



*MOVE FORWARD. ALWAYS.™*



# **CC4-50 CRIMPER OPERATORS MANUAL WITH ACT™ CONTROLLER**



## WARNING - SAFETY NOTE



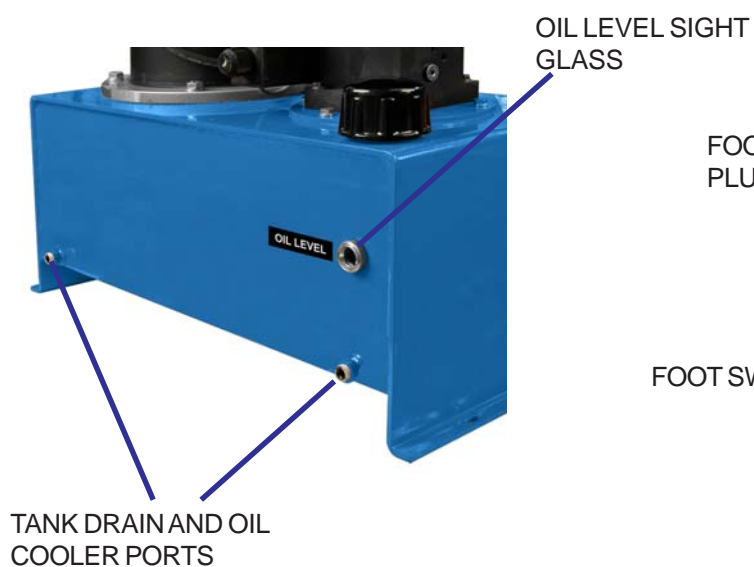
**IMPORTANT** - DO NOT OPERATE THIS EQUIPMENT UNTIL YOU READ AND FULLY UNDERSTAND THIS MANUAL AND ITS ASSEMBLY INSTRUCTIONS

ALWAYS WEAR EYE PROTECTION

**WARNING!** USE ONLY THOSE HOSE AND COUPLING COMBINATIONS AND CRIMPING EQUIPMENT SPECIFIED IN DAYCO HYDRAULIC PUBLISHED LITERATURE. DAYCO RECOMMENDATIONS ARE BASED ON TESTING, AND USE OF HOSE AND COUPLING COMBINATIONS OTHER THAN THOSE RECOMMENDED BY DAYCO CAN RESULT IN SERIOUS INJURY, DEATH OR SUBSTANTIAL PROPERTY DAMAGE. DAYCO DISCLAIMS ALL LIABILITY FOR ANY HOSE AND COUPLING ASSEMBLY THAT IS NOT MADE ACCORDING TO DAYCO RECOMMENDATIONS. CONSULT YOUR LOCAL DAYCO REPRESENTATIVE OR DAYCO DISTRIBUTOR IF YOU HAVE ANY QUESTIONS.

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FOOT SWITCH  
PLUG IN PORT



FOOT SWITCH



## SPECIFICATIONS:

MAX HEAD OPENING W/O DIES -----	168 MM (6.62 IN)
MASTER DIE INSIDE DIAMETER -----	130 MM (5.11 IN)
MAXIMUM DIE OPENING -----	DIE CLOSED DIAMETER + 38 MM
CRIMPER SIZE -----	29 IN LONG X 20 IN DEEP X 32 IN HIGH
WEIGHT -----	573 LB (269 KG)
ELECTRICAL REQUIREMENTS -----	220 VOLT 3 PHASE (STANDARD)
-----	440 VOLT 3 PHASE (OPTIONAL)
MOTOR -----	7.5 HP
RESERVIOR CAPACITY -----	8 US GAL
OIL TYPE -----	ISO 46 HYDRAULIC OIL
MASTER DIES -----	145MM I.D. MASTER DIE STANDARD
ADAPTER DIES -----	99 MM I.D. ADAPTER DIES INCLUDED
HOSE CAPACITY -----	2 INCH 6 SPIRAL
-----	2-1/2 INCH INDUSTRIAL

## **INITIAL CRIMPER SET UP**

CHECK RESERVIOR OIL LEVEL WITH SIGHT GLASS AT REAR OF TANK

CHECK ELECTRICAL CIRCUIT TO BE CERTAIN THAT IT MATCHES THE CRIMPER REQUIREMENTS SHOWN ON THE TAG ATTACHED TO THE CRIMPER CORD.

MAKE CERTAIN THAT MOTOR ROTATES IN THE DIRECTION OF THE ARROW SHOWN ON THE MOTOR HOUSING.

IF MOTOR ROTATION IS INCORRECT REVERSE ANY TWO HOT WIRES IN THE CRIMPER PLUG.

*SEE INITIAL SETUP AND MAINTENANCE SECTION*

Patent(s) Pending



MANUAL MODE FUNCTION: CLOSE DIES  
AUTO MODE FUNCTION: CYCLE START

MANUAL MODE FUNCTION: OPEN DIES  
AUTO MODE FUNCTION: CYCLE STOP

EMERGENCY STOP

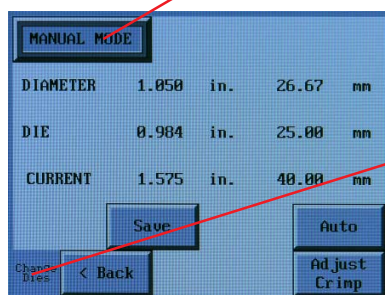
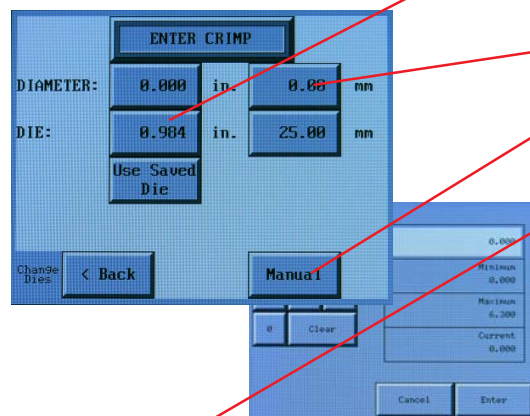
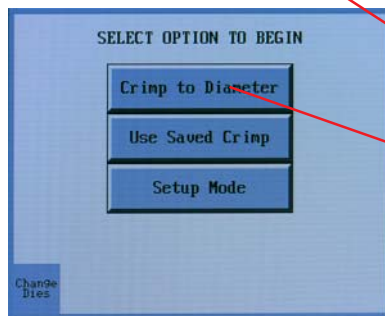
## NOTE:

IF THE CRIMPER IS IN **MANUAL MODE**, THE GREEN OPEN/CLOSE BUTTONS WILL OPEN AND CLOSE THE CRIMPER HEAD.

IF THE CRIMPER IS IN **AUTO MODE**, THE BUTTONS FUNCTION AS CYCLE START AND CYCLE STOP BUTTONS.

IF THE CRIMPER IS IN **SEMI-AUTO MODE**, PRESSING THE FOOT SWITCH OR THE CLOSE BUTTON WILL CLOSE THE CRIMPER HEAD AND RELEASING WILL HALT THE CLOSING ACTION.





To make a manual crimp, two numbers are needed:

**The closed diameter of the die** (in either in or mm)

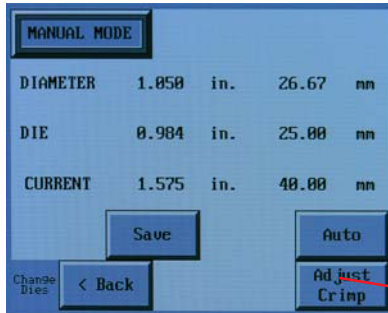
**The finished crimp diameter** (in either in or mm)

That's all you need to know. ACT™ does the rest.

- Press **START MOTOR**
- Select **CRIMP TO DIAMETER**
- Enter the closed diameter of the die set in either in or mm and press **ENTER**. *Note: for a 25mm die, enter 2500. ACT™ will add the decimal point.*
- Enter the finished crimp diameter and press **ENTER**.
- From the **ENTER CRIMP** screen, press the **MANUAL** button to put the crimper in manual mode
- Confirm that the die and finished crimp diameters are correct and that **MANUAL MODE** is displayed.
- Press and hold the green close button until the crimper stops closing.
- Check the final crimp diameter. If a minor correction is required see **HOW TO MAKE MINOR CORRECTIONS**.

*Tip: Pressing the **CHANGE DIES** button allows the crimper head to be fully opened or closed with the green **OPEN-CLOSE** buttons on the controller front panel. When the **CHANGE DIES** button is blinking the dies can be opened and closed manually without altering any of the crimper settings.*

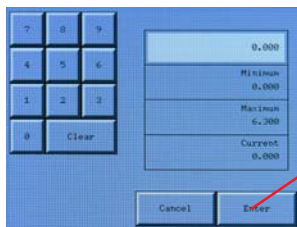
## HOW TO MAKE MINOR CORRECTIONS



- Due to variations in hose and fitting tolerances a minor crimp adjustment may be required if the measured diameter of the final crimp is not within the hose and fitting manufacturer's specifications. ACT™ technology makes minor corrections a simple process which requires no addition or subtraction.

*If the finished crimp diameter is not within the required specifications:*

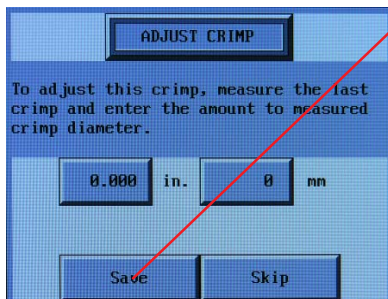
- Press the **ADJUST CRIMP** button.



- Enter the measured diameter of the fitting (Not the amount of correction).

- Press **SAVE**.

- Make another crimp and verify that the fitting is within specifications.



**EXAMPLE:** *If the hose and fitting manufacturer specifies that the finished crimp should measure 1.500 to 1.520 and the measured crimp diameter was 1.530, simply enter the measured diameter (1.530) and press **SAVE**. The finished crimp diameter can be entered in either in or mm and ACT™ will make the conversion.*

*While a single correction will usually bring the hose and fitting into specifications, the process can be repeated as many times as is required.*



### ACT™ TECHNOLOGY

On crimpers equipped with ACT™ controllers the sensors which sense the position of the dies are supplemented by a pressure transducer which senses the “effort” required to make a crimp and compensates for variations in hose and fitting combinations. This unique feature means that the operator can enter the finished crimp diameter and will seldom, if ever, have to enter an offset to achieve the correct finished crimp diameter.



## HOW TO ADD A SAVED DIE

Up to 50 different dies can be saved in the computer memory. These dies can be recalled in the set up process eliminating the need to re-enter the die size each time.

To enter a saved die:

- From the **OPTION** screen, press **SETUP MODE**.
- Select **SAVED DIES**
- Select the save position (1-50) where the die is to be saved and press the **EDIT** button
- Enter a die description (up to 12 alpha/numeric characters)
- Enter diameter units (inch or metric)
- Enter the closed diameter of the die.
- Press **SAVE** and **EXIT**
- The saved die will now appear on the **SELECTED DIE** screen. From this screen individual dies can be cleared or edited.

## HOW TO RECALL A SAVED DIE

- Select **CRIMP TO DIAMETER**, and from the **ENTER CRIMP** screen, select **USE SAVED DIE**.

- Select the saved die (1-50) and press **LOAD** and then **OK**. The die parameters will now be used for the crimp process.

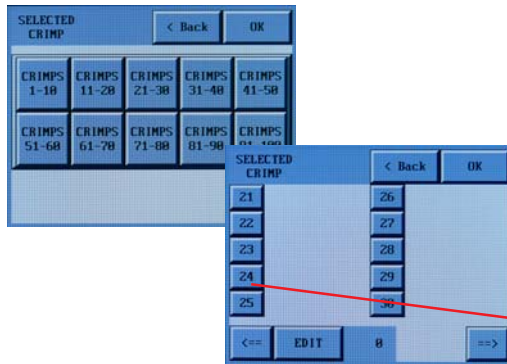
- From the **ENTER CRIMP** screen press **MANUAL**.

- The saved die will now be shown on the crimp parameters screen

The screenshots show the following sequence of screens:

- MACHINE SETUP**: A menu with options: 1. Allow crimp to diameter? (Yes), 2. Count is how many crimps? (1), 3. Saved Dies, 4. Saved Crimps, Exit, and More >.
- SELECTED DIE**: A screen showing a grid of die positions (1-10, 11-20, 21-30, 31-40, 41-50) and a **SELECTED DIE** field.
- Enter Die to Save**: A screen with fields for Description (24 MM Die), Diameter Units (mm), and Closed Diameter (24.00). It has **SAVE** and **EXIT** buttons.
- SELECT OPTION TO BEGIN**: A screen with options: Crimp to Diameter and Use Saved Crimp.
- ENTER CRIMP**: A screen with fields for DIAMETER (0.000 in., 0.00 mm) and DIE (0.000 in., 25.00 mm). It has a **Use Saved Die** button.
- SELECTED DIE**: A screen showing the selected die (1 24 MM DIE) and a **LOAD** button.
- ENTER CRIMP**: A screen showing the updated crimp parameters (DIAMETER: 1.050 in., 26.67 mm; DIE: 24 MM DIE) and a **Manual** button.

## HOW TO ADD A SAVED CRIMP



- Adjust the die diameter and crimp diameter as required and place the crimper in **MANUAL** mode.

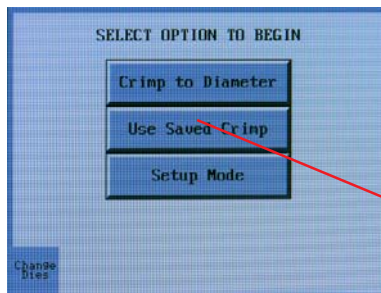
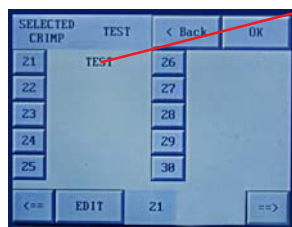
- Press **SAVE**

- Select a location (1-100) and press **EDIT**

- Enter a description (up to 12 characters)

- Press **SAVE** and **EXIT**

- The die and crimp setting can now be recalled from the saved location as required (21 on the example screen shown)



## TO RECALL SAVED CRIMP

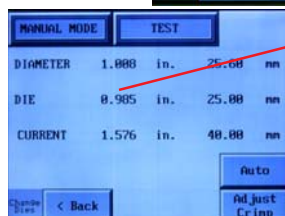
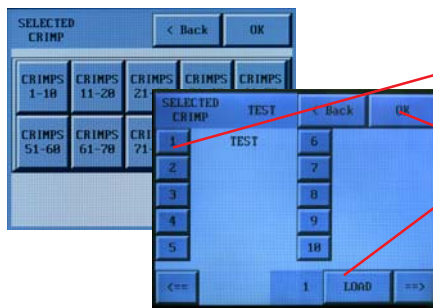
- Select **USE SAVED CRIMP** from the option screen

- Select a previously saved crimp from location 1-100.

- Press **LOAD**

- Press **OK**

- The saved crimp will appear on the manual screen



## FULL AUTO MODE

With the crimper in **FULL AUTO** mode additional functions are available:

- The crimper will cycle automatically from the **CRIMP** button on the touch screen, the green **CYCLE START** button on the panel, or the foot switch.

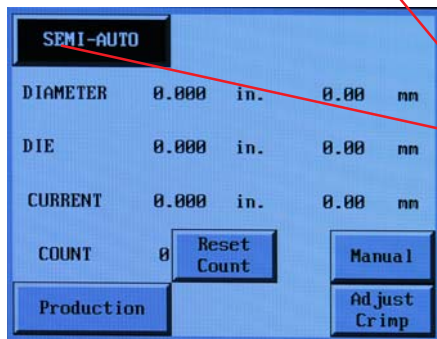
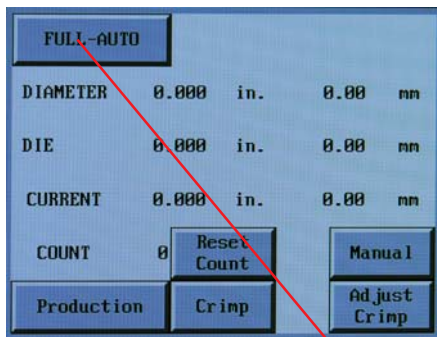
- To set the position to which the dies will retract, close the crimper to the desired retract position prior to pressing the **FULL AUTO** button.

*Note: The retraction position must be set a minimum amount above the finished crimp diameter or the crimper will not retract. The minimum retraction diameters are:*

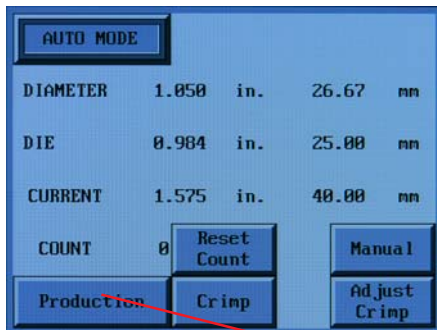
CC38 - Crimp Diameter plus 2 mm

CC4-50 - Crimp Diameter plus 2 mm

CC60 - Crimp Diameter plus 3 mm



- Pressing the **FULL AUTO** button will toggle the crimper into **SEMI-AUTO** mode. In **SEMI-AUTO** mode, pressing the **FOOT SWITCH** or the **CLOSE** button will close the crimper head and releasing it will cause the head to stop closing. This mode allows the crimper to be jogged into position allowing more precise positioning of a fitting in the dies. Pressing the **SEMI AUTO** button will toggle the crimper back to **FULL AUTO** mode

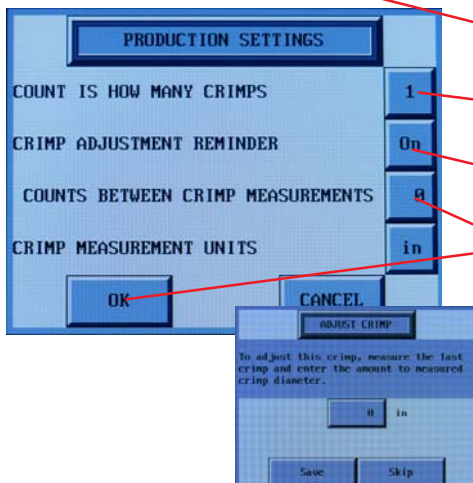


In **FULL AUTO** mode pressing the foot switch will start the crimp cycle and the dies will stop closing when the crimp cycle is complete

- The **COUNT** function is activated allowing the operator to monitor the number of crimps made.

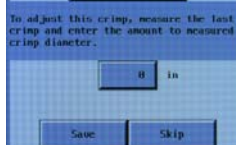
- A measurement can be required after a preset number of crimps. See **SET REQUIRED MEASUREMENT**

## SET REQUIRED MEASUREMENT



- Press the **PRODUCTION** button.
- Determine if 1 or 2 crimps will count as a crimp
- Toggle the **CRIMP ADJUSTMENT REMINDER** to **ON**.
- Set the **COUNTS BETWEEN CRIMP MEASUREMENTS** to the desired number and press **OK**.

- At the set interval, the **ADJUST CRIMP** screen will come up and the operator will be asked to measure the last crimp and enter a correction if required.



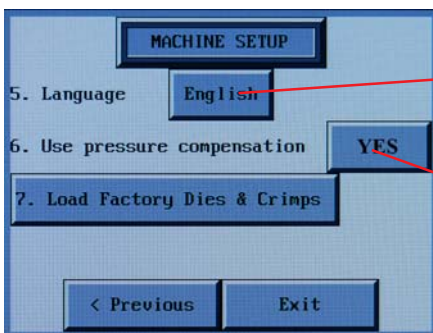


## ACT™ ADDITIONAL FEATURES



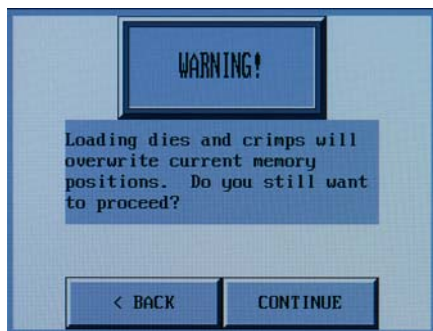
- Additional features and functions of the ACT™ controller can be accessed by pressing the **MORE** button on the **MACHINE SET UP** screen.

When “Allow Crimp to Diameter” is set to “**YES**”, all of the adjustment functions of the crimper are available. When “Allow Crimp to Diameter” is set to “**NO**” only the settings entered as a saved crimp can be used.

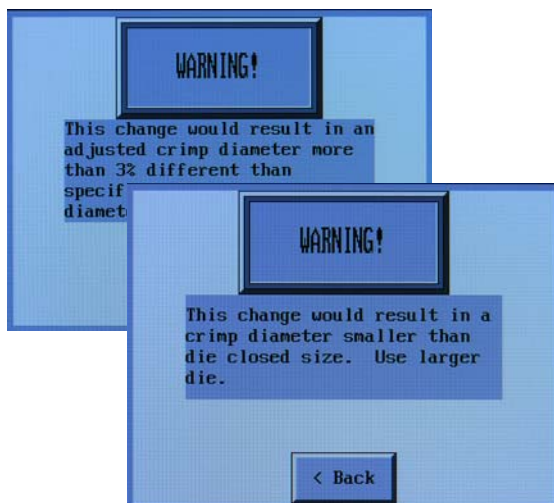


- English or Spanish language options are available.

The “Use Pressure Compensation” is set to “**YES**” for all crimpers equipped with a pressure transducer. A security code is required to turn this function on or off.



- Some hose and fitting manufacturers furnish a complete set of crimp specifications which can be downloaded into the crimper memory. Prior to downloading, a warning screen will appear warning that all previously entered settings will be lost.



- If an operation is attempted which is outside of the range of the die set selected or which could result in a bad crimp, a series of warning screens will appear to help diagnose the problem.

Industrial and Hydraulic hose dies are available for this crimper. Industrial Dies are inserted directly into the Master Dies and hydraulic dies require an intermediate die. Hydraulic Dies are available with an 80mm, 84mm, 99mm and 130mm O.D.

*The I.D. of the intermediate die must match the O.D. of the hydraulic die or accurate crimps are not possible.*

## INDUSTRIAL DIE INSTALLATION INTERMEDIATE ADAPTER DIE INSTALLATION

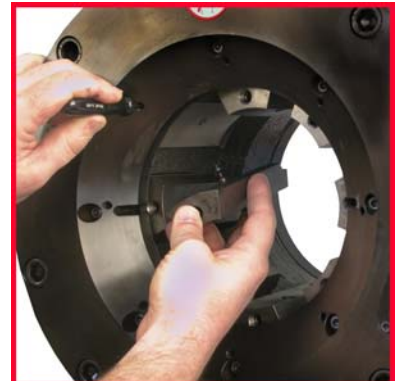
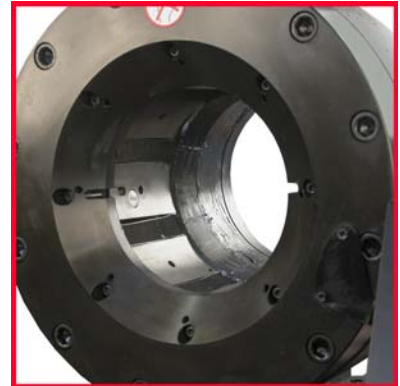
Turn on the crimper at the master power switch (See AccuCrimp Controller Instructions) and go to Manual mode.

Insert the die removal tool in the release hole to release the retaining spring and attach either an Intermediate Adapter Die or a Hydraulic Die to the Master Die. the numbers stamped on the face of the die should face the operator.

Mount all 8 dies in a similar manner.

If Industrial Dies are being used, proceed to the AccuCrimp Operating instructions and set up the crimper for the correct crimp diameter.

If Hydraulic Dies are being used, see Hydraulic Die Installation instructions.





Install Intermediate Adapter Dies as shown previously making certain that the Intermediate Adapter Die I.D. matches the Hydraulic Die O.D.

Remove the Hydraulic Dies from their holder with the magnetic die insertion tool as shown.



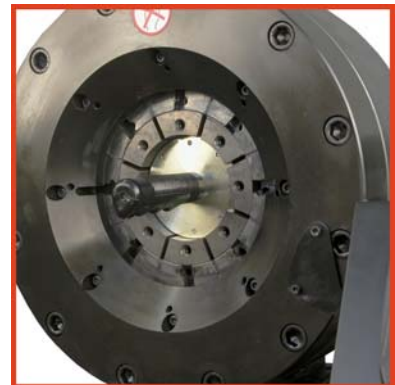
The die size stamped on the face of the die should face toward the operator

Align the studs of the Hydraulic Dies with the holes in the Adapter Dies and with the crimper in manual mode **SLOWLY** close the crimper head on the die set.



Bring the crimper head to a fully closed position and remove the die insertion tool.

The dies may also be inserted manually with the crimper head in the fully open position.



Proceed to the AccuCrimp operating instructions to set up the crimper for the hose and fitting being crimped.

For Hydraulic Die removal, place the crimper in manual mode or press the **CHANGE DIES button on the controller**, and bring the crimper head to the fully closed position. Insert the die removal tool and open the crimper head releasing the Hydraulic Dies from their spring retention holes.



The optional AccuStop™ coupling stop eliminates guesswork allowing the operator to visually observe exactly where the crimp will be positioned on the fitting without the need for trial and error and product scrap due to poor crimp positioning.

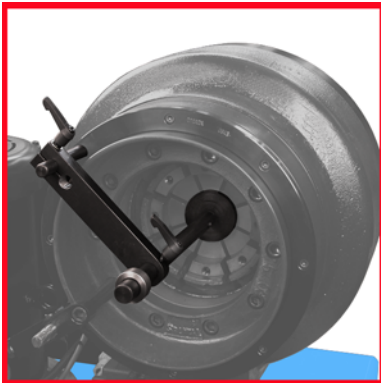
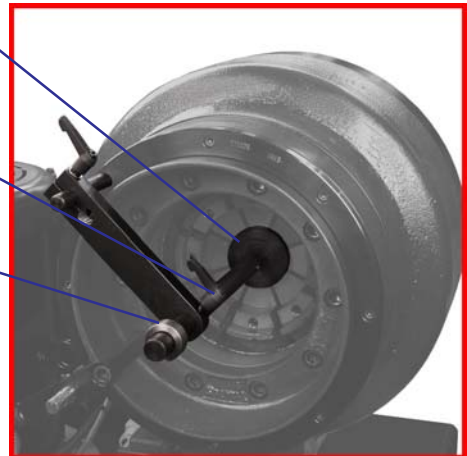
With the Coupling Stop retracted, load the appropriate set of dies and set crimp diameters as required.

With the crimper in the **MANUAL** mode, bring the dies to a fully closed position

Coupling Stop

Coupling Stop Clamp

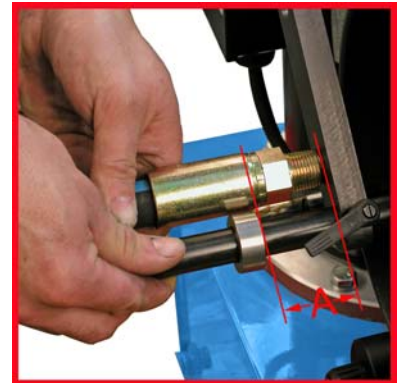
Coupling Stop Guide



Loosen the Coupling Stop Clamp and position the Coupling Stop against the back face of the dies.



Slide the Coupling Stop Guide against the Coupling Stop Arm.



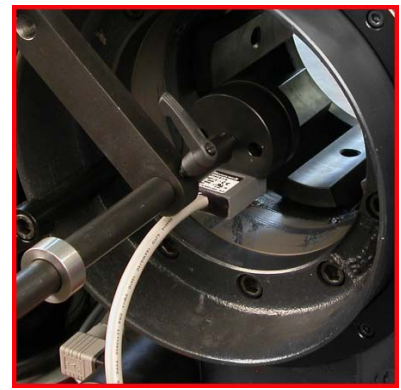
Hold the fitting against the Coupling Stop Arm withdraw the Coupling Stop Rod such that the Guide is aligned with the desired crimp position. Lock the Coupling Stop Clamp.



Position the fitting against the Coupling Stop and actuate the crimper in the normal manner.



The dimension from the face of the fitting to the crimp position will now be the dimension established in the previous step.



An electronic Coupling Stop is available. Set up is identical, but when the fitting touches the Coupling Stop, the crimp cycle will start automatically.

**CAUTION:** When using an electronic Coupling Stop, disconnect it from the controller prior to setup. Failure to do so will cause the crimper to activate during the set up process.

Do not lift the machine by the crimper head. Lift with a fork lift under the tank.

Mount the crimper on a sturdy surface

Electrical Requirements:

220 Volt 3 Phase Current (Standard)

440 Volt 3 Phase Current (Optional)

Check to be certain that the motor rotates in the direction of the arrow shown on the motor housing. If motor rotation is opposite of the direction of the arrow, reverse any two hot wires in the electrical plug.

Damage to the pump can result if the motor does not rotate in the correct direction.

Check the oil level in the sight glass on the rear of the crimper. 8 U.S. gallons of ISO 46 hydraulic oil are required to completely refill the tank.

Oil can be drained from either of the two ports at the bottom of the tank.

An additional oil cooler, while not normally required, can be plumbed into the two ports at the rear of the crimper



Front Flange Bolts

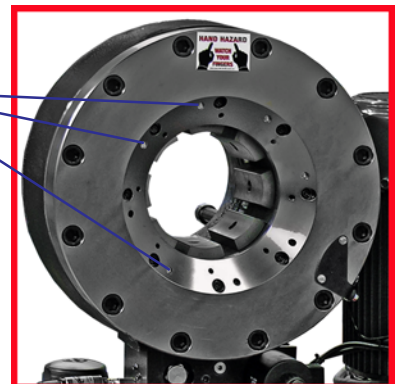
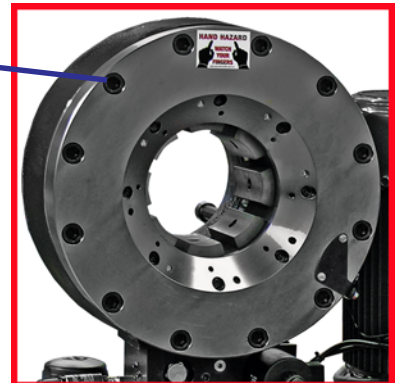
Front Flange Bolts: Periodically, every 6-12 months depending upon usage, the front flange bolt torque should be checked. The correct torque is 330NM (243 Ft Lbs)

Proper lubrication is essential to prevent damage to the machine and to assure accurate crimping.

Lubricate the crimping head after each 100 crimping cycles or at the start of each shift if the crimper is used in a production setting.

Grease Fittings

Bring the master dies to the fully closed position and lubricate the die fingers through the 8 lubrication fittings in the front flange face. Use only a high quality moly-disulfide grease. Failure to do so may result in damage to the wearing surfaces.



Dayco recommends that all users familiarize themselves with Dayco's warning statements, SAE J1273, and the Kwikrimp® concept, found in this operator's manual.

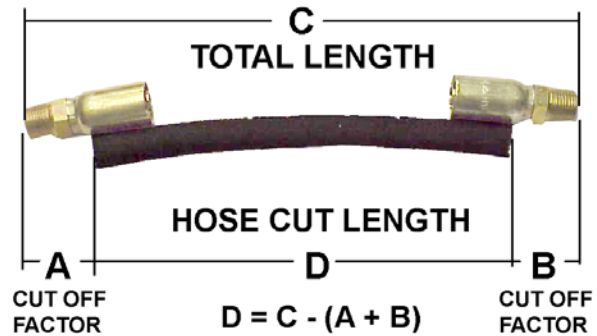
Select the Dayco hose and coupling to be assembled.

Determine the correct crimp setting from the crimp specifications sheet.

Determine hose cut length by subtracting the cutoff factor for each coupling from the overall length of the assembly. For these cutoff factors, see Dayco's published catalog data.

Cut the hose square and to the proper length with a suitable saw.

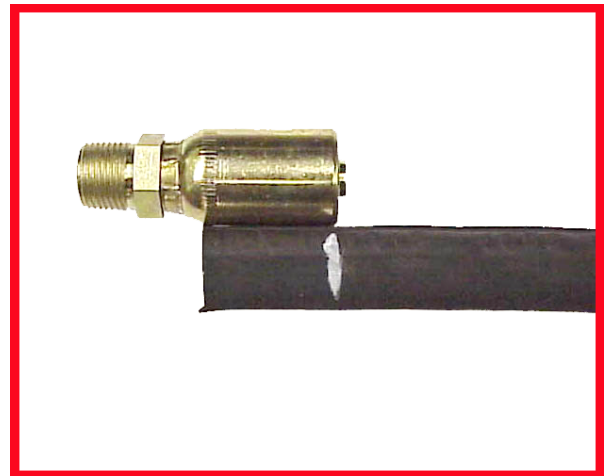
$$\text{HOSE CUT LENGTH} = \text{TOTAL LENGTH} - (\text{CUT OFF FACTOR A} + \text{CUT OFF FACTOR B})$$



coat the coupling stem with Dayco hose assembly lubricant (HAL16) to ease hose insertion. Insert the hose until it "bottoms" in the coupling shell.

To insure that the hose is bottomed in the collar, mark the insertion depth on the hose before inserting it into the coupling (see figure below).

Using a clockwise twisting motion or fixing the hex on the coupling in a vise may help when tolerances are tight



## **PROBLEM: CRIMPER WILL NOT RUN AT ALL**

- Check the E-Stop switch to be certain that it is not depressed. A slight twist is required to release switch after it has been depressed.
- PLC (Programmable Logic Control) must be reset.

## **PROBLEM: CRIMPER RUNS BUT IS SLOW OR NON-FUNCTIONAL**

- Check supply voltage to see that it matches the voltage specified on the tag attached to the crimper.
- Check motor rotation and be certain that the motor rotates in the direction of the arrow on the motor housing. For three phase units rotation can be reversed by switching any two wires in the plug.

## **PROBLEM: CRIMPER WILL CLOSE ON FITTING BUT DOES NOT DEVELOP POWER TO COMPLETE THE CRIMP**

- Fitting is too large for selected crimp die. Select a crimp die that is closer to final crimp diameter. Machine has built-in safety by-pass to protect internal components from damage due to incorrect die selection.
- Check oil level. Position dies to the fully open position and check oil sight gage in rear of machine. Be sure the oil level is in the middle of the sight glass. Use ISO 32 or 46 weight hydraulic oil.

## **PROBLEM: CRIMPER WILL NOT OPEN TO RETRACT POSITION IN AUTO MODE**

- Retract position must be at least 2 mm larger than the final crimp diameter

***If problem(s) persist contact Customer Service for additional troubleshooting assistance***



THE KWIKRIMP® CONCEPT IS AN ENGINEERED PROGRAM, DESIGNED TO INCORPORATE DAYCO HOSE, FITTINGS AND CRIMPERS INTO ONE EFFECTIVE AND RELIABLE HOSE ASSEMBLY SYSTEM.

The Kwikrimp® Concept is an affirmation to all Dayco Distributors, OEMs and users of the Kwikrimp® system that Dayco will support only those who use Dayco hose and couplings in the Kwikrimp® assembly system. However, the Kwikrimp® Concept is also a statement that serves to warn that Dayco will not be responsible when interchanging a Dayco hose and/or couplings with hose and/or couplings of any other manufacturer. Dayco products are part of an engineered system, which must be assembled and used in accordance with Dayco instructions and limitations.

Dayco hose, couplings and crimping machines are designed into an effective and reliable assembly system and the use of other than Dayco products may produce hose assemblies that will not meet rated performance. Failure to follow Dayco instructions and limitations could lead to premature hose failures resulting in property damage, serious injury or death.

Dayco's limited warranty shall apply only if the customer uses hose, fittings, hose fitting components and crimp equipment specifically engineered, designed and produced to Dayco process specifications.

**DAYCO DISCLAIMS ANY RESPONSIBILITY OR LIABILITY FOR ANY CRIMPED HOSE ASSEMBLIES NOT PRODUCED FROM GENUINE DAYCO HOSE FITTINGS, HOSE AND EQUIPMENT, IN CONFORMANCE WITH DAYCO PROCESS SPECIFICATIONS FOR EACH SPECIFIC HOSE ASSEMBLY.**

The argument that hoses branded with identical SAE numbers are the same and can be interchanged with Dayco couplings is not true! Hose with identical brand can be expected to perform only to the requirements of SAE when assembled with compatible couplings. SAE recognizes this fact as shown by the following statement taken from the 1998 SAE Handbook, J1273, Volume 2, and page 22.198.

**3.10 Proper End Fitting – Care must be taken to insure proper compatibility exists between the hose and coupling selected based on the manufacturer's recommendations substantiated by testing to industry standards such as SAE J517.**

All Dayco distributors, OEMs and Kwikrimp® users must recognize that the following points are critical when considering any and all aspects of the Kwikrimp® program.

1. The data supplied with each Crimper was developed after extensive impulse testing with Dayco hose and couplings. All Dayco hose styles are tested with the proper Kwikrimp® couplings before they are added to the Dayco Approved List. Dayco is constantly checking and upgrading hose quality.
2. Dayco Kwikrimp® data does not apply to all hose and couplings, only those products bearing the Dayco identification with the proper Dayco catalog number.

Dayco couplings used with other than Dayco branded hose will not necessarily produce a good assembly. Identical hose styles, made by different suppliers, are not the same when it comes to performance with Dayco couplings.

CC4-50 is warranted to be free from defects in material and workmanship under normal operating conditions and recommended usage for a period of ninety (90) days from date of delivery. Any product which is shown to be defective shall be replaced or repaired free of charge or extended a credited refund of the original acquisition cost to purchaser. This limited warranty is contingent upon the conditions that prompt receipt of notice of any defect, that purchaser establish the product has been properly installed, maintained, and operated within the limits of related and normal usage as specified, and that upon request purchaser will return the defective product.

The terms of this limited warranty do not in any way extend to any product or part which have a life, under normal usage, inherently shorter than ninety (90) days.

**THESE LIMITED WARRANTIES TO REPAIR OR REPLACE DEFECTIVE PRODUCTS AS SET FORTH ABOVE AND ANY ADDITIONAL WARRANTY EXPRESSLY STATED TO BE A WARRANTY AND SET FORTH IN WRITING ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE.**

**PURCHASER'S SOLE AND EXCLUSIVE REMEDY PURSUANT TO ANY CLAIM OF ANY KIND, INCLUDING BUT NOT LIMITED TO, A CLAIM IN CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY, SHALL BE (a) THE REPAIR OR REPLACEMENT AT THE OPTION OF THE MANUFACTURER OF DEFECTIVE PRODUCTS OR (b) A CREDITED REFUND OF THE PRICE OF THE DEFECTIVE PRODUCT OR PART IF THE PRODUCT OR PART IS UNABLE TO BE EFFECTIVELY REPAIRED, REPLACED OR CORRECTED IN A REASONABLE TIME AFTER USING BEST EFFORTS. CLAIMS OF ANY KIND INCLUDE BUT ARE NOT LIMITED TO THOSE FOR ANY LOSS OR DAMAGE ARISING OUT OF, CONNECTING WITH, OR RESULTING FROM THE DESIGN, MANUFACTURE, SALE, DELIVERY, RESALE, INSTALLATION, TECHNICAL DIRECTION OF INSTALLATION, INSPECTION, REPAIR, OPERATION OR USE OF ANY PRODUCT OR PART. IF, HOWEVER, ANY WARRANTIES ARE EXPRESSLY SET FORTH IN WRITING IN ADDITION TO THOSE SET FORTH HEREIN, THE LIABILITY UNDER SUCH ADDITIONAL WARRANTY SHALL TERMINATE NINETY (90) DAYS FROM THE DATE OF SHIPMENT TO PURCHASER.**

**UNDER NO CIRCUMSTANCES SHALL ANY LIABILITY WHATSOEVER BE IMPOSED FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, SUCH AS, BUT NOT LIMITED TO, LOSS OF PROFIT OR REVENUE, LOSS OF USE OF THE PRODUCT, COST OF CAPITAL, COST OF REPLACEMENT EQUIPMENT, OR CLAIMS RESULTING FROM CONTRACTS WITH THIRD PARTIES, UNLESS EXPRESSLY PROVIDED IN WRITING, IN NO EVENT SHALL ANY LIABILITY OR RESPONSIBILITY BE ASSUMED FOR PENALTIES, PENALTY CLAUSES OR LIQUIDATED DAMAGES OF ANY DESCRIPTION, CERTIFICATIONS OR INDEMNIFICATIONS OF PURCHASERS OR OTHERS OR COSTS, DAMAGES OR EXPENSES ARISING OUT OF OR RELATED TO THE PRODUCTS.**