

Articulating Arm Extensions

Part Number	Length (inches)
204014	12
204122	18
204119	24
204120	30

Conversion Kits for Cleco Screwdriver Balance Arms

To Convert Balance Arms		Part No.
From	To	
SBA-12	PBA-12*	521041
SBA-18	PBA-18*	521042
Spring	Cylinder	201606
SBA or PBA Standard Duty	SBA or PBA Heavy Duty**	521060

*Conversion kits for -24 and -30 models are available upon request.
 **Has four springs to support heavier tools or longer arms.

Tool Holders

Part Number	Description
301128	17/47 Pistol-Horiz. Tool Holder
301129	17/47 Pistol- Vert. Tool Holder
301130	17/47 Inline-Horiz. Tool Holder
301131	17/47 Inline-Vert. Tool Holder



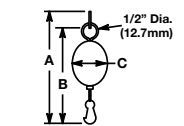
Ergonomic Tool Balancers

Capacity:
 0.5 – 20.5 kg
 1.0 – 45 Lbs

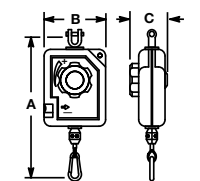
- External tension Adjustment
- 360° Swivel
- Retracting In-Line Cable



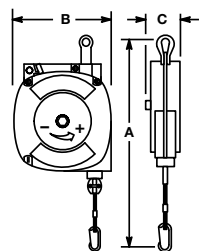
Model No.	Lock Feature	Capacity		"A"		"B"		"C"		Weight	
		lbs.	kg	in.	mm	in.	mm	in.	mm	lbs.	kg
Light Duty – 4.6 ft. (1.4m) Cable Travel											
PL-12A	-	12.0-1.0	5.5-0.5	6.8	171	5.1	130	2.3	58	-	-
Light Duty – 5.0 ft. (1.5m) Cable Travel											
200427	-	2.0-0	.9-0	10.9	277	4.4	112	1.6	41	1.3	0.6
200428	-	4.0-2.0	1.8-0.9	10.9	277	4.4	112	1.6	41	1.3	0.6
200429	-	5.0-3.0	2.3-1.4	10.9	277	4.4	112	1.6	41	1.3	0.6
Light Duty – 5.2 ft. (1.6m) Cable Travel											
BL-2A	-	2.0-1.0	0.9-0.5	10.4	263	4.0	102	2.2	56	1.1	0.5
BL-4A	-	4.0-2.0	1.8-0.9	10.4	263	4.0	102	2.2	56	1.1	0.5
Light Duty – 6.7 ft. (2.0m) Cable Travel											
BL-6A	-	6.0-4.0	2.7-1.8	12.9	327	5.5	140	3.1	79	3.3	1.5
BLL-6A	Ratchet	6.0-4.0	2.7-1.8	12.9	327	5.5	140	3.1	79	3.3	1.5
BL-8A	-	8.0-6.0	3.6-2.7	12.9	327	5.5	140	3.1	79	3.3	1.5
BLL-8A	Ratchet	8.0-6.0	3.6-2.7	12.9	327	5.5	140	3.1	79	3.3	1.5
Medium Duty – 6.6ft. (2.0m) Cable Travel											
BM-13A	Automatic	13-9.0	5.9-4.1	13.8	350	6.9	175	4.5	114	9.0	4.1
BML-13A	Automatic/Ratchet	13-9.0	5.9-4.1	13.8	350	6.9	175	4.5	114	9.0	4.1
BM-18A	Automatic	18-13	8.2-5.9	13.8	350	6.9	175	4.5	114	9.0	4.1
Medium Duty – 6.0ft. (1.8m) Cable Travel											
BM-25A	Automatic	25-18	11.4-8.2	20.7	527	7.8	197	6.6	169	19	8.6
BM-35A	Automatic	35-25	15.9-11.4	20.7	527	7.8	197	6.6	169	19	8.6
BM-45A	Automatic	45-35	20.5-15.9	20.7	527	7.8	197	6.6	169	19	8.6



Light Duty (PL Series)



Light Duty (BL Series)



Medium & Heavy Duty

*4.9 ft. cable travel



TM-COM Network Software

Cooper Tools' proprietary TM-COM software delivers ultimate control to the user, empowering them to control the production process remotely through programming that is easy to use and intuitive. Anything that can be programmed locally on the controller can also be done from a remote location using the exact same screens.

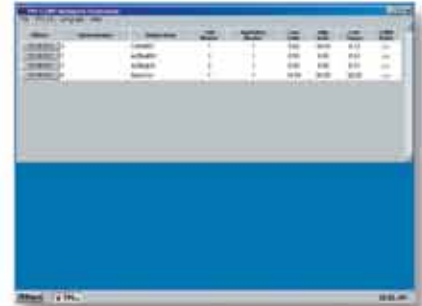
Using TM-COM software to monitor, modify, and/or manage the production line will increase your efficiency and productivity. Centralized management of the tightening process assures quality products.

TM-COM can communicate using either a RS232 serial connection or through an Ethernet TCP/IP connection.



TM-COM Software

Part Number	Description
TM-COM-V2.05	TM-COM network software, USB key



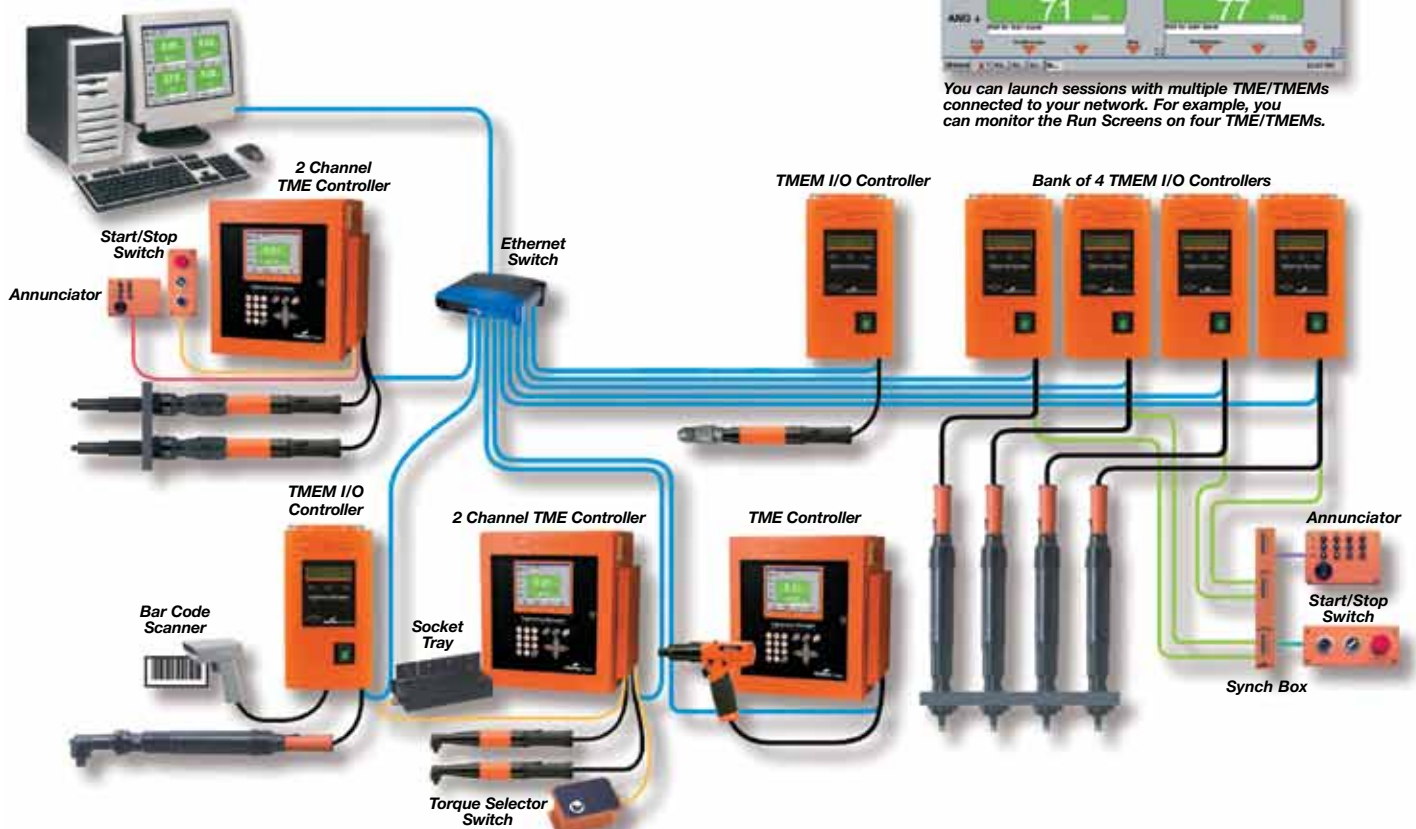
Network Overview Screen lists all Tightening Managers connected to the network.



From the Navigator Screen, you can access all the programming screens available on the TME or TMEM.



You can launch sessions with multiple TME/TMEMs connected to your network. For example, you can monitor the Run Screens on four TME/TMEMs.



Cleco®

TM-COM1 Setup Software

Cooper Tools' TM-COM1 software works just like TM-COM except it will communicate with only one controller at a time.

TM-COM1 can communicate using either a RS232 serial connection or through an Ethernet TCP/IP connection.



When TM-COM1 is first launched, a pop-up menu will be displayed. From this menu, the user will choose the communication method to the TME or TMEM - either RS232 serial or Ethernet.



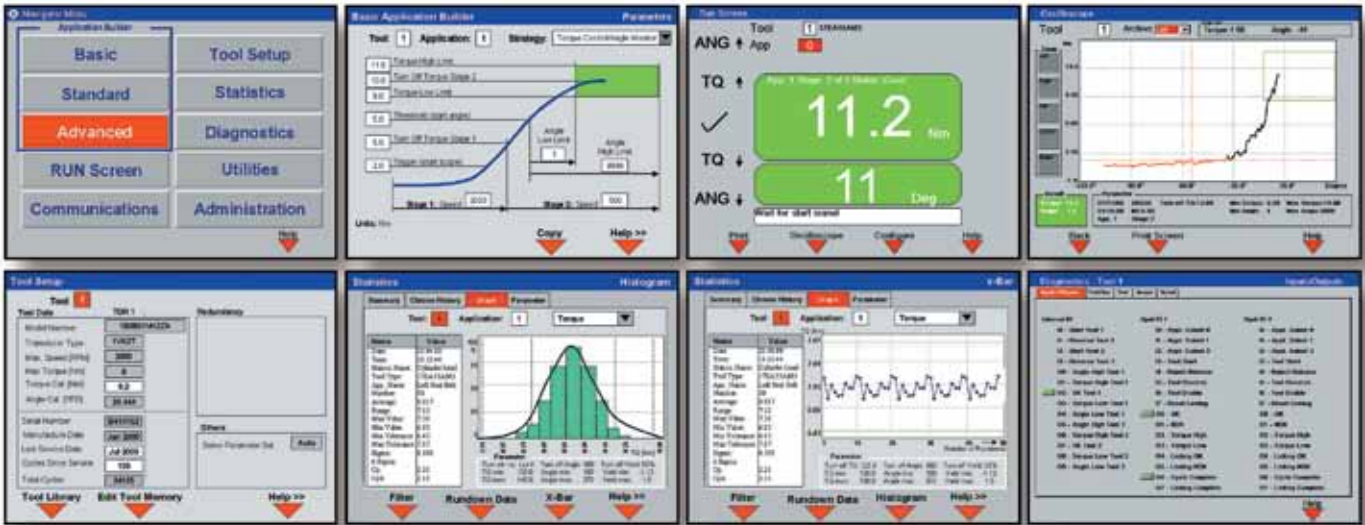
Once the communication method is chosen, another pop-up screen will appear for the user to set up the chosen method. When the user clicks "OK", the familiar Navigator screen appears. From the Navigator screen, the user can access all the programming screens to completely set up the TME or TMEM for normal operation.

TM-COM1 Software

Part Number	Description
TM-COM1-V2.05	TM-COM1 setup software, USB key



All screens available on TME and TM-COM are also available in TM-COM1.



TM-COM1 connected to standard TMEM via RS232 serial.

TM-COM1 connected to TMEM I/O via RS232 serial.

TM-COM1 connected to TME via Ethernet crossover cable.

TM-COM1 connected to TME 2-channel via Ethernet crossover cable.



TM-COM1M “Mini” Software

Cooper Tools’ TM-COM1M is a simplified version of TM-COM1. This software is included free with every Cleco Tightening Manager controller.

The limited screen offering of TM-COM1M still allows the user to program critical fastening strategies, program multi-stage rundowns, and change speeds.

The hardware connection methods are the same as TM-COM1. Communication is either RS232 serial connection or through an Ethernet TCP/IP connection.



TM-COM1M ships FREE with every Cleco Tightening Manager controller!



A limited number of screens are available in TM-COM1M.



TM-COM1M connected to standard TMEM via RS232 serial.

TM-COM1M connected to TMEM I/O via RS232 serial.

TM-COM1M connected to TME via Ethernet crossover cable.

TM-COM1M connected to TME 2-channel via Ethernet crossover cable.

Software

Part Number	Description
TM-COM-V2.05	Network software, 10 installs (Serial cable included)
TM-COM1-V2.05	Setup software, 10 installs (Serial cable included)
543448	Notebook computer loaded with TM-COM (Carrying case included)
543449	Desktop computer loaded with TM-COM (Monitor, keyboard and mouse included)
543488	Notebook computer loaded with TM-COM1 (Carrying case included)

TM-COM Minimum System Requirements

Operating System: Windows 2000, NT or XP
Processor: Pentium
Memory: 256MB
Free Disk Space: 10MB per controller
Other: MS Office 2000

TM-COM1 & TM-COM1M Minimum System Requirements

Operating System: Windows 2000, NT or XP
Processor: Pentium
Memory: 256MB
Other: MS Office 2000
If connected to: TMEM Standard – RS232 serial connection
 TMEM I/O – RS232 serial or Ethernet connection
 TME – RS232 serial or Ethernet connection

115VAC Ethernet Switches

Part No.	Ports			Approx. Dimensions		Weight	
	Total	In	Out	Inches	mm	lbs.	kg
543444-8	8	1	7	6.5x4.5x1.5	160x110x35	0.6	0.3
543444-16	16	1	15	7x6x2.5	185x150x65	1.1	0.5
543444-24	24	1	23	10.5x7x2	270x170x50	3.0	1.3

Direct Connect Cables

Connects TME or TMEM direct to PC

Part No.	Description	Length	
		ft.	m
543446-7	Ethernet crossover cable	7	2
543490-10	Serial cable null modem	10	3

Patch Cables

Connects Ethernet Switches to TME or PC

Part Number	Length	
	Feet	Meters
543445-7	7	2
54 3445-50	50	15
543445-100	100	30

Programming Languages*

All TME, TMEI, and TMEM controllers offer programming in the languages listed below.

All programming software, as well as the user interface on a TME, allows programming in the languages listed below.

- English
- German
- Italian
- Spanish
- Czechoslovakian
- Portuguese
- French
- Polish
- Nederland
- Chinese**

* The languages listed as part of the controller model number refers only to the language of the programming manual shipped with each unit.

** Requires special software to be loaded to the controller.

Software Functionality

	TM-COM	TM-COM1	TM-COM1M
Overview Screen	*		
Network Software	*	*	*
Single point serial connection	•	•	•
Single point Ethernet connection	•	•	•
Navigator	•	•	•
Basic Application Builder	•	•	•
Torque Control/Angle Monitor	•	•	•
Angle Control/Torque Monitor	•	•	•
Standard Application Builder (Seq 11,30,50,41)	•	•	•
High Speed Rundown	•	•	•
Torque Control/Angle Monitor	•	•	•
Angle Control/Torque Monitor	•	•	•
Angle Controlled Backoff	•	•	•
TubeNut	•	•	•
Advanced Application Builder	•	•	•
Setup Matrix	•	•	•
+24V Inputs/Outputs	•	•	•
I/O Mapping	•	•	•
FieldBus	•	•	•
DeviceNet	•	•	•
Profibus	•	•	•
Linking	•	•	•
System Settings	•	•	•
Run Screen	•	•	•
Oscilloscope graphs	•	•	•
Communications	•	•	•
Data Transmission	•	•	•
Part ID (Barcode)	•	•	•
Printer	•	•	•
Tool Setup	•	•	•
Read Tool Memory	•	•	•
Tool Library	•	•	•
Statistics	•	•	•
Chrono History	•	•	•
X-bar, Range, Histogram charts	•	•	•
Export Data	•	•	•
Data Filter	•	•	•
Diagnostics	•	•	•
(I/O, Fieldbus, Arcnet, Tool)	•	•	•
Inputs/Outputs	•	•	•
FieldBus	•	•	•
Tool	•	•	•
Arcnet	•	•	•
Serial	•	•	•
Utilities	•	•	•
Software Upgrade	•	•	•
Administration	•	•	•
Load/Save system setup	•	•	•
Print reports + system setup	•	•	•
Password	•	•	•
Time/Date	•	•	•
Language Selection	•	•	•
Counter	•	•	•

Your Single Source For Custom Automated Systems

Automated Systems provides custom solutions for the automated fastening of threaded joints.

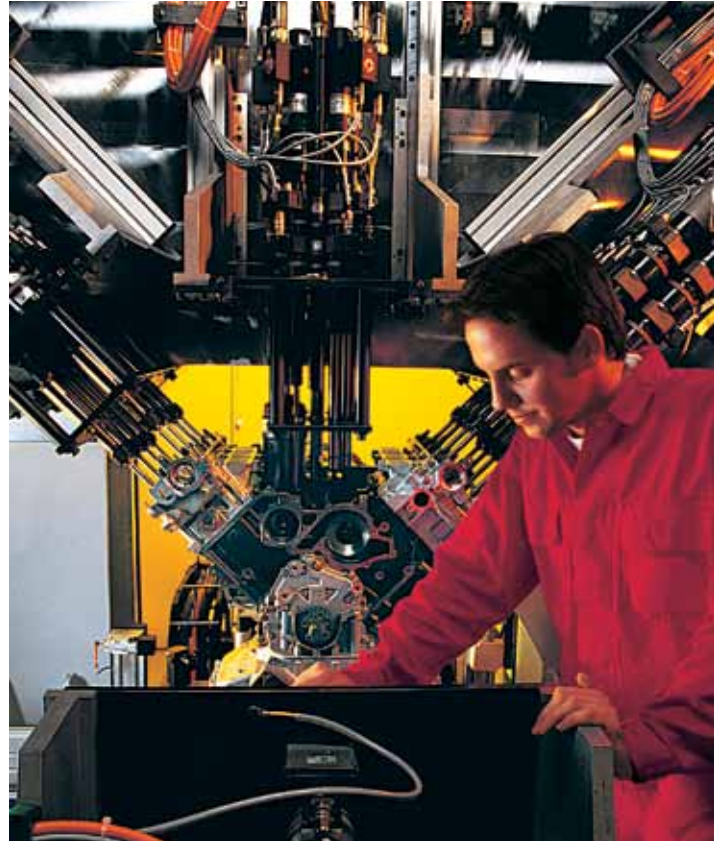
Our global customers span the entire vehicle assembly market, including passenger cars and trucks, power train assembly, off-road vehicles, and agricultural machines. We support machine tool builders in the vehicle and industrial markets with custom fastening system designs based on proven fastening product building modules.

Over many decades, Automated Systems has been providing custom solutions for training, service, and support. From single handheld nutrunners to multiple spindle machines, our custom designed systems are used around the world in an interesting variety of applications.

We have a full support staff of Sales Engineers, Mechanical Engineers, Controls Engineers, Project Managers, Field Service Engineers and In house Service Engineers waiting to serve you.

Custom Automated Solutions

The custom designed equipment Automated Systems creates can be configured in either vertical or horizontal orientations depending on the application and customer requirements



An automatic station on an engine assembly line uses two opposing electric power heads, each having 8 spindles, and a center power head of 6 spindles.



Shown above is a manually operated system with a four (4) spindle powerhead that has the capability to manually orientate the spindles radially.

Shown below is a semi-automated water-pump subassembly fastening station. This station design includes a safety light curtain and a 4 spindle fixtured electric tool.

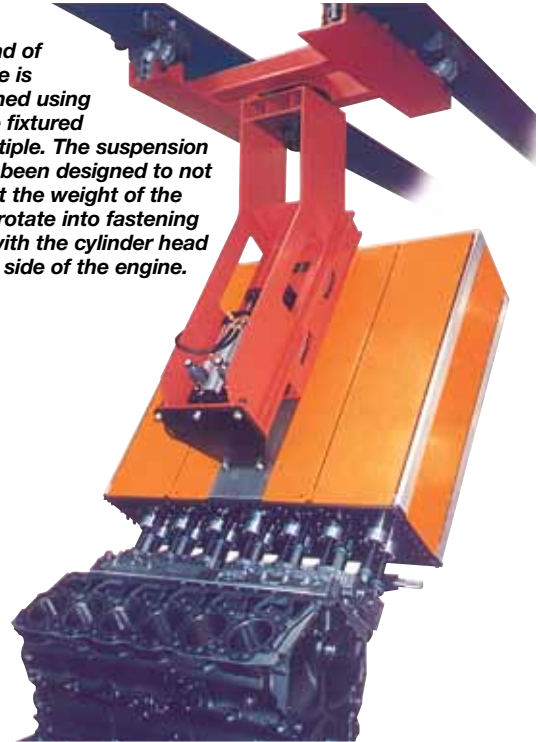


utilizing standard components. Designs may incorporate operator input or be fully automated dependent on the needs of the customer.

Automated Systems' products use high-efficiency electric motors manufactured by Cooper Tools specifically for this application. Available motor torques range from 2 Nm to 4,000 Nm. Motor spindles can be mounted and arranged to match any pattern using standard in-line, special offset, and 90° angle electric motors.

In order to apply our powerhead designs, we also design custom suspension systems along with cable management systems to provide support and movement. In addition to custom built stations fitted with fixtured nutrunner powerheads, Automated System designs, builds, installs and provides service and support from the complete fastening lines.

The left cylinder head of a V12 engine is being fastened using a 26 spindle fixtured electric multiple. The suspension system has been designed to not only support the weight of the tool, but to rotate into fastening alignment with the cylinder head on the right side of the engine.

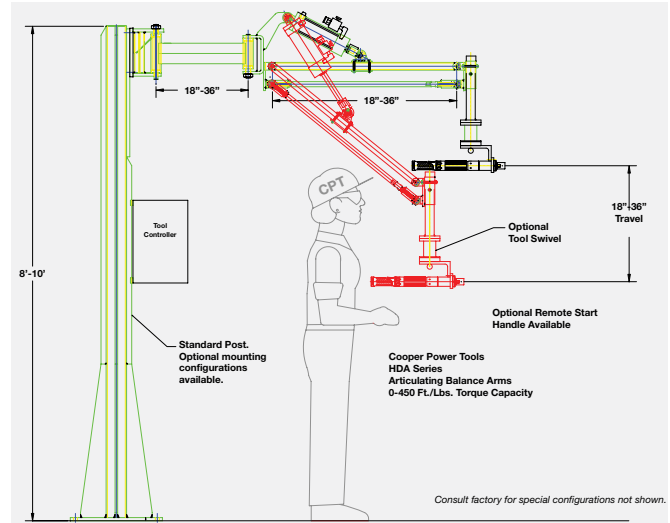


The above manually operated railroad wheel bearing multiple has the capability to tighten three (3) fasteners equally spaced on various centers between 3.50" to 5.85" diameters up to 600 NM torque.

Articulating Support Arms

The basic underlying reason for the use of an articulating arm is to improve productivity through applied ergonomics. A manufacturer cannot ignore the pressure to improve productivity of employees because of the impact productivity has on the bottom line.

Automated Systems offers an articulating arm that can be designed for your suspension application. Articulating arms are also called tool balance arms. Automated Systems' HDA series articulating arms are sized and designed to accommodate different size tools and mounting brackets required for specific applications. The arm can be suspended from an overhead rail,



structural column, ceiling mounted or post. The tool is typically mounted on the end of the arm.

Uses for Articulating Arms

- Stop or AGV stations
- Slow moving conveyor arms
- Work cells
- Side or overhead tool position work

Typical Articulating Arm Features

- Single or parallel arms
- Arm leveling base
- Boom
- Air balancing cylinder
- Mounting end
- Lift arm

Optional Features

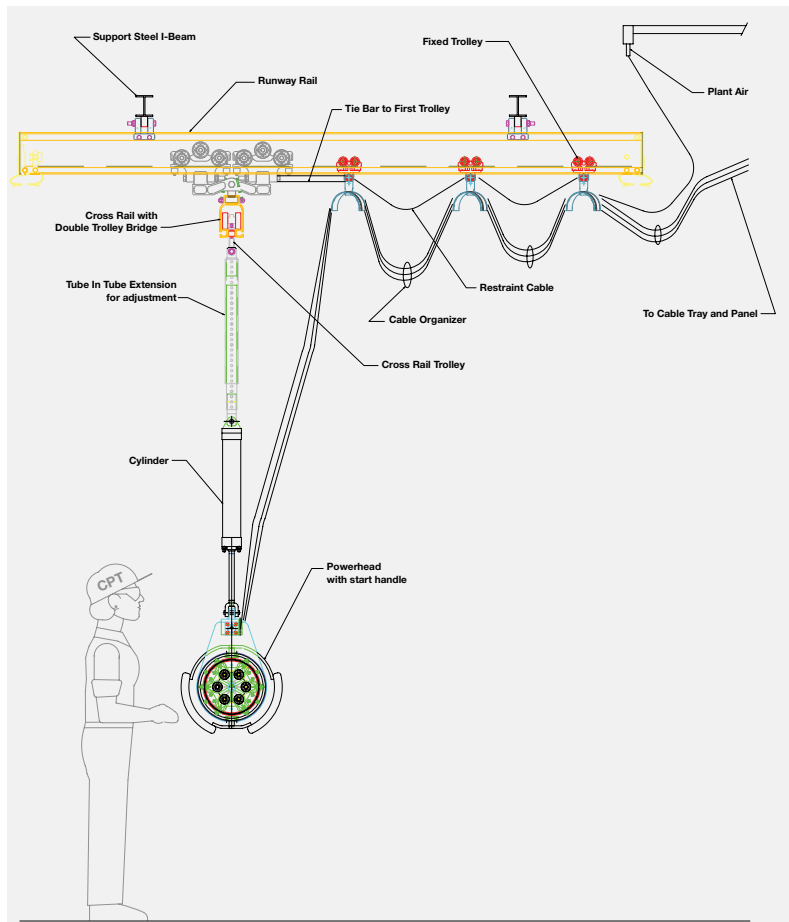
- Pneumatic or electric disc brake

Cable Management

Cooper Tools can provide you with assistance ranging from concept to installation of an efficient cable management solution. Cooper Tools equipment uses cables in conjunction with hand held tools, fixtured hand tools or when nutrunners are provided for incorporation into automated systems.

Cables need to be protected throughout their routing. We protect the cables from machine movement, equipment, chaffing, sharp objects, vibration, heat and liquid.

We have a full support staff of Sales Engineers, Mechanical Engineers, Controls Engineers, Project Managers, Field Service Engineers and In-house Service Engineers waiting to serve you.





Repair bay operator is using a two spindle fixtured tool to fasten components of a wheel hub assembly.



Modular Handling Systems for Handheld Nutrunners & Tightening Spindles

Advantages

- High flexibility/adaptability to your fastening application
- Compact and coordinated system
- Effortless handling
- Can handle DGD and EMT spindles as well as Cleco DC nutrunners
- Modular components means short delivery times

Standard Features

- Dual start/stop handles
- Lightweight aluminum covers & frame
- E-stop
- Ease of service. Easy spindle removal for maintenance or calibration
- Remote spindle indicator lights

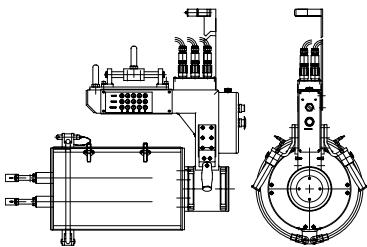
- 2 inch retractable spindle travel
- On-powerhead calibration
- Extended support tubes

Optional Features

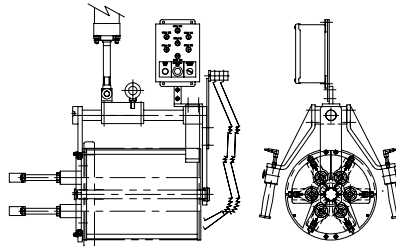
- Powerhead kick-off from wheel
- Remote digital display (MMI)

- Headlights
- Adjustable spindle centers
- Auto spindle retraction for multi-product assembly lines
- Fabricated steel suspension arm
- Part detection

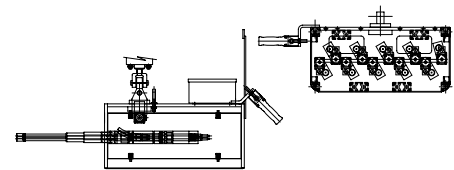
Typical Torque Handling System Configurations



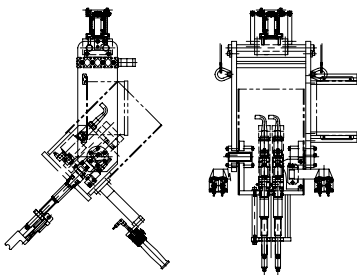
Horizontal Rear Trunion Mount (Wheelnut Application)



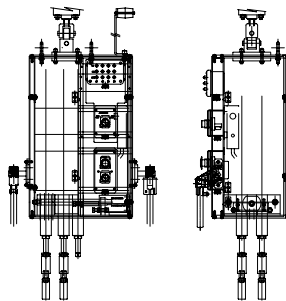
Horizontal Front Trunion Mount (Wheelnut Application)



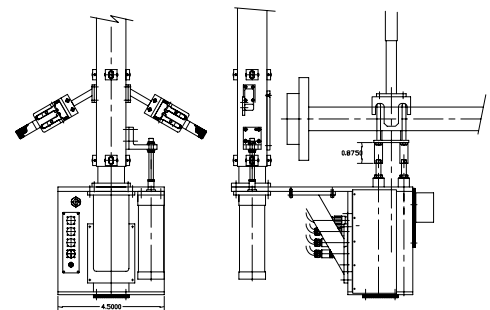
Horizontal Enclosure (Exhaust Manifold Application)



Angled Down Swivel Open Frame (Rocker Application)



Vertical Down Enclosure (U-bolt Application)



Vertical Up Enclosure (U-bolt Application)

Wheelnut Fastening

Cooper Tools is the recognized leader in the design and manufacture of multiple spindle wheelnut assembly systems. We are known across the globe for excellence of innovative engineering design, support, and quality award winning service.

Decades of expertise in the design and manufacturing of multiple spindle fixtured and portable assembly systems have identified Cooper Tools as an experienced, innovative supplier capable of creating custom solutions matched to unique customer assembly requirements.

Cooper Tools makes use of standard system building block components which are used to blend a custom system from a complete line of DC electric spindles, fastening controllers and an extensive listing of twenty-four different fastening strategies which not only include the usual Torque Control, Angle Control and Yield, but also includes the unusual Pulse Torque Recovery makeup torque fastening strategy awarded US Patent number 5,094,301.

Medium Duty Wheelnut Tool For Passenger Vehicles requiring Medium Torque, High Volume

- 100 Nm to 500 Nm

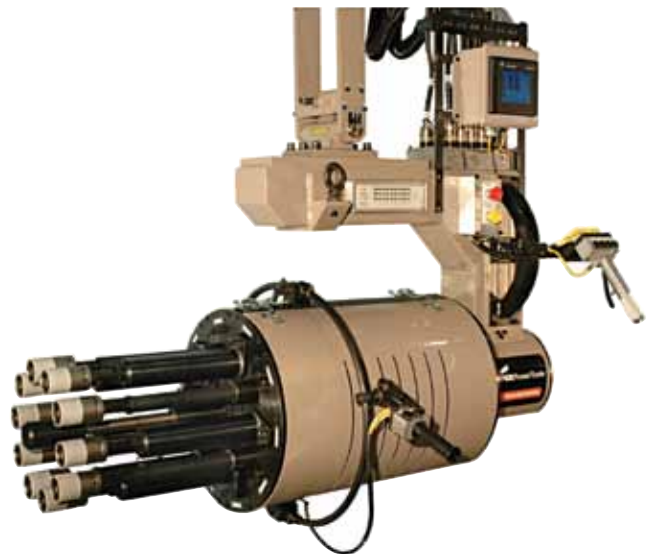
Cooper Tools supplies custom Wheelnut multiple designs using standard major components with proven track records for reliability, lifetime performance, millions of cycles capability and ergonomic solutions which support operator safety, comfort and efficiency.



Heavy Duty Wheelnut Tool For Trucks requiring High Torque, Low Volume

- 700 Nm to 1200 Nm

Cooper Tools Wheelnut multiples use high-efficiency electric motors manufactured specifically for this application. Available motor torques range from 700 Nm to 1200 Nm. Motor spindles can be mounted and arranged to match any bolt circle pattern, using standard in-line motors with or without offset gearing.



Adjustable Wheel Stud Centers

When several similar wheels need to be assembled and the economics of separate powerheads dictates a single powerhead, Cooper has the answer! Adjustable stud centers. The position of the studs can be controlled by an operator manual switch, or auto detection.



Budd Double Wheels

When it comes to fastening inner and outer wheel lug nuts including Budd style stud/nut adapters, a wheelnut powerhead requires long retractable spindles which are designed to prevent side loading. Cooper Tools has the know-how, and the products to supply wheelnut multiples for double wheel truck applications. Our wheel equipment is more rugged than the trucks it assembles.

Suspension System

A properly designed suspension system can not only support the tool and return it to a home position, it can also provide a zero gravity lift and hold. The total weight of the tool is controlled by the operator with very little pressure required to move the tool up or down.



Local Operator Display (Operator Interface)

Each powerhead displays a red, green, and yellow LED on a per spindle basis. The LED display indicates the status of the last tightening as NOK, OK and Low Torque or Angle. An optional local operator interface display can be used to display output, and accept touch screen switch inputs.



Some of the uses of a local operator display include:

- Application selection
- Tool home position jog
- Overall fastening status in green or red
- Part graphics
- Fastening values for torque and angle
- Functional push-button inputs & display outputs

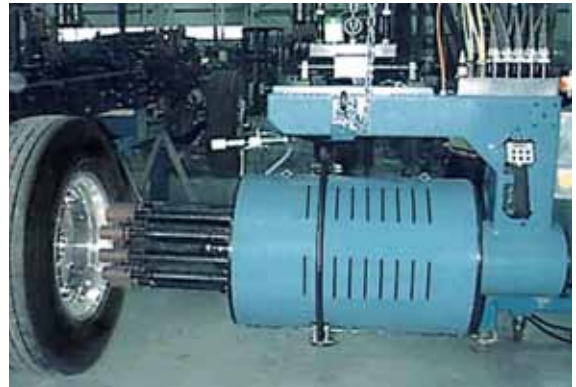
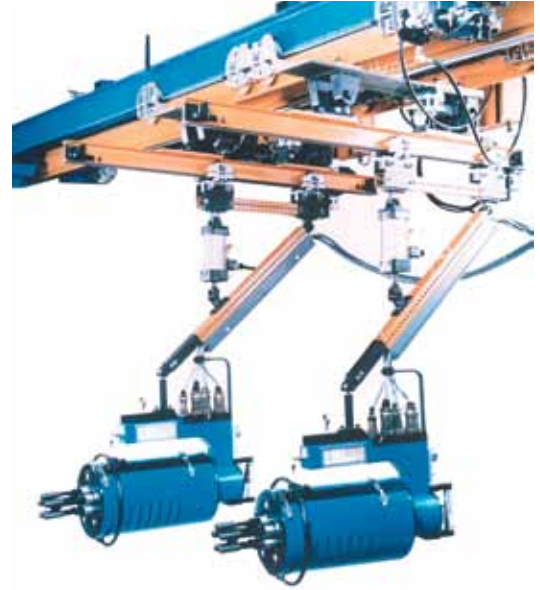


Push-off and Return

On moving transfer lines, the overhead suspension system can be mounted to an overhead track, supporting the multiple. At the conclusion of the fastening rundown by all spindles, the suspension pushes the tool away from the wheel and returns the tool to the home position ready for the next wheel. The vehicle on the assembly transfer line continues to move while the lug nuts are being tightened.

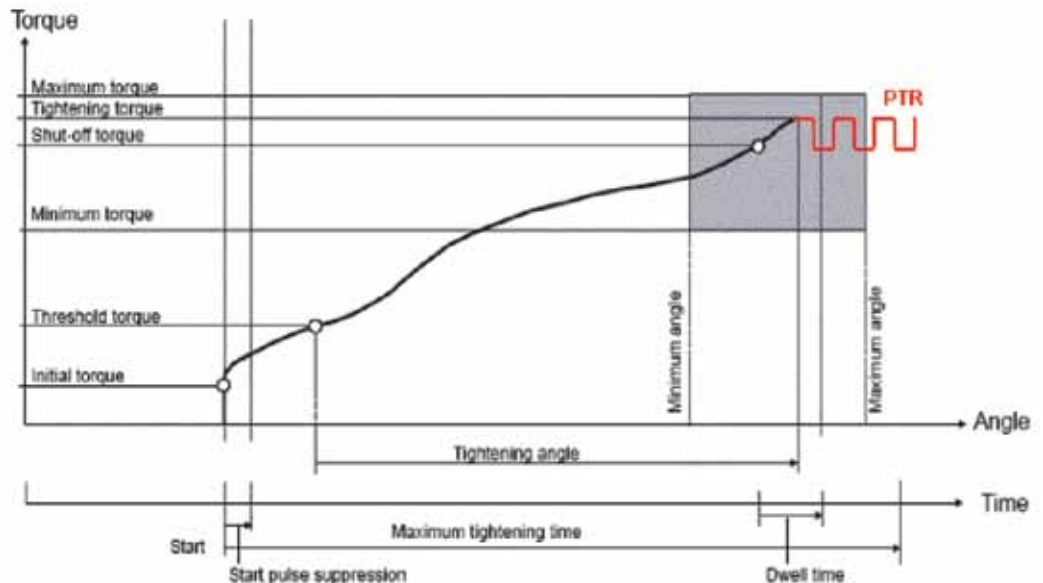
Application Detection of Aluminum and Steel Wheels

Wheel lug nut tools are distinguished from standard horizontally aligned systems by their cylindrical shape. Rotation of the tool is required for proper alignment with the wheel lugs, and the ability to provide a clear line of sight for the operator. In addition, a 6 spindle tool can be rotated 30 degrees, rundown a second time and tighten the alternate 6 lug nuts on a 12 lug nut wheel. This alternative design is tightening dual truck wheels, and can automatically determine if the wheel is aluminum or steel and change the fastening parameters automatically.



Pulse Torque Recovery (PTR)

Pulse Torque Recovery (PTR) provides a way to program “make-up torque” by pulsing torque at the conclusion of a fastening rundown. PTR is used most successfully on gasket joints, springy sheet metal, or soft metal (aluminum) where a “recovery torque” is required. If a soft joint begins to relax immediately following the rundown, PTR can add a pre-programmed number of pulses following shutoff target torque to make up the loss of residual torque in the joint. This strategy was awarded U.S. Patent 5,094,301.



Fixtured Electric Nutrunners – Transducer Control

Inline Floating Spindle Tools



Cleco®

18ES, 48ES & 67ES Inline Floating Spindle Series



Torque Range
2 - 2060 Nm
1.5 - 1520 Ft. Lbs.

Bolt Size
M5 - M36
#10 - 1 1/2"

Cleco Inline Floating Spindle	Torque Range		Max. Speed	Float		Output Drive Size	Minimum Center to Center		Weight*		Length	
	Model Number	ft. lbs.		Nm	RPM		in.	mm	in.	mm	lbs.	kg
18ES06ZA	1.5-4.4	2-6	4000	.98	25	1/4	1.81	46	3.0	1.4	15.5	394
18ES12ZA	2.2-8.9	3-12	1820	.98	25	1/4	1.81	46	3.2	1.5	16.0	406
18ES17ZA	3.0-12.5	4-17	1290	.98	25	1/4	1.81	46	3.2	1.5	16.0	406
48ES12ZA	2.2-8.9	3-12	4000	.98	25	1/4	1.81	46	3.4	1.5	16.7	425
48ES271ZB	4.4-19.9	6-27	1820	1.97	50	3/8	1.81	46	5.8	2.6	22.0	559
48ES361ZB	5.9-28.0	8-38	1290	1.97	50	3/8	1.81	46	5.8	2.6	22.0	559
48ES602ZB	8.8-42.0	12-57	855	1.97	50	1/2	2.20	56	8.4	3.8	24.4	620
48ES702ZB	10.3-50.2	14-68	570	1.97	50	1/2	2.20	56	8.4	3.8	24.4	620
48ES802ZB	12.5-60.5	17-82	450	1.97	50	1/2	2.44	62	9.6	4.4	26.7	678
48ES1152ZB	18.4-84.8	25-115	320	1.97	50	1/2	2.44	62	9.6	4.4	26.7	678
48ES1502ZB	22.1-110.6	30-150	245	1.97	50	1/2	2.44	62	9.6	4.4	26.7	678
48ES1653ZB	24.3-121.7	33-165	220	1.97	50	3/4	3.15	80	14.6	6.6	28.6	726
48ES2503ZB	36.1-182.1	49-247	145	1.97	50	3/4	3.15	80	14.6	6.6	28.6	726
67ES65BZ4	10-47	13-64	535	.69	17.6	1/2	1.31	33	10.8	4.9	21.0	533
67ES105BZ4	15-77	21-104	330	.69	17.6	1/2	1.31	33	10.8	4.9	21.0	533
67ES135BZ4	20-100	27-135	245	.69	17.6	1/2	1.31	33	10.8	4.9	21.0	533
67ES190Z6	28-140	38-190	165	.75	19	3/4	1.31	33	15.6	7.1	22.0	559
67ES285Z6	42-210	57-285	115	.75	19	3/4	1.31	33	15.6	7.1	22.0	559
67ES385Z6	57-285	77-386	83	.75	19	3/4	1.31	33	15.6	7.1	22.0	559
67ES475Z6	70-350	95-475	67	.75	19	3/4	1.31	33	16.0	7.3	22.4	569
67ES610Z6	90-450	122-610	50	.75	19	3/4	1.31	33	16.0	7.3	22.4	569
67ES850Z8	125-625	170-848	33	1.0	25	1	1.50	38	20.0	9.1	23.8	605
67ES1050Z8	155-775	210-1050	27	1.0	25	1	1.50	38	20.0	9.1	23.8	605
67ES1670Z8	246-1230	334-1668	17	1.0	25	1	1.50	38	20.0	9.1	23.8	605
67ES2060Z8	304-1520	412-2060	14	1.0	25	1	1.50	38	20.0	9.1	23.8	605

*Weights are without tool cable or reaction bar if so equipped.

General: All tools must be used with an approved Cooper Tools cable and controller.

Standard Equipment: Matrix Connector; 67ES series – Mounting plate.

All standard 18ES & 48ES tools have thru hole output.

Extra Equipment: Std. Tool Cable 542778-XX, R.A. Swivel Cable 544055-XX, Inline Swivel Cable 544056-XX, Extension Cable 542779-XX.

Additional Accessories: (Pages 41-49, 45-47)

Note: See page 31 for non-floating 67 Series spindles.



DGD

Inline Floating Spindle

Torque Range
2 - 1600 Nm
1.5 - 1180.1 Ft. Lbs.

Bolt Size
M5 - M30
#10 - 1 3/8"

DGD Inline Floating Spindle			Torque Range		Max. Speed	Float		Output Drive Size	Minimum Center to Center		Weight		Length	
Part No.	Model Number	Motor Size	ft. lbs.	Nm		RPM	in.		mm	in.	mm	lbs.	kg	in.
578514	1BB-1B011A-1K3MS-1ZA	1	1.5-8.1	2-11	1222	1.97	50	3/8	1.69	43	3.0	1.4	15.6	396
578500	1BB-1B030A-1K1M-1ZA	1	3.7-23.6	5-32	462	1.97	50	3/8	1.69	43	3.2	1.5	15.6	396
578502	1BB-1B050A-1K2M-1ZA	1	11.0-39.0	15-53	272	1.97	50	3/8	1.69	43	3.2	1.5	15.6	396
578600	2BB-2B100A-2K1M-2ZA	2	18.4-75.2	25-102	329	1.97	50	1/2	2.20	56	3.4	1.5	18.9	481
578602	2BB-2B150A-2K2M-2ZA	2	22.1-112.8	30-153	219	1.97	50	1/2	2.20	56	5.8	2.6	18.9	481
578700	3BB-3B260A-3K2M-3ZA	3	22.1-132.7	30-180	339	1.97	50	3/4	3.18	81	5.8	2.6	21.9	558
578702	3BB-3B180A-3K1M-3ZA	3	36.8-191.7	50-260	220	1.97	50	3/4	3.18	81	8.4	3.8	21.9	558
578800	4BB-4B360A-4K1M-4ZA	4	88.5-265.5	120-360	266	1.97	50	3/4	3.58	91	8.4	3.8	27.1	689
578801	4BB-4B460A-4K2M-4ZA	4	118.0-339.2	160-460	209	1.97	50	3/4	3.58	91	9.6	4.4	27.1	689
578802	4BB-4B630A-4K2M-4ZA	4	162.2-464.6	220-630	141	1.97	50	1	3.58	91	9.6	4.4	27.1	689
578803	4BB-4B360A-4K1M-4Z1250A	4	295.0-921.8	400-1250	78	1.97	50	1	4.76	121	9.6	4.4	29.2	742
578804	4BB-4B460A-4K2M-4Z1600A	4	398.2-1180.1	540-1600	61	1.97	50	1.5	4.76	121	14.6	6.6	29.2	742

Standard Equipment: Air LB Connector

Fixtured Electric Nutrunners – Transducer Control

Inline & Offset Floating Spindle Tools



EMT Inline Floating Spindles Series

Torque Range
19.1 - 1485 Nm
14.1 - 1095 Ft. Lbs.

Bolt Size
M7 - M30
5/16" - 1 3/8"



EMT Inline Floating Spindle			Torque Range		Max Speed	Float		Output drive size	Min center dist		Weight		Length	
Part No.	Motor Size	Model No.	ft. lbs.	Nm	RPM	in.	mm.		in	mm	lbs	kg.	in.	mm
571110	1	EMT80-10R6-3/8"-APM	14.1	19.1	860	2	50.8	0.38	1.81	50	9.5	4.3	19.47	494.5
571111	1	EMT80-6R6-1/2"-APM	26	35	467	2	50.8	0.5	1.81	50	9.5	4.3	19.47	494.5
571105	1	EMT80-4R6-1/2"-APM	35	47	350	2	50.8	0.5	1.81	50	9.5	4.3	19.47	494.5
571104	1	EMT80-3R6-1/2"-APM	51	70	237	2	50.8	0.5	1.81	50	9.5	4.3	19.47	494.5
571100	1	EMT80-2R6-1/2"-APM	68	93	177	2	50.8	0.5	1.81	50	9.5	4.3	19.47	494.5
571222	2	EMT200-10R6-1/2"-APM	40	54	614	2	50.8	0.5	2.38	60.3	15.5	7	21.82	554.2
571211	2	EMT200-5R6-1/2"-APM	73	99	334	2	50.8	0.5	2.38	60.3	15.5	7	21.82	554.2
571221	2	EMT200-4R6-1/2"-APM	97	132	250	2	50.8	0.5	2.38	60.3	15.5	7	21.82	554.2
571205	2	EMT200-3R6-1/2"-APM	144	195	169	2	50.8	0.5	2.38	60.3	15.5	7	21.82	554.2
571220	2	EMT200-2R6-1/2"-APM	192	260	127	2	50.8	0.62	2.38	60.3	15.5	7	21.82	554.2
571308	3	EMT400-10R6-3/4"-APM	50.1	67.9	1155	2	50.8	0.75	6.38	162	29	13.2	23.89	606.8
571307	3	EMT400-8R6-3/4"-APM	69.4	94.1	833	2	50.8	0.75	6.38	162	29	13.2	23.89	606.8
571304	3	EMT400-5R6-3/4"-APM	179	243	310	2	50.8	0.75	6.38	162	29	13.2	23.89	606.8
571303	3	EMT400-4R6-3/4"-APM	208	282	266	2	50.8	0.75	6.38	162	29	13.2	23.89	606.8
571302	3	EMT400-3R6-3/4"-APM	288	391	192	2	50.8	0.75	6.38	162	29	13.2	23.89	606.8
571400	3	EMT600-3R6-1"-APM	396	537	149	2	50.8	1"	7.12	181	35	15.9	24.25	616
571404	3	EMT600-2R6-1"-APM	576	781	102	2	50.8	1"	7.12	181	35	15.9	24.25	616
571500	4	EMT800-2R6-1"-APM	792	1073	102	2	50.8	1"	7.5	190.5	50	22.6	28.44	722.4
571002	4	EMT1200-2R8-1"-APM	1095	1485	74	2	50.8	1"	9.38	238.12	60	27.2	32.91	835.9

*EMT80, EMT200, EMT400 - Optional length spindle drivers available (R8,R10,R12)
 *EMT600, EMT800 - Optional length spindle drivers available (R8,R10,R12,R16)
 *EMT80, EMT200 - Output drive size (Sq. Drive) available in 3/8", 1/2", 5/8"
 *EMT400, EMT600 - Output drive size (Sq. Drive) available in 3/4", 1"
 *EMT Fixtured tools may be configured to meet your requirements.
 Contact Cooper Tools for your configuration.

Standard Equipment: Air LB Connector
Optional Connectors: Contact your nearest CT Sales & Service Center if a motor is required with a VEAM or PTR connector.



Offset Floating Spindle Series

Torque Range
2 - 1600 Nm
1.5 - 1180.1 Ft. Lbs.

Bolt Size
M5 - M24
#10 - 1 1/8"



DGD Offset Floating Spindle			Torque Range		Max. Speed	Float		Output Drive Size	Minimum Center to Center		Weight		Length	
Part No.	Model Number	Motor Size	ft. lbs.	Nm	RPM	in.	mm		in.	mm	lbs.	kg	in.	mm
578515	1BB-1B011A-1VK3M	1	1.5-8.1	2-11	1161	1.97	50	3/8	1.37	35	8.8	4.0	15.1	384
578506	1BB-1B050A-1VK1M	1	3.7-23.6	5-32	439	1.97	50	3/8	1.37	35	8.8	4.0	15.1	384
578505	1BB-1B030A-1VK2B	1	11.0-39.0	15-53	258	1.97	50	3/8	1.37	35	8.8	4.0	15.1	384
578613	2BB-2B100A-2VK1M	2	18.4-75.2	25-102	307	1.97	50	1/2	1.73	44	17.8	8.1	19.8	504
578614	2BB-2B150A-2VK2M	2	22.1-112.8	30-153	204	1.97	50	1/2	1.73	44	17.8	8.1	19.8	504
578709	3BB-3B180A-3VK1M	3	22.1-132.7	30-180	315	1.97	50	3/4	2.32	59	31.3	14.2	21.7	553
578705	3BB-3B260A-3VK2M	3	36.8-191.7	50-260	204	1.97	50	3/4	2.32	59	31.3	14.2	21.7	553
578805	4BB-4B360A-4VK1M	4	88.5-265.5	120-360	249	1.97	50	3/4	2.99	76	47.3	21.5	25.7	655
578806	4BB-4B460A-4VK2M	4	118.0-339.2	160-460	196	1.97	50	3/4	2.99	76	47.3	21.5	25.7	655
578807	4BB-4B630A-4VK3M	4	162.2-464.6	220-630	133	1.97	50	1	2.99	76	47.3	21.5	25.7	655
578808	4BB-4B630A-4VK4MS	4	184.4-590.0	250-800	110	1.97	50	1	2.99	76	48.5	22.0	25.7	655

Standard Equipment: Air LB Connector

Fixtured Electric Nutrunners – Transducer Control

Offset & Right Angle Floating Spindle Tools



Cleco®

EMT Offset Floating Spindles Series

Torque Range
19.1 - 1073 Nm
14.1 - 792 Ft. Lbs.

Bolt Size
M7 - M27
5/16" - 1 1/4"

EMT Offset Floating Spindles			Torque Range		Max Speed	Float		Output drive size	Min center dist		Weight		Length	
Part No.	Motor Size	Model No	ft. lbs	Nm	RPM	in.	mm.		in	mm	lbs	kg.	in.	mm
571112	1	EMT80-10-OS75-3/8"-APM	14.1	19.1	860	2	50.8	0.38	1.06	27	11	4.9	21.51	546.3
571113	1	EMT80-6-OS75-3/8"-APM	26	35	467	2	50.8	0.38	1.06	27	11	4.9	21.51	546.3
571114	1	EMT80-4-OS75-1/2"-APM	35	47	350	2	50.8	0.5	1.06	27	11	4.9	21.51	546.3
571115	1	EMT80-3-OS75-1/2"-APM	51	70	237	2	50.8	0.5	1.06	27	11	4.9	21.51	546.3
571223	2	EMT200-10-OS150-1/2"-APM	40	54	614	2	50.8	0.5	1.5	38.1	21	9.5	25.26	641.6
571215	2	EMT200-5-OS150-1/2"-APM	73	99	334	2	50.8	0.5	1.5	38.1	21	9.5	25.26	641.6
571224	2	EMT200-4-OS150-1/2"-APM	97	132	250	2	50.8	0.5	1.5	38.1	21	9.5	25.26	641.6
571225	2	EMT200-3-OS250-1/2"-APM	144	195	169	2	50.8	0.5	1.88	47.6	21	9.5	25.26	641.6
571201	2	EMT200-2-OS250-5/8"-APM	192	260	127	2	50.8	0.62	1.88	47.6	21	9.5	25.26	641.6
571309	3	EMT400-5-OS400-3/4"-APM	179	243	310	2	50.8	0.75	4.75	120.6	39	17.7	30	762
571310	3	EMT400-4-OS400-3/4"-APM	208	282	266	2	50.8	0.75	4.75	120.6	39	17.7	30	762
571311	3	EMT400-3-OS400-3/4"-APM	288	391	192	2	50.8	0.75	4.75	120.6	39	17.7	30	762
571410	3	EMT600-3-OS600-1"-APM	396	537	149	2	50.8	1"	4.75	120.6	45	20.4	30.38	771.6
571413	3	EMT600-2-OS600-1"-APM	576	781	102	2	50.8	1"	4.75	120.6	45	20.4	30.38	771.6
571503	4	EMT800-2-OS800-1"-APM	792	1073	102	2	50.8	1"	5.62	142.7	90	40.8	34.56	877.8

*EMT Fixtured Offset tools may be configured to meet your requirements. Contact CooperTools for your configuration.

Standard Equipment: Air LB Connector.

Optional Connectors: Contact your nearest CT Sales & Service Center if a motor is required with a VEAM or PTR connector.



Cleco®

Right 18EA, 48EA & 67EA Angle Floating Spindle

Torque Range
5.1 - 255 Nm
3.7 - 188.1 Ft. Lbs.

Bolt Size
M7 - M18
1/4" - 3/4"

Cleco Angle Floating Spindle	Torque Range		Max. Speed	Float		Output Drive Size	Minimum Center to Center		Weight*		Length	
	ft. lbs.	Nm	RPM	in.	mm		in.	mm	lbs.	kg	in.	mm
18EA16S131	3.7-12.5	5.1-17	1225	.98	25	3/8	1.10	28	4.4	2.0	16.0	406
18EA23S131	5.3-17.7	7.2-24	860	.98	25	3/8	1.10	28	4.4	2.0	16.0	406
18EA30S131	4.4-22.8	6.0-31	655	.98	25	3/8	1.10	28	4.4	2.0	16.0	406
48EA37S231	5.9-28.0	8.0-38	1225	.74	19	3/8	1.33	34	5.2	2.4	18.6	474
48EA52S231	8.1-39.8	11-54	860	.74	19	3/8	1.33	34	5.2	2.4	18.6	474
48EA53S341	8.1-39.8	11-54	850	.74	19	1/2	1.73	44	5.9	2.7	20.0	509
48EA74S341	11.0-56.8	15-77	600	.74	19	1/2	1.73	44	5.9	2.7	20.0	509
48EA95S341	14.7-72.2	20-98	460	.74	19	1/2	1.73	44	5.9	2.7	20.0	509
48EA110S341	16.9-81.1	23-110	400	.74	19	1/2	1.73	44	7.2	3.3	20.5	521
48EA135S461	20.6-101.7	28-138	270	.74	19	3/4	2.12	54	8.8	4.0	20.5	522
48EA230S461	34.6-172.5	47-234	150	.74	19	3/4	2.12	54	10.3	4.7	22.1	563
67EA150S461	22.1-110.6	30-150	210	.74	19	3/4	2.04	52	13.0	5.9	25.7	655
67EA185S461	27.3-136.3	37-185	170	.74	19	3/4	2.04	52	13.0	5.9	25.7	655
67EA210S461	31.0-154.8	42-210	155	.74	19	3/4	2.04	52	13.0	5.9	25.7	655
67EA235S461	33.9-169.6	46-230	135	.74	19	3/4	2.04	52	13.0	5.9	25.7	655
67EA255S461	40.6-188.1	55-255	115	.74	19	3/4	2.04	52	13.0	5.9	25.7	655

*Weights are without tool cable or reaction bar if so equipped.

General: All tools must be used with an approved Cooper Tools cable and controller.

Standard Equipment: Matrix Connector.

Extra Equipment: Std. Tool Cable 542778-XX, R.A. Swivel Cable 544055-XX, Inline Swivel Cable 544056-XX, Extension Cable 542779-XX.

Additional Accessories: (Pages 41-49)

Fixtured Electric Nutrunners – Transducer Control

Right Angle Non-Floating Spindle Tools



Right Angle Non-Floating Spindle Series

Torque Range
2 - 630 Nm
1.5 - 484.6 Ft. Lbs.

Bolt Size
M5 - M22
#10 - 1"



Angle Non-Floating Spindle			Torque Range		Max. Speed	Float		Output Drive Size	Minimum Center to Center		Weight		Length	
Part No.	Model Number	Motor Size	ft. lbs.	Nm	RPM	in.	mm		in.	mm	lbs.	kg	in.	mm
578516	1BB-1B011A-1WK3M	1	1.5-8.1	2-11	1146	.98	25	3/8	2.04	52	9.7	4.4	16.8	427
578513	1BB-1B030A-1WK1M	1	3.7-23.6	5-32	434	.98	25	3/8	2.04	52	9.7	4.4	16.8	427
578511	1BB-1B050A-1WK2M	1	11.0-39.0	15-53	255	.98	25	3/8	2.04	52	9.7	4.4	16.8	427
578608	2BB-2B100A-2WK1M	2	18.4-75.2	25-102	310	.98	25	1/2	2.32	59	16.7	7.6	19.8	505
578606	2BB-2B150A-2WK2M	2	22.1-112.8	30-153	206	.98	25	1/2	2.32	59	16.7	7.6	19.8	505
578710	3BB-3B180A-3WK1M	3	22.1-132.7	30-180	327	.98	25	3/4	3.18	81	37.0	16.8	23.8	607
578706	3BB-3B260A-3WK2M	3	36.8-191.7	50-260	211	.98	25	3/4	3.18	81	37.0	16.8	23.8	607
578809	4BB-4B360A-4WK1M	4	88.5-265.5	120-360	257	.98	25	3/4	4.40	112	57.5	26.1	25.3	645
578810	4BB-4B460A-4WK2M	4	118.0-339.2	160-460	202	.98	25	3/4	4.40	112	57.5	26.1	25.3	645
578811	4BB-4B630A-4WK3M	4	162.2-464.6	220-630	136	.98	25	1	4.40	112	57.5	26.1	25.3	645

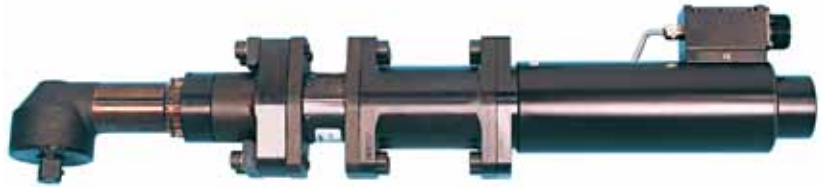
Standard Equipment: Air LB Connector



EMT Right Angle Non-Floating Spindles Series

Torque Range
16 - 830 Nm
12 - 612 Ft. Lbs.

Bolt Size
M7 - M30
5/16" - 1 3/8"



EMT Angle Non-Floating Spindle			Angle Head Type	Torque Range		Max Speed	Output Drive Size	Min Center Dist		Weight		Length **	
Part No.	Model No.	Motor Size		ft. lbs.	Nm	RPM		In	Mm	Lbs.	kg	in	mm
571116	EMT80-10P-APM	1	P	21.8	29.6	552	.38	1.44	36.6	12.5	5.7	16.63	422.4
571117	EMT80-6P-APM	1	P	40.4	54.4	300	.50	1.44	36.6	12.5	5.7	16.63	422.4
571118	EMT80-4P-APM	1	P	54.4	73.1	225	.50	1.44	36.6	12.5	5.7	16.63	422.4
571119	EMT80-3P-APM	1	P*	79.3	108.9	152	.50	1.44	36.6	12.5	5.7	16.63	422.4
571120	EMT80-10T-APM	1	T	26.0	35.0	463	.50	1.75	44.5	13	5.9	16.66	432.1
571121	EMT80-6T-APM	1	T	48.0	65.0	251	.50	1.75	44.5	13	5.9	16.66	432.1
571122	EMT80-4T-APM	1	T	65.0	87.0	188	.50	1.75	44.5	13	5.9	16.66	432.1
571123	EMT80-3T-APM	1	T	94.0	130.0	127	.50	1.75	44.5	13	5.9	16.66	432.1
571124	EMT80-2T-APM	1	T*	126.0	172.0	95	.50	1.75	44.5	13	5.9	16.66	432.1
571127	EMT200-10V-APM	2	V	53.3	72.0	460	.50	2.19	55.6	20	9.0	21.00	533.4
571128	EMT200-5V-APM	2	V	97.3	132.0	250	.625	2.19	55.6	20	9.0	21.00	533.4
571129	EMT200-4V-APM	2	V	129.3	176.0	187	.625	2.19	55.6	20	9.0	21.00	533.4
571230	EMT200-3V-APM	2	V*	192.0	260.0	126	.75	2.19	55.6	20	9.0	21.00	533.4
571231	EMT200-10X-APM	2	X	85.0	114.0	289	.625	2.19	55.6	21	9.5	21.00	533.4
571232	EMT200-5X-APM	2	X	155.0	210.0	157	.75	2.19	55.6	21	9.5	21.00	533.4
571233	EMT200-4X-APM	2	X	206.0	280.0	117	.75	2.19	55.6	21	9.5	21.00	533.4
571234	EMT200-3X-APM	2	X	306.0	414.0	79	.75	2.19	55.6	21	9.5	21.00	533.4
571235	EMT200-2X-APM	2	X*	408.0	552.0	59	.75	2.87	74.0	21	9.5	21.00	533.4
571312	EMT-400-3V-APM	3	V*	384.0	521.0	144	.75	2.19	55.6	36	16.4	25.94	658.8
571313	EMT-400-3X-APM	3	X*	612.0	830.0	90	.75	2.87	74.0	37	16.8	26.32	668.5

*Tool output exceeds angle head capacity – P head: 60 ft- lbs, T head: 100 ft- lbs, V head: 180 ft- lbs and X head: 350 ft lbs.

**Length is measured from center of the square drive to the end of the motor.

Standard Torque reaction bracket

P and T head - #201012 (Optional bracket # 201039)

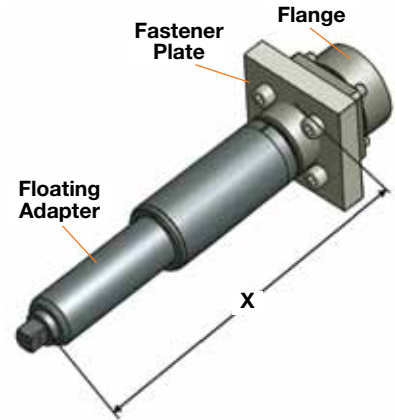
V and X head - # 201034(Optional bracket # 201510)

Standard Equipment: Air LB Connector

Optional Connectors: Contact your nearest CT Sales & Service Center if a motor is required with a VEAM or PTR connector.

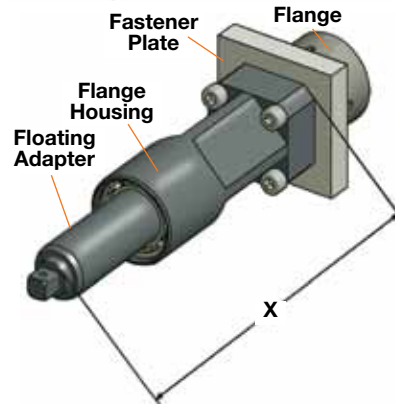
DGD Floating Adapter

Model No.	Motor Size	Maximum Torque		X		Output Drive Size	Drive
		ft. lbs.	Nm	in.	mm		
922325	1	44.25	60	7.08	180	3/8	1ZB 1VK
910609	2	118.00	160	7.08	180	1/2	2ZB 2VK
935552	2	147.51	200	7.08	180	3/4	2ZB 2VK
910613	3	383.63	520	7.28	185	3/4	3ZB 3VK
912106	4	383.63	520	7.48	190	3/4	4VK
912147	4	921.95	1250	7.32	186	1	4VK
S976956	4	921.95	1250	5.31	140	1	4ZA
S308441	4	1180.09	1600	5.31	140	1 1/2	4ZA
916642	4	383.63	520	7.28	185	3/4	4ZA
916643	4	921.95	1250	7.48	190	1	4ZA



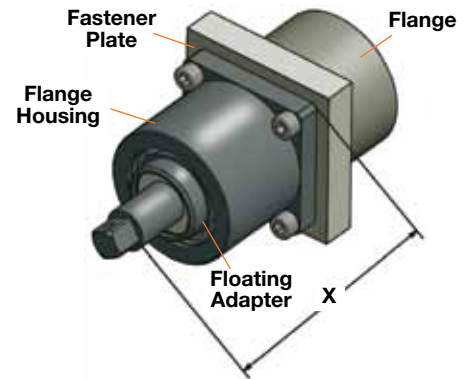
DGD Floating Adapter Including Flange Housing

Model No.	Motor Size	Maximum Torque		X		Output Drive Size	Drive
		ft. lbs.	Nm	in.	mm		
S308434	1	44.25	60	6.61	168	3/8	1ZB
S308435	2	118.00	160	6.77	172	1/2	2ZB
S308450	2	147.51	200	6.77	172	3/4	2ZB
S308436	3	383.63	520	6.92	176	3/4	3ZB
S308437	1	44.25	60	6.61	168	3/4	1VK
S308438	2	81.13	110	6.55	166.5	1	2VK
S308475	2	147.51	200	6.55	166.5	1	2VK
S308439	3	221.26	300	6.73	171	1 1/2	3VK
S308440	4	383.63	520	6.88	175	3/4	4VK
S308474	4	486.79	660	6.73	171	1	4VK



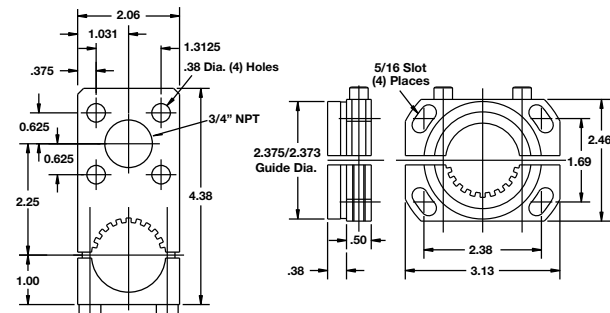
DGD Floating Adapter Including Flange Housing for Right Angle Drive

Model No.	Motor Size	Maximum Torque		X		Output Drive Size
		ft. lbs.	Nm	in.	mm	
929041	1	44.25	60	2.95	75	3/8
929053	2	125.38	170	3.54	90	1/2
929061	2	147.51	200	4.52	115	3/4
929065	3	221.26	300	4.13	105	3/4
929077	4	383.63	520	4.52	115	3/4
929089	4	486.79	660	4.52	115	1



Mounting Brackets for EMT Series Tools

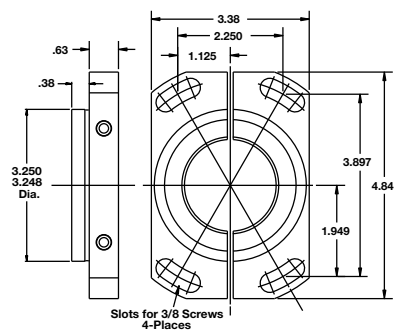
EMT 80 Series



Torque Reaction Bracket
#201012 (Standard)

Torque Reaction Bracket
#201039 (Optional)

EMT 200 & 400 Series



Torque Reaction Bracket
#201034 (Standard)

Torque Reaction Bracket
#201510 (Optional)

Tork-Trak™

(T3M) single channel controller provides extraordinary programming capabilities and interface options for any assembly line. With a wide range of hardware and software options, Tork-Trak can be customized to accommodate your specific fastening requirements and assembly line communication protocols.



The Tork-Trak™ (T3M) is expandable to handle up to four (4) spindles with the use of a Slave Module. Requirements beyond four (4) spindles must be quoted by an application center.

Tork-Trak is capable of handling a broad array of fixtured and portable electric tools ranging in torque from 1 to 4000 Nm, including Cleco, DGD, EMT, and Rotor tools. The controller can control up to ten (10) Cleco LiveWire tools.

The controllers incorporate the most intuitive user interface available today using a menu driven structure, as opposed to the sequential nature of other controllers.

Tork-Trak controllers support the monitoring, evaluation, and editing of any procedure through the use of unique graphic displays. Programming is made easy, data collection and statistics menus are used to monitor the process, and an on-board oscilloscope is available for thorough analysis of torque/angle characteristics of fastening.

Controller Hardware Features

- Industrial PC with PC-104 board set.
- High resolution color TFT digital LCD display with 1024 x 768 pixels – XGA with DVD viewing quality!
- All cables connect through a bulkhead below the front door, allowing several controllers to be mounted side by side.
- Eight front panel indicator lights. High-Low Torque & Angle, Accept & Reject and two user programmable indicator lights.
- 16 user programmable outputs/inputs & mating connector
 - Ethernet port (standard)
 - USB port for memory stick file transfer (standard)
 - Keyboard/mouse ports
 - Keyboard with integrated trackball supplied with each controller
 - Field Bus port
 - 650 MHz Celeron processor, PC-104 CPU
 - 24 VDC, fused, for physical I/O, replaceable from the outside of the enclosure
 - Serial RS-232 port for barcode and serial data.
 - Optional USB/Ethernet ports available

Controller Software Features

- Industrial PC Windows operating system
- Ease of programming
- Same TM Multi-Trak software as used on the Cooper Power Tools Automated Systems multiple spindle panels
- Assures quality fastening on critical assembly processes
- Single or dual transducers to verify torque
- Self diagnostics
- 28 user programmable fastening strategies including Yield and Gradient as well as self-tap and tube-nut
- Network communication capability
 - RS-232 Serial
 - Ethernet TCP/IP
 - Ethernet data & control protocols
 - FieldBus
 - DeviceNet
 - ProfiBus
 - InterBus
 - USB
- Expandable physical I/O (8 in/8 out are standard)
- Expandable spindle support through low-cost Satellites
- FieldBus virtual I/O



Single and double bay control panels shown above have a capacity of up to 32 spindles. This controller is air conditioned, and supports Ether Net and FieldBus communications using Pentium-4 CPU technology. Also pictured above right is a single bay fastening control panel with capacity up to 12 spindles.



The Mid-Six controller is a wall mount design capable of handling up to six spindles and has all of the features as our larger panels.

Automated Systems multi-spindle controllers provide extraordinary capabilities and interface options for any assembly line. These controllers have the capability to house up to 32 spindles with a wide range of hardware and software options. The multi-spindle controller platform is capable of handling a broad array of fixtured and portable electric tools ranging from 1 to 4000 Nm, including Cleco, DGD, EMT, and Rotor tools. In addition, the controller can control up to ten (10) Cleco LiveWire™ tools.

TM Multi-Trak software is at the heart of the system, providing a common programming interface for T3M, Mid-Six, and Multi-spindle controllers. The software can be customized to accommodate your specific fastening requirements and assembly line protocols.

Fastening System Kit (FSK)

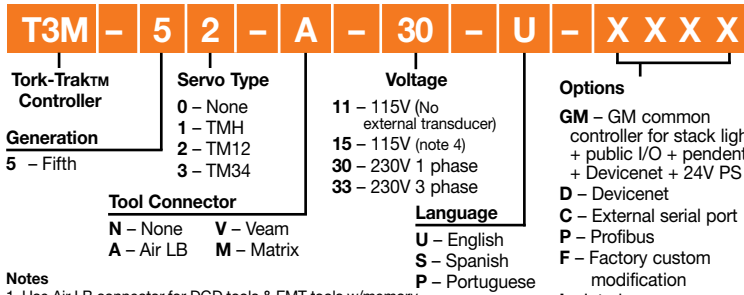
The **Fastening System Kit (FSK)** is available to enable the user to handle his own installation and integration. The FSK will be engineered to meet your specific application requirements and will be delivered with documentation for ease of installation. The FSK's can be used in conjunction with new or existing systems.

The Fastening System Kit will consist of the following standard components.



- Servo Modules (Sub plate mountable)
- Fastening Controller with Virtual I/O, Physical I/O and Ethernet or Field bus Ports
- Miscellaneous inter-connect cables and connectors.
- Tools
- Documentation

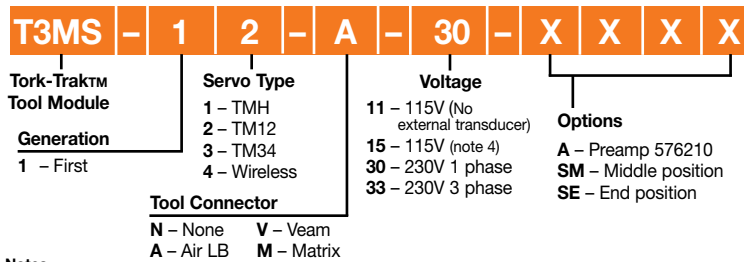
T3M Nomenclature



Notes

- Use Air LB connector for DGD tools & EMT tools w/memory. Use Veam connector for EMT tools.
- Use TMH servo for Cleco hand tools. Use TM12 or TM34 for EMT & DGD fixtured tools.
- TMH & TM12 require 230 VAC 1 phase voltage, TM34 requires 230 VAC 3 phase voltage.
- If 115V is required, an external transformer will be supplied. (P/N 572674)
- TM34 is a 3 phase servo only and 115 VAC 1 phase cannot be used.
- Use preamp option for older EMT tools with no built-in preamp.
- S1 supports 1 slave for a total of 2 spindles. S2 supports 2 slaves for a total of 3 spindles. S3 supports 3 tool modules for a total of 4 spindles.

T3MS Tool Module Nomenclature



Notes

- Use Air LB connector for DGD tools & EMT tools w/memory. Use Veam connector for EMT tools w/o memory. Use Matrix connector for Cleco tools.
- Use TMH servo for Cleco hand tools. Use TM12 or TM34 for EMT & DGD fixtured tools.
- TMH & TM12 require 230 VAC 1 phase voltage, TM34 requires 230 VAC 3 phase voltage.
- If 115V is required, an optional, external transformer is required. Specify transformer input voltage as 440V 3 phase or 230V 3 phase or 115V 1 phase.
- TM34 is a 3 phase servo only. 115 VAC 1 phase cannot be used on the TM34 servo.
- Use preamp option for older EMT tools with no built-in preamp.

T3M & T3MS Controllers for Cleco Tools

Model Number		Servo	Features	Tool Connection
115VAC	230VAC			
T3M Tork-Trak				
T3M-51-M-15-U	T3M-51-M-30-U	TMH	-	Matrix
T3M-51-M-15-U-D	T3M-51-M-30-U-D	TMH	DeviceNet	Matrix
T3M-51-M-15-U-I	T3M-51-M-30-U-I	TMH	Interbus	Matrix
T3M-51-M-15-U-P	T3M-51-M-30-U-P	TMH	Profibus	Matrix
T3MS Tork-Trak Tool Module				
T3MS-11-M-15-SM	T3MS-11-M-30-SM	TMH	Mid. Position	Matrix
T3MS-11-M-15-SE	T3MS-11-M-30-SE	TMH	End Position	Matrix

Cleco Tool Cables

Tool Cable	Extension Cable
542778- XM Standard	542779- XM (optional)
544055- XM Angle Swivel	
544056- XM Inline Swivel	

X = 1**, 2**, 3, 6, 8, 10, 15, 50 (meters) **X** = 1, 2, 3, 6, 8, 10, 15, 50 (meters) **Matrix**

**Must be used with 542779 extension cable.

T3M & T3MS Controllers for Sizes 1 & 2 DGD & EMT Tools

Model Number	Servo	Features	Tool Connection
T3M Tork-Trak			
T3M-52-A-30-U	TM12	-	Air LB
T3M-52-A-30-U-D	TM12	DeviceNet	Air LB
T3M-52-A-30-U-I	TM12	Interbus	Air LB
T3M-52-A-30-U-P	TM12	Profibus	Air LB
T3MS Tork-Trak Tool Module			
T3MS-12-A-30-SM	TM12	Mid. Position	Air LB
T3MS-12-A-30-SE	TM12	End Position	Air LB

Note: Optional fabricated controller stands are available. Contact your local CT representative for details. See sample stand below.

T3M & T3MS Controllers for Sizes 3 & 4 DGD & EMT Tools

Model Number	Servo	Features	Tool Connection
T3M Tork-Trak			
T3M-53-A-33-U	TM34	-	Air LB
T3M-53-A-33-U-D	TM34	DeviceNet	Air LB
T3M-53-A-33-U-I	TM34	Interbus	Air LB
T3M-53-A-33-U-P	TM34	Profibus	Air LB
T3MS Tork-Trak Tool Module			
T3MS-13-A-33-SM	TM34	Mid. Position	Air LB
T3MS-13-A-33-SE	TM34	End Position	Air LB

Note: Optional fabricated controller stands are available. Contact your local CT representative for details. See sample stand below.

DGD & EMT Tool Cables – Low Flex

Tool Cable
577004- XX (standard)
XX = 25, 35, 50, 75, 100 (feet)



DGD & EMT Tool Cables – High Flex

Tool Cable	Extension Cable
577003- XX (standard)	577005- XX (optional)
XX = 15, 25, 35, 50, 75, 100 (feet)	XX = 10, 15, 20, 25, 35, 50 (feet)

Fabricated Aluminum Controller Stand

Part No.	Application
572644	Mid-Six or T3M controllers
572686	Mid-Six or T3M & 3 slave modules

Optional fabricated controller stands are available to meet your custom needs. Contact your local Cooper Tools representative for complete details.



Joint Simulator

Joint simulators are most frequently used to certify the repeatability of nutrunners before being installed on a production line and are also an excellent means of testing nutrunners following repair.

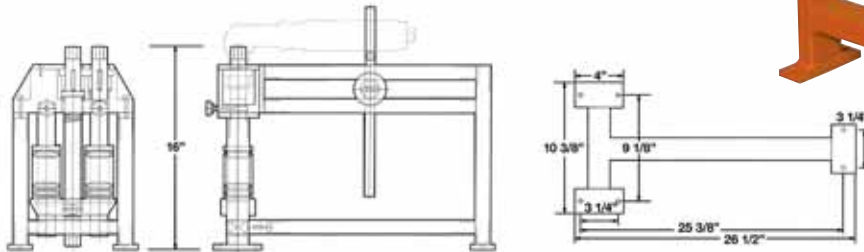
The Joint Simulator can simulate and test the torque output of nutrunners on both hard and soft joints. Each Joint Simulator is supplied with a quantity of spring washers which are used to test tool accuracy. Torque per revolution is varied by stacking the spring washers in different combinations.

Electronic torque testing is accomplished by attaching an external rotary transducer between the tool's square drive and the socket.

Joint Simulator Features

- Easy access, load, set-up and maintenance.
- Heavy-duty and economical.
- Adjustable torque reaction bracket can accommodate virtually any tool.
- For use with reversible/non-reversible tools.

Part Number	Torque Range		Width		Height		Length	
	Ft. Lbs.	Nm	in.	mm	in.	mm	in.	mm
550006	12-220	15-300	10.4	264	16	406	26.5	667



Flexibility. Tracea

The Mobile Assembly Station (MAS) combines accurate transducerized nutrunners, secure database storage and an intuitive user interface making it ideal for repair area assembly, backup of the main assembly line or entire product assembly.

MAS supports an unlimited number of programmable torque applications which are selected via the included industrial PC or by an optional bar code scanner.

MAS can interface with up to three Cleco 18/48 series corded DC electric nutrunners. For the ultimate in flexibility, MAS can also be interfaced with up to five Cleco LiveWire™ tools. That's eight tools in total, covering torque from 2 to 230 NM.

Features

- Interface with up to eight (8) separate tools
 - Up to three (3) Cleco 18/48 DC electric tools
 - Up to five (5) Cleco LiveWire™ tools
- Interface with static torque wrenches
- Interface with barcode scanners
- Integrated industrial PC
 - Keyboard with storage drawer
 - USB user port
- Pre installed torque cart software
- 15" full color LCD display
- Custom-designed industrial grade cart.
- 6" polyurethane casters
- Three (3) external tool storage shelves
- Four lockable internal storage drawers
- Integrated forklift slots



ability. Portability.

Develop

- Assembly parameters programmed via MS Access away from the distractions of the production environment
- Full control over the process including torque, fastening speed and angular rotation

Perform

- MAS guides user step by step through the entire process, prohibiting advancement until the job is done right
- MAS contains entire assembly process allowing repair bay operators to select the job that needs to be done

Analyze

- Data can be analyzed on the MAS or exported using the standard USB interface
- Torque data can be analyzed by either part or process
- Each fastening event stores torque, angle, time/date of event, status, etc.

Flexibility

For ultimate flexibility the MAS can interface with up to (5) LiveWire cordless or LiveWire VMAX tools. Tools can be added as they are needed without any hardware modifications. For a more traditional solution, the MAS can be fitted with up to (3) corded DC electric tools.



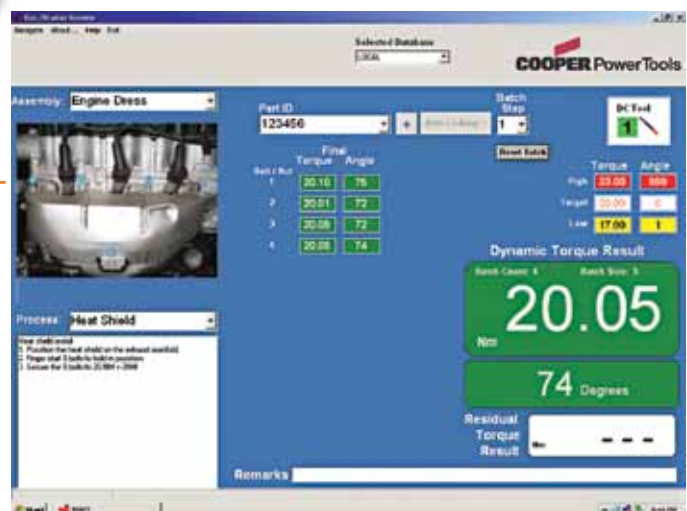
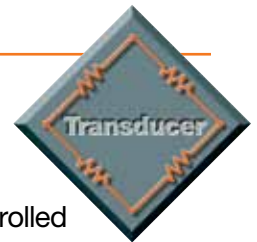
User Interface

User interface software allows for full customization.

- Show a picture of the actual part to eliminate confusion and illustrate proper bolt tightening sequence.
- Add text work instructions to guide operator through the correct assembly process.
- Real time feedback to insure all bolts are tightening within your specifications.

Traceability

When using our LiveWire or 18/48 Series DC electric nutrunners, you can rest assured that the correct torque will be applied and recorded. Both products are controlled by a NIST traceable strain gage torque transducer. The MAS can also be used with optional static torque wrenches which also contain traceable strain gage torque transducers.



Automated Systems

Mobile Assembly Station (MAS)

Mobile Assembly Station (MAS)

Model Number	LiveWire Interface	18/48 Series Interface		
	1 to 5 Tools	1 Tool	2 Tools	3 Tools
FC-20-N-15-U-L	•			
FC-21-M-15-U-E1		•		
FC-21-M-15-U-E2			•	
FC-21-M-15-U-E3				•
FC-21-M-15-U-E1L	•	•		
FC-21-M-15-U-E2L	•		•	
FC-21-M-15-U-E3L	•			•

Standard cart operates on 115VAC. Other options available upon request.
Standard operating language is English. Other languages available upon request.

Optional Equipment

Model Number	Description	Comments
572688	Static Torque Wrench Interface	Supports 1 wrench
572689-1	3/8" drive electronic torque wrench – 7.5-75 in.lbs.	Transducerized wrench with RF communication
572689-2	3/8" drive electronic torque wrench – 7.5-75 ft.lbs.	Transducerized wrench with RF communication
572689-3	1/2" drive electronic torque wrench – 25-250 ft.lbs.	Transducerized wrench with RF communication



Customer & Application Information

Date _____

Customer Name and Address _____

Contact Information _____

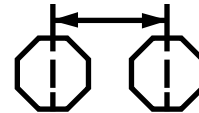
Application Description _____

Fastening Strategy

- Torque Monitoring Torque Control Torque Control and Angle Monitor Angle Control and Torque Monitor
 Other _____ Reject Strategy _____

Center to Center Spacing for Multiple Spindle Applications

To ensure the bolts are not set too close for the tools to reach without interference from the tool body. Attach bolt pattern drawing if necessary.



Controller and Nutrunner System

- Controller:** Multi-Trak Tork-Trak T3M T3M Slave Module m-Pro 400SE TME TME
 Fastening System Kit (FSK) Fabricated stand for controller Mobile Assembly Station (MAS)

Nutrunners: Electric Fixtured: DGD EMT In-line Offset Right Angle Electric Hand Tool: Cleco

Cabling: Standard Special High Flex Field Cable Length: 25' 50' 75' Drop Cable Length: 12' 25'

Customer Supplied Primary Voltage

- 480 VAC, 3 Phase 220 VAC, 3 Phase 110 VAC, 1 Phase Other

Accept and Reject Signals Light Box OK/ NOK Other HMI None

Communications Requirements

- RS232 Ethernet Field Bus: Devicenet Profibus Interbus Ethernet I/P

Server Interfaces: No Yes. If yes what is the Protocol _____

Mechanical Equipment and Support

Multiple Frame: Enclosure Covers Fixed Bolt Pattern Spindle Center Adjustment Manual Automatic
Frame Options: _____

Suspended Multiple Components

- Orientation:** Vertical Horizontal Rotary (Trunnion) Angular Pivoting Angular Fixed
Suspension: Air Balancer (Cyl) Spring Balancer Torque Tube Articulating Arm Other

Rail Information: _____

Field Service Support

- No Yes - at customers facility - Installation Supervision , Start-up & Runoff: Days Required _____

Comments: _____

CPT Representative: _____



Quality Fastener Tools

For more than half a century Apex has maintained the position of world leader in industrial fastening tools. Many power and insert bits, socket combinations and other drivers/adapters pioneered by Apex have today become industry standards, while Apex quality, service and selection give you unsurpassed value.

More Quality For Your Money

Apex quality starts with the selection of raw materials. Only carefully chosen, high grade tool steel is used to make Apex industrial fastener tools. Next, each tool is precision machined from solid bar stock to exacting standards of accuracy. You always get a snug, secure fit – a fit that is not possible from stamped tools.

Finally, each Apex fastener tool is tempered with our exclusive heat treating process. During this step the degree of hardness is determined based upon the application.

Fast Delivery

All Apex standard catalog items are available off-the-shelf for immediate delivery. If you need special assistance with your order, your Apex manufacturer's representative can handle any questions you may have.

Special Orders

Apex offers the broadest selection of screw driver and nut runner tools available, from bits, sockets and universal wrenches to extensions, adapters and nut setters. If you have a special application, contact your Apex representative. We may have what you need in stock, or can design and produce special fastener tools for almost any application.

Ordering Information

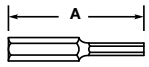
Apex products are distributed world-wide. For a catalog of the complete line of Apex quality fastener tools or to locate your nearest Apex distributor, visit our website at www.coopertools.com or www.apex-tools.com.



Registered Trade Marks: HI-TORQUE, Voi-Shan; TORX, Camcar Division of Textron; ACR, POZIDRIV, TORQ-SET and TRI-WING, Phillips International Co.; SUPADRIV, EIS (Fasteners) LTD.; SEL-O-FIT, FLIP-TIP, and Apex, Cooper Industries, Cooper Tools Division, Apex Operation.

Insert Bits

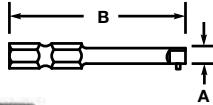
(1/4" hex for socket head cap screws and set screws)



Part Number	Hex Size (in.)	"A"		Cap Screw	Set Screw
		in.	mm		
185-00	1/16	1.00	25.4	1	5.6
185-0	5/64	1.00	25.4	2.3	8
185-1	3/32	1.00	25.4	4.5	10
185-9	7/64	1.00	25.4	6	—
185-2	1/8	1.00	25.4	8	1/4
185-10	9/64	1.00	25.4	8	—
185-3	5/32	1.31	33.3	10	5/16
185-4	3/16	1.31	33.3	1/4	3/8
185-5	7/32	1.31	33.3	—	7/16
185-6	1/4	1.31	33.3	5/16	1/2
185-7	5/16	1.25	31.8	3/8	5/8
185-8	3/8	1.25	31.8	7/16, 1/2	3/4

Square Drive Adapter

(1/4" hex drive sockets) Use with Quick Change and Bit & Finder Models, except as noted.



Part Number	"A" Sq. Drive	"B"		Bushing Number
		in.	mm	
EX250-2	1/4	2.00	50.8	—
EX250-3	1/4	3.00	76.2	847295*
EX250-4	1/4	4.00	101.6	—
EX250-6	1/4	6.00	152.4	—
EX370	3/8	1.63	41.3	—
EX370-3	3/8	3.00	76.2	847295*
EX500-2	1/2	2.00	50.8	—
EX500-3	1/2	3.00	76.2	—

*Note: Required for bit and finder models.

Hex Extensions

Part Number	Hex Drive (in.)	Type of Lock	Overall Length	
			in.	mm

Male Hex Drive with 1/2" Male Square

EX-501-3	7/16	Pin	3	76
EX-501-4	7/16	Pin	4	102
EX-501-6	7/16	Pin	6	152

Male Hex Drive with 3/8" Male Square

EX-371-3	7/16	Pin	3	76
EX-371-4	7/16	Pin	4	102
EX-371-6	7/16	Pin	6	152



Hex Drive Nutsetters

Part Number	Size (in.)	Overall Length (in.)	Socket Nose Diameter (in.)
-------------	------------	----------------------	----------------------------

7/16" 6 Point

6N-1416-3	1/2	3	13/16
6N-1416-4	1/2	4	13/16
6N-1418-3	9/16	3	7/8
6N-1418-4	9/16	4	7/8
6N-1420-3	5/8	3	1
6N-1420-6	5/8	6	1



Insert Bits

Used with Bit Holders
(all bits are 1.0" (25.4 mm) long)



Point Size	Part Number		Wood		Machine & Self-Tapping			
	Phillips	Pozi-Drive	Flat & Oval	Round	Flat, Oval & Pan	Fillister	Truss	Binding
0	446-0	446-1P2D	0.1	0.1	0.1	0.1	0.1	0.1
1	HPL-1	440-1PZD	2-4	2-4	2-4	2-4	2-4	2-4
2	HPI-2	440-2PZD	5-8	5-10	5-10	5-10	6-10	5-10
3	HPI-3	440-3PZD	10-16	12-16	12-16	12-5/16	12-16	12-1/4

6 Point Sockets

Part No.	Hex Opening	Overall Length	Nose End Diameter	Drive End Diameter	Opening Depth
----------	-------------	----------------	-------------------	--------------------	---------------

3/8" Square Drive Sockets, SAE

3112	3/8	1 1/4	19/32	3/4	1/4
3114	7/16	1 1/2	11/16	3/4	9/32
3116	7/16	1/2	1 1/2	13/16	11/32
3118	7/16	9/16	1-1/2	7/8	7/16

1/2" Square Drive Sockets, SAE

5112	3/8	1 1/2	5/8	15/16	1/4
5114	7/16	1 1/2	11/16	15/16	9/32
5116	1/2	1 1/2	13/16	15/16	11/32
5120	5/8	1 1/2	1	1	7/16
5122	11/16	1 1/2	1 1/8	1 1/8	7/16
5124	3/4	1 1/2	1 1/8	1 1/8	15/32

3/4" Square Drive Sockets, SAE

7128	7/8	2	1 1/2	1 1/2	9/16
7132	1	2	1 5/8	1 5/8	5/8
7136	1 1/8	2 1/8	1 3/4	1 3/4	3/4
7140	1 1/4	2 1/8	2	1 3/4	13/16
7144	1 3/8	2 1/8	2 1/8	2 1/8	13/16
7148	1 1/2	2 1/4	2 1/4	2 1/8	1

1" Square Drive Sockets, SAE

8132	1	2 1/8	1 5/8	2	13/16
8140	1 1/4	2 1/8	2 1/8	2 1/8	13/16
8144	1 3/8	2 1/8	2 1/8	2 1/8	13/16
8148	1 1/2	2 1/4	2 1/4	2 1/8	15/16
8156	1 3/4	2 3/8	2 5/8	2 5/8	11/16
8164	2	2 5/8	3	2 5/8	1 3/16

1 1/2" Square Drive Sockets, SAE

9156	1 3/4	2 7/8	2 7/8	3	1 1/8
9160	1 7/8	3	3 1/8	3	1 1/4
9164	2	3 1/8	3 1/4	3 1/4	1 3/8
9172	2 1/4	3 1/4	3 3/8	3 1/4	1 1/2

3/8" Square Drive Sockets, Metric

12mm13	12	38.1	19.1	19.1	7.2
14mm13	14	38.1	22.2	22.2	11.1
16mm13	16	38.1	23.8	23.8	11.1

1/2" Square Drive Sockets, Metric

16mm15	16	38.1	25.4	25.4	11.1
18mm15	18	38.1	28.6	28.6	11.1
20mm15	20	38.1	31.7	31.7	11.9
22mm15	22	38.1	33.3	33.3	14.3

5/8" Square Drive Sockets, Metric

24mm16	24	51	38.1	38.1	15.9
--------	----	----	------	------	------

3/4" Square Drive Sockets, Metric

28mm17	28	54	44.4	44.4	19.1
30mm17	30	54	47.6	44.4	19.1
32mm17	32	54	50.8	44.4	20.6
34mm17	34	54	54.0	54.0	20.6
36mm17	36	57	57.1	54.0	23.8

1" Square Drive Sockets, Metric

32mm18	32	54	54.0	54.0	20.6
34mm18	34	54	54.0	54.0	20.6
36mm18	36	57	57.1	54.0	23.9
38mm18	38	57	57.1	54.0	23.9
42mm18	42	60	63.5	54.0	23.9
46mm18	46	64	69.8	66.7	26.9



APEX® μ -Guard™

Quality Anti-Mar Fastener Tools Begin With Quality Fastener Tools.

Apex μ -Guard™ provides a protective barrier between genuine Apex fastener tools and your finely finished workpiece. The free-spinning patent-pending design provides maximum protection for polished and highly sensitive surfaces.

Apex μ -Guard™ covering is made of a thermo plastic urethane (TPU elastomer) which cushions against costly incidental side impacts. It offers the lowest coefficient of friction for maximum tool efficiency. It is also non-removable for tamper resistance.

With Apex μ -Guard™ you get the proven Apex fastener tool fit and performance plus the best protection available against marring and in-system damage.

μ -Guard™ is your guard against the potential hazards caused by rotational friction.



If it doesn't say Apex on the outside, how can you be sure of what's on the inside?

Prevents Side Impact Damage



Free-Spinning Design



Virtually Damage Free



μ-Guard Sockets

(Includes socket and cover)



Part Number	Socket	Drive End			Socket Length	Fastener End			Assembly Features
		Size	Type	Sex		Size	Type	Sex	
UGS-AB710	10MM21	1/4	Square	F	standard	10 mm	Hex	F	FS
UGS-AB710-01	M-10MM21	1/4	Square	F	standard	10 mm	Hex	F	FS, M
UGS-AB710-02	MB-10MM21	1/4	Square	F	standard	10 mm	Hex	F	FS, M, B
UGS-BA610	10MM13	3/8	Square	F	standard	10 mm	Hex	F	FS
UGS-BA610-01	M-10MM13	3/8	Square	F	standard	10 mm	Hex	F	FS, M
UGS-BB710	10MM23	3/8	Square	F	long	10 mm	Hex	F	FS
UGS-BB710-01	M-10MM23	3/8	Square	F	long	10 mm	Hex	F	FS, M
UGS-BB710-02	MB-10MM23	3/8	Square	F	long	10 mm	Hex	F	FS, M, B
UGS-BB713	13MM23	3/8	Square	F	long	13 mm	Hex	F	FS
UGS-BB713-01	M-13MM23	3/8	Square	F	long	13 mm	Hex	F	FS, M
UGS-BB713-02	MB-13MM23	3/8	Square	F	long	13 mm	Hex	F	FS, M, B
UGS-CB713	13MM25	1/2	Square	F	long	13 mm	Hex	F	FS
UGS-CB713-03	SF-13MM25	1/2	Square	F	long	13 mm	Hex	F	FS, SF
UGS-CB715	15MM25	1/2	Square	F	long	15 mm	Hex	F	FS
UGS-CB715-03	SF-15MM25	1/2	Square	F	long	15 mm	Hex	F	FS, SF
UGS-CB718	18MM25	1/2	Square	F	long	18 mm	Hex	F	FS
UGS-CB718-03	SF-18MM25	1/2	Square	F	long	18 mm	Hex	F	FS, SF

If your tool is not shown in the table of representative products above, please contact your Apex representative.

μ-Guard Extensions

(Includes extension and cover)



Part Number	Extension	Drive End			Extension Length	Socket End			Assembly Features*
		Size	Type	Sex		Size	Type	Sex	
UGE-A2A	EX-250-2	1/4	Hex	M	2	1/4	Square	M	FS
UGE-A4A	EX-250-4	1/4	Hex	M	4	1/4	Square	M	FS
UGE-A6A	EX-250-6	1/4	Hex	M	6	1/4	Square	M	FS
UGE-B2A	EX-370-2	1/4	Hex	M	2	3/8	Square	M	FS
UGE-B4A	EX-370-4	1/4	Hex	M	4	3/8	Square	M	FS
UGE-B6A	EX-370-6	1/4	Hex	M	6	3/8	Square	M	FS
UGE-B3C	EX-376-3	3/8	Square	F	3	3/8	Square	M	FS
UGE-B6C	EX-376-6	3/8	Square	F	6	3/8	Square	M	FS
UGE-B12C	EX-376-12	3/8	Square	F	12	3/8	Square	M	FS
UGE-C4C	EX-508-4	1/2	Square	F	4	1/2	Square	M	FS
UGE-C8C	EX-508-8	1/2	Square	F	8	1/2	Square	M	FS
UGE-C12C	EX-508-12	1/2	Square	F	12	1/2	Square	M	FS

If your tool is not shown in the table of representative products above, please contact your Apex representative.

μ-Guard Bit Holders

(Includes bit holder and cover)



Part Number	Bit Holder	Drive End			Socket Length	Fastener End			Assembly Features
		Size	Type	Sex		Size	Type	Sex	
UGH-1NAA	M-490	1/4	Hex	M	2 31/32	1/4	Hex	F	FS, M, ET
UGH-1AAA	M-490-2	1/4	Hex	M	2	1/4	Hex	F	FS, M, ET
UGH-2NBG	838	3/8	Square	F	1 1/2	1/4	Hex	F	FS, ET
UGH-1NBG	M-838	3/8	Square	F	2 5/8	1/4	Hex	F	FS, M, ET
UGH-2NBC	835	3/8	Square	F	1 1/2	5/16	Hex	F	FS, ET
UGH-1NBC	M-835	3/8	Square	F	2 3/4	5/16	Hex	F	FS, M, ET
UGH-2NBD	855	1/2	Square	F	1 1/2	5/16	Hex	F	FS, ET
UGH-1NBD	M-855	1/2	Square	F	2 3/4	5/16	Hex	F	FS, M, ET
UGH-2NCK	QR-308	3/8	Square	F	1 3/4	1/4	Hex	F	FS, QR
UGH-2NCF	QR-508	1/2	Square	F	2 1/8	1/4	Hex	F	FS, QR
UGH-2NCJ	QR-314	3/8	Square	F	2	7/16	Hex	F	FS, QR
UGH-2NCL	QR-514	1/2	Square	F	2 1/8	7/16	Hex	F	FS, QR

If your tool is not shown in the table of representative products above, please contact your Apex representative.

*Features Abbreviations

- FS** Free Spinning Tool is able to rotate independently of Cover
- M** Magnetic Tool includes magnet to hold the position of the fastener during fastening operation
- B** Bolt Clearance Tool is spring-loaded to allow bolt or nut to retract into the socket body
- SF** Surface Drive Tool has radiused corners to allow easier alignment and engagement of fastener
- ET** Exposed Tip Cover extends beyond end of Bit Holder to shield the majority of a standard 1 inch long Insert Bit.

- QR** Quick Release Tool has tension feature to allow quick & easy change between bits
Cover will not extend beyond end of Bit Holder

Notes: Reported lengths are based on uncovered tool length only for reference. Cover may extend beyond end of tool by 2 mm unless otherwise noted.

Conversion Tables

Millimeter – Decimal – Fraction

mm	Dec.	in.	mm	Dec.	in.	mm	Dec.	in.	mm	Dec.	in.	mm	Dec.	in.
0.100	.0039		5.159	.2031	13/64	10.300	.4055		15.400	.6063		20.400	.8031	
0.200	.0079		5.200	.2047		10.319	.4063	13/32	15.478	.6094	39/64	20.500	.8071	
0.300	.0118		5.300	.2087		10.400	.4094		15.500	.6102		20.600	.8110	
0.397	.0156	1/64	5.400	.2126		10.500	.4134		15.600	.6142		20.638	.8125	13/16
0.400	.0157		5.500	.2165		10.600	.4173		15.700	.6181		20.700	.8150	
0.500	.0197		5.556	.2188	7/32	10.700	.4219		15.800	.6220		20.800	.8189	
0.600	.0236		5.600	.2205		10.716	.4219	27/64	15.875	.6250	5/8	20.900	.8228	
0.700	.0276		5.700	.2244		10.800	.4252		15.900	.6250		21.000	.8268	
0.794	.0313	1/32	5.800	.2283		10.900	.4291		16.000	.6299		21.034	.8182	53/64
0.800	.0315		5.900	.2323		11.000	.4331		16.100	.6339		21.100	.8307	
0.900	.0354		5.953	.2344	15/64	11.100	.4370		16.200	.6378		21.200	.8307	
1.000	.0394		6.000	.2362		11.113	.4375	7/16	16.272	.6406	41/64	21.200	.8346	
1.100	.0433		6.100	.2402		11.200	.4409		16.300	.6417		21.300	.8386	
1.191	.0469	3/64	6.200	.2441		11.300	.4449		16.400	.6457		21.400	.8425	
1.200	.0472		6.300	.2480		11.400	.4488		16.500	.6496		21.431	.8438	27/32
1.300	.0512		6.350	.2500	1/4	11.500	.4528		16.600	.6535		21.500	.8465	
1.400	.0551		6.400	.2520		11.509	.4531	29/64	16.669	.6563	21/32	21.600	.8504	
1.500	.0591		6.500	.2559		11.600	.4567		16.700	.6575		21.700	.8543	
1.588	.0625	1/16	6.600	.2598		11.700	.4606		16.800	.6614		21.800	.8583	
1.600	.0630		6.700	.2638		11.800	.4646		16.900	.6654		21.828	.8594	55/94
1.700	.0669		6.747	.2656	17/64	11.900	.4685		17.000	.6693		21.900	.8622	
1.800	.0709		6.800	.2677		11.906	.4688	15/32	17.066	.6719	43/64	22.000	.8661	
1.900	.0748		6.900	.2717		12.000	.4724		17.100	.6732		22.100	.8701	
1.984	.0781	5/64	7.000	.2756		12.100	.4764		17.200	.6772		22.200	.8740	
2.000	.0878		7.100	.2795		12.200	.4803		17.300	.6811		22.225	.8750	7/8
2.100	.0827		7.144	.2813	9/32	12.300	.4843		17.400	.6850		22.300	.8780	
2.200	.0866		7.200	.2835		12.303	.4844	31/64	17.463	.6875	11/16	22.400	.8819	
2.300	.0906		7.300	.2874		12.400	.4882		17.500	.6890		22.500	.8858	
2.381	.0938	3/32	7.400	.2913		12.500	.4921		17.600	.6929		22.600	.8898	
2.400	.0945		7.500	.2953		12.600	.4961		17.700	.6968		22.622	.8906	57/64
2.500	.0984		7.541	.2969	19/64	12.700	.5000	1/2	17.800	.7008		22.700	.8937	
2.600	.1024		7.600	.2992		12.800	.5039		17.859	.7031	45/64	22.800	.8976	
2.700	.1063		7.700	.3031		12.900	.5079		17.900	.7047		22.900	.9016	
2.778	.1094	7/64	7.800	.3071		13.000	.5118		18.000	.7087		23.000	.9055	
2.800	.1102		7.900	.3110		13.097	.5156	33/64	18.100	.7126		23.019	.9063	29/32
2.900	.1142		7.938	.3125	5/16	13.100	.5157		18.200	.7165		23.100	.9094	
3.000	.1181		8.000	.3150		13.200	.5197		18.256	.7188	23/32	23.200	.9134	
3.100	.1220		8.100	.3189		13.300	.5236		18.300	.7205		23.300	.9173	
3.175	.1250	1/8	8.200	.3228		13.400	.5276		18.400	.7244		23.400	.9213	
3.200	.1260		8.300	.3268		13.494	.5313	17/32	18.500	.7283		23.416	.9219	59/64
3.300	.1299		8.334	.3281	21/64	13.500	.5315		18.600	.7323		23.500	.9252	
3.400	.1339		8.400	.3307		13.600	.5354		18.653	.7344	47/64	23.600	.9291	
3.500	.1378		8.500	.3346		13.700	.5394		18.700	.7362		23.700	.9331	
3.572	.1406	9/64	8.600	.3386		13.800	.5433		18.800	.7402		23.800	.9370	
3.600	.1417		8.700	.3425		13.891	.5469	35/64	18.900	.7441		23.900	.9409	
3.700	.1457		8.731	.3438	11/32	13.900	.5472		19.000	.7480		24.000	.9449	
3.800	.1496		8.800	.3465		14.000	.5512		19.050	.7500	3/4	24.100	.9488	
3.900	.1535		8.900	.3504		14.100	.5551		19.100	.7520		24.200	.9528	
3.969	.1563	5/32	9.000	.3543		14.200	.5591		19.200	.7559		24.209	.9531	61/64
4.000	.1575		9.100	.3583		14.288	.5625	9/16	19.300	.7598		24.300	.9567	
4.100	.1624		9.128	.3594	23/64	14.300	.5630		19.400	.7638		24.400	.9606	
4.200	.1654		9.200	.3622		14.400	.5669		19.447	.7656	49/64	24.500	.9646	
4.300	.1693		9.300	.3661		14.500	.5709		19.500	.7677		24.600	.9685	
4.366	.1719	11/64	9.400	.3701		14.600	.5748		19.600	.7717		24.606	.9688	31/32
4.400	.732		9.500	.3740		14.684	.5781	37/64	19.700	.7756		24.700	.9724	
4.500	.1772		9.525	.3750	3/8	14.700	.5787		19.800	.7795		24.800	.9764	
4.600	.1811		9.700	.3819		14.800	.5827		19.844	.7813	25/32	24.900	.9803	
4.700	.1850		9.800	.3858		14.900	.5866		19.900	.7835		25.000	.9843	
4.763	.1875	3/16	9.900	.3898		15.000	.5906		20.000	.7874		25.003	.9844	63/64
4.800	.1890		9.922	.3902	25/64	15.081	.5938	19/32	20.100	.7913		25.100	.9882	
4.900	.1929		10.000	.3937		15.100	.5945		20.200	.7953		25.200	.9921	
5.000	.1969		10.100	.3976		15.200	.5984		20.241	.7969	51/64	25.300	.9961	
5.100	.2008		10.200	.4016		15.300	.6024		20.300	.7992		25.400	1.000	1

Conversion Tables

Torque – Air Pressure – Miscellaneous



Torque Conversion Factors		
To Convert	Into	Multiply By
Inch Pounds	Foot Pounds	0.0835
Inch Pounds	Newton meters	0.1130
Inch Pounds	Kg-meters	0.0115
Inch Pounds	Kg-Cm	1.1519
Foot Pounds	Inch Pounds	12.000
Foot Pounds	Newton meters	1.3560
Foot Pounds	Kg-meters	0.1382
Foot Pounds	Kg-Cm	13.8240
Newton Meters	Inch Pounds	8.8440
Newton Meters	Foot Pounds	0.7370
Newton Meters	Kg-meters	0.1020
Newton Meters	Kg-Cm	10.2000
Kg meters	Inch Pounds	86.8100
Kg meters	Foot Pounds	7.2340
Kg meters	Newton-meters	9.8040
Kg Cm	Inch Pounds	0.8681
Kg Cm	Foot Pounds	0.0723
Kg Cm	Newton-meters	0.0980

Torque Conversion – In. Lbs. (Nm)					
In. Lbs.	Nm	In. Lbs.	Nm	In. Lbs.	Nm
5	0.6	50	5.7	140	15.8
10	1.1	60	6.8	150	17.0
15	1.7	70	7.9	160	18.1
20	2.3	80	9.0	170	19.2
25	2.8	90	10.2	180	20.3
30	3.4	100	11.3	190	21.5
35	4.0	110	12.4	200	22.6
40	4.5	120	13.6		
45	5.1	130	14.7		

Torque Conversion – Ft. Lbs. (Nm)							
Ft. Lbs.	Nm	Ft. Lbs.	Nm	Ft. Lbs.	Nm	Ft. Lbs.	Nm
1	1.36	33	44.8	65	88.1	97	131.5
2	2.7	34	46.1	66	90.0	98	133.0
3	4.1	35	47.5	67	90.9	99	134.2
4	5.4	36	48.8	68	92.2	100	135.6
5	6.8	37	50.2	69	93.6	110	149.2
6	8.1	38	52.0	70	94.9	115	156.0
7	9.5	39	52.9	71	96.3	120	163.0
8	10.9	40	54.2	72	97.6	125	170.0
9	12.2	41	55.6	73	99.0	130	176.3
10	13.6	42	57.0	74	100.3	135	183.1
11	14.9	43	58.3	75	102.0	140	190.0
12	16.3	44	60.0	76	103.1	145	197.0
13	17.6	45	61.0	77	104.4	150	203.4
14	19.0	46	62.4	78	105.8	155	210.2
15	20.3	47	63.7	79	107.1	160	217.0
16	21.7	48	65.1	80	108.5	165	224.0
17	23.1	49	66.4	81	110.0	170	231.0
18	24.4	50	67.8	82	111.2	175	237.3
19	25.8	51	69.2	83	112.6	180	244.1
20	27.1	52	70.5	84	114.0	185	251.0
21	28.5	53	71.9	85	115.3	190	258.0
22	29.8	54	73.2	86	117.0	195	264.4
23	31.2	55	74.6	87	118.0	200	271.2
24	32.5	56	75.9	88	119.3	225	305.1
25	33.9	57	77.3	89	121.0	250	339.0
26	35.3	58	78.7	90	122.0	275	373.0
27	36.6	59	80.0	91	123.4	300	407.0
28	38.0	60	81.4	92	125.0	350	475.0
29	39.3	61	82.7	93	126.1	400	542.4
30	40.7	62	84.1	94	127.5		
31	42.0	63	85.4	95	129.0		
32	43.4	64	86.8	96	130.2		

Inch Bolt Torque Table

SAE J429 and ASME 574

Steel Grade	SAE 5		SAE 8		Socket Head Cap Screws	
	Dry	Lubed	Dry	Lubed	Dry	Lubed
1/4-20	(101)	(76)	(143)	(107)	(168)	(120)
1/4-28	(116)	(87)	(147)	(123)	(192)	(144)
5/16-18	(209)	(157)	(295)	(221)	(348)	(264)
5/16-24	(231)	(174)	(327)	(245)	(384)	(288)
3/8-16	(372)	(276)	44	33	51	38
3/8-24	(420)	(312)	49	37	58	43
7/16-14	49	37	70	52	81	61
7/16-20	55	41	78	58	91	68
1/2-13	75	57	106	80	124	93
1/2-20	85	64	120	90	140	105
5/8-11	150	113	212	159	238	179
5/8-18	170	127	240	180	270	202
3/4-10	267	200	376	282	423	317
3/4-16	297	223	420	315	472	354
7/8-9	429	322	606	455	682	511
7/8-14	474	355	669	502	752	564
1-8	644	483	909	681	1022	767
1-12	722	542	1020	765	1147	860

Metric Bolt Torque Table

ISO 898

Property Class	8.8		10.9		12.9 Socket Head Cap Screw	
	Torque in Newton Meter - Nm					
Nom Size x Pitch	Dry	Lubed	Dry	Lubed	Dry	Lubed
M5 x 0.80	6.1	4.6	8.8	6.7	10.3	7.7
M6 x 1.00	10.4	7.8	15	11.2	17.6	13.1
M7 x 1.00	17.6	13.1	25.1	18.9	29.4	22
M8 x 1.25	25.4	19.1	37.6	27.3	42.6	32.1
M10 x 1.50	50	38	72	54	84	64
M12 x 1.75	88	66	126	94	146	110
M14 x 2.00	141	106	201	150	235	176
M16 x 2.00	218	164	312	233	365	274
M18 x 2.50	301	226	431	323	504	378
M20 x 2.50	426	319	609	457	712	534
M22 x 2.50	580	435	831	624	971	728
M24 x 3.00	736	552	1052	789	1231	923
M27 x 3.00	1079	809	1544	1158	1805	1353
M30 x 3.50	1463	1097	2092	1570	2446	1834
M33 x 3.50	1990	1493	2849	2137	3328	2497
M36 x 4.00	2557	1918	3659	2744	4276	3208

Lubed means cleaned dry bolts lubricated with a standard medium viscosity machine oil. Lubricate all contact areas of the bolts and washers. Lubricating the bolts is the suggested method.

Miscellaneous Conversion Factors			Air Pressure Conversion		
To Convert	Into	Multiply By	PSI	kPa*	Bar**
Inches	Millimeters	25.4000	85	586	5.9
Millimeters	Inches	0.0394	90	620	6.2
Pounds	Kilograms	0.4536	95	655	6.6
Kilograms	Pounds	2.2050	100	690	6.9
psi	bar	0.069	125	860	8.6
bar	psi	14.5			

*Preferred: Approximate to the nearest 5 kPa.
**Approximate to the nearest 0.5 Bar.

The Total Solution

The total solution from Cooper Tools includes not only a complete line of quality industrial tools and accessories but also a professional engineering and product support staff to help customize each tool to specific application requirements. All are as close as a telephone or e-mail.

Cooper Tools maintains company-owned Service Centers in strategic locations throughout the world, staffed with professional tool repair technicians who use genuine Cooper Tools parts and who are outfitted with the very latest in testing, calibration and inspection equipment. Each tool that is returned to a customer from one of our Service Centers carries with it a warranty that is Cooper Tools' assurance that it will perform just like it did when it was purchased new.



Our support personnel are fully capable of helping to diagnose problems and promptly recommend solutions.

Our complete line of tools are carefully designed and

built from the finest materials available in order to provide years of trouble free service. But, as with any piece of equipment, service problems can occur. All tools are designed to be easy to service ... that is, of course, with properly trained personnel.

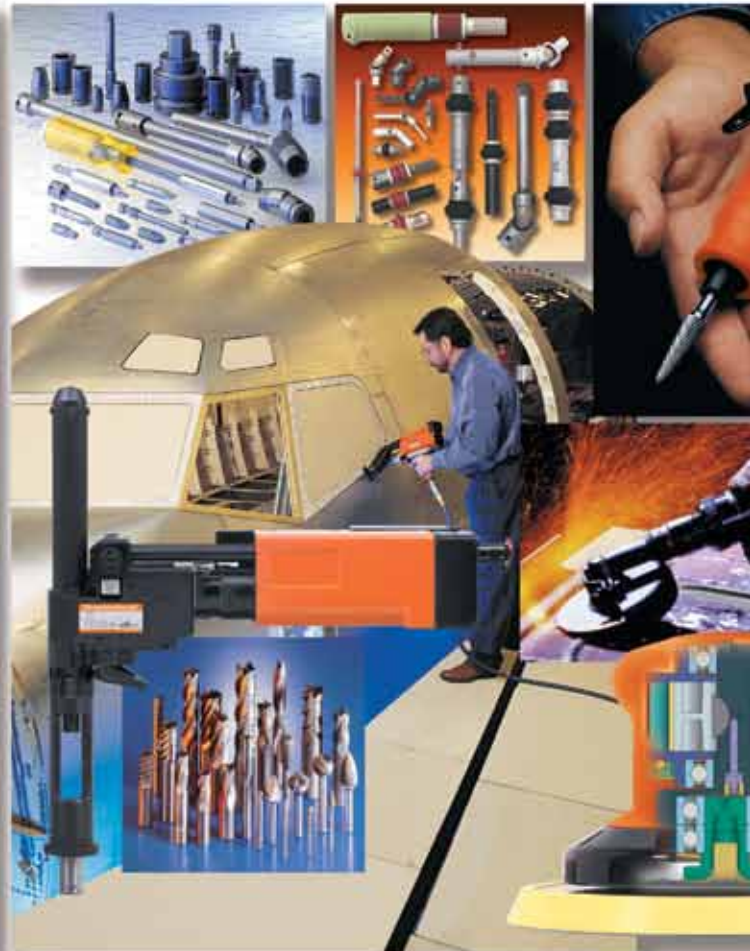
To facilitate quick repairs, and limit downtime ...

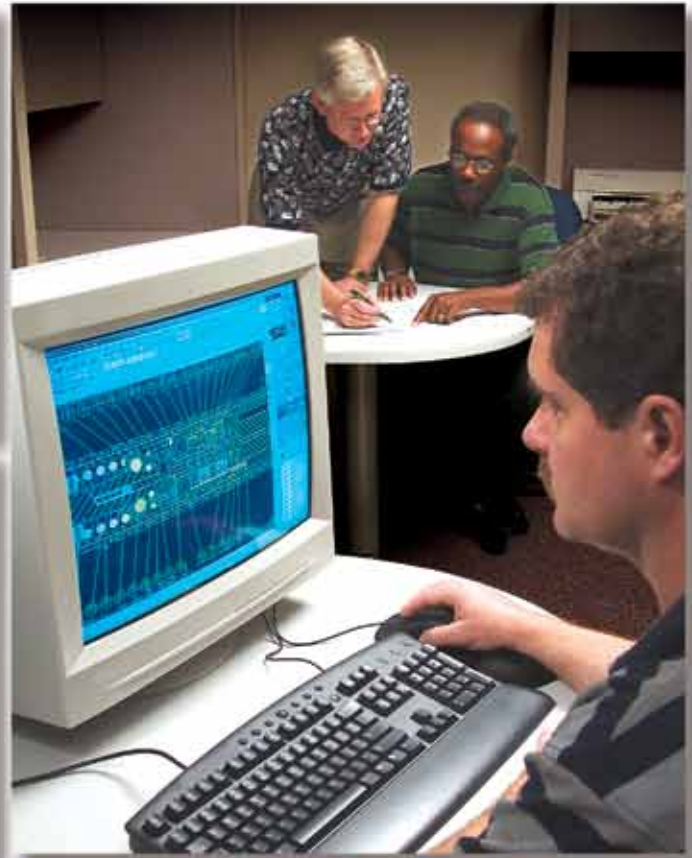
TRAINING

Cooper Tools conducts training seminars covering all aspects of every tool we make.

Introductory training seminars are designed to fully acquaint students with the entire line of tools and their fundamental operation. Advanced training seminars, which are often tailored to individual needs, are designed to hone the skills of the experienced student. Hands-on experience, with an emphasis on troubleshooting and repairing, are the focus of this training.

Service literature, product information, brand catalogs and FAQs are also available around the clock on the web. Just access www.coopertools.com for the latest information available.





Sales & Service Centers

Note: All locations may not service all products. Please contact the nearest Sales & Service Center for the appropriate facility to handle your service requirements.

Dallas, TX

**Cooper Tools
Sales & Service Center**
1470 Post & Paddock
Grand Prairie, TX 75050
Tel: (972) 641-9563
Fax: (972) 641-9674

Detroit, MI

**Cooper Tools
Sales & Service Center**
2630 Superior Ct.
Auburn Hills, MI 48326
Tel: (248) 391-3700
Fax: (248) 391-6295

Houston, TX

**Cooper Tools
Sales & Service Center**
6550 West Sam Houston
Parkway North, Suite 200
Houston, TX 77041
Tel: (713) 849-2364
Fax: (713) 849-2047

Seattle, WA

**Cooper Tools
Sales & Service Center**
2865 152nd Ave N.E.
Redmond, WA 98052
Tel: (425) 497-0476
Fax: (425) 497-0496

Lexington, SC

Cooper Tools
670 Industrial Drive
Lexington, SC 29072
Tel: (800) 845-5629
Tel: (803) 951-7544
Fax: (803) 358-7681

Los Angeles, CA

**Cooper Tools
Sales & Service Center**
15503 Blackburn Ave
Norwalk, CA 90650
Tel: (562) 926-0810
Fax: (562) 802-1718

York, PA

**Cooper Tools
Sales & Service Center**
York Service Center
3990 E. Market Street
York, PA 17402
Tel: (717) 755-2933
Fax: (717) 757-1659

Brazil

Cooper Tools Industrial Ltda.
Av. Liberdade, 4055
Zona Industrial - Iporanga
18087-170 Sorocaba, SP Brazil
Tel: (011) 55 15 238 3929
Fax: (011) 55 15 228 3260

Canada

**Cooper Tools
Sales & Service Center**
5925 McLaughlin Road
Mississauga, Ont. L5R 1B8
Canada
Tel: (905) 501-4785
Fax: (905) 501-4786

China

Cooper (China) Co., Ltd.
955 Sheng Li Road,
Heqing Pudong, Shanghai
China 201201
Tel: +86-21-28994176
Fax: + 86-21-51118446

France

**Cooper Tools SAS
Recoules Operation**
Zone Industrielle
BP 28
Avenue Maurice Chevalier
77831 Ozoir-la-Ferrière Cedex
France
Tel: (011) 33 1 64 43 22 00
Fax: (011) 33 1 64 40 17 17

Germany

**Cooper Tools
GmbH & Co. OHG**
Postfach 30
D-73461 Westhausen
Tel: +49 (0) 73 63/ 81-0
Fax: +49 (0) 73 63/ 81-222

Mexico

**Cooper Tools
de México S.A. de C.V.**
Libramiento La Joya No. 1
Bodega No. 2
Esq. Politécnico, Barrio San José
Cuautitlán, Edo de México C.P. 54870
Phone: (011) 525 5899 9510
Fax: (011) 525 5870 5012

Cooper Tools Is On The Web!

Cooper Tools provides a complete resource for power tools on-line. Our website www.coopertools.com offers product information, service literature, brand catalogs, press releases and more. A dominant source of information, the Cooper Tools website is your source for application solutions on-line.



Making your job easier is our goal!

You can access service literature anytime. Choose a category such as Assembly Tools or Material Removal Tools from the main menu and then click on the brand you're looking for. You'll be on your way to any current service literature you need, whether it's Cleco, Apex, Master Power, or any of our power tool brands.



Up-to-date product catalogs are also available online providing

you with current information on our broad product line. Even Material Safety Data Sheets (M.S.D.S.) for Safety and Disposal Information are available on our website.



It's simple!

Our *Customer Care* section provides you with information such as answers to frequently asked questions or contact phone numbers and addresses for your area of the country. You can browse through the *What's New* information to learn how Cooper Tools continues to be your source for solutions.



For even faster searches, you can go direct to a brand site by simply entering the brand name. Entering www.dotco-tools.com takes you directly to the Dotco brand site.

What is the future of www.coopertools.com? A dynamic site continuing to focus on your need for up-to-date information on the latest Cooper Tools' offerings that you can access anytime you need... twenty-four hours a day, seven days a week!

Sales & Service Centers

Note: All locations may not service all products. Please contact the nearest Sales & Service Center for the appropriate facility to handle your service requirements.

Dallas, TX
Cooper Tools
Sales & Service Center
1470 Post & Paddock
Grand Prairie, TX 75050
Tel: 972-641-9563
Fax: 972-641-9674

Detroit, MI
Cooper Tools
Sales & Service Center
2630 Superior Court
Auburn Hills, MI 48326
Tel: 248-391-3700
Fax: 248-391-7824

Houston, TX
Cooper Tools
Sales & Service Center
6550 West Sam Houston
Parkway North, Suite 200
Houston, TX 77041
Tel: 713-849-2364
Fax: 713-849-2047

Lexington, SC
Cooper Tools
670 Industrial Drive
Lexington, SC 29072
Tel: 800-845-5629
Tel: 803-359-1200
Fax: 803-358-7681

Los Angeles, CA
Cooper Tools
Sales & Service Center
15503 Blackburn Ave
Norwalk, CA 90650
Tel: 562-926-0810
Fax: 562-802-1718

Seattle, WA
Cooper Tools
Sales & Service Center
2865 152nd Ave N.E.
Redmond, WA 98052
Tel: 425-497-0476
Fax: 425-497-0496

York, PA
Cooper Tools
Sales & Service Center
3990 East Market Street
York, PA 17402
Tel: 717-755-2933
Fax: 717-757-5063

Canada
Cooper Tools
Sales & Service Center
5925 McLaughlin Road
Mississauga, Ont. L5R 1B8
Canada
Tel: 905-501-4785
Fax: 905-501-4786

Westhausen, EMEA
Cooper Power Tools
GmbH & Co. OHG
Postfach 30
D-73461 Westhausen
Germany
Phone: +49 (0) 73 63/ 81-0
Fax: +49 (0) 73 63/ 81-222
HTWE.sales
@cooperindustries.com

Coventry, UK
Cooper Power Tools
GmbH & Co. OHG
Unit G Quinn Close
Seven Stars Industrial Estate
Whitlet
Coventry CV3 4LH
UK
Phone: +44-2476-3089 60
Fax: +44-2476-3089 69

Cooper Tools
P.O. Box 1410
Lexington, SC 29071-1410
USA
Phone: 800-845-5629
803-359-1200
Fax: 803-359-0822

Cooper Tools
2630 Superior Court
Auburn Hills, MI 48326
Phone: 248-391-3700
888-332-6061
Fax: 248-391-7824

Cooper Tools
5925 McLaughlin Road
Mississauga, Ontario
Canada L5R 1B8
Phone: 905-501-4785
Fax: 905-501-4786

Cooper Tools
de México S.A. de C.V.
Libramiento La Joya No. 1
Bodega No. 2
Esq. Politécnico
Barrio San José
Cuautitlán, Edo de México
C.P. 54870
Phone: +52-55-5899-9510
Fax: +52-55-5870-5012

Cooper Tools Industrial
Ltda.
Av. Liberdade, 4055
Zona Industrial - Iporanga
18087-170 Sorocaba, SP
Brazil
Tel: +55-15-3238-3929
Fax: +55-15-228-3260

Cooper Power Tools SAS
Zone industrielle - B.P. 28
77831 Ozoir-la-Ferrière
Cedex
France
Téléphone: +33-1-6443-2200
Téléfax: +33-1-6440-1717

Cooper Power Tools
GmbH & Co. OHG
Postfach 30
D-73461 Westhausen
Germany
Phone: +49 (0) 73 63/ 81-0
Fax: +49 (0) 73 63/ 81-222
HTWE.sales
@cooperindustries.com

Cooper (China) Co., Ltd.
955 Sheng Li Road,
Heqing Pudong, Shanghai
China 201201
Tel: +86-21-28994176
+86-21-28994177
Fax: + 86-21-51118446

www.coopertools.com

Cooper Tools
1000 Lufkin Road
Apex, NC 27539
Phone: 919-387-0099
Fax: 919-387-2614
www.coopertools.com