

# 2090-Series Circular-DIN Connector Kits, Flange Kits, and Crimp Tools

2090-KFBM4-CAAA, 2090-KPBM4-12AA, 2090-KPBM4-06AA, 2090-KFBM7-CAAA, 2090-KPBM7-12AA, 2090-KPBM7-06AA, 2090-KFBE7-CAAA, 2090-KPBE7-12AA, 2090-KPBE7-06AA, 2090-KFB47-CF, 2090-KPB47-12CF, 2090-KPB47-06CF, 2090-TCR47-M23, 2090-TCR47-M40

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## About The Connector Kits, Flange Kits, and Crimp Tools

These 2090-series kits and crimp tools are used for assembling a wide variety of motor/actuator cables with rugged DIN connectors for connecting motion control systems.

Installation instructions from the manufacturer were included in the shipping box with the respective kit or crimp tool. This collective installation instruction includes additional information.

## Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (publication [SGL-1.1](#) available from your local Rockwell Automation sales office or online at <http://www.rockwellautomation.com/literature>) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc., be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc., cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc., with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.



**WARNING:** Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.



**ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you to identify a hazard, avoid a hazard, and recognize the consequences.



**SHOCK HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.



**BURN HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.

### IMPORTANT

Identifies information that is critical for successful application and understanding of the product.

## Before You Begin

Remove all packing material from within and around the item. After unpacking, verify the catalog number against the purchase order, and visually inspect the cable and each connector for damage. If necessary, notify the carrier of any shipping damage immediately.

Cables are stored and shipped in a coil, and will retain this shape unless you allow the cable to straighten itself. To straighten a cable, hang a short cable from its mid-point or lay a long cable on the floor in a straight line. Any coiling that persists in the cable should relax within the next twenty-four hours. Doing this results in a cable that is easier to install.

Observe the following precautions when installing the cables in a servo system. Failure to observe these safety notices could result in personal injury or damage to the motor and equipment.



**ATTENTION:** Arcing or unexpected motion can occur if the power, brake, or feedback cables are connected or disconnected while power is applied to the drive. Always remove power to the servo drive before connecting or disconnecting cables at the drive or at the motor.

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**ATTENTION:** To avoid the hazard of electrical shock, make sure shielded power cables are grounded at a minimum of one point. To prevent the build-up of electrical energy, factory-supplied power cables use one of these grounding techniques:

- The overall shield is bonded to the connector housing.
- A section of the overall shield is exposed for connection to ground.
- The overall shield is connected to a ground wire.

If the exposed cable braid or a ground wire is present, connect it to the power cable clamp, housing, or another suitable chassis ground on the drive.

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**ATTENTION:** The maximum length of cabling between the drive and the motor must not exceed 90 m (295.5 ft), and a maximum of two extension cables may be connected between a drive and a motor. Refer to the Kinetix Motion Control Selection Guide, publication [GMC-SG001](#), for additional information.

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**ATTENTION:** Do not tightly gather or coil the excess length of a power cable. Heat is generated within a cable whenever power is applied. Always position a power cable so it may freely dissipate any heat.

A power cable should not be coiled, except for temporary use when building or testing a machine. If you temporarily coil a power cable, you must also derate the cable to meet local code or follow a authoritative directive, such as Engineering Section 310.15(C) of the NEC Handbook.

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**ATTENTION:** The examples in this publication show all the available connections, some of which may not be appropriate for your specific installation. Refer to your drive installation or user manual for recommended wire trim lengths, and wiring examples appropriate to your drive and motor application.

Do not connect unused wires. Unused wires may be trimmed and finished as necessary to prevent accidental contact with other wires and wire shields, or with a ground connection.

## Catalog Number Descriptions

Catalog numbers and descriptions for the 2090-series circular-DIN connector kits, flange kits, and crimp tools are listed in the table below.

Cat. No.	Description	Plug, Extension, and Flange Type
2090-TCR47-M40	Hand crimp tool	
2090-TCR47-M23	8-point indenter crimp tool with digital display	
2090-KFBM4-CAAA	Threaded feedback plug	Type 623 plug (solder version)
2090-KFBM7-CAAA	SpeedTec feedback plug	Type 923 plug (9-pin, crimp version)
2090-KPBM4-12AA	Threaded power plug	
2090-KPBM7-12AA	SpeedTec power plug	Type 940 plug (8-pin, crimp version)
2090-KPBM4-06AA	Threaded power plug	
2090-KPBM7-06AA	SpeedTec power plug	Type 623 extension (solder version)
2090-KFBE7-CAAA	SpeedTec compatible feedback receptacle	
2090-KPBE7-12AA	SpeedTec compatible power receptacle	Type 923 extension (9-pin, crimp version)
2090-KPBE7-06AA	SpeedTec compatible power receptacle	Type 940 extension (8-pin, crimp version)
2090-KFB47-CF	Cable flange for (threaded and SpeedTec) feedback connector	Two-part flange (hinged, metal version, CF)
2090-KPB47-12CF	Cable flange for (threaded and SpeedTec) power connectors	Two-part flange (hinged, metal version, 12CF)
2090-KPB47-06CF	Cable flange for (threaded and SpeedTec) power connector	Two-part flange (hinged, metal version, 06CF)

## Hand Crimp Tool

The hand crimp tool is equipped with a double-ratchet mechanism. To open the tool, fully close the handles. The mechanism unlocks after the handles are fully closed. Included with the crimp tool is one 010 positioning insert.



Cat. No. 2090-TCR47-M40



**ATTENTION:** Understand the crimp tool and how it works. Use the crimp tool only for crimping the contacts included in the 2090-series kits. Misuse may cause personal injury.

## Verify the Crimp Tool Accuracy

Before performing any work, check the crimp tool using a .0850 GO/.0950 NO-GO test gauge.



**IMPORTANT** Do not crimp on the test gauge.

### ***Go-check***

1. Set the crimp tool to 4 and close the handles.
2. Insert the go-gauge (green) into the crimp indenters.

The go-gauge should pass through the opening and beyond the indenter tips.

### ***No-go-check***

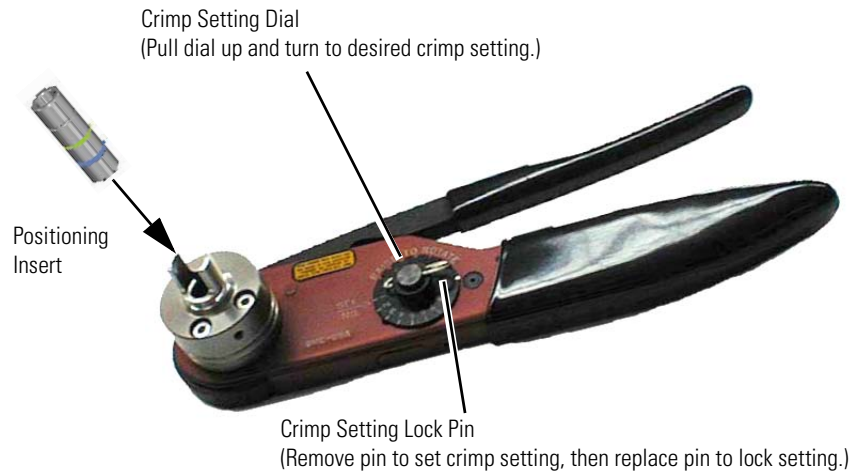
1. Leave the crimp tool on setting 4 and close the handles.
2. Insert no-go-gauge (red) into the crimp indenters.

The no-go-gauge may pass partially through the indenters, but not completely.

## Setting the Crimp Value

For crimp depth setting and positioning insert selection, see [Table 1 on page 7](#). The values in the table are for standard fine stranded copper wires. The values serve as reference only and must be verified with a pull test according to [BS EN 60352-2](#) (Solderless Connections. Crimped Connections. General Requirements, Test Methods and Practical Guidance), Table 4, using the actual wire.

1. Insert the positioning insert into the crimp tool.
2. Remove the crimp setting lock pin.
3. Lift the crimp setting dial and turn to the desired crimp setting.
4. Replace the crimp setting lock pin.



## Crimping a Contact

1. Insert the wire into the contact (actual contacts will vary).



2. Feed the contact and wire as far as possible through the indenters to the stop in the positioning insert.
3. Close the crimp tool handles all the way, and then release the handles to allow the crimp tool to open.

**Note:** If the crimp tool does not open, the handles were not closed far enough for the crimp to be successful. Continue to close the handles until the crimp tool is able to open.

4. Remove the wire and contact from the positioning insert.

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**IMPORTANT** Perform a pull test according to [BS EN 60352-2](#), Table 4, for the first crimp, and periodically throughout multiple crimpings.

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## Maintenance

Keep the indenter tips free from abrasion and soiling. Use an air gun to remove any dirt particles. Wipe down the crimp tool with a clean dry cloth.

**IMPORTANT** We strongly recommend the following:

- Do not use any rinsing solutions.
- Do not lubricate.
- Do not try to repair.
- Do not disassemble.

## Crimp Settings

**Table 1 - Settings Matrix for Hand Crimp Tool**

Contact Type <sup>(1)</sup>	Positioning Insert		Wire Size, mm <sup>2</sup> (AWG) <sup>(5)</sup>					
	Version <sup>(3)</sup>	Color Code <sup>(4)</sup>	1.5 (16)	2.5 (14)	4.0 (12)	6.0 (10)	10 (8)	16 (6)
60.042.11	010	Blue	2	3	4			
		Green				4	6	
60.043.11	010	Blue				4	6	
		Green				8		
60.225.11	010	Blue	2	3	4			
		Green				4	6	
60.227.11	010	Blue				4	6	
		Green				8		
61.039.11 61.074.11	010	Blue	2	3	4			
		Green				4	6	
61.040.11 61.075.11	010	Blue				4	6	
		Green				8		
Extraction Force (pull test) [N] <sup>(2)</sup>		Setpoint	150	230	310	360	380	–
		Actual Value	>250	>370	>600	>850	>1200	>1700

(1) The contacts are included in small bags in the connector and extension kits. Match the number on the bag of contacts to the number in the contact type column.

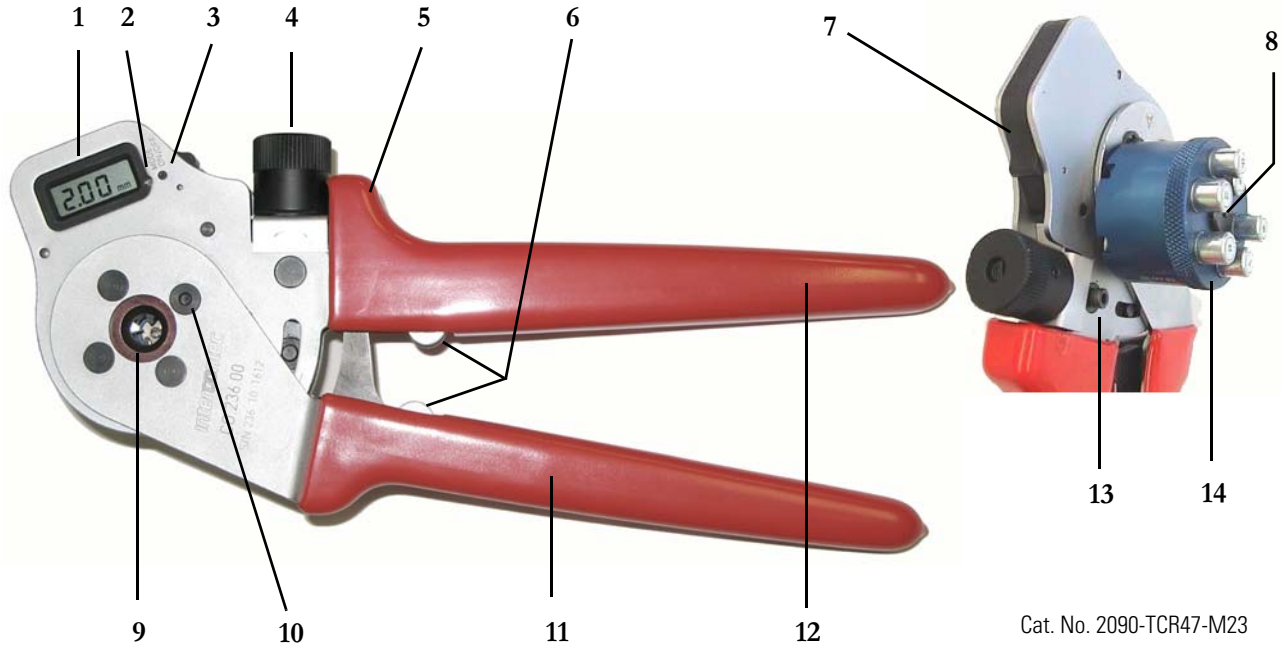
(2) The values serve as reference only and must be verified with a pull test according to BS EN 60352-2, Table 4, using the actual wire.

(3) The contact type determines which locator version to use. Match the contact type number to the locator version number.

(4) For positioning inserts with two color codes, match the color code to the wire size.

(5) Match the wire size and crimp value to an available contact type to determine the locator version. The crimp values are labeled on the crimp setting dial.

## 8-point Indent Crimp Tool with Digital Display



Cat. No. 2090-TCR47-M23

1	Digital display	8	Allen wrench fitting in center of revolving locator to assemble locator to crimp tool
2	Mode push button	9	Crimp indenter
3	On push button	10	Allen wrench fitting in rivet to disassemble revolving locator to crimp tool
4	Adjustment wheel (at 0.01 mm increments)	11	Movable handle
5	Emergency release	12	Fixed handle
6	Endstops	13	Adjustment wheel setscrew
7	Battery compartment	14	Revolving locator with six cartridges

The 8-point indent crimp tool is designed for crimping 2090-series signal and power contact wires with a cross section of 0.10...4.0 mm<sup>2</sup> (0.003...0.157 in.<sup>2</sup>). The revolving locator offers maximum flexibility and process safety.

Use the crimp tool only in accordance with these instructions and in strict compliance with acknowledged safety rules.



**ATTENTION:** Understand the crimp tool and how it works. Use the crimp tool only for crimping the contacts included in the 2090-series kits. Misuse may cause personal injury.



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## Parts Included with the 8-point Crimp Tool

These parts are included with the crimp tool:

- one crimp tool
- two locators (requires assembly onto the crimp tool)
- one 2 mm calibration gauge
- two Allen wrenches (used to assemble a locator onto the crimp tool)
- one lithium battery (installed)



This product contains a sealed lithium battery which may need to be replaced during the life of the product.

At the end of its life, the battery contained in this product should be collected separately from any unsorted municipal waste.

The collection and recycling of batteries helps protect the environment and contributes to the conservation of natural resources as valuable materials are recovered.

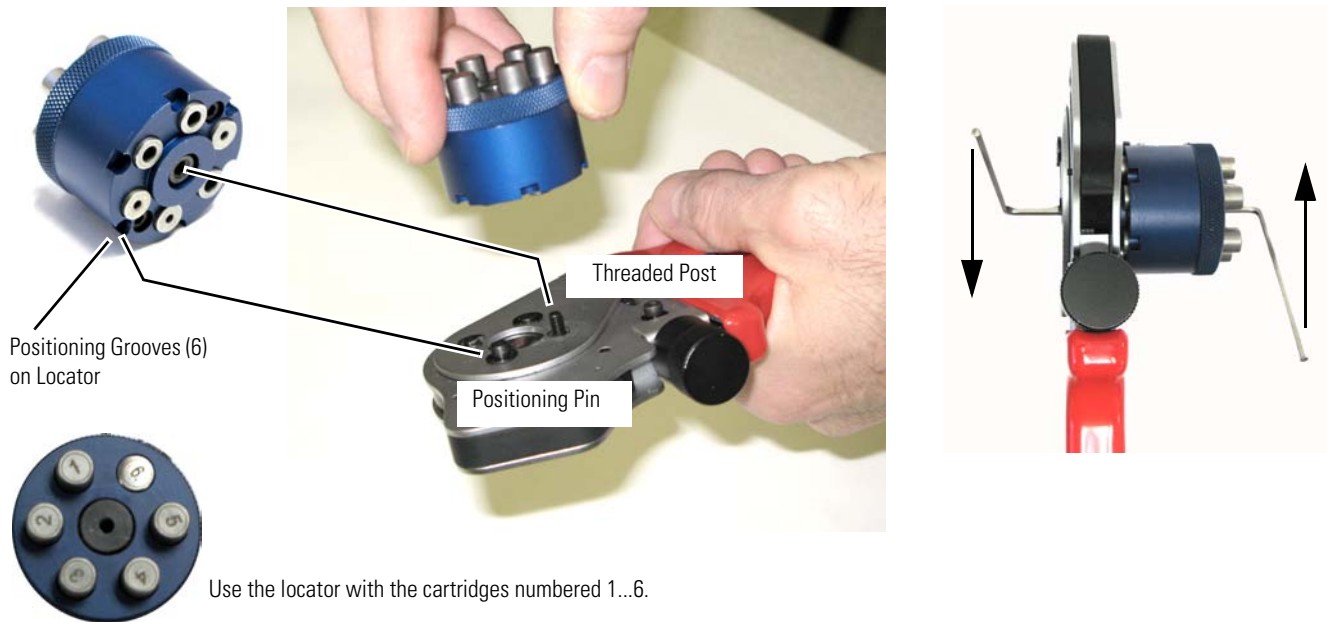
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## Initial Assembly and Calibration of the Crimp Tool

Before the first use of the crimp tool, you must install a locator and calibrate the crimp tool.

- To install the locator, see [Installing a Locator on page 10](#).
- To calibrate the crimp tool, see [Calibrating the Crimp Tool on page 11](#).

## Installing a Locator



**IMPORTANT** The 8-point indent crimp tool comes with two locators. Install the locator with the cartridges numbered 1...6. The connector kits do not use the locator with the cartridges numbered 7...12.

1. Screw the locator onto the threaded post and slowly turn the locator until it makes contact with the positioning pin on the crimp tool.
2. Align one of the positioning grooves on the locator with the positioning pin on the crimp tool.
3. Insert one Allen wrench into the Allen fitting in the rivet on front of the crimp tool, and hold in place.
4. Insert the other Allen wrench in the center of the locator and turn the Allen wrench clockwise to draw the locator down on the threaded post.

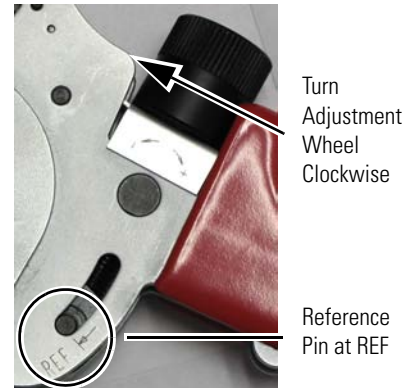
**Note:** The locator is properly installed when the Allen wrenches can no longer be tightened, but the locator can still rotate.

## Changing a Locator

1. Insert one Allen wrench into the Allen fitting in the rivet on front of the crimp tool, and hold in place.
2. Insert the other Allen wrench in the center of the locator and turn counterclockwise to lift the locator off the threaded post.
3. See [Installing a Locator on page 10](#) to install a different locator.

## Calibrating the Crimp Tool

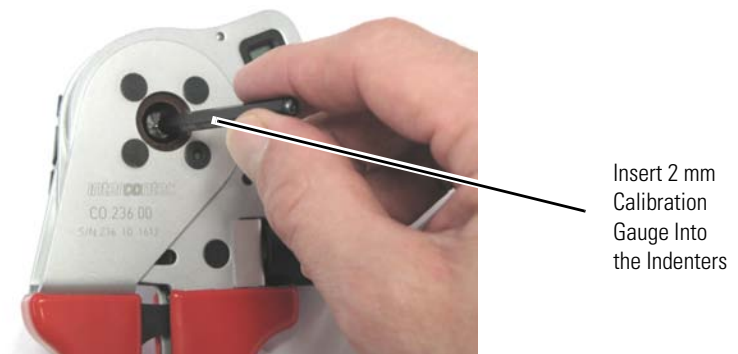
1. Pull the battery compartment open and remove the battery.
2. Turn the adjustment wheel all the way clockwise (towards the -) until the adjustment wheel stops turning and the reference pin is at REF.



3. Replace the battery and close the battery compartment until it snaps closed.



4. Close the handles of the crimp tool to the endstops and hold the handles in the closed position.
5. Turn the adjustment wheel counterclockwise (towards the +) to open the crimp indenters to the size of the 2 mm calibration gauge.
6. Place the 2 mm calibration gauge into the crimp indenters.



7. Slowly turn the adjustment wheel until the 2 mm calibration gauge is snug inside the crimp indenters.

**Note:** You should still be able to insert and remove the 2 mm calibration gauge from between the crimp indenters when the gauge is snug.

8. Remove the 2 mm calibration gauge, open the handles, and set the crimp tool on a flat surface, with the digital display facing up.
9. Press and hold down the On push button.
10. Use the 2 mm calibration gauge to press the Mode push button. Hold the Mode push button down for 5 seconds.

Press Down Mode  
Button with 2 mm  
Calibration Gauge

Press Down On/Off  
Button with Finger



11. Release the Mode push button.
12. Continue to hold down the On push button for 5 more seconds.
13. Release the On push button.

The digital display value resets to 2.00 mm.

The crimp tool is now calibrated and ready for use.

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**IMPORTANT** If code E1 displays in the digital display, the calibration was not successful. Repeat the procedure for calibrating the crimp tool until 2.00 mm shows on the digital display.

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## Operating the Crimp Tool

### **Switch On**

Press the On push button, or turn the adjustment wheel in any direction. The digital display appears in standard (mm).

### **Switch Off**

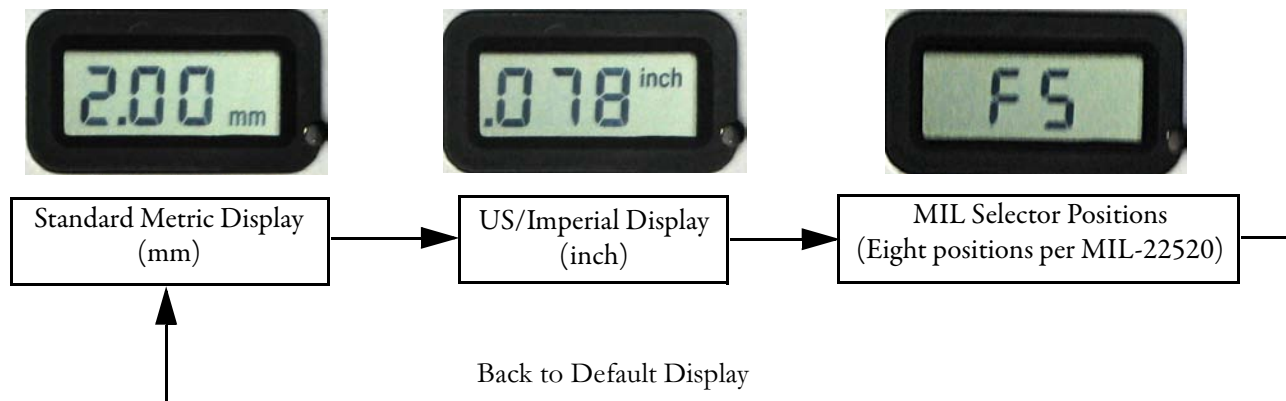
When the digital display is on, press the On push button to switch the digital display off.

### **Power Saving**

The digital display automatically switches off after one minute of non-operation.

## Changing the Mode Display

Display modes are listed in the flow chart below. Press the Mode push button with the 2 mm calibration gauge to advance to the next setting.



## Verify the Crimp Tool Accuracy



Before starting any work, perform the steps below to verify the accuracy of the crimp tool.

1. Turn the adjustment wheel to set the crimp value to 2.00 mm.

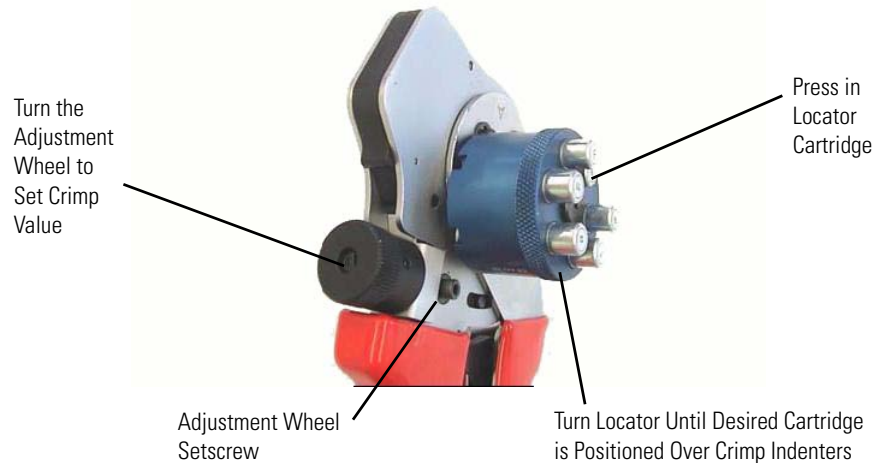
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**IMPORTANT** For accuracy when setting the crimp value, always turn the adjustment wheel from a larger number to the actual setting (for example, turn the adjustment wheel up to 2.10 mm and then turn the adjustment wheel down to 2.00 mm. Do not start at 1.90 mm and turn the adjustment wheel up to 2.00 mm).

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2. Close the crimp tool handles to the endstops and hold.
3. Insert the 2 mm calibration gauge between the crimp indenters.
  - If the calibration gauge can be inserted, and feels snug without play, the calibration is OK.
  - If the calibration gauge cannot be inserted, or can be inserted but feels loose and has play, the crimp tool must be calibrated. See [Calibrating the Crimp Tool on page 11](#).

## Setting the Crimp Value



See [Table 2 on page 20](#) and [21](#) for crimp depth setting and locator selection. The values in the table are for standard fine stranded copper wires. The values serve as reference only and must be verified with a pull test according to [BS EN 60352-2](#) (Solderless Connections. Crimped Connections. General Requirements, Test Methods and Practical Guidance), Table 4, using the actual wire.

1. Loosen the adjustment wheel setscrew.
2. Set the crimp value by turning the adjustment wheel until the digital display shows the required value.

**Note:** Turn the adjustment wheel clockwise to reduce the crimp value, and counterclockwise to increase the crimp value.

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**IMPORTANT** For accuracy when setting the crimp value, always turn the adjustment wheel from a larger number to the actual setting. For example, turn the adjustment wheel up to 2.10 mm and then turn the adjustment wheel down to 2.00 mm. Do not start at 1.90 mm and turn the adjustment wheel up to 2.00 mm.

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3. Use an Allen wrench to tighten the adjustment wheel setscrew to save the settings.
4. If necessary, pull up on the locator until the spring-loaded cartridge that is locked in place is released.
5. See [Table 2 on page 20](#) and [21](#) to determine the correct locator selection.
6. Turn the locator to align the desired locator cartridge with the crimp indenters, then press in the locator cartridge until it snaps into place.

## Crimping a Contact

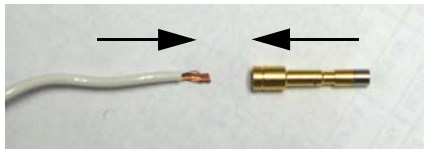


**ATTENTION:** Do not crimp or gauge objects not intended for the crimp tool.

Do not crimp solid material exceeding 35 Hot Rolled Coil (HRC) (for example, steel).

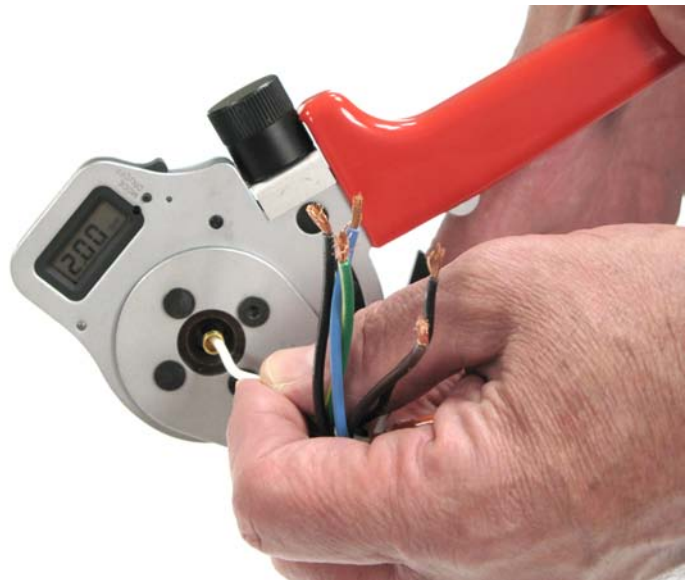
See [Table 2 on page 20](#) and [21](#) to determine the correct contact size in relation to the wire size being used.

1. Insert the wire into the contact (actual contacts will vary).



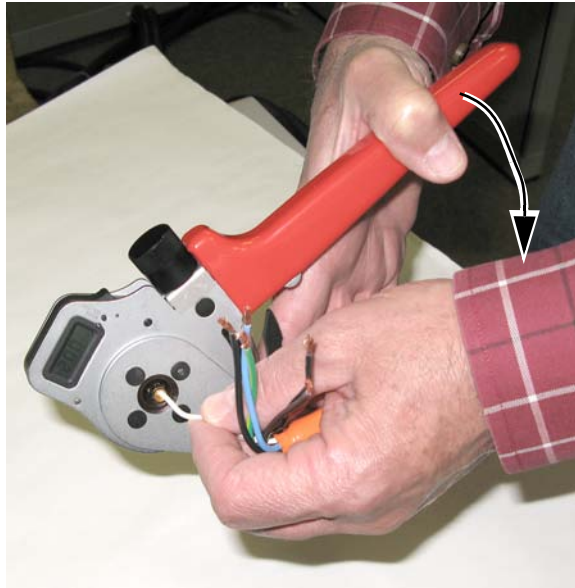
2. Feed the contact and wire as far as possible through the indenters to the stop in the locator cartridge.

The locator cartridge provides for the exact positioning of the contact.





3. Close the crimp tool handles until the end-stops touch, and then release the handles to allow the crimp tool to open.



**Note:** If the crimp tool does not open, the handles were not closed far enough for the crimp to be successful. Continue to close the handles until the end-stops touch and the crimp tool is able to open.

4. Remove the wire and contact from the locator cartridge.



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**IMPORTANT** Perform a pull test according to [BS EN 60352-2](#), Table 4, for the first crimp, and periodically throughout multiple crimpings.

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## Changing the Battery

The life of the lithium battery (CR2025) for the display is approximately 1 year, depending on the amount of use. When you change the battery, you must calibrate the crimp tool. Follow these steps to change the battery and calibrate the crimp tool.

1. Pull the battery compartment open and remove the battery.
2. Dispose of the battery properly.



This product contains a sealed lithium battery which may need to be replaced during the life of the product.

At the end of its life, the battery contained in this product should be collected separately from any unsorted municipal waste.

The collection and recycling of batteries helps protect the environment and contributes to the conservation of natural resources as valuable materials are recovered.

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3. Before you install the new battery, you must follow the steps for calibrating the crimp tool. Follow the instructions in [Calibrating the Crimp Tool on page 11](#) (starting at step 2).



**ATTENTION:** After changing the battery, you must calibrate the crimp tool.

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## Maintenance

Keep the indenter tips free from abrasion and soiling. Use an air gun to remove any dirt particles. Wipe down the crimp tool with a clean dry cloth. Ensure that all bolts are secured with retaining rings.

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**IMPORTANT** We strongly recommend the following:

- Do not use any rinsing solutions.
  - Do not lubricate.
  - Do not try to repair.
  - Do not disassemble.
-

## Troubleshooting

<b>Problem Condition</b>	<b>Cause</b>	<b>Fix</b>
The digital display shows E1.	Calibration failed.	Repeat the calibration procedure (see page <a href="#">11</a> ).
The digital display shows CAL.	The crimp tool needs to be calibrated.	Calibrate the crimp tool (see page <a href="#">11</a> ).
The digital display shows Fc.	The crimp tool Mode is set to the MIL position.	Turn the adjustment wheel until the display shows a valid MIL setting (F1...F7), or change the Mode to mm or inches (see page <a href="#">13</a> .)
The locator cannot be installed on the crimp tool.	One or more locator cartridges is locked in the down position, preventing the locator from fitting onto the threaded post.	Insert the Allen wrench into the Allen fitting in the locator and press the spring-loaded fitting until the locator cartridges are released.
The locator is not installed on the crimp tool, and one or more locator cartridges is locked in the down position.	When you press down on the locator cartridges, they lock in the down position.	
The crimp tool handles cannot be closed far enough to complete a crimp and allow the crimp tool to open.	An incorrect crimp setting for the wire size, locator cartridge, and/or contact type being crimped.	<ol style="list-style-type: none"> <li>1. Pull back the red vinyl cover on the fixed handle (near the adjustment wheel).</li> <li>2. Use a screwdriver to press the ratchet gear away from the catch until it unlocks.</li> </ol> <p>Verify the proper crimp setting for the wire size, locator cartridge, and contact type being crimped.</p>
	The material being crimped is too hard for the crimp tool.	<ol style="list-style-type: none"> <li>1. Pull back the red vinyl cover on the fixed handle (near the adjustment wheel).</li> <li>2. Use a screwdriver to press the ratchet gear away from the catch until it unlocks.</li> </ol> <p>Do not crimp materials or contacts that are not designated for use with the crimp tool.</p>

## Crimp Settings

**Table 2 - Settings Matrix for 8-point Indent Crimp Tool with Digital Display**

Contact Type <sup>(1)</sup>	Locator Cartridge <sup>(3)</sup>	Wire Size, mm <sup>2</sup> (AWG) <sup>(4)</sup>														
		0.1 (27)	0.14 (26)	0.2 (24)	0.24 (23)	0.35 (22)	0.5 (20)	0.75 (19)	0.82 (18)	1.0 (17)	1.3 (16)	1.5 (15)	2.1 (14)	2.5 (13)	3.3 (12)	4.0 (11)
60.001.11	6		F1/ 0.71	F2/ 0.81	F2/ 0.81	F3/ 0.91	F4/ 0.99	F4/ 0.99	F4/ 0.99	F5/ 1.14						
60.003.11	1					F5/ 1.14	F5/ 1.14	F6/ 1.32	F6/ 1.32	F6/ 1.32	F7/ 1.50	F7/ 1.50	F7/ 1.50	F8/ 1.72		
60.011.11	6		F1/ 0.71	F2/ 0.81	F2/ 0.81	F3/ 0.91	F4/ 0.99	F4/ 0.99	F4/ 0.99	F5/ 1.14						
60.023.11	1											F3/ 0.91	F4/ 0.99	F4/ 0.99	F5/ 1.14	
61.004.11	6		F1/ 0.71	F2/ 0.81	F2/ 0.81	F3/ 0.91	F4/ 0.99	F4/ 0.99	F4/ 0.99	F5/ 1.14						
61.009.11	5		F1/ 0.71	F2/ 0.81	F2/ 0.81	F3/ 0.91	F4/ 0.99	F4/ 0.99	F4/ 0.99	F5/ 1.14						
61.010.11	1					F5/ 1.14	F5/ 1.14	F6/ 1.32	F6/ 1.32	F6/ 1.32	F7/ 1.50	F7/ 1.50	F7/ 1.50	F8/ 1.72		
61.020.11	3		F1/ 0.71	F2/ 0.81	F2/ 0.81	F3/ 0.91	F4/ 0.99	F4/ 0.99	F4/ 0.99	F5/ 1.14						
61.021.11	2					F5/ 1.14	F5/ 1.14	F6/ 1.32	F6/ 1.32	F6/ 1.32	F7/ 1.50	F7/ 1.50	F7/ 1.50	F8/ 1.72		
61.022.11	1					F5/ 1.14	F5/ 1.14	F6/ 1.32	F6/ 1.32	F6/ 1.32	F7/ 1.50	F7/ 1.50	F7/ 1.50	F8/ 1.72		
61.023.11	1											F3/ 0.91	F4/ 0.99	F4/ 0.99	F5/ 1.14	
61.027.11	2											F3/ 0.91	F4/ 0.99	F4/ 0.99	F5/ 1.14	
Extraction <sup>(2)</sup> Force (pull test) [N]	Setpoint	12	18	28	32	45	60	85	90	108	135	150	200	230	275	310
	Actual Value	>20	>30	>40	>45	>65	>100	>140	>145	>190	>200	>260	>300	>390	>420	>600

(1) The contacts are included in small bags in the connector and extension kits. Match the number on the bag of contacts to the number in the contact type column.

(2) The values serve as reference only and must be verified with a pull test according to BS EN 60352-2, Table 4, using a particular wire.

(3) The contact type determines which locator cartridge to use. Match the contact type number to the locator cartridge number.

(4) Match the wire size and crimp value to an available contact type to determine the locator cartridge. The crimp values are shown in MIL/mm values.

**Table 2 - Settings Matrix for 8-point Indent Crimp Tool with Digital Display  
(continued)**

Contact Type <sup>(1)</sup>	Locator Cartridge <sup>(3)</sup>	Wire Size, mm <sup>2</sup> (AWG) <sup>(4)</sup>														
		0.1 (27)	0.14 (26)	0.2 (24)	0.24 (23)	0.35 (22)	0.5 (20)	0.75 (19)	0.82 (18)	1.0 (17)	1.3 (16)	1.5 (15)	2.1 (14)	2.5 (13)	3.3 (12)	4.0 (11)
61.055.11	1											F3/ 0.91	F4/ 0.99	F4/ 0.99	F5/ 1.14	
61.097.11	1	F2/ 0.81	F2/ 0.81	F3/ 0.91	F3/ 0.91	F4/ 0.99	F4/ 0.99									
61.098.11	4	F2/ 0.81	F2/ 0.81	F3/ 0.91	F3/ 0.91	F4/ 0.99	F4/ 0.99									
61.107.11	4					F5/ 1.14	F5/ 1.14	F6/ 1.32	F6/ 1.32	F6/ 1.32	F7/ 1.50	F7/ 1.50	F7/ 1.50	F8/ 1.72		
61.108.11	4					F5/ 1.14	F5/ 1.14	F6/ 1.32	F6/ 1.32	F6/ 1.32	F7/ 1.50	F7/ 1.50	F7/ 1.50	F8/ 1.72		
61.109.11	4	F2/ 0.81	F2/ 0.81	F3/ 0.91	F3/ 0.91	F4/ 0.99	F4/ 0.99									
61.193.11	1					F5/ 1.14	F5/ 1.14	F6/ 1.32	F6/ 1.32	F6/ 1.32	F7/ 1.50	F7/ 1.50	F7/ 1.50	F8/ 1.72		
61.194.11	1	F2/ 0.81	F2/ 0.81	F3/ 0.91	F3/ 0.91	F4/ 0.99	F4/ 0.99									
61.197.11	4					F5/ 1.14	F5/ 1.14	F6/ 1.32	F6/ 1.32	F6/ 1.32	F7/ 1.50	F7/ 1.50	F7/ 1.50	F8/ 1.72		
61.198.11	4	F2/ 0.81	F2/ 0.81	F3/ 0.91	F3/ 0.91	F4/ 0.99	F4/ 0.99									
61.204.11	4					F5/ 1.14	F5/ 1.14	F6/ 1.32	F6/ 1.32	F6/ 1.32	F7/ 1.50	F7/ 1.50	F7/ 1.50	F8/ 1.72		
61.205.11	4	F2/ 0.81	F2/ 0.81	F3/ 0.91	F3/ 0.91	F4/ 0.99	F4/ 0.99									
61.216.11	1											F3/ 0.91	F4/ 0.99	F4/ 0.99	F5/ 1.14	
Extraction <sup>(2)</sup> Force (pull test) [N]	Setpoint	12	18	28	32	45	60	85	90	108	135	150	200	230	275	310
	Actual Value	>20	>30	>40	>45	>65	>100	>140	>145	>190	>200	>260	>300	>390	>420	>600

(1) The contacts are included in small bags in the connector and extension kits. Match the number on the bag of contacts to the number in the contact type column.

(2) The values serve as reference only and must be verified with a pull test according to BS EN 60352-2, Table 4, using a particular wire.

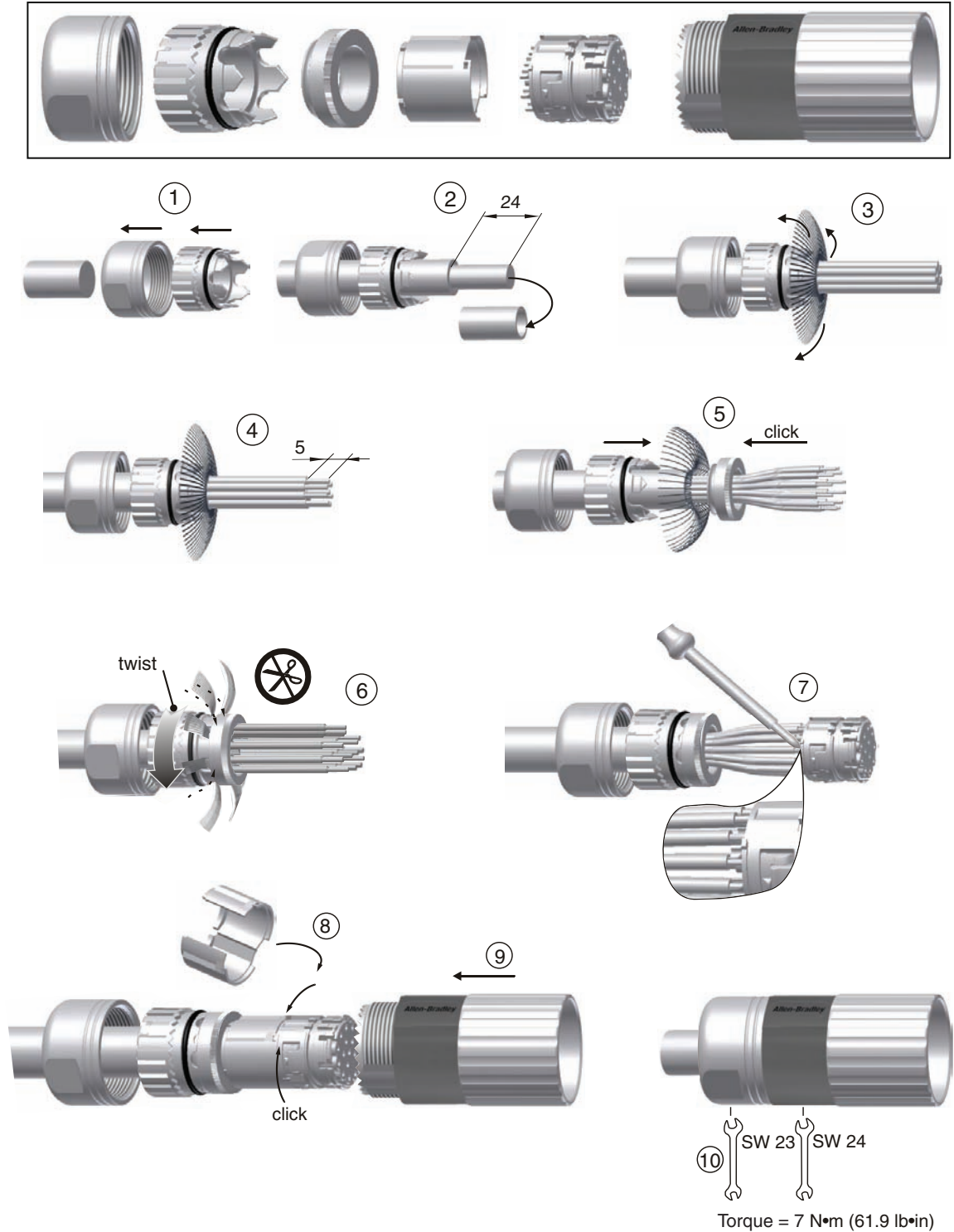
(3) The contact type determines which locator cartridge to use. Match the contact type number to the locator cartridge number.

(4) Match the wire size and crimp value to an available contact type to determine the locator cartridge. The crimp values are shown in MIL/mm values.

## Circular-DIN Connector Kits Type 623 Plug (solder version) (cable plugs)

**Note:** The M4 and M7 connectors look different, but they are assembled the same way. Figure 1 shows an M4 connector.

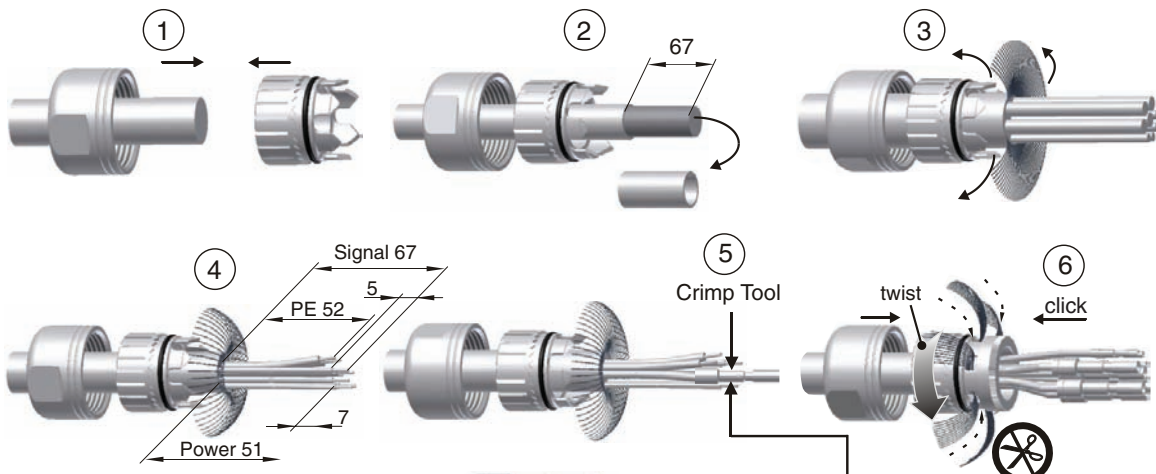
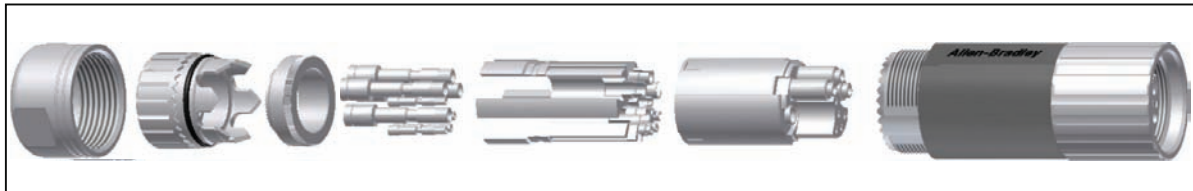
**Figure 1 - Kits 2090-KFBM4-CAAA and 2090-KFBM7-CAAA**



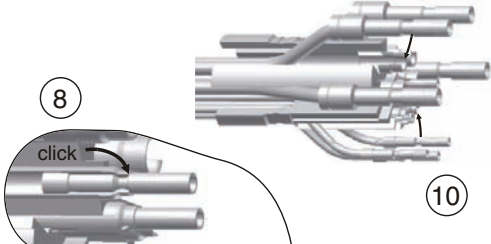
### Type 923 Plug (9-pin, crimp version)

**Note:** The M4 and M7 connectors look different, but they are assembled the same way. Figure 2 shows an M4 connector.

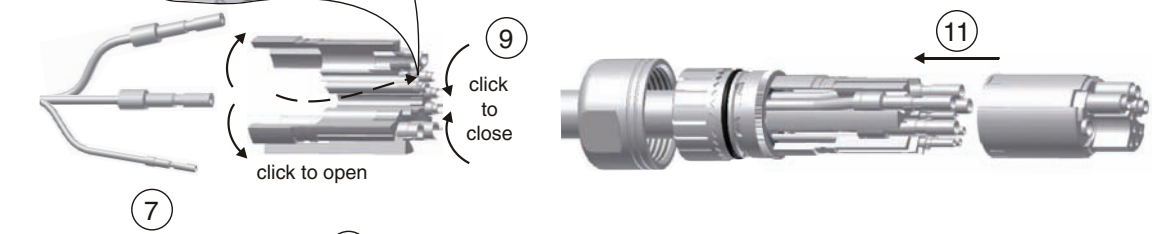
**Figure 2 - Kits 2090-KPBM4-12AA and 2090-KPBM7-12AA**



Position!



	Crimp Tool No.:	Positioner No.:
a(mm <sup>2</sup> )		
Power	0.35...2.5	Digital Crimp Tool
	2.5...4.0	
Signal	0.14...1.0	2090-TCR47-M23
		Tool Settings: see Table 2



Torque = 10...17 N•m (88.5...150.4 lb•in)

### Type 940 Plug (8-pin, crimp version)

**Note:** The M4 and M7 connectors look different, but they are assembled the same way. Figure 3 shows an M4 connector.

**Figure 3 - Kits 2090-KPBM4-06AA and 2090-KPBM7-06AA**

The diagram illustrates the assembly process in 14 numbered steps:

- Disassembly of the connector housing.
- Insertion of the braided shield (70) into the housing.
- Insertion of the crimp tool (5) into the housing.
- Insertion of the Power, PE, and Signal wires (8) into the crimp tool.
- Use of the Crimp Tool (5) to crimp the wires.
- Twisting the wires (7) and clicking the crimp tool (6).
- Opening the crimp tool (8) to check the crimp.
- Positioning the crimped wires (9) and clicking the crimp tool (10) to close it.
- Positioning the crimped wires (11) and clicking the crimp tool (12) to assemble.
- Assembling the crimped wires (13) into the housing.
- Final assembly of the plug (14) using SW 41 wrenches.

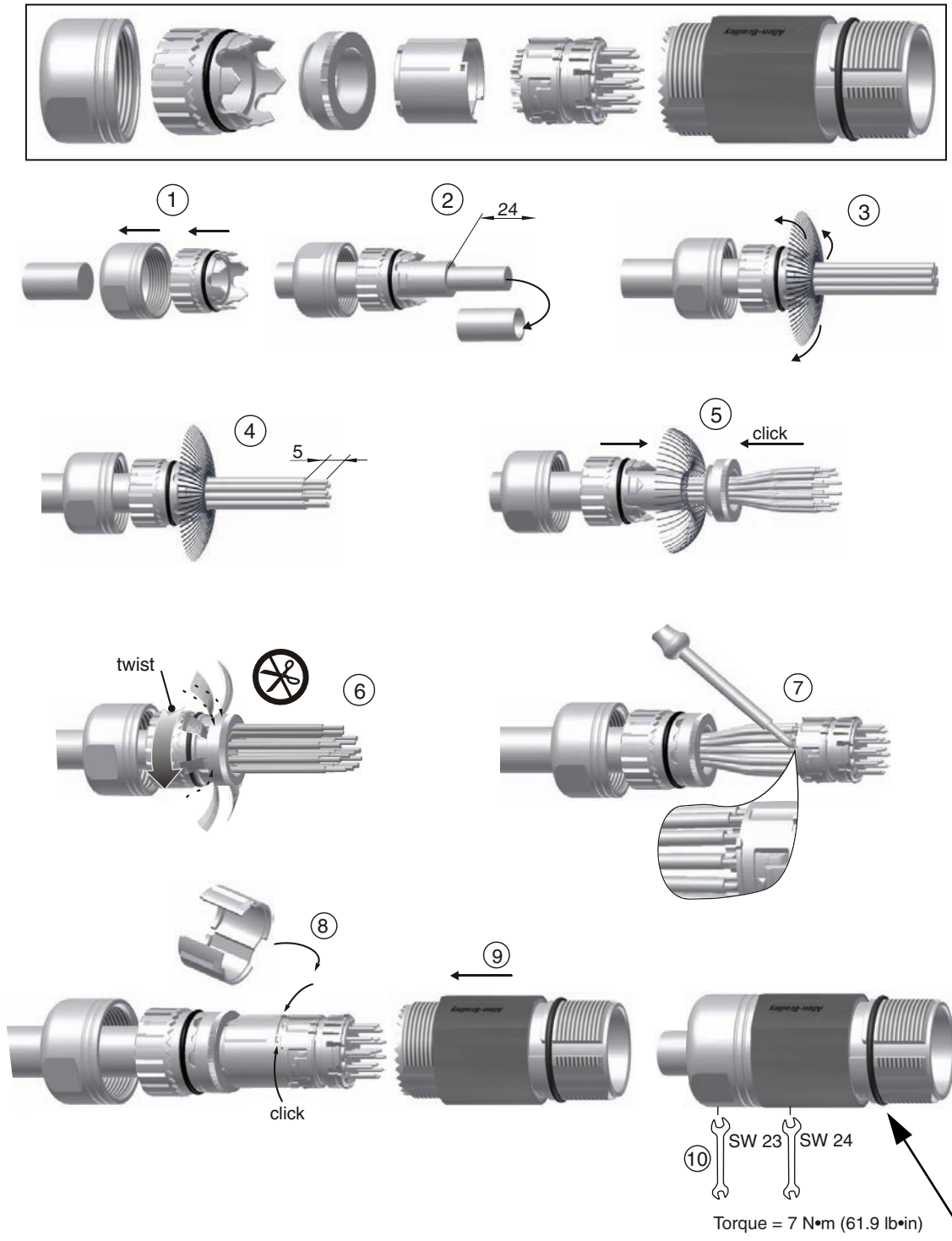
	a(mm²)	1(mm)	Crimp Tool No.:	Positioner No.:	Colour
Signal			Digital Crimp Tool 2090-TCR47-M23		Tool Settings: See Table 2
PE	Contact Type		Hand Crimp Tool 2090-TCR47-M40	010	blue green
	1.5...4.0	59			
	6...10	51 59			
Power	1.5...4.0	58	Hand Crimp Tool 2090-TCR47-M40	010	blue green
	6...10	50 58			

Torque = cable ø 9...16 mm (0.35...0.62 in.) 27 N•m (238.9 lb•in)  
 cable ø 16.5...25 mm (0.64...0.98 in.) 18 N•m (159.3 lb•in)



# Circular-DIN Connector Kits Type 623 Extension (solder version) (extension cable plugs)

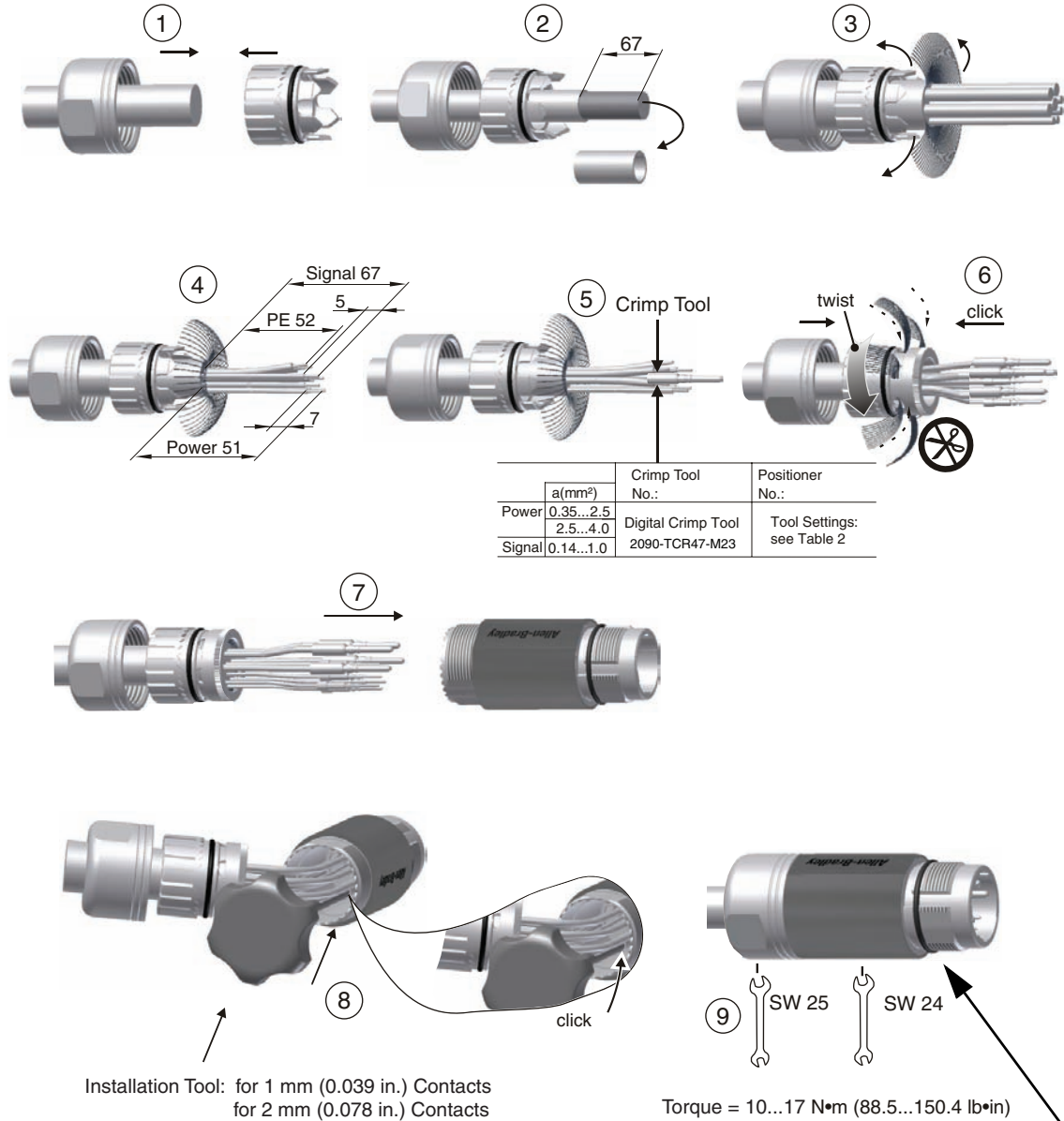
Figure 4 - Kit 2090-KFBE7-CAAA



**IMPORTANT** If installing a SpeedTec connector on this extension, remove the O-ring on the end of the extension.

## Type 923 Extension (9-pin, crimp version)

Figure 5 - Kit 2090-KPBE7-12AA

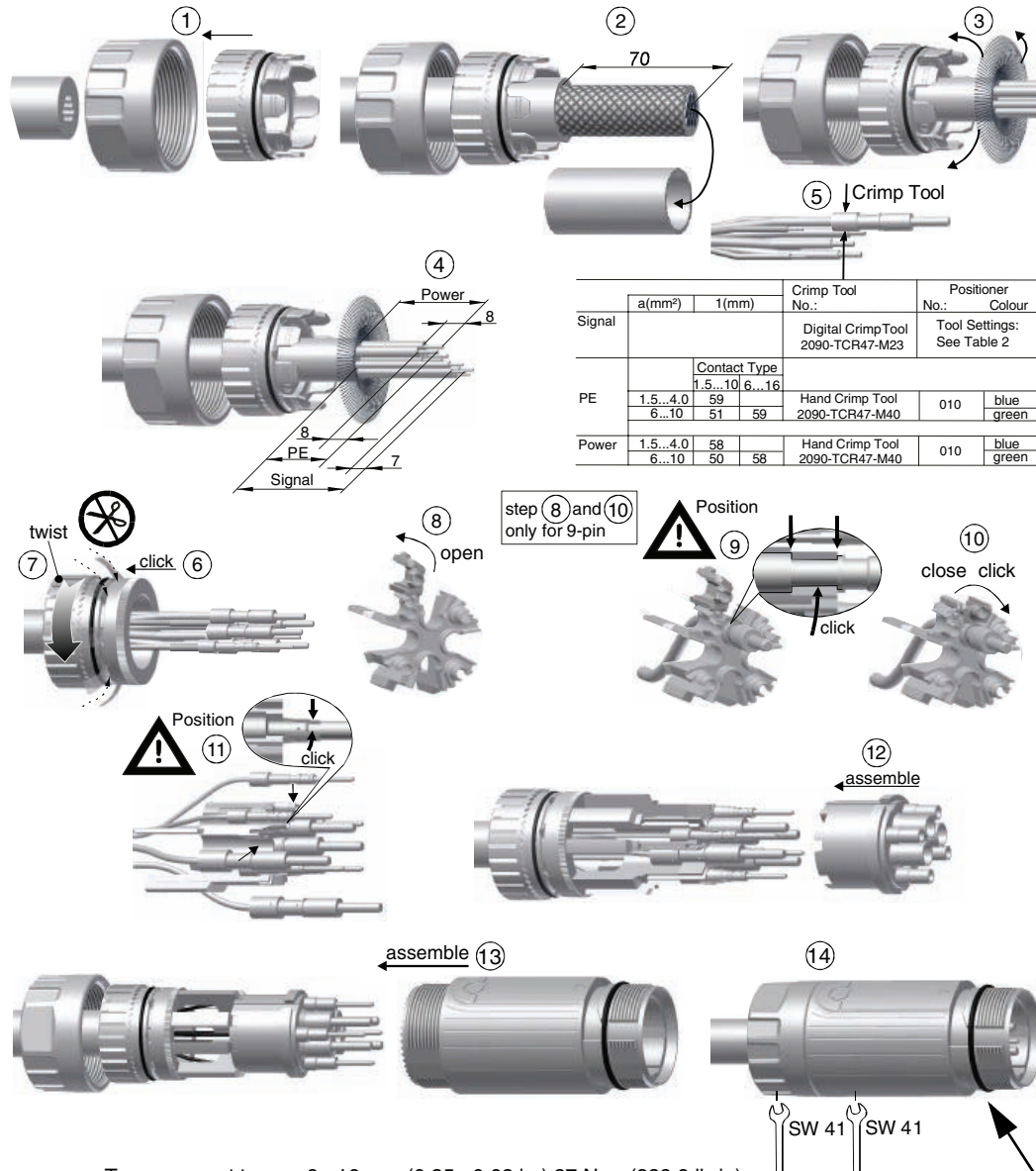
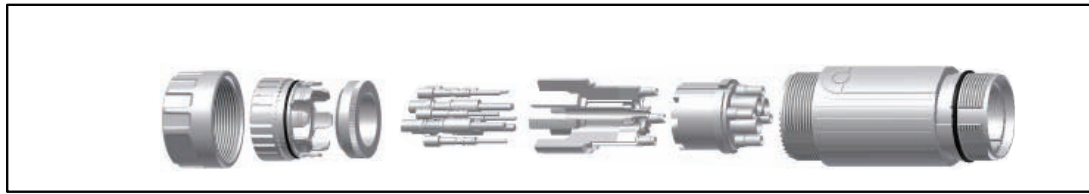


### IMPORTANT

If installing a SpeedTec connector on this extension, remove the O-ring on the end of the extension.

## Type 940 Extension (8-pin, crimp version)

Figure 6 - Kit 2090-KPBE7-06AA



Torque = cable Ø 9...16 mm (0.35...0.62 in.) 27 N•m (238.9 lb•in)  
 cable Ø 16.5...25 mm (0.64...0.98 in.) 18 N•m (159.3 lb•in)

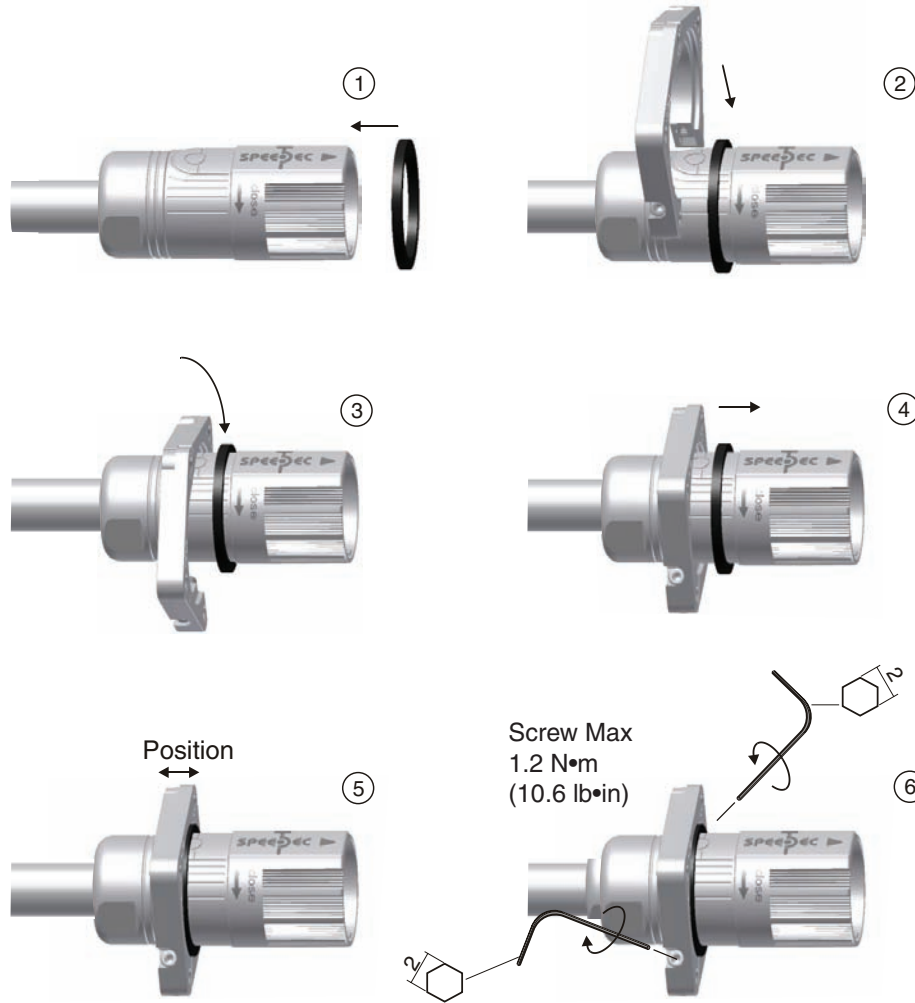
**IMPORTANT** If installing a SpeedTec connector on this extension, remove the O-ring on the end of the extension.

# Flange Kits

## Two-part Flange (hinged, metal version, CF)

**IMPORTANT** Flange and gasket are provided in this kit.  
Connector and cable are not included in this kit.

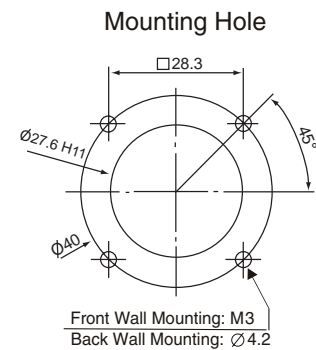
Figure 7 - Kit 2090-KFB47-CF



Option 1:  
Back Wall Mounting



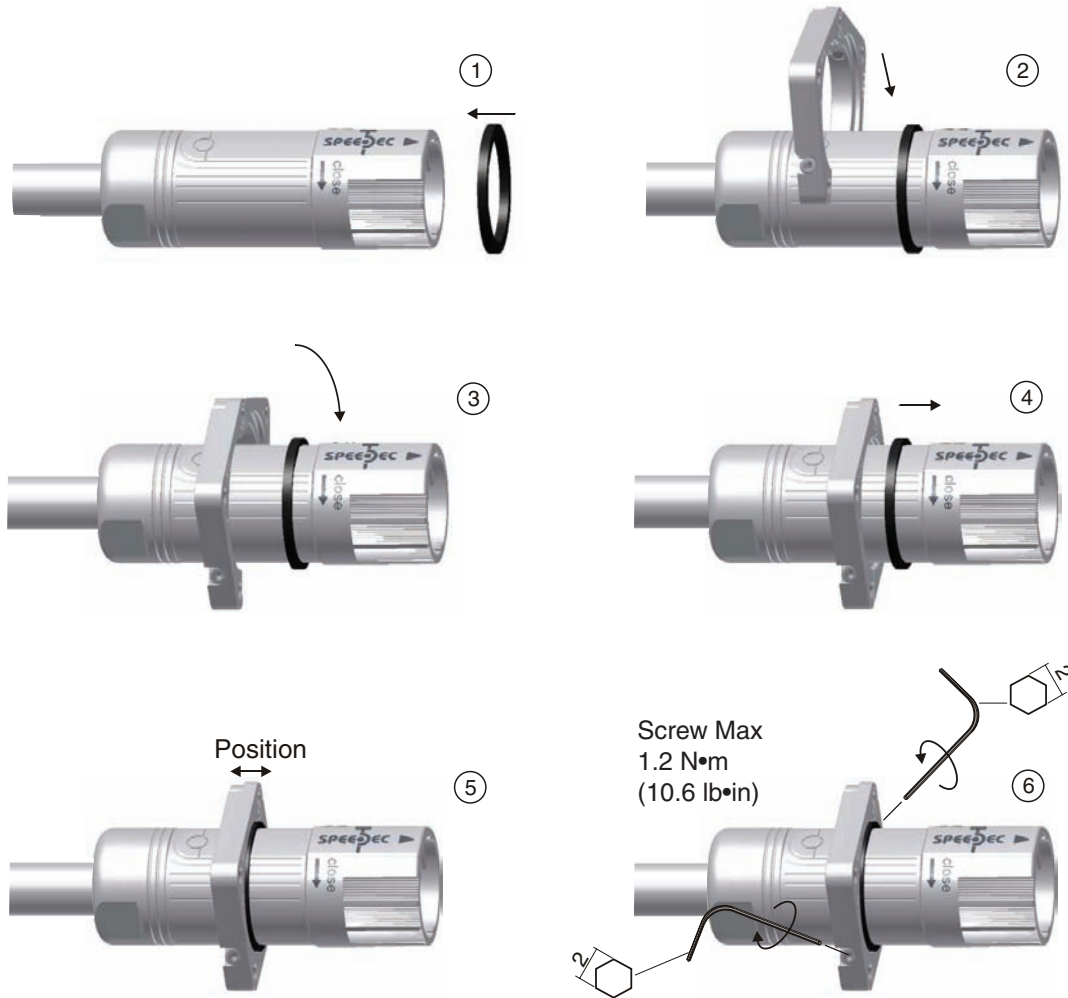
Option 2:  
Front Wall Mounting



## Two-part Flange (hinged, metal version, 12CF)

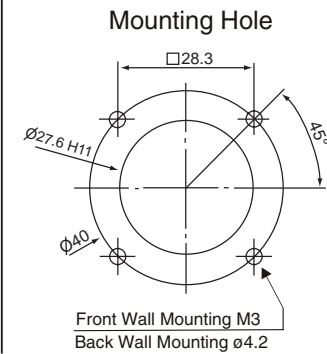
**IMPORTANT** Flange and gasket are provided in this kit.  
Connector and cable are not included in this kit.

Figure 8 - Kit 2090-KPB47-12CF



Option 1:  
Back Wall Mounting

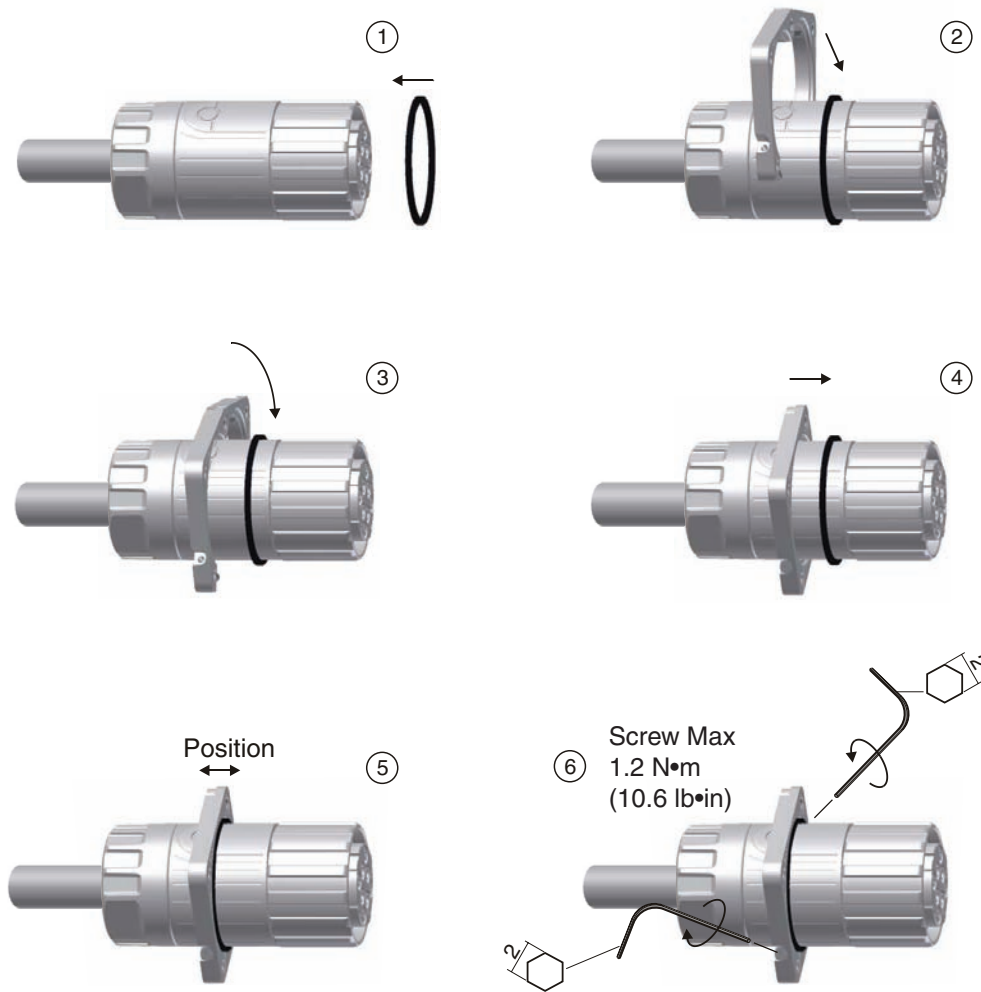
Option 2:  
Front Wall Mounting



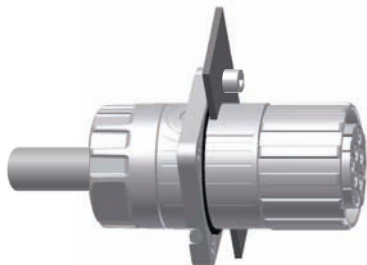
## Two-part Flange (hinged, metal version, 06CF)

**IMPORTANT** Flange and gasket are provided in this kit.  
Connector and cable are not included in this kit.

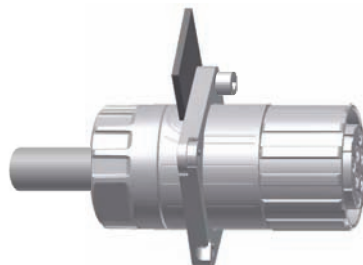
Figure 9 - Kit 2090-KPB47-06CF



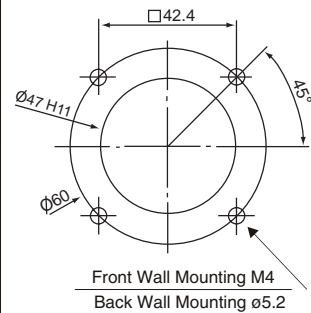
Option 1:  
Back Wall Mounting



Option 2:  
Front Wall Mounting



Mounting Hole





## Additional Resources

These documents contain additional information concerning related Rockwell Automation products.

Resource	Description
Kinetix Motion Control Selection Guide, publication <a href="#">GMC-SG001</a>	Specifications, motor/servo-drive system combinations, and accessory items for Kinetix Motion Control products
System Design for Control of Electrical Noise Reference Manual, publication <a href="#">GMC-RM001</a>	Information, examples, and techniques designed to minimize system failures caused by electrical noise
EMC Noise Management DVD, publication GMC-SP004	
Understanding the Machinery Directive, publication <a href="#">SHB-900-RM001</a>	A road map to CE marking and safety-related control product applications
Guidelines for Handling Lithium Batteries, publication <a href="#">AG-5.4</a>	Provides safety information on the handling of lithium batteries, including handling and disposing of leaking batteries
National Electrical Code, published by the National Fire Protection Association of Boston, MA	An article on wire sizes and types for grounding electrical equipment
Allen-Bradley Industrial Automation Glossary, publication <a href="#">AG-7.1</a>	A glossary of industrial automation terms and abbreviations

You can view or download publications at <http://www.rockwellautomation.com/literature>. To order paper copies of technical documentation, contact your local Rockwell Automation distributor or sales representative.

# Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At <http://www.rockwellautomation.com/support/>, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration, and troubleshooting, we offer TechConnect support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit <http://www.rockwellautomation.com/support/>.

## Installation Assistance

If you experience a problem within the first 24 hours of installation, review the information that is contained in this manual. You can contact Customer Support for initial help in getting your product up and running.

United States or Canada	1.440.646.3434
Outside United States or Canada	Use the <a href="#">Worldwide Locator</a> at <a href="http://www.rockwellautomation.com/support/americas/phone_en.html">http://www.rockwellautomation.com/support/americas/phone_en.html</a> , or contact your local Rockwell Automation representative.

## New Product Satisfaction Return

Rockwell Automation tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

United States	Contact your distributor. You must provide a Customer Support case number (call the phone number above to obtain one) to your distributor to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

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Publication 2090-IN042A-EN-P - May 2011