
7. Place a prepared wire in the crimp area and press the foot switch.
8. Inspect the completed crimp and adjust as needed.

4.7. Adjusting the crimp height

Refer to the 408 series instruction sheet provided with the applicator to perform this adjustment. Refer to **Adjusting** on page 40 for procedures to adjust the crimp height using the machine precision adjustment feature.

5. DIE VISION SYSTEM

5.1. Power On and Initialization

Begin by powering on the HV-20V. Once the HV-20V has started up, turn on the NUC PC. Wait for both the HV-20V and NUC PC to complete their boot-up processes. After they're both up and running, check the Die vision system display screen. When the screen indicates "CQM connected", proceed to the next step.

5.2. Downloading and Installing DieIQ Files



DieIQ Files are TE provided files that enables us to use the vision system with different terminals and die sets. They are required to use the Vision **System**. To download a DieIQ file, go to this site:

<https://data-applicationtooling.connect.te.com/>

1. Find your terminal part number and select it from the list. This will download a file with extension ".dieiq".
2. Put this file on a USB drive and connect drive to USB port on left side of CQM II.
3. Navigate to the menu and go to Maintenance > Firmware Update> Die Vision Update.
4. Select one of the DieIQ files on your USB drive and load.
5. Now a part can be configured on the CQM II with this terminal part number.

5.3. Part Selection

Once a DieIQ file has been loaded on the CQM II, a part can be configured. Ensure that "**Die Vision Installed**" is selected on the machine settings on the CQM II and ensure that "**Use Die Vision**" is selected on the CQM II Options tab.

1. On the CQM II Part tab, create a new CQM Part Number.
2. Press the  button to go to the Die Vision Screen.
3. Select terminal and die set part numbers, die set revision, and feed configuration for your application.
4. Press the  button again to go to next screen and save Die Vision selections.
5. The part should now be configured on the CQM II. Go to the Die Vision monitor to finish setting up part by choosing the vision tests to perform and taking reference.

5.4. Reference Images

The Die Vision System requires references images for operation. When setting up a new part on the CQM, the user is prompted to take reference images on the Die Vision monitor.



NOTE

Follow the instructions on the screen to take reference images of the die set, terminal, and cable.



CAUTION

Make sure the die set is properly secured, the terminal is in the correct position, and the cable is the correct cable and has been prepared properly for the application.

Taking quality reference images are important for the Die Vision System to function properly.

Reference images must be taken under the following conditions:

- New part setup
- Camera position or lens focus has been adjusted.
- Changes to setup within camera view (vacuum added, applicator changes, etc)
- Drastic lighting changes, such as if the machine is near a window and the time of day has changed.
- Tests are not performing as expected, especially Terminal Position or Cable Diameter tests.

5.5. Die Serial Number

The Die Serial Number Test reads the data matrix codes on the die set and upper and lower dies to ensure that the user is using the correct die set and that the dies have been installed correctly for the parts selected on the CQM II. The crop regions for the die set and upper and lower die are generated automatically. If the codes were not found, try adjusting the focus and re-taking reference images. If the decoded data matrix values are incorrect, ensure that the correct die set has been selected on the CQM and that the latest DieIQ file has been installed.




To configure the Die Serial Number Test, select the  icon on the following button See Figure 18.

Figure 18



A data matrix code will be physically marked on the upper die, lower die, and on the die set (on the locating fixture, for example). If a data matrix code is missing or the Vision system cannot read one of the codes, the reading of this code can be disabled with radio buttons on the configuration screen.

If this test is not listed, select the  icon in the top right corner of the screen and select the  icon to go to Vision Settings and make sure the "Die Serial Number Test" is selected.

If the Die Serial Number test is not passing try the following, depending on the situation on the right side of the screen:

- Gray background with no data matrix in image -- make camera is positioned properly using Focus Tool and Focus Fixture, check that die set is installed correctly.
- Gray background with data matrix in image -- use Focus Tool and adjust focus of camera.
- Red background -- part number does not match selection on CQM II Die Vision screen. If die part number is correct contact TE for updated DieIQ files.



NOTE

Reference images should be retaken if camera focus or position is changed.

Press the  button to save all changes or press the  button to revert any changes made.

5.6. Terminal Position

The Terminal Position Test uses the reference image(s) to check that:

- The inserted terminal is the expected terminal in good condition.
- The lower die doesn't have any extra foreign objects.
- The terminal is in good crimping position.

The Terminal Position Test starts running after a terminal is inserted and stops running after a cable is inserted.


To configure the Terminal Position Test, select the  icon on the following button: See Figure 19

Figure 19





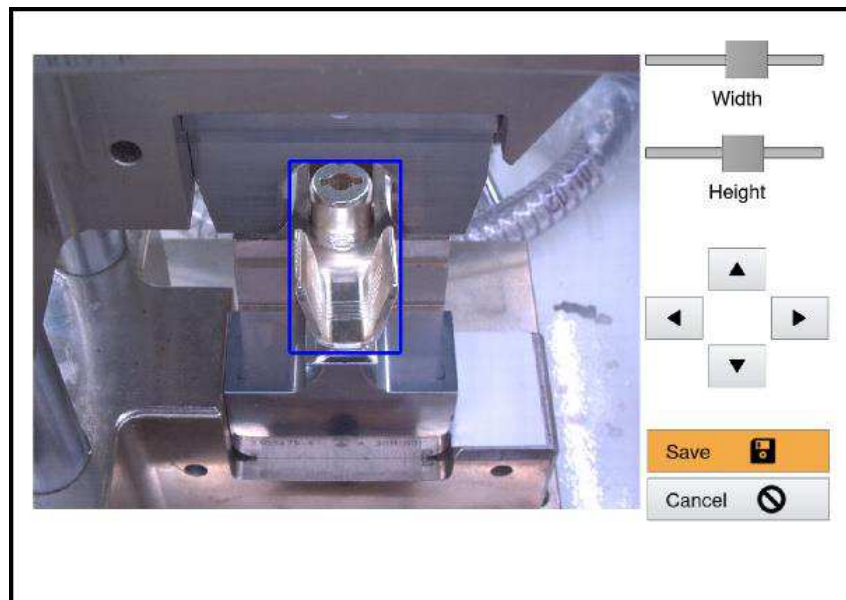

If this test is not listed, select the  icon in the top right corner of the screen and select the  icon to go to Vision Settings and make sure the Terminal Position Test is selected. To configure the Terminal Position Test, first set the crop region by pressing "**Adjust Terminal Region**".

Figure 20

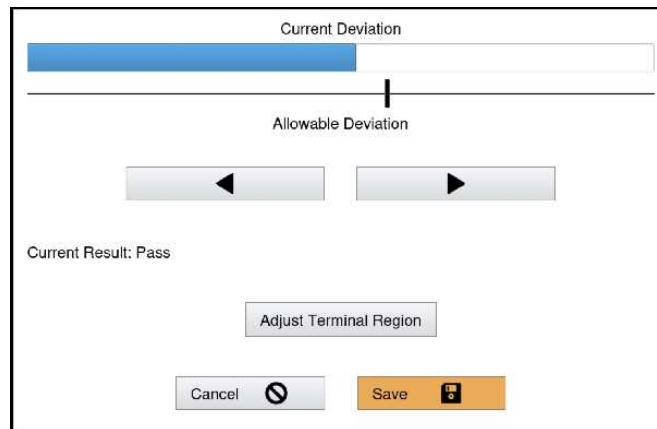


On this screen, use the sliders and arrows to adjust the size and position of the rectangle. The system will look inside this rectangle for terminal position changes (See Figure 20). Adjust the rectangle so it has critical parts of the terminal and can accommodate any subtle misplacements that are acceptable for the crimp (such as side to side movement within the tooling). The rectangle can encompass the full terminal or a key part of the terminal, depending on the user's application. Note: the smaller the rectangle, the more sensitive this test is to small variation in position or terminal characteristics.

Press the  button to save region changes.

On the configuration page(See Figure 21), move the "**Allowable Deviation**" slider to adjust the pass/fail sensitivity. Higher allowable deviation means more lenient pass parameters. If the terminal is in a good position but the test isn't passing, increase the threshold. The blue bar shows how much the terminal is currently deviated from the reference image(s).

Figure 21



Press the  button to save all changes or press the  button to revert any changes made.

5.7. Cable Diameter

The Cable Diameter test measures the diameter of the cable and angle of approach from two different camera views. This test works with all cable colors, though occasionally misreads white, black, or gray cable. This test utilizes both the terminal and cable reference images. If this test does not operate properly, first try re-taking reference images.


To configure the Cable Diameter Test, select the  icon on the following button:

Figure 22





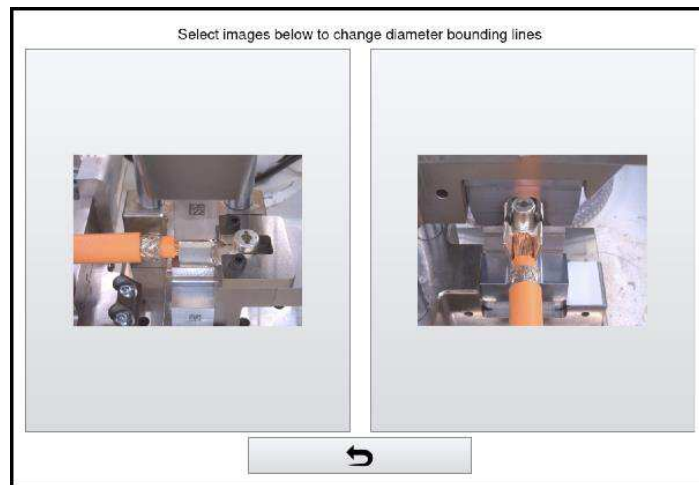
If this test is not listed, select the  icon in the top right corner of the screen and select the  icon to go to Vision Settings (See Figure 22) and make sure the Cable Diameter test is selected. On the first configuration screen, the user can choose to configure the front view or side view first. Select the image corresponding to the angle you want to set up. Both camera views must be configured for operation.

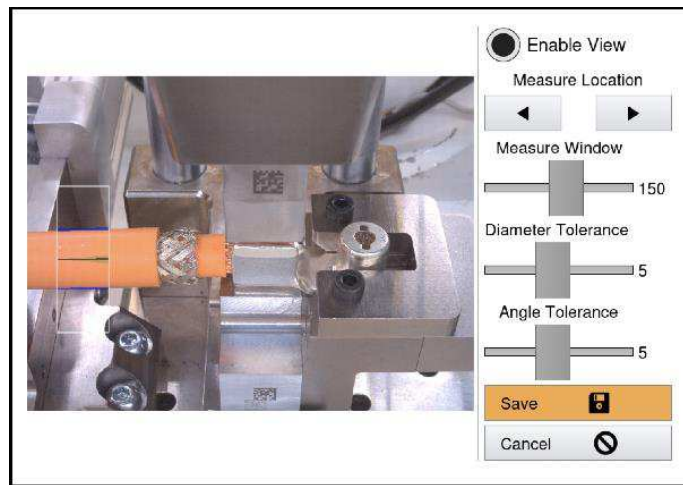
Figure 23



On the configuration screen for each camera view, the user can enable or disable that particular camera view for the diameter test. The white box displayed on the image is where the system is looking for the cable and reading the diameter and angle. Use the "**Measure Location**" arrows.◀▶ and "**Measure Window**" slider to change the size and position of that box in the image. Use the "**Tolerance**" sliders to increase or decrease the tolerance allowed by the system to pass or fail. "**Diameter Tolerance**" is in pixels. "**Angle Tolerance**" is in degrees.(See Figure 24)

In the case of unusual tool or other obstruction that would interfere with the camera view, one of the views may need to be disabled for this test.

Figure 24



Press the button to save all changes or press the button to revert any changes made.

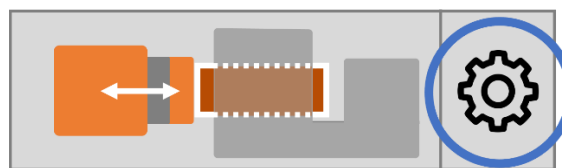
5.8. Brush Position

The Brush Position Test measures the length of brush visible on either side of the terminal. Within the Brush Position test, two lengths are checked:

- **Insulation Brush** -- visible length of brush between the insulation of the cable and the edge of the terminal
- **Conductor Brush** -- visible length of brush past the other edge of the terminal (open barrel terminals only)

To configure the Brush Position Test, select the icon on the following button: (See Figure 25)

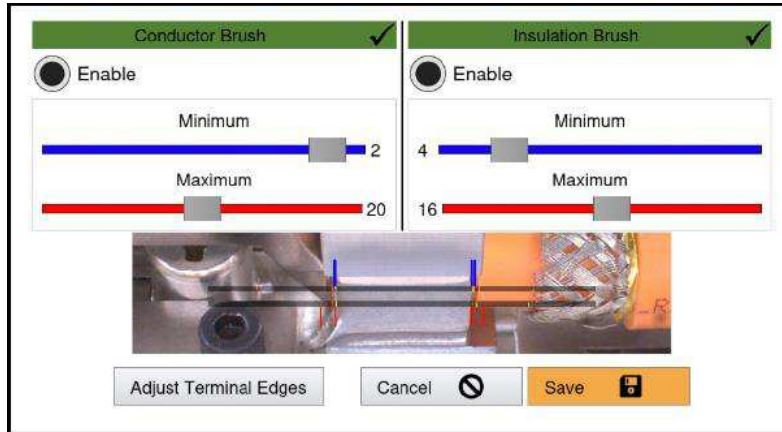
Figure 25



If this test is not listed, select the icon in the top right corner of the screen and select the icon to go to Vision Settings and make sure the Brush Position Test is selected.

On the Brush Position configuration screen, there are two black rectangles that indicate where samples are collected.

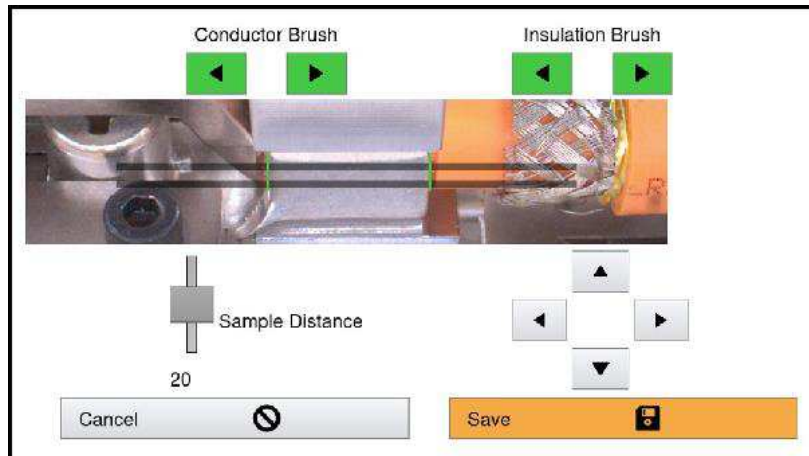
Figure 26



i **NOTE**
For closed barrel terminals, Conductor Brush must be disabled.

When setting up a part, first make sure the crop region and terminal edges are set properly. Press the "**Adjust Region and Terminal Edges**" button to view the following screen.

Figure 27



Use the arrows in the bottom right of the screen to move the sample regions (See Figure 27) like the image above where the Insulation Brush edge of the terminal is at the midpoint of the black rectangles. Adjust the "Sample Distance" slider to configure how close together the samples are, making sure that both rectangles are over brush regions. Next, use the arrows in green to line up the green vertical lines with the edge(s) of the terminal.

Press the button to save the cropping and terminal edges or press the button to revert any changes made.

Now in the configuration page, use the "Minimum" and "Maximum" sliders to set limits for the desired length of brush on each side of the terminal. Units are in pixels.

Press the button to save all changes.

5.9. Terminal Position Deviation

The terminal position deviation test checks that a terminal is still in position after cable is inserted. The Terminal position Deviation Test starts running after a terminal is inserted and stops running after a cable is inserted.

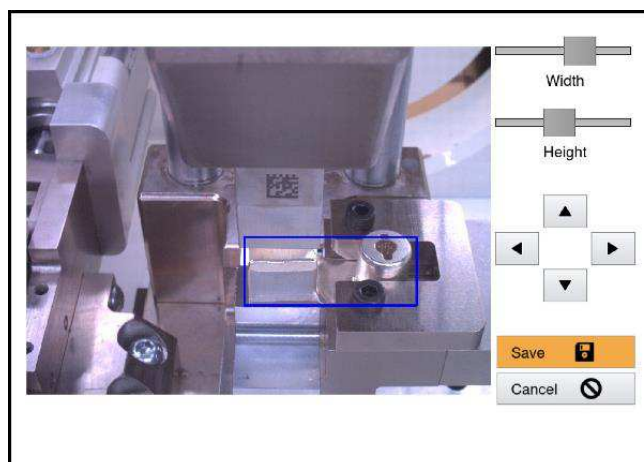
To configure the Terminal Position Deviation Test, select the icon on the following button: (See Figure 28)

Figure 28



If this test is not listed, select the icon in the top right corner of the screen and select the icon to go to Vision Settings and make sure the "Terminal Position Deviation Test" is selected. To configure the Terminal Position Deviation Test, first set the crop region by pressing "Adjust Terminal Region".

Figure 29




Like the Terminal Position Test, this test is configured using the sliders and arrows to adjust the size and position of the rectangle. The system will look inside this rectangle for terminal position changes. Adjust the rectangle so it has critical parts of the terminal and can accommodate any subtle misplacements that are acceptable for the crimp (such as side to side movement within the tooling). When sizing and positioning the rectangle, choose an area that encompasses a portion of the terminal and a tooling edge. Also, it is best to have no cable visible in this region.



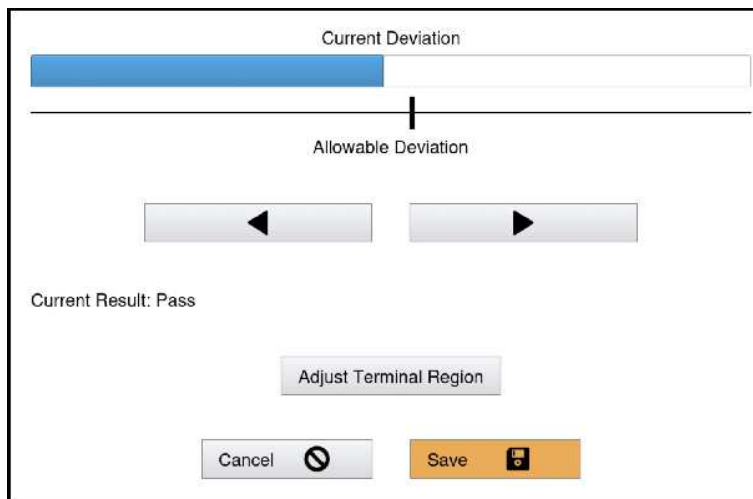
NOTE

The smaller the rectangle, the more sensitive this test is to small variation in position.

Press the  button to save all changes.

On the configuration page, move the "**Allowable Deviation**" slider to adjust the pass/fail sensitivity. Higher allowable deviation means more lenient pass parameters. If the terminal is in a good position but the test isn't passing, increase the threshold. The blue bar shows how much the terminal is currently deviated from the reference image(s). (See Figure 30)

Figure 30



Press the  button to save all changes or press the  button to revert any changes made.

5.10. Camera Setup

The Cameras Setup page has two tools to assist with setting up the cameras. These tools are outlined below. Note that both tools require that the applicator is removed, and a focus fixture is installed. (See Figure 31)

Figure 31



5.11. Find Cameras

If one or more cameras is not capturing images or if a camera has been replaced in the machine, go to the Find Cameras tool to register the serial number of the camera. To use this tool, install the focus fixture in the machine and press **Start** (See Figure 32)

Figure 32



NOTE

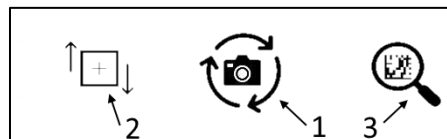
If one of the cameras was not check that the cable is connected at the halo and the vision computer and go to the "Focus Tool" setting to make sure that the lens is focused so that both data matrices are in the frame and in focus. Then try to identify the camera image.

If any cameras were not found in this process, make sure the failed camera's cable is connected to the camera in the machine and connected to the vision computer. If everything is connected, go to the Focus Tool and ensure both data matrices are in frame and clearly focused.

5.12. Focus Tool

The Focus Tool is designed to assist the user with properly focusing the camera lenses and adjusting the angle of the cameras. Each camera should be set up one at a time. On the focus tool screen, the following buttons perform that actions described below. (See Figure 33)

Figure 33



1. Change cameras currently being configured.
2. Switch between the upper and lower box on the image. Use with the arrow keys to center on upper and lower data matrix codes.
3. Automatically locate the data matrices in the image and place boxes at center.

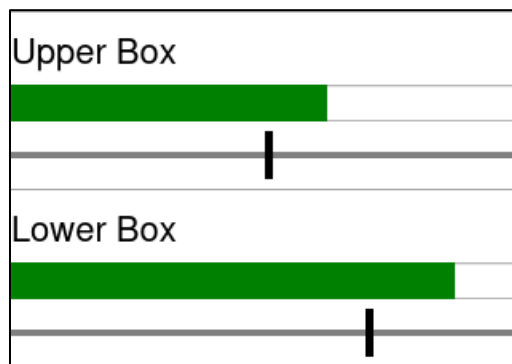
Figure 34



To use the focus tool:

1. Adjust screw next to camera to change its angle until the **BOTTOM OF F.O.V** line is at bottom edge of image frame.
2. Make sure upper and lower box are centered on the respective data matrices. Use the arrows to move the boxes or automatically the boxes or automatically button (See Figure 34).
3. Loosen lens locking rings on the camera.
4. Twist lens clockwise until both data matrices are out of focus.
5. Press **Start Focus Sweep**.
6. Twist lens counterclockwise until both data matrices are in focus and continue to twist until they are out of focus again.
7. Twist lens clockwise again until both upper and lower data matrices are in focus. When both bars are past acceptable thresholds and turn green, the camera is focused correctly.

Figure 35: Need a Name



8. Tighten lens locking ring.
9. Repeat for each camera until all have been setup.



NOTE

You may need to use the adjust screw again after you are satisfied with the focus and tighten the locking ring to ensure the "Bottom of F.O.V." line is at the bottom.

6. PREVENTIVE MAINTENANCE

Preventive maintenance will keep the machine in good working order and ensure maximum reliability and service from all components.

**DANGER**

To avoid personal injury, electrical and pneumatic power must be **disconnected** at the source prior to maintenance.

**DANGER**

The AC motor drive maintains high voltage for a period of time after power has been removed. Disconnect the power source and wait several minutes before opening the electrical enclosure.

6.1. Cleaning

- Clean any debris from the applicator area daily.

**DANGER**

Compressed air used for cleaning must be reduced to less than 207 kPa [30 psi] and effective chip guarding and personal protective equipment (including eye protection) must be used.

- If an air-feed assembly is installed, check and replace the air filter element, if necessary.
- Wipe the guards with a soft, clean cloth.

**CAUTION**

Do not use any solvent to clean the guards. Solvent can cause irreparable damage.

6.2. Lubrication

The moving parts of the machine require regular lubrication to ensure reliable service and long life. Preferred greases are Chevron™ Delo™ ESI™ EP NLGI 2, and Chevron Ulti-Plex™ EP NLGI 2.



NOTE

Contact TE Engineering for second choice alternatives.



NOTE

For operation in temperatures below 10° C [50° F], it might be necessary to use a NLGI 1 grease.



CAUTION

Use only lithium-based grease with extreme pressure (EP) additives.

Every 250,000 cycles, use a grease gun to apply the recommended grease to the lubrication points shown in Figure 36. Details are provided in Table 10.



NOTE

For proper distribution of grease, the ram should be located at the top of the stroke.

Figure 36: Lubrication points (shown without guards for clarity)

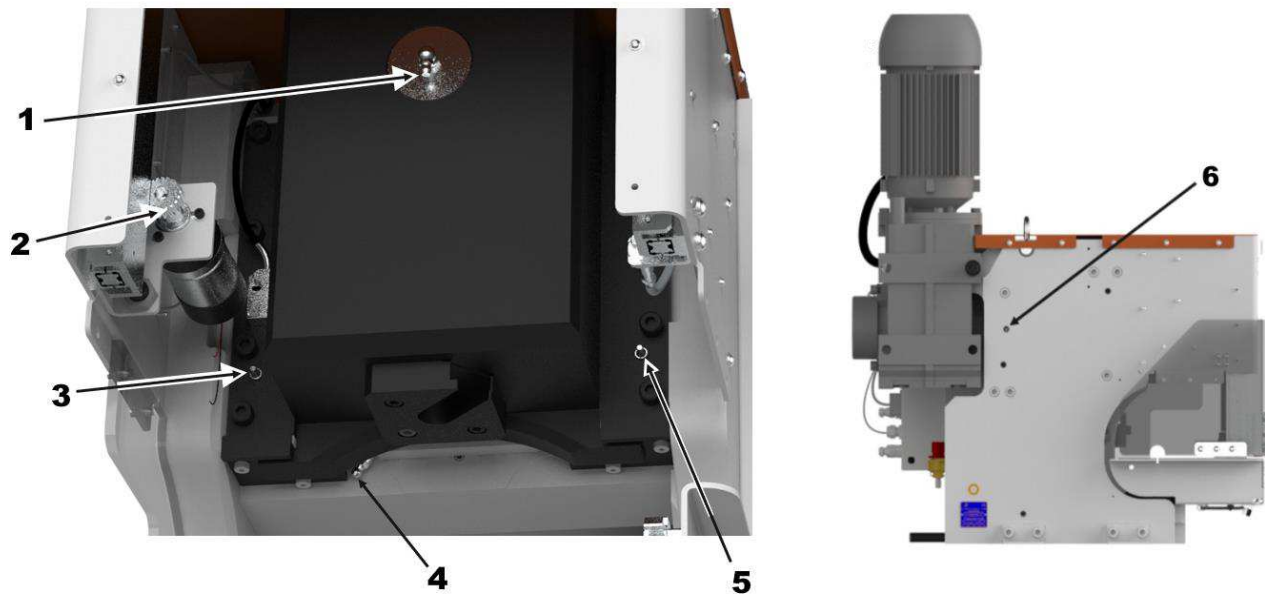


Table 10: Lubrication details

	Lubrication point	Details
1	Ram assembly pin	Pump grease until grease is forced out between link and ram.
2	Guard door gear rack	Apply grease along rack and cycle the door to distribute.
3	Left side of ram assembly	Pump grease until grease is forced out the top of the ram-way.
4	Front bearing	Behind the bottom left side of the ram assembly.
5	Right side of ram assembly	Pump grease until grease is forced out the top of the ram-way.
6	Rear bearing	Along the left side.

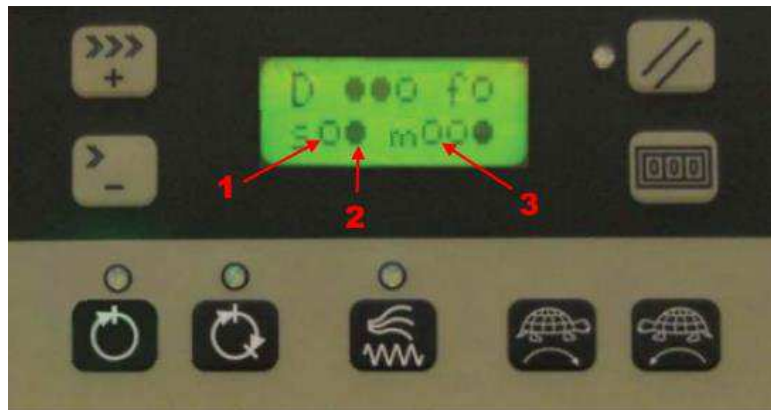
6.3. Safety system check



A check of the safety system should be performed once per shift, or at least once per day during routine production. Perform the following during the check:

A. HF-20 Terminators

1. Power ON the system by turning on the AC disconnect switch.
2. Place the system in diagnostic mode (see section 9.2).
3. Close all the guards: Front Guard and Side Guard (if equipped).
4. On the control panel display, verify that the input identifier is ON (Figure 37).

Figure 37: Input identifiers for HF-20



- 1** Guards interlocks
- 2** Emergency stop
- 3** Motor safety stop
-  OFF
-  ON

5. Open the Front Guard. Verify that the input identifier **Guard Interlocks** is OFF (Figure 37).
6. Close all the guards: Front Guard and Side Feed Guard (if equipped).
7. On the control panel display, verify that the input identifier **Guard Interlocks** is ON (Figure 37).
8. Twist and pull out (to release) the **Emergency Stop** Button.
9. Press the **Safety Reset** push button.
10. Verify that the **Safety Reset** indicator in the Safety Reset push button turns ON when the button is pressed.
11. Verify that the input identifier **Emergency Stop** is ON and the input identifier **Motor Safety Stop** is OFF (Figure 37).
12. Press the **Emergency Stop** push button.
13. Verify that the **Safety Reset** indicator in the Safety Reset push button turns OFF when the Emergency Stop push button is pressed.
14. Verify that the input identifier **Emergency Stop** is OFF and the input identifier **Motor Safety Stop** is ON.



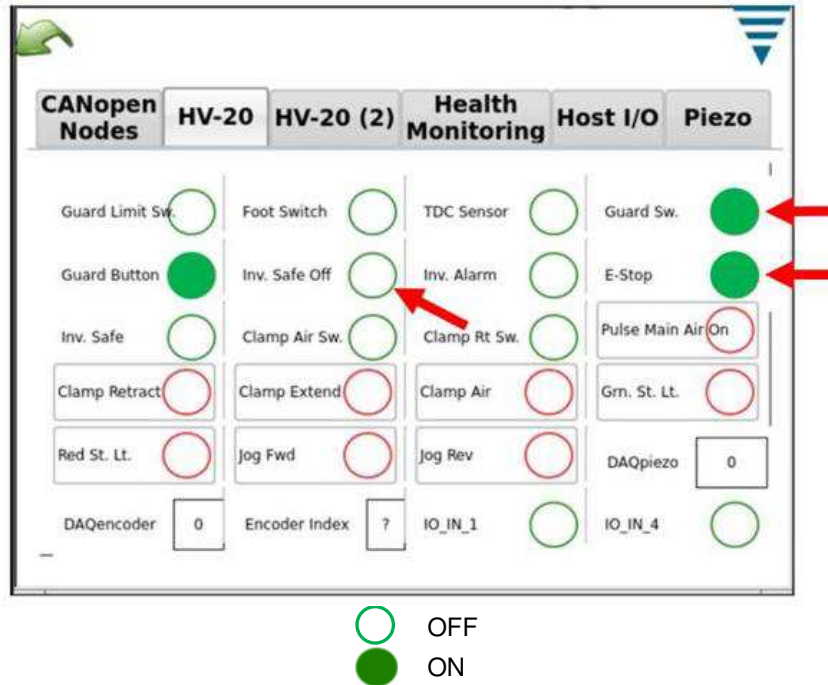
DANGER

If the preceding checks cannot be verified, **do not** operate the machine. Failure to verify these systems checks indicates a potential problem with the safety system. Contact TE Field Engineering personnel for assistance.

B. HV-20 Terminators

1. Power ON the system by turning on the **AC Disconnect** switch.
2. Navigate to the HV-20 diagnostic display (Figure 52).

Figure 38: Input identifiers for HV-20



3. Close all the guards: Front Guard and Side Feed (if equipped).
4. On the diagnostic display, verify that the input identifier **Guards Sw.** is ON (Figure 38).
5. Open the Front Guard. Verify that the input identifier **Guards Sw.** is OFF.
6. Close all the guards: Front Guard and Side Feed Guard (if equipped).
7. On the virtual keypad display, verify that the input identifier **Guards Sw.** is ON.
8. Twist and pull out (to release) the **Emergency Stop** push button.
9. Press the **Safety Reset** push button.
10. Verify that the **Safety Reset** indicator in the **Safety Reset** push button turns ON when the button is pressed.
11. Verify that the input identifier **E-Stop** is ON and that the input identifier **Inv. Safe Off** is OFF (Figure 38).
12. Press the **Emergency Stop** push button.
13. Verify that the **Safety Reset** indicator in the **Safety Reset** push button turns OFF when the **Emergency Stop** push button is pressed.
14. Verify that the input identifier **E-Stop** is OFF and that the input identifier **Inv. Safe Off** is ON.



DANGER

If the preceding checks cannot be verified, **do not** operate the machine. Failure to verify these systems checks indicates a potential problem with the safety system. Contact [TE Field Engineering](#) personnel for assistance.

7. ADJUSTMENTS

The following adjustments are necessary to maintain the machine in operating condition, and to set up the machine after replacing parts.



DANGER

To avoid personal injury, **always** disconnect electrical and air supplies before performing adjustments.

7.1. Shut height

A. Measuring

The shut height is the distance between the bottom portion of the ram post adapter and the top surface of the machine base plate. It is measured by installing a Base Plate Adapter P/N 2326544-1 onto the machine base plate as shown in Figure 39.

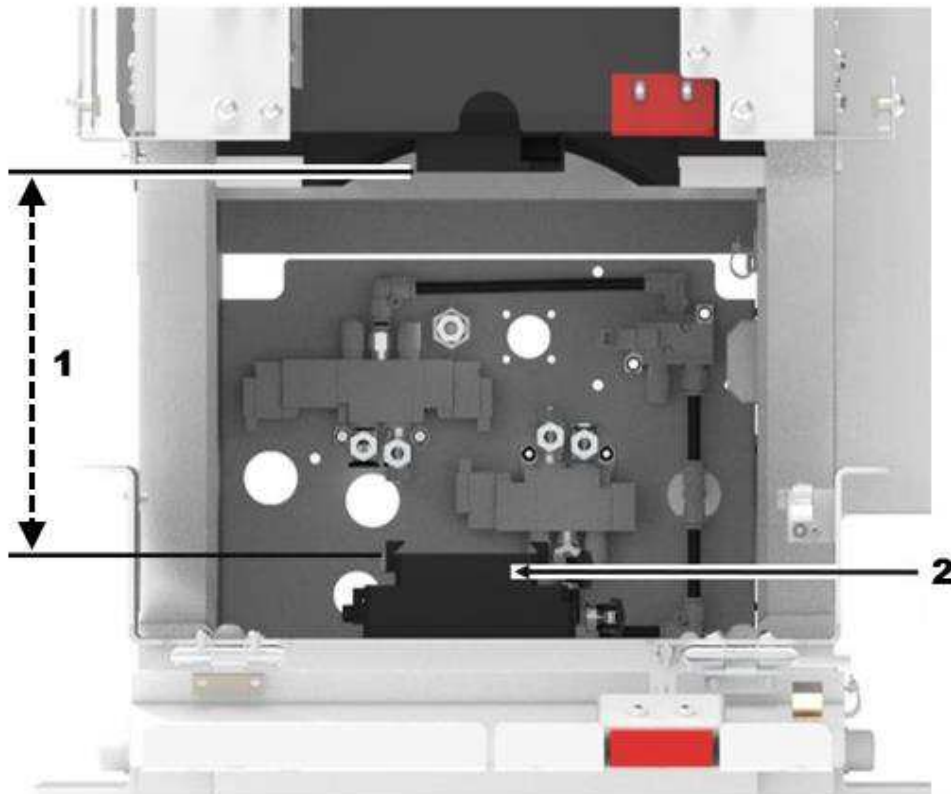


NOTE

Shut Height Gage PN 679655-2 (see Table 11) is recommended for measuring shut height (refer to [408-8535](#) for instructions on use of the gage along with Base Plate Adapter PN 2326544-1).

Follow the procedure for measuring the shut height as described in [408-8535](#).

Figure 39: Measuring shut height



- 1 Shut height dimension (see Table 11)
- 2 Base plate adapter 2326544-1

Table 11: Shut height dimension

Shut height gage	Shut height dimension (with plate adapter installed) mm [inch]	Applicator type
679655-2	135.790 ±0.025 [5.346 ± .001]	TE-Type

B. Adjusting

The shut height is pre-set at the factory and should not require further adjustment unless it is necessary to replace parts. Before you make any changes to the machine, contact your local Field Service Representative, or call the Tooling Assistance Center at 1-800-722-1111.



CAUTION

Never attempt to adjust the shut height without **first** trying an applicator that is known to produce terminations of the correct crimp height. If this applicator produces correct terminations, the trouble is in the original applicator and the shut height **must not be changed**.

If the shut height must be adjusted, use the following procedure:



DANGER

To avoid personal injury, **always** turn the machine OFF and disconnect the power supply to the machine before making any adjustments. If the applicator is an air-feed type, **disconnect** the air lines to the valve located on the right side of the machine.

1. Check shut height as described in **Measuring** on page 39
2. If the shut height is incorrect, proceed as follows:
 - a. Remove three socket head cap screws which secure the ram post adaptor.
 - b. Remove the ram post adaptor and shims.
 - c. Change the shim thickness as required to adjust the shut height. Shims contain .051 mm [.002-in.] peel-type laminations.



NOTE

If additional shims are required, order TE PN 2326019-1 See section 12 for ordering instructions.

- d. Re-install the ram post adaptor.
 - e. Insert screws in the ram post adaptor.
 - f. Place the shims over the screws and onto the adaptor post.
 - g. Re-install the socket head cap screws into the ram assembly to secure the ram post adaptor.
 - h. Re-tighten the screws.
3. Repeat steps 1 and 2 as necessary until the proper shut height is attained.



NOTE

The miniature applicator is an integrated assembly consisting of upper tooling, lower tooling, and adjustment mechanisms. The applicator requires a fixed shut height (the distance between the bottom of the ram and the base mount when the ram is **fully** bottomed). The required adjustments for crimp height are made by using the wire and insulation discs within the applicator. Refer to the instruction sheet supplied with the applicator for adjustment procedures.

7.2. Guard insert

A guard insert (PN 2326448-1) is supplied with the machine and is mounted on the upper guard. The safety switch actuator is mounted to the guard insert. The machine does not operate without the guard insert and safety switch actuated mounted in place.

8. MACHINE OPTIONS

Table 12 lists the available machine options for the HF-20 and HV-20 Terminator Machines. Refer to the applicable section for installation instructions.

Table 12: Machine options

Part number	Description	Section	Purpose	HF-20	HV-20
2372210-1	Air feed kit	8.1	Required to run certain types of air feed applicators and vacuum systems (HF-20 terminators Rev D and later)	Opt	Std*
2350380-1			Required to run certain types of air feed applicators and vacuum systems (HF-20 terminators Rev C and earlier)		
2335299-1	Vacuum system	8.2	Keeps die adapter area clean		Std
—	Manual cable clamp	8.3	Holds cable during crimping. Available on various tool holders.		
—	Automatic cable clamp	8.4	Captures cable after bad crimp. Available on various tool holders.	N/A	Opt
—	Automatic cable clamp pneumatics	7.4	Extra valves for automatic cable clamp		Std

Std: Standard

Opt: Optional

N/A: Not available

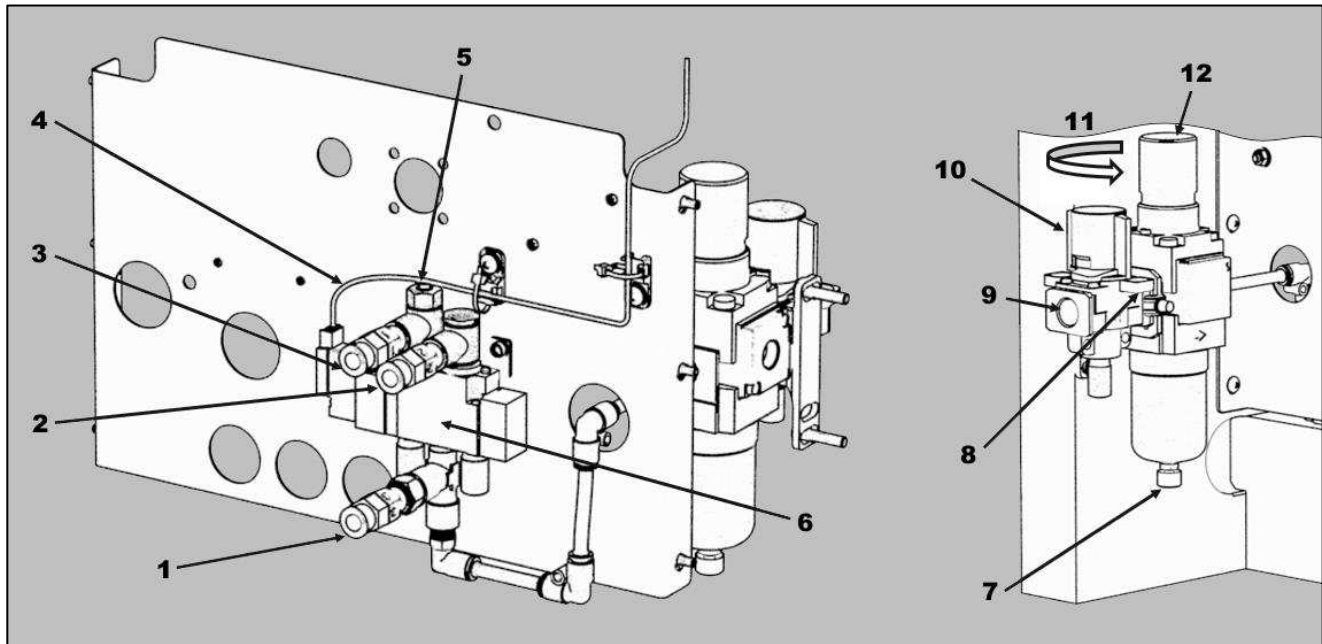
*Air feed valve is part of automatic cable clamp pneumatics.

Air feed kit 2372210-1 is for HF-20 terminators Rev D and later.

Air feed kit 2350380-1 is for HF-20 terminators Rev C and earlier.

8.1. Air feed valve kit (PN 2372210-1)

Figure 40: Air feed valve kit PN 2372210-1



- 1** Port 3: Constant air supply (for use with air feed units with built-in valves)
- 2** Port 2: Cylinder retract connection (throttle acting air cylinder connection)
- 3** Port 1: Cylinder extend connection (spring return cylinder connection)
- 4** Air feed cable
- 5** Flow control adjustment
- 6** Air feed valve
- 7** Water manual drain
- 8** Lock out hole
- 9** 1/4 Rc supply port
- 10** Main air shutoff valve
- 11** Air ON
- 12** Pressure regulator

To install Air Feed Kit PN 2372210-1, proceed as follows:



DANGER

To avoid personal injury, turn OFF the machine, disconnect it from the power source, and disconnect the air supply to be used to power the air feed kit.



NOTE

TE drawing [2372210](#) provides additional details for installing the air feed kit.

1. Disconnect power.
2. Remove six screws on the guard.
3. Remove rear panel.
4. Mount the air feed valve to the inside of the rear panel.
5. Reinstall the rear panel.
6. Reinstall the six screws on the rear panel.
7. Attach the air line from the valve to the pressure regulator/shut off valve.

8. Mount the pressure regulator/shut off valve to the terminator frame.
9. Route the air feed cable (Figure 41) through the gap in the rear guard (Figure 42).

Figure 41: Air feed cable

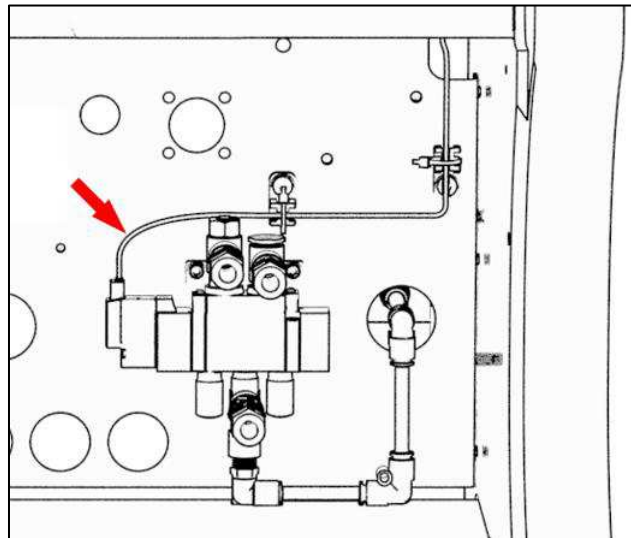
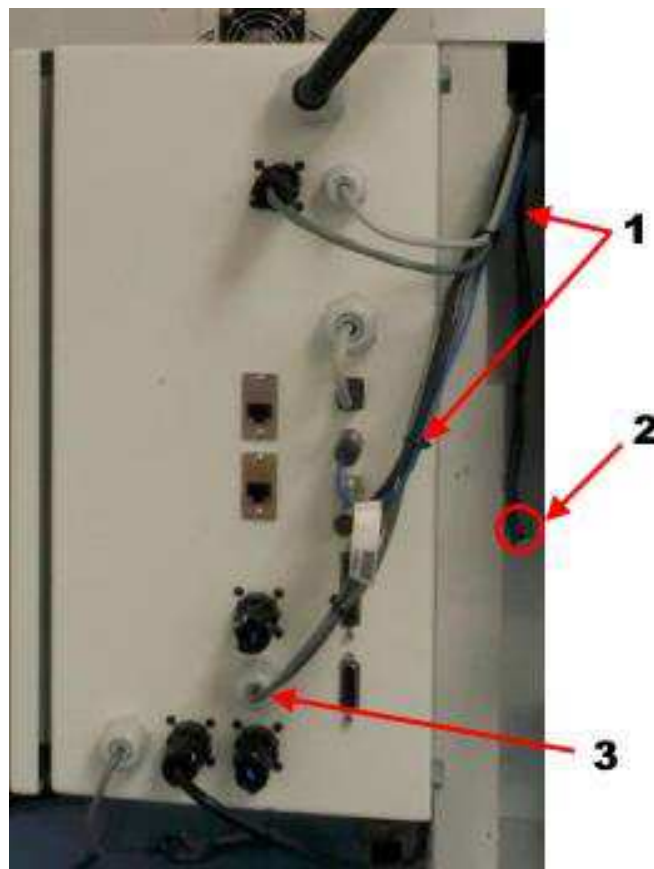


Figure 42: Routing the air feed cable



- 1** Route cable with other cables
- 2** Route cable through opening in guard
- 3** Route cable through cable gland into electrical enclosure

10. Unscrew the cable gland (Figure 42), using care not to damage the existing wire going through it.
11. Route the air feed cable through the cable gland into the electrical box.
12. Plug the air feed cable into connector J17 on the PC board.
13. Retighten the cable gland securing the air feed cable. Use care not to overtighten and damage the wire.
14. Reverse steps 2 and 3 to reassemble the guards.
15. Install the air feed applicator onto the baseplate and connect it to the applicable ports.
16. Make sure the slide valve is off (pulled away from the filter).
17. Install a (customer-supplied) hose fitting in the shut off valve.
18. Attach the air supply hose to the air valve assembly.
19. To turn air on, rotate the shutoff valve to ON. To turn air off, rotate the shutoff valve in the opposite direction.
20. To lock air in the OFF position, rotate the shut off valve to the OFF position and secure the lockout with a (customer supplied) padlock.

**NOTE**

The air can be turned OFF by rotating the shutoff valve to the OFF position.

**NOTE**

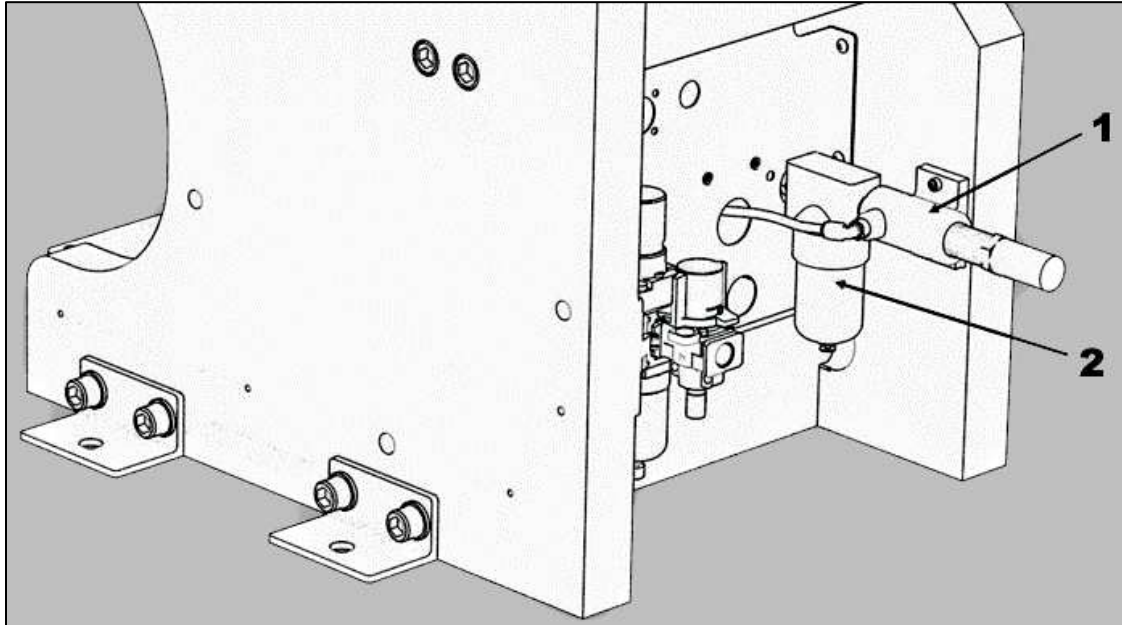
The return feed stroke for the two fastest machine speeds occurs 220 milliseconds after the start of the crimp cycle. For the four slower machine speeds, it occurs 440 milliseconds after the start of the crimp cycle.

8.2. Vacuum system

To install the vacuum system, proceed as follows:

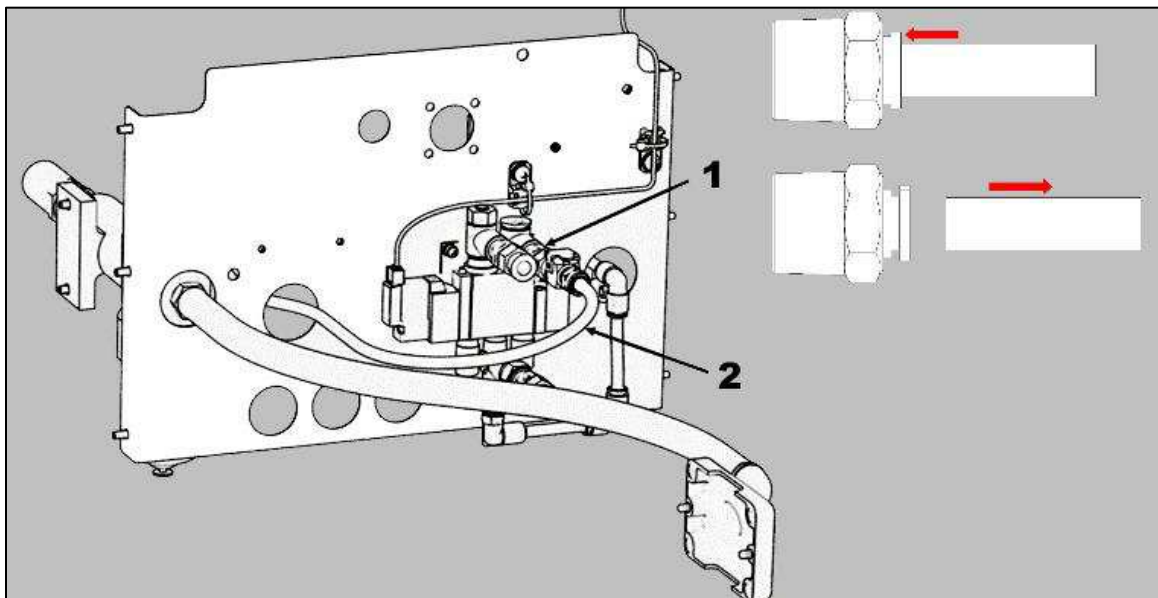
1. Attach the vacuum system to the left frame plate as shown in Figure 43.

Figure 43: Vacuum system



2. Thread the air hose through the rear guard and plug it into the air valve as shown in Figure 44.

Figure 44: Threading the air hose



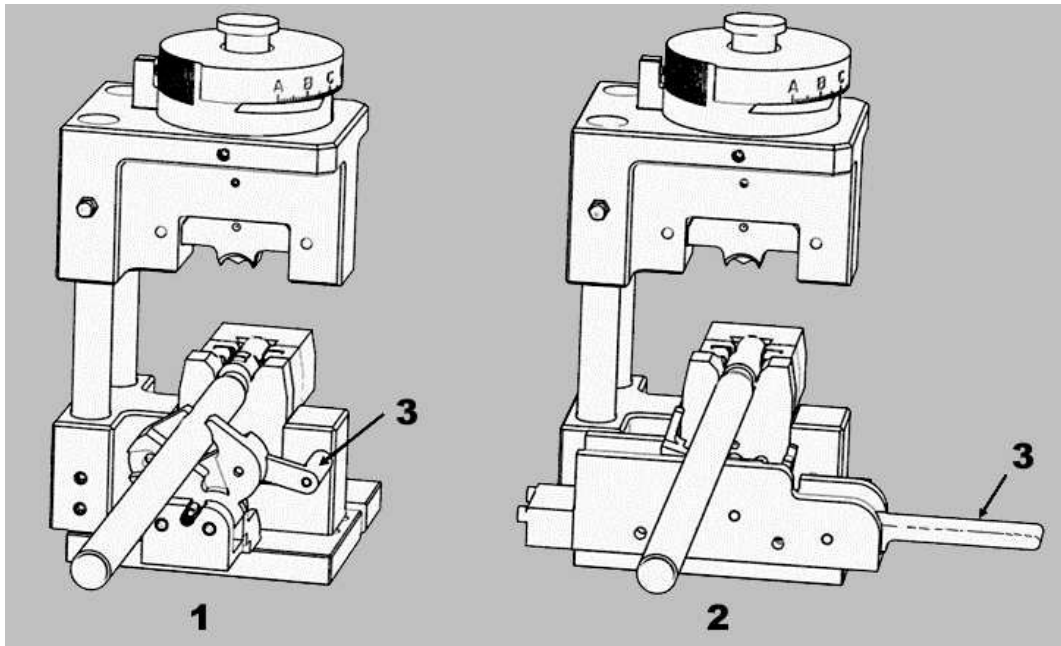
- 1** Port 2
- 2** Vacuum air supply line

3. See the assembly drawing for compatible die holders.

8.3. Manual cable clamp

The manual cable clamp is available on certain die holders. See Figure 45.

Figure 45: Manual cable clamps



- 1 Original style cable clamp
- 2 New manual style cable clamp
- 3 Handle



NOTE

The jaws only help locate the cable. They do not lock the cable in place before or during crimping. They allow the cable to slide in the jaws due to terminal extrusion during crimping.

A. Operation of the original manual clamp

To load the cable:

1. Press down on the handle to open the jaws.
2. Position the cable.
3. Release the handle and springs will close the jaws.

To unload the cable:

1. Press down on the handle to open the jaws.
2. Remove the cable.
3. Release the handle and springs will close the jaws.

B. Operation of the new manual clamp

To load the cable:

1. Position the cable.
2. Lift the handle. Springs close the jaws.

To unload the cable:

1. Push down fully on the handle to open the jaws. The jaws remain open.
2. Remove the cable.

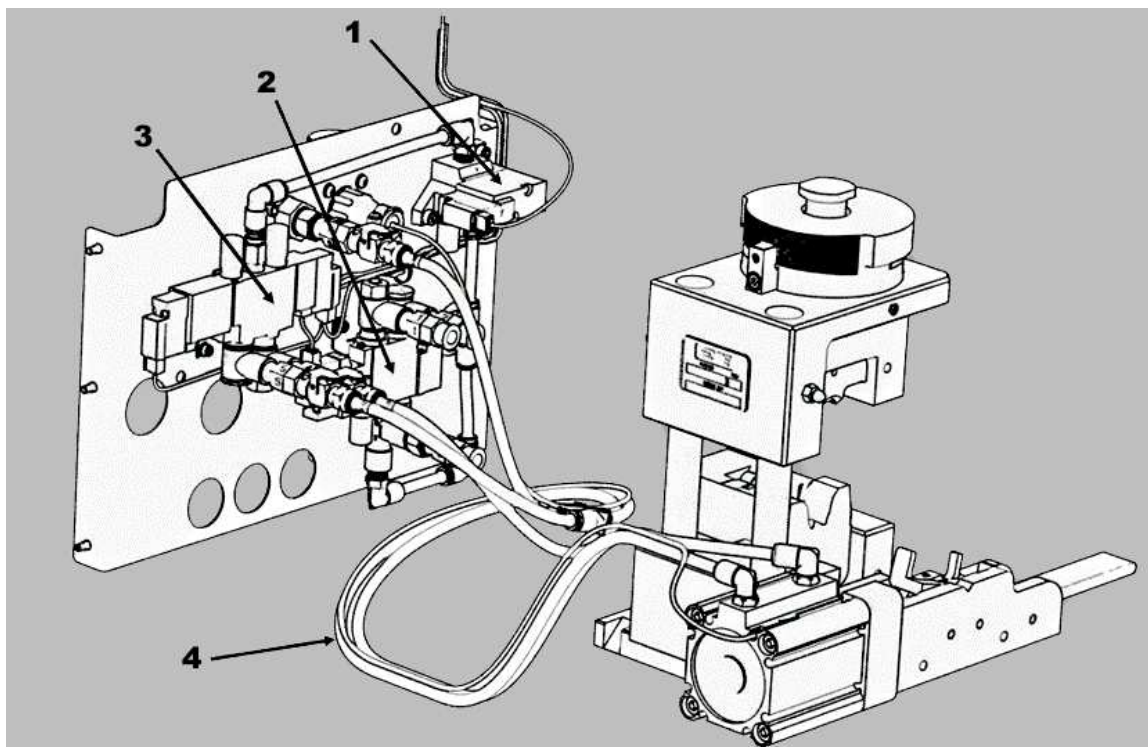
8.4. Automatic cable clamp

The automatic cable clamp is available on certain die holders for use on the **HV-20 terminator only**. See Figure 48.

A. Cable clamp installation

1. Mount the die holder with the cable clamp in the terminator.
2. Route the air lines as shown in Figure 46 and Figure 47.

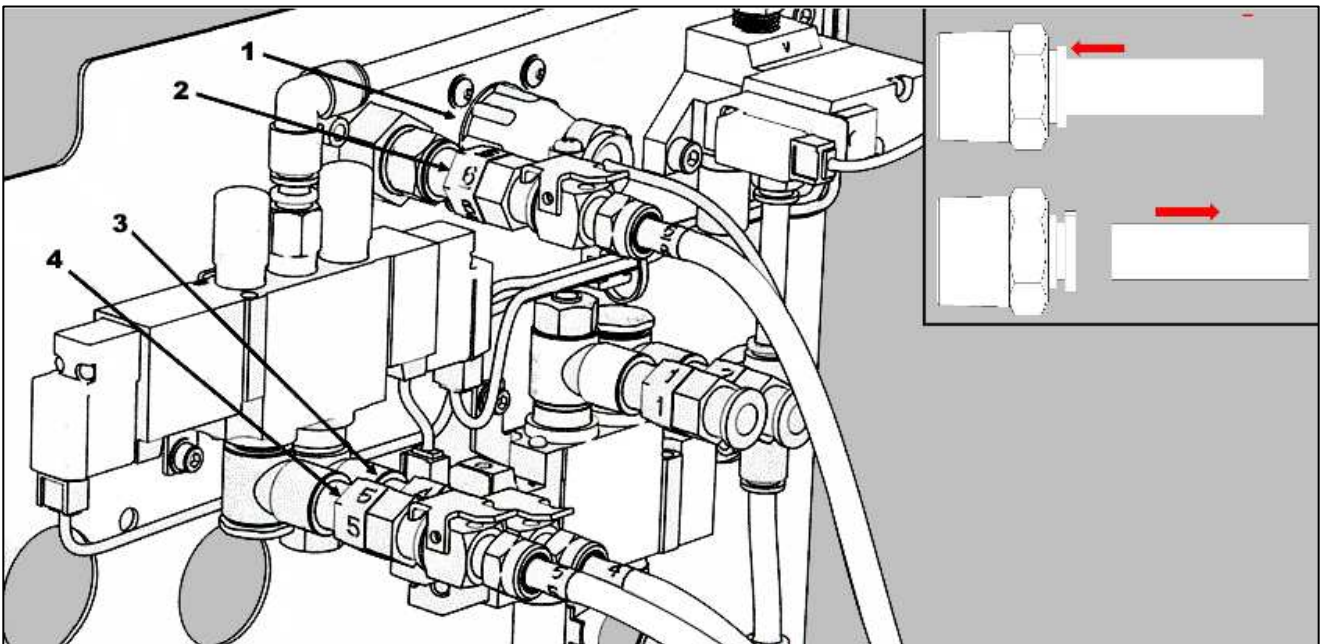
Figure 46: Routing the air lines (terminator frame and guards not shown for clarity)



- 1 Main air valve
- 2 Air feed/vacuum valve
- 3 Clamp valve
- 4 Route air lines similar to figure

3. Install the air lines in the matching ports: air line 4 in port 4, air line 5 in port 5, air line 6 in port 6 (Figure 47).

Figure 47: Air lines and ports



- 1 CPC
- 2 Port 6
- 3 Port 4
- 4 Port 5

4. Install the CPC connector on the CPC.

B. Automatic cable clamp operation

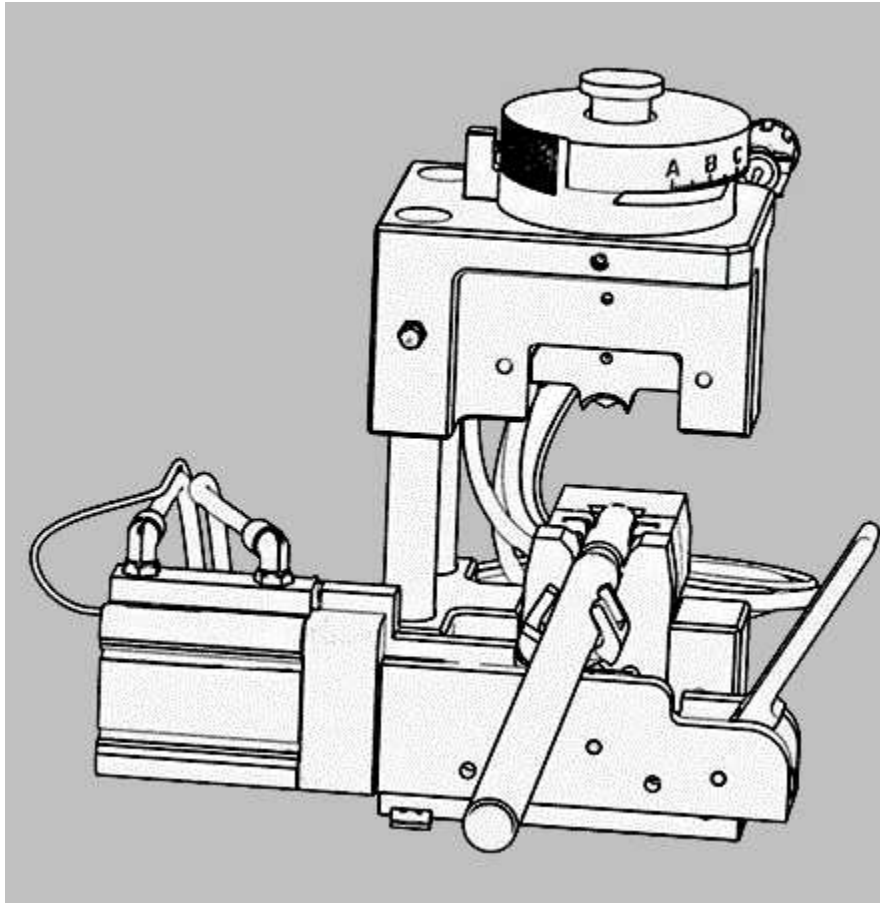
1. To load the cable:
 - a. Position the cable.
 - b. Lift the handle. Springs close the jaws (Figure 48).



NOTE

The jaws only help locate the cable. They do not lock the cable in place before or during crimping. They allow the cable to slide in the jaws due to terminal extrusion during crimping.

Figure 48: Jaws clamped on cable



2. Unload the cable.

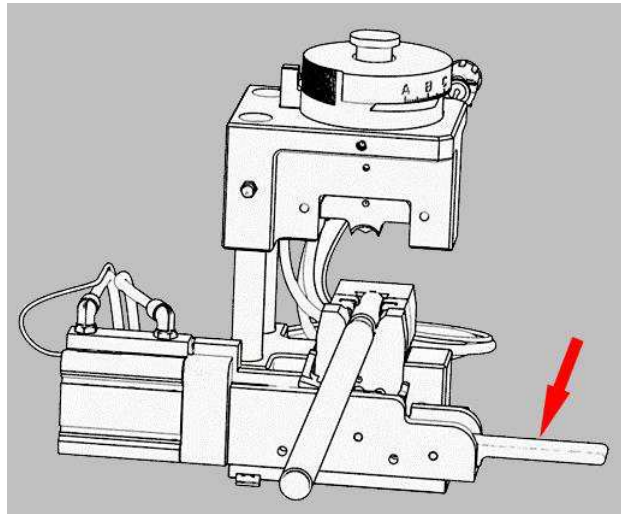


NOTE

The setup person can select between manual unload operation and automatic unload operation from the display screen when selecting to use the automatic cable clamp.

- Manual jaw opening operation:
 - a. Push down fully on the handle (Figure 49) to open the jaws. The jaws remain open.

Figure 49: Handle of automatic cable clamp



- b. Remove the cable.
- Automatic jaw opening operation:
 - a. The jaws open automatically after a good or defective crimp is acknowledged. Raise the guards.
 - b. Remove the cable.

C. Operation with the Crimp Quality Monitor and automatic cable clamp



NOTE

For the automatic cable clamp to work, Crimp Quality Monitoring and the automatic cable clamp must be selected by the setup person on the display screen prior to termination.



NOTE

The automatic cable clamp can be set to open manually (operator must push on handle to open the grip jaws) or open automatically (clamp air cylinder will open the grip jaws and reset the handle) after a good crimp or after a defective crimp is acknowledged.

1. Load a terminal into the die holder.
2. Load a wire or cable into the die holder and close the clamp jaws by lifting up on the handle.



NOTE

The jaws only help locate the cable. They do not lock the cable in place before and during crimping. They allow the cable to slide in the jaws due to terminal extrusion during crimping. Cable should be supported outside of the guarding to prevent cable movement before termination.

3. Press the Guard Control push button to close the guard.

4. Press the foot switch to start a terminator cycle and crimp the terminal. The Crimp Quality Monitor analyzes the crimp.
 - If the crimp is determined to be good:
 - a. Open the upper guard by pushing the guard control push button.
 - If manual jaw opening operation was selected, open the jaws by pressing down fully on the handle.
 - If automatic jaw opening operation was selected, the jaws will open automatically before the guard opens.
 - b. Remove the terminated cable.
 - If the crimp is determined to be defective:
 - a. Air pressure is supplied to the grip jaws to apply additional force. This makes it difficult for the operator to remove the cable from the jaws. The guards do not open. An error message is displayed on the screen.
 - b. A supervisor or other authorized person must enter a code on the display screen to clear the error message and continue operation.
 - c. Open the upper guard by pushing the guard control push button.
 - If manual jaw opening operation was selected, open the jaws by pressing down fully on the handle.
 - If automatic jaw opening operation was selected, the jaws open automatically before the guard opens.
 - d. Remove the defectively terminated cable.

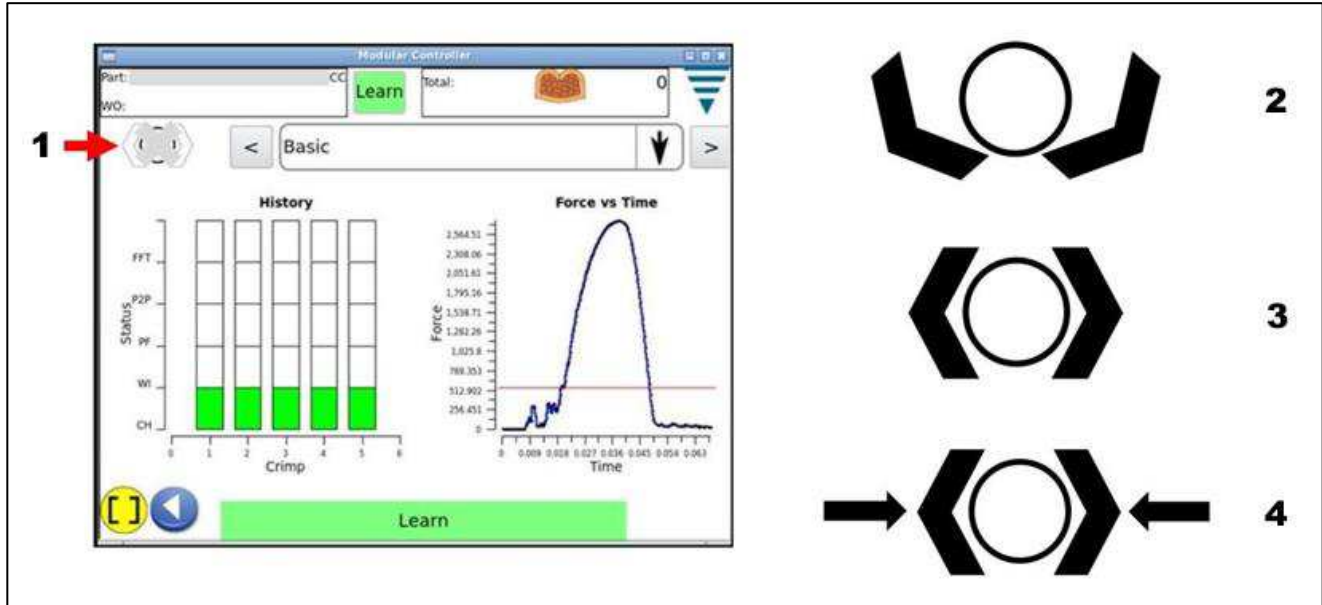
**NOTE**

The cable should be inspected by a qualified person to determine if the cable needs to be reworked.

The status of the cable clamp jaws is displayed on the display screen (Figure 50).

i **NOTE**
X superimposed on the clamp icon indicates a sequence error.

Figure 50: Status of cable clamp jaws



- 1 Clamp icon (showing sequence error)
- 2 Opened
- 3 Closed
- 4 Locked

9. TROUBLESHOOTING

Contact the Tooling Assistance Center at 1-800-722-1111.

9.1. Error codes

Table 13: Error codes

Code	Description
E001	The host is inhibiting operation.
E002	The guard interlock is open.
E005	The control panel is not communicating with the CPU board.
E020	Movement of the TDC switch was not detected.
E021	The TDC switch was not made.
E050	No Modbus Communications with motor drive.
E052	The motor drive indicates the safety circuit is open.
E053	The motor drive indicates it has detected an internal safety fault.
Ennn54	The motor drive indicates it has a fault. " nnn " represents the fault number. Contact TE Engineering for details
E057	Crimp position not achieved
E070	Emergency Stop
E071	Guard failed to open
E072	Guard failed to close
E073	Linear encoder not working
E074	Front guard position switch is bad
E075	Guard Movement Inhibited
E076	Ram Drift Detected
E077	Thermal Switch
E099	Host Module not detected
E100	Stuck keypad button
E101	Foot switch input stuck on

9.2. Diagnostics

The control panel can be placed in a diagnostic mode to check operation of the machine inputs.

A. HV-20 only

Navigate to the Diagnostics screen and click the **HV-20** tab (Figure 51). Various indicators are displayed (Table 14).

Figure 51: HV-20 tab

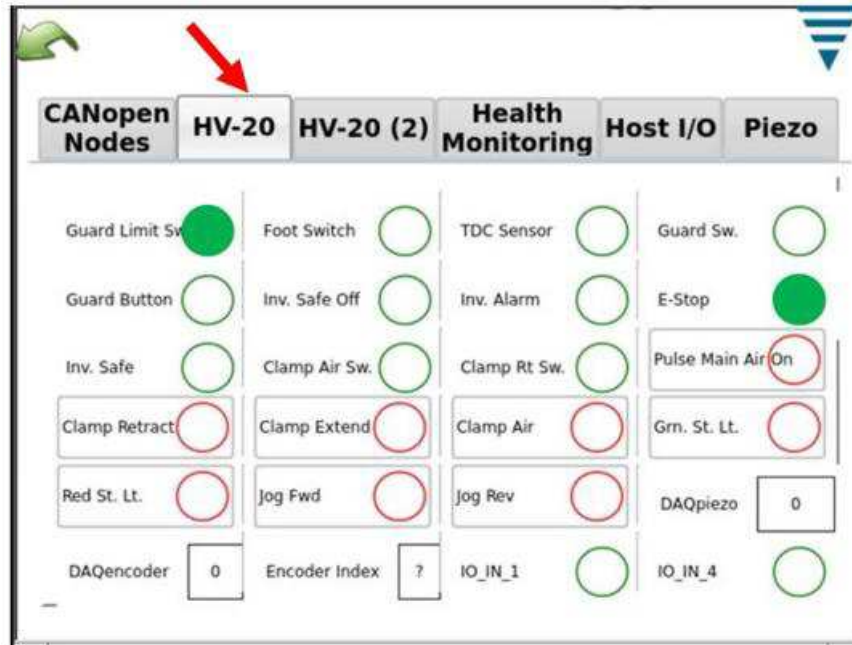


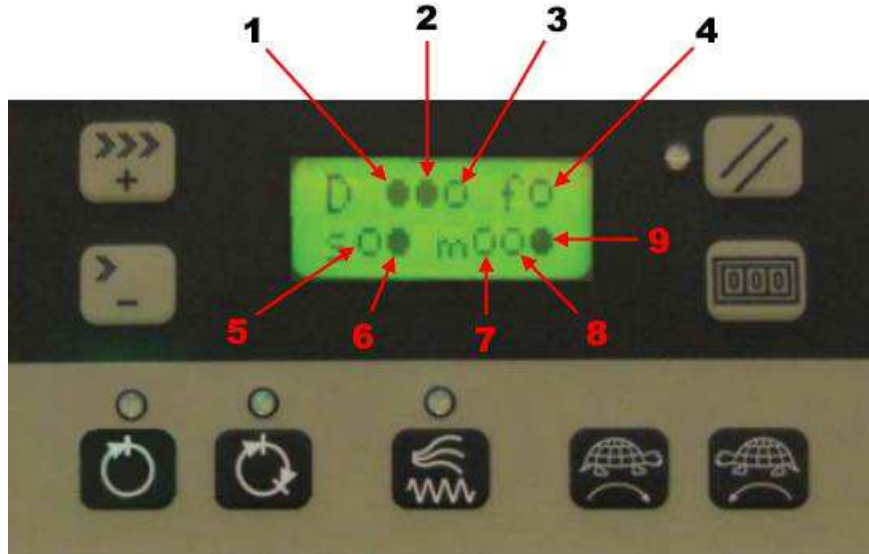
Table 14: HV-20 input status indicators

Icon	Meaning
	Input is ON
	Input is OFF

B. Selecting the diagnostic mode

1. Press and release Error Reset to clear any error.
2. Press and hold Error Reset for five seconds. The control panel software version is displayed.
3. Release the Error Reset. A display like the one in Figure 52 is presented.

Figure 52: HV-20 diagnostic display



- | | |
|--------------------------|---------------------|
| 1 TSC position switch | 6 Emergency stop |
| 2 Guard positions switch | 7 Motor safety stop |
| 3 Guard push button | 8 Motor fault |
| 4 Foot switch | 9 Motor not E safe |
| 5 Guards interlocks | |

Each of the inputs is shown with an input identifier (Table 13), followed by an input status indicator (Table 15).

Table 15: Input status indicators

Icon	Meaning
	Input is ON
	Input is OFF

Some identifiers have more than one associated input, and therefore have multiple input status indicators.

4. Press **Error Reset** to exit the diagnostic mode.

10. IDENTIFYING THE SOFTWARE VERSION

1. Ensure that the machine is OFF.
2. Turn power to the machine ON.

When the display on the control panel appears, the control panel software version is displayed briefly, followed by the HV-20 / HF-20 software version.

The format for both is x . xx . xx.

11. DISPOSAL

Contact TE for disposal:

- [Europe](#)
- [United States](#)

12. REPLACEMENT AND REPAIR

Customer-replaceable parts are listed in the product drawing. Stock and control a complete inventory to prevent lost time when replacement of parts is necessary. Parts other than those listed should be replaced by TE Connectivity to ensure quality and reliability. Order replacement dies through your TE representative, or go to TE.com and click the **Shop TE Store** link at the top of the page.

For field service, go to the [Service and Repair](#) page on the TE website, or send an e-mail to the address for your region in Table 16.

Figure 53: Service and repair



Table 16: Field service e-mail addresses

Region	Address
Asia	Tefe1ap@te.com
EMEA (including India)	Tefe1@te.com
North America	Fieldservicesnorthamerica@te.com
South America	FSE@te.com

13. RESTRICTION ON HAZARDOUS SUBSTANCES (ROHS) INFORMATION

Information on the presence and location of any substances subject to RoHS can be found at <https://www.te.com/commerce/alt/product-compliance.do>. Enter the equipment part number in the box and click the **Search** button.

14. REVISION SUMMARY

- Added Section 5