QUALITY TOOLS FOR THE

Aerospace Industry

Recoules® Quackenbush®

Cleco®

DOTCO®

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Recoules Quackenbush® Cleco® DOTCO® APEX®

Assuring You Of The Right Tool For The Right Application

The Advanced Drilling Equipment line has been developed to address the singular nature of achieving optimum hole quality in the aerospace industry.

In most traditional industries, precision holes can be successfully drilled with a drill press or CNC machine. But because a significant number of aircraft components are too large, too complex and too irregularly shaped to be taken to a machining center, portable precision drill motors must be taken to the plane itself. It is impractical to drill precision holes in a wing, fuselage or engine nacelle any other way.

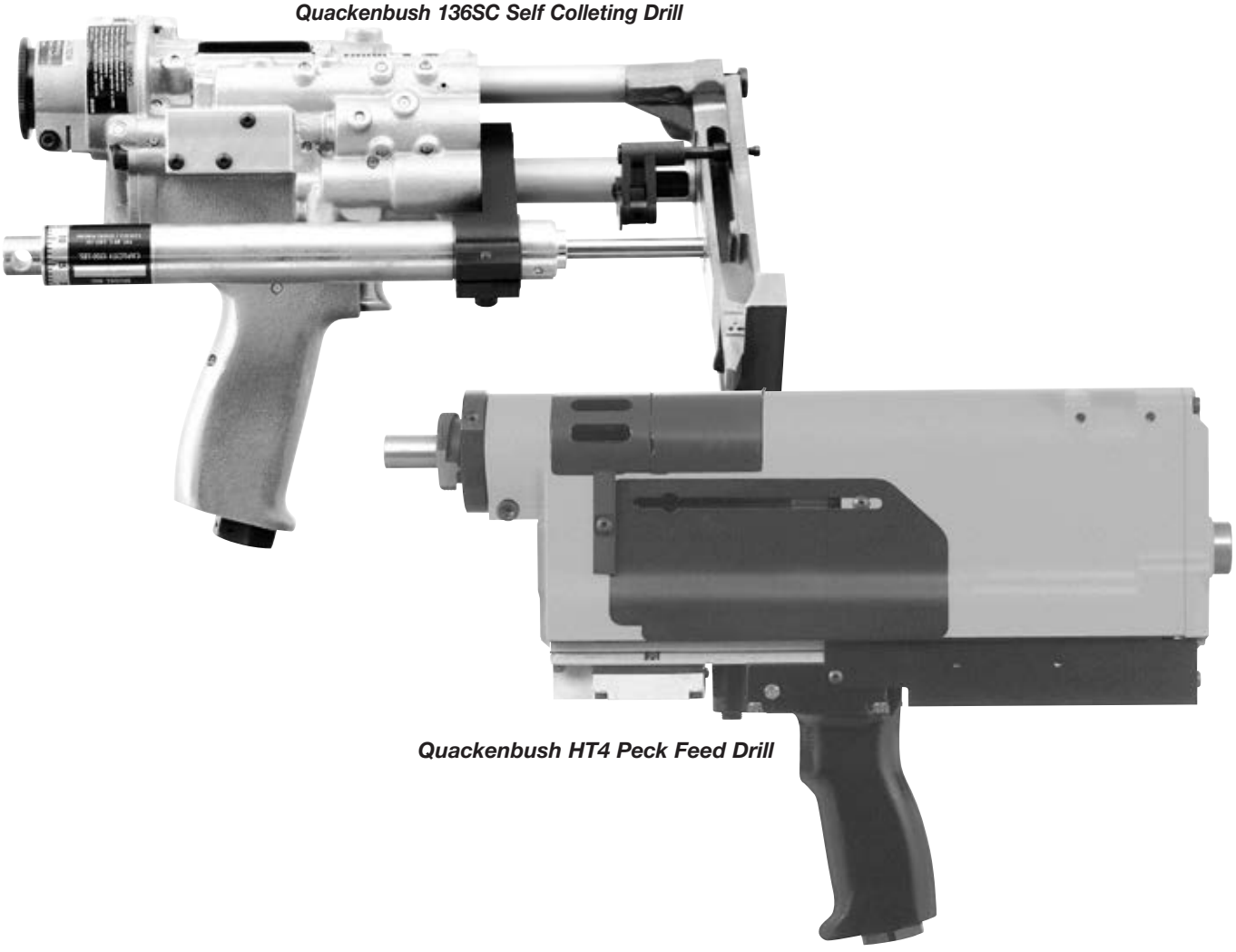
The wide range of hole sizes, the critically close tolerances required of those holes and the divergent materials used in the aerospace manufacturing industry demand that these portable precision drill motors be available with a remarkably broad range of cutter speeds, feed rate combinations, and physical properties that can accommodate virtually any workspace or application.

Responding successfully to these demands for quality and flexibility has made the Apex Tools Advanced Drilling Equipment line the most impressive, and the most respected, in the business.

Included are positive feed drills for deep hole drilling in in-line, piggyback, and right angle configurations, peck drills designed specifically to enhance hole quality when drilling through layers of dissimilar materials, and self colleting drills that are perfect for drilling smaller holes throughout the aircraft.

We invite your attention to a detailed picture of the various Advanced Drilling Equipment tools and accessories in the pages that follow.

Quackenbush 136SC Self Colleting Drill



Quackenbush HT4 Peck Feed Drill

Selecting The Right Tool

The old saying, “you’ve got to have the right tool to do the job right”, is so true in regards to advanced drilling equipment. For certain applications, as shown in the diagram below, a specific tool is required. However, other applications may be served by more than one tool. Detailed analysis by one of our experienced technical assistants will help you make the right tool selection for your particular applications. Some factors to consider are fixturing costs, access, hole quality, material(s) being drilled, production rate, budget, and familiarity with product.

Peck Feed Drill
- **Stacks of different materials**
- **Close tolerance, one-shot drilling**

Peck Feed or Positive Feed Drill

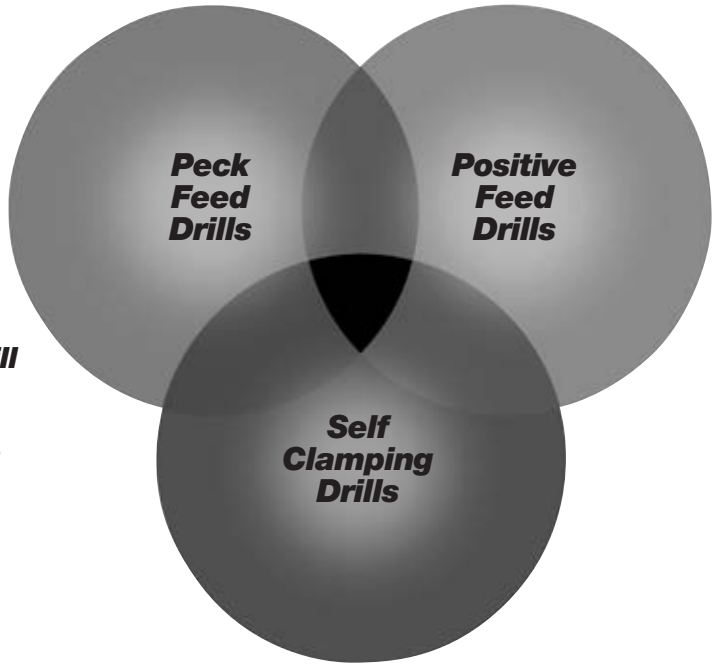
Positive Feed Drill
- **Work hardening materials**
- **Controlled fixed feed rates**
- **Drilling stroke >4 inches**

Positive Feed or Self Clamping Drill

Self Clamping Drill
- **Drilling and countersinking of wings and fuselage**
- **Nutplate holes**

Self Clamping or Peck Feed Drill

Peck Feed or Positive Feed or Self Clamping Drill



Quackenbush 10QNPD Nut Plate Drill

Quackenbush 60QBSF Back Spotfacer

Speed, Feed & Power

Please use the chart below as a guide only. Many variables contribute to the optimum parameters for each application. These variables include: particular material characteristics, cutter design, cutter sharpness, airline pressure and flow capacity and cutter lubrication.

All portable drilling tools have limited power and thrust. In most cases, holes over 1/2 inch diameter cannot be produced at machine tool rates. Feed rates and/or speeds are reduced. Consult Apex Tools for advise on particular applications.

For best results with your drilling system:

1. Maintain lubricated air to the tool with pressure of 90 psig *while the tool is running.*

2. Use high quality cutters.

3. Replace cutters when point dulls – hole diameter generally increases, cycle times lengthen *(except positive feed)* and hole finish worsens.

4. Whenever possible, provide lubricant mist to the drill point.

5. Insure there is an adequate flow path for drill chips *(swarf).*

6. Utilize fixtures that are secure and rigid.

7. Assure that accessory items are sized correctly and working properly.

8. Train operating personnel in the proper use of the tool.

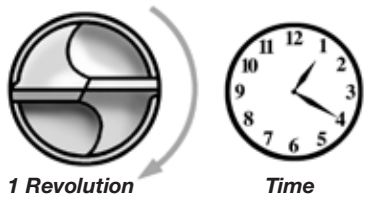
		Drill Diameter						
		1/8	3/16	1/4	5/16	3/8	7/16	1/2
Material	**Function**	**.125**	**.188**	**.250**	**.313**	**.375**	**.437**	**.500**
Aluminum (300 SFM)	Speed (RPM)	9000	6000	4600	3600	3000	2600	2300
	Feed Rate (IPR)	.002	.003	.004	.004	.004	.004	.004
	Power (HP)	.2	.3	.6	1.0	1.5	1.8	2.0
Mild Steel (90 SFM)	Speed (RPM)	2700	1800	1300	1100	900	750	650
	Feed Rate (IPR)	.005	.005	.005	.006	.006	.006	.006
	Power (HP)	.2	.3	.6	1.0	1.5	1.8	2.0
High Strength Steel Stainless Steel (30 SFM)	Speed (RPM)	900	600	450	375	300	250	220
	Feed Rate (IPR)	.001	.001	.001	.001	.001	.001	.001
	Power (HP)	.2	.3	.6	1.0	1.5	1.8	2.0
Titanium/Inconel (20 SFM)	Speed (RPM)	600	400	300	250	200	175	150
	Feed Rate (IPR)	.002	.003	.003	.003	.004	.004	.005
	Power (HP)	.2	.3	.6	1.0	1.5	1.8	2.0
Composites	Graphite, kevlar, fiberglass, and other composite materials vary widely. Fiber, resin, processing method and type of cutting tool all affect the optimum drilling speed and feedrate. Little power or thrust is normally required, but controlled feedrates at the proper speed is mandatory. Carbide or diamond cutting tools are required. Contact your material supplier or experiment with an NC Drilling Machine.							
Stacks of Various Materials	Use the lowest speed and feedrate of the materials in the stack. Peck feed drilling is best.							

A. Peck Drilling permits higher drilling speeds *B. Carbide cutting tools (when applicable) permits higher drilling speeds* *C. Oil hole cutting tools permit higher drilling speeds.*

Speed (RPM)

Describes the number of revolutions of the spindle per unit of time.

Example: *Revolutions per minute=RPM*

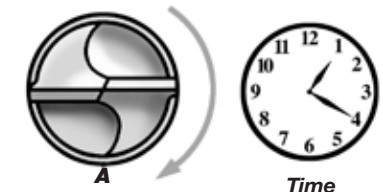


Speed = Revolution ÷ Time

Surface Speed (SFM)

Describes the velocity *(speed)* of the ***outside*** of the drill bit.

Example: *30 surface feet per minute (30 SFM)*

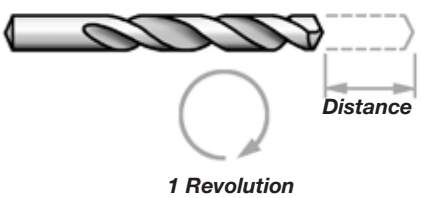


Surface Speed = Distance ÷ Time (rotational)

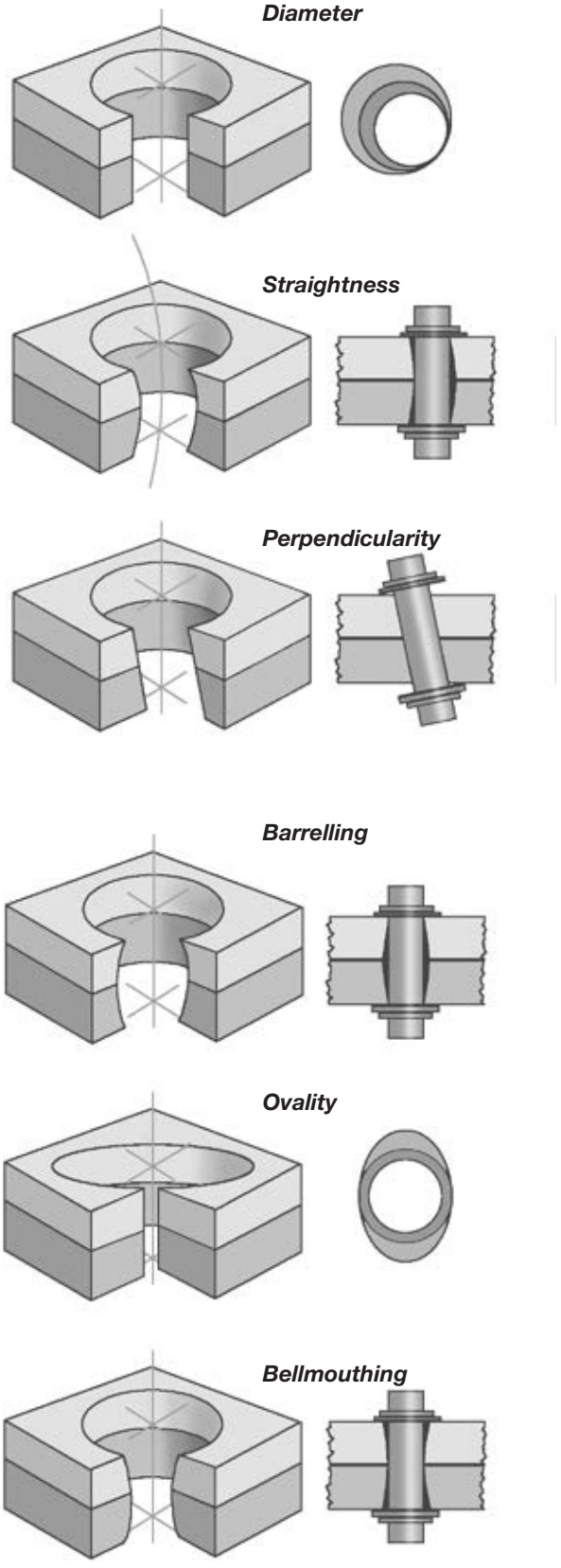
Feed Rate (IPR)

Describes the distance the spindle travels during each revolution.

Example: *0.002 inches per revolution = .002 IPR*



Feed Rate = Distance ÷ Revolution



Benefits of Proper Hole Preparation

Improved Hole Quality

- Diameter tolerance
- Countersink depth tolerance
- Hole finish
- Hole straightness
- Lack of burrs
- No delamination in composites
- No fiber fraying in composites
- No metallurgical change from excess heat

Lowered Cost Per Hole

- Decrease the drilling time
- Reduce the number of operations for a finished hole
- Combine drilling and countersinking into one operation
- Self clamping attachments minimize hole to hole time

Reduced Inventory & Capital Investment

- Portable equipment eliminates expensive, large stationary machines
- Simultaneous drilling and countersinking reduces total equipment requirements
- Self clamping significantly reduces fixturing costs
- Modular designs reduce the number of complete backup units

Reduced Safety Hazards

- Less operator contact
- Drill bit control through nosepieces and fixtured bushings
- All reactions of the drilling process are absorbed by the fixture and drilling equipment

Warranty, Lubrication Products & Safety Recommendations

Warranty

Apex Tool Group warrants products and parts sold by it, insofar as they are of its own manufacture, against defects of material and workmanship, under normal use and service in accordance with its written instructions, recommendations, and ratings for installation, operation, maintenance, and service of products, for a period of **ONE YEAR FROM THE DATE OF INITIAL USE, BUT IN NO EVENT SHALL THE WARRANTY EXCEED 24 MONTHS FROM DATE OF DELIVERY TO DISTRIBUTOR.** Proof of Purchase with shipment date must be furnished by the user to validate the warranty. This warranty applies only to products manufactured by Apex Tool Group and specifically excludes products manufactured by others. Products not manufactured by Apex Tool Group are warranted only to the extent and in the manner warranted to Apex Tool Group by the manufacturer and then only to the extent Apex Tool Group is able to enforce such warranty. Apex Tool Group's warranty with respect to products manufactured by it is limited to the repair or replacement, as Apex Tool Group may elect, of any defective part regarding which the Distributor has given 5 days written notice from the discovery of such defect. Installation and transportation costs are not included. Apex Tool Group shall have the option of requiring the return to it of the defective material, transportation prepaid, for inspection. No allowance will be made for repairs without Cooper's approval. **APEX TOOL GROUP MAKES NO OTHER WARRANTY OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, AND HEREBY DISCLAIMS ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

Lubrication Products

Apex Tool Group's products are classified as non-hazardous manufactured items, defined in the OSHA 1910.1200 Hazard Communication Standard as "Articles". These products, under conditions of normal use, do not release or cause exposure to a hazardous chemical.

Under normal conditions of use, lubrication products sold separately for or used within these tools should not cause an exposure hazard. Refer to the Material Safety Data Sheet (M.S.D.S.) for Safety and Disposal Information. M.S.D.S. sheets are available upon request from Apex Tool Group or on our website at ***www.apextoolgroup.com***.

Apex Tool Group is also aware of, and complies with, the provisions of section 611 amendments to the Clean Air Act of 1990. No ozone depleting chemicals have been used in the manufacture of our products.

If you resell or distribute these products, you have the responsibility for ensuring that the Material Safety Data Sheets are provided to the purchaser.

Proper lubrication is essential to the economical operation of pneumatic and electric tools. Apex Tool Group Tools perform better and their life is extended by using the recommended lubricants. All lubricants that are listed in the accessory section of this catalog have undergone extensive testing and are recommended for use with Apex Tool Group products.

Safety Recommendations – Safe Drilling Practices

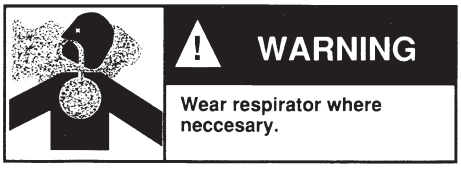
For your safety and the safety of others, read and understand the safety recommendations and operating instructions supplied with the tool.

Always wear personal protective equipment.

For additional information on eye protection, refer to Federal OSHA Regulations, 29 CFR, Section 1910.133, Eye and face Protection, and ANSI Z 87.1, Occupational and Educational Eye and Face Protection. This standard is available from the American National Standards Institute, Inc., 11 West 42nd Street, New York, NY 10036.

Hearing protection is recommended in high noise areas (above 85 dBA). Close proximity of additional tools, reflective surfaces, process noises, and resonant structures can substantially contribute to the sound level experienced by the operator. For additional information on hearing protection,

refer to Federal OSHA regulations, 29 CFR, Section 1910.95, Occupational Noise Exposure and American National Standards Institute, ANSI S12.6, Hearing Protectors.



Drilling operations may produce hazardous fumes and/or dust. To avoid adverse health effects utilize adequate ventilation and/or wear a respirator. Read the material safety data sheet of any cutting fluids or materials involved in the drilling process.

Follow good machine shop practices. Rotating shafts and moving components entangle and entrap, and may result in serious injuries. Never wear long hair, loose fitting clothes, gloves, ties, or jewelry when working with or near a drill of any type.

Safety Labels. The safety labels found on our Advanced Drilling Equipment are essential parts of the product. Labels should not be removed. Labels should be checked periodically for legibility. Replace safety labels when missing or when the information can no longer be read. Replacement labels can be ordered using the part numbers found in each respective tool's Operating Instructions and Service Manual.

WARNING Some non-ferrous metal chips (or dusts) are combustible. Examples: Aluminum, magnesium, titanium, and zirconium. See the material safety data sheets for combustibility of materials drilled. Never collect spark generating material with combustible material. Examples: Collecting both steel and aluminum or steel and titanium.

Our Advanced Drilling Equipment tools are often used with lubricant or cooling systems which must be properly maintained to avoid leakage. Failure to do so can result in serious injuries from slipping on oily surfaces.

Due to the multitude and variety of tooling applications, the user's methods engineering, standard tooling engineering, and/or safety engineering departments, etc., must consider any entrapment and entanglement hazards that may be associated with each specific application and provide adequate operator protection from inadvertent contact with any moving components. Spindle guards are available in one inch increments for all of our Advanced Drilling Equipment right angle drills, and should be used to cover any exposed spindle.

Our Advanced Drilling Equipment tools are designed to operate on 90 psig (6.2 bar) air pressure. Excessive air pressure can increase the loads and stress on tool parts and drills, and may cause breakage. **Higher air pressure can also increase the sound level of the tool.** Installation of a filter-regulator-lubricator in the air supply line ahead of the tool is recommended. The use of a quick disconnect or self-relieving valve within reach of the user of the tool is highly recommended.

Before connecting the tool with a trigger to the air supply, check the throttle for proper operation (i.e. throttle valve moves freely and returns to closed position). Before removing a tool from service or changing drill bits, make sure the air line is shut off and drained of air by using the self-relieving valve. This will prevent the tool from operating if the throttle is accidentally engaged. Also, make sure the chuck key or drill drift is removed before operating.

CAUTION Cutting tools used with our Advanced Drilling Equipment tools are sharp. Handle them carefully to avoid injury.

CAUTION Before mounting any positive feed drill, check the means for mounting the drill to the tooling fixture or jig. Lock screws, lock liners, and bushings must be in good condition and securely installed. Before operating, be sure the nose piece is properly locked in the fixture. Positive feed drills can exert high torques and high thrust loads. If failure of the lock screws, lock liners, or drill bushing occurs, the drill may suddenly

spin and back away from the drill fixture.
Keep fingers and hands away from the slots in the tool nose at all times. **Rapid spindle retraction occurs automatically on some models after drilling cycle and can be activated manually, even with the air supply disconnected, on other models.** Most nose pieces used with positive feed drills are slotted for visibility and access to the chuck and cutter. Because the spindle retracts at a much faster rate than it feeds, care should be taken to avoid entrapment.

The clamping and feed mechanisms of our self-colleting drills can move when air supply is connected or disconnected. To avoid injury, keep fingers and hands away from the clamping and feed mechanism of the tool when handling or operating. The clamping and feed mechanism of our nut plate drills

is covered by a clear polycarbonate guard for visibility. The clamping and feed mechanism can also move when the air supply is connected or disconnected. To avoid injury, keep fingers and hands away from these areas when handling or operating these tools and **keep the guard in place.**

WARNING Before starting the tool, the collet and mandrel of our Advanced Drilling Equipment tools must be inserted into a properly sized pre-drilled hole of proper material thickness. An improperly sized pre-drilled hole prevents the mandrel from engaging the collet and could result in slippage of the tool. An improperly selected collet and mandrel can also result in slippage of the tool.

WARNING

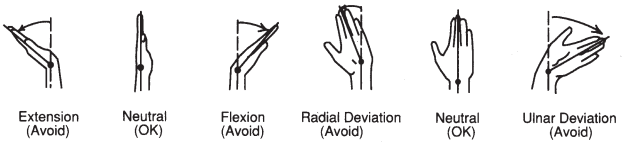
Repetitive work motions and /or vibration may cause injury to hands and arms.
Use minimum hand grip force consistent with proper control and safe operation.
Keep body and hands warm and dry.
Avoid anything that inhibits blood circulation.
Avoid continuous vibration exposure.
Keep wrists straight.
Avoid repeated bending of wrists and hands.

Some individuals may be susceptible to disorders of the hands and arms when performing tasks consisting of highly repetitive motions and/or exposure to extended vibration. Cumulative trauma disorders such as carpal tunnel syndrome and tendonitis can be caused or aggravated by repetitious, forceful exertions of the hands and arms. Vibration may contribute to a condition called Raynaud's Syndrome. These disorders develop gradually over a period of weeks, months, and years. It is presently unknown to what extent exposure to vibrations or repetitive motions may contribute to the disorders. Hereditary factors, vasculatory or circulatory problems, exposure to cold and dampness, diet, smoking and work practices are thought to contribute to the conditions.

Operators should be made aware of the following symptoms and warning signs so that a problem can be addressed before it becomes a debilitating injury. Any user suffering prolonged symptoms of tingling, numbness, blanching of fingers, clumsiness or weakened grip, nocturnal pain in the hand, or any other disorders of the shoulders, arms, wrists, or fingers is advised to consult a physician. If it is determined that the symptoms are job related or aggravated by movements and postures dictated by the job design, it may be necessary for the employer to take steps to prevent further occurrences. These steps might include, but are not limited to, repositioning the workpiece or redesigning the workstation, reassigning workers to other jobs, rotating jobs, changing work pace, and/or changing the type of tool used so as to minimize stress on the operator. Some tasks may require more than one type of tool to obtain the optimum operator/tool/task relationship.

The following suggestions will help reduce or moderate the effects of repetitive workmotions and/or extended vibration exposure:

- Use a minimum hand grip force consistent with proper control and safe operations.
- Keep body and hands warm and dry (cold weather is reported to be a major factor contributing to Raynaud's Syndrome)
- Avoid anything that inhibits blood circulation
  – Smoking Tobacco (another contributing factor)
  – Cold Temperatures
  – Certain Drugs
- Tasks should be performed in such a manner that the wrists are maintained in a neutral position, which is not flexed, hyperextended, or turned side to side
- Stressful postures should be avoided – select a tool appropriate for the job and work location
- Avoid highly repetitive movements of hands and wrists, and continuous vibration exposure (aftereach period of operation, exercise to increase blood circulation)
- Interrupt work, activities, or rotate jobs to provide periods free from repetitive work motions
- Keep tool well maintained and replace worn parts



Speed and Feed Selection Considerations

Because our Advanced Drilling Equipment tools are portable and generally hand-carried from one drill location to the next, every effort has been made to make them as compact and light-weight as possible without compromising the strength required to provide rugged durability and service. A wide selection of feeds and speeds are available to accommodate drilling of a variety of materials.

CAUTION Good machining practice is an integral part of obtaining optimum service life from the tool and the cutter. Selection of speeds and feeds must take into consideration workpiece material and hardness, cutter geometry and sharpness, and quality of lubrication.

Use of the highest feed rates at the lowest speeds in conjunction with very tough or hard materials will likely result in higher than normal maintenance. The exceptionally low speeds, obtained by high numerical gear reductions, can yield very high theoretical stall torque that far exceed the torque requirements of a well engineered drilling application. High loads imposed by feeds excessive for the material and cutter combination may result in damage.

TORQUE CONVERSION – IN. LBS. (NM)					
In.	Nm	In.	Nm	In.	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		

Suggested Surface Speeds for High Speed Steel Drills*

MATERIAL	S.F.M.
Alloy Steels – 300 to 4000 Brinell	20-30
Stainless Steels – Medium range	30-40
Automotive Steel Forgings and the like	40-50
Tool Steels Annealed – 90 to 1.20 Carbon	50-60
Steels – .40 to .50 Carbon	70-80
Steels – .20 to .30 Carbon (Machinery Steel)	80-110
Hard, Chilled Cast Iron	30-40
Medium Hard Cast Iron	70-110
Soft Cast Iron	100-150
Malleable Iron	80-90
Monel Metal	40-50
High Tensile Strength Bronze	70-150
Ordinary Brass and Bronze	200-300
Aluminum and its Common Alloys	250-400
Magnesium and its Common Alloys	250-400
Plastics – Common Types	100-150
Wood	300-400

* Carbon Steel Drills should be operated at 40%–50% of the above speeds.

These speeds indicate the approximate range under normal conditions. For peak performance on individual jobs, adjustments may be required.

To convert surface feet per minute (SFM) into revolutions per minutes (RPM) use the following formula:

$$RPM = \frac{SFM \times 3.82}{Diameter}$$

Example: To drill 1/4" hole in aluminum:

$$\frac{300 \times 3.82}{.250} = 4.584 \text{ RPM}$$

TORQUE CONVERSION FACTORS		
To Convert	Into	Mulitply 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

MISCELLANEOUS CONVERSION FACTORS		
To Convert	Into	Mulitply By
Inches	Millimeters	25.4000
Millimeters	Inches	0.0394
Pounds	Kilograms	0.4536
Kilograms	Pounds	2.2050
psi	bar	0.069
bar	psi	14.5

AIR PRESSURE CONVERSION		
PSI	kPa*	Bar**
85	586	5.9
90	620	6.2
95	655	6.6
100	690	6.9
125	860	8.6

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

Drill Diameter (inches)	Surface Speed, Feet per Minute											
	30	40	50	60	70	80	90	100	110	200	300	400
Spindle Speeds, RPM												
1/4	458	611	764	917	1070	1222	1375	1528	1681	3056	4584	6111
5/16	367	489	611	733	856	976	1100	1222	1345	2445	3666	4888
3/8	306	407	509	611	713	815	917	1019	1120	2037	3056	4074
7/16	262	349	437	524	611	698	786	873	960	1746	2619	3492
1/2	229	306	382	458	535	611	688	764	840	1528	2282	3056

If there is a choice between tools of about the same speed but of different sizes, final selection is made by preference for a lighter-weight tool or one with more power to maintain speed under load.

Drilling Through Composite Stacks Just Got Faster

The New Quackenbush® Adaptive Drilling System Makes It Happen

Recoules®
Quackenbush®

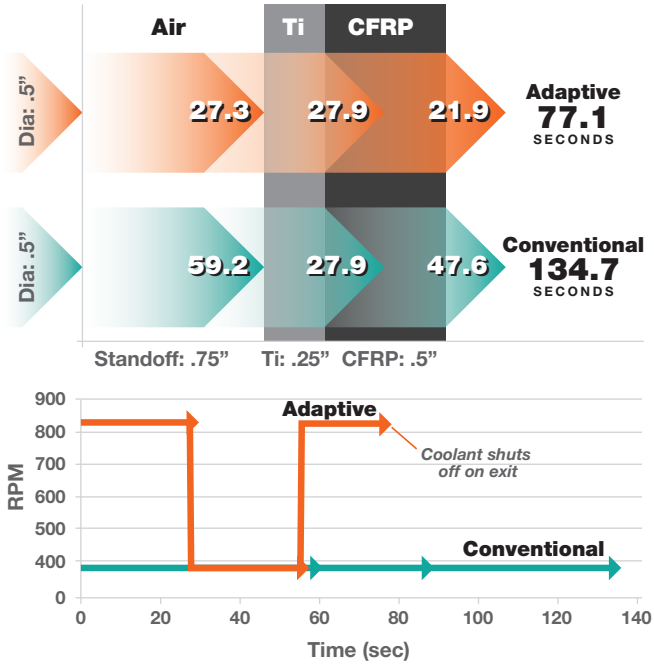
SP-1312-EN 090210 00M

Optimizing Cutter Speed F

The Quackenbush® Adaptive Drilling System automatically matches drill speed to the material regardless of layer thickness, changing speed in less than one second, so it's always drilling at the fastest speed possible. The result is a cycle-time reduction of up to 60% over conventional positive feed drilling and a major increase in productivity.

Up To 60% Cycle Time Reduction

The adaptive drilling system automatically changes from high to low speed when drilling Ti. High speed can be up to 3X faster, giving impressive cycle time reductions in dissimilar material stacks. Allowable combinations are CFRP/Ti, Ti/CFRP, Ti/CFRP/Ti, Al/CFRP/Ti, and Ti/Al.



Minimize Clean-up Time

Coolant flow rates are programmable for each material of a stack and can be shut off on breakthrough to reduce cleanup time and further increase productivity.

Computer Process Control

On-board tool memory module

The adaptive programming interface kit allows application and process parameters to be set on the on-board tool memory module. The control box reads the memory, provides the process control, and stores cycle data. Key programming features are speed, coolant flow, cutter data, maximum holes per cutter, and material stack combination. At the end of each cycle, data is stored on the control box and can be downloaded to a PC for traceability and diagnostics using an Ethernet connection.

For Maximum Productivity

Easy Conversion Of Existing Drills

The Adaptive Drilling System is designed to enable the most efficient use of your existing equipment. Although the control box can operate only one tool at a time, it can control multiple different applications one after the other. Ease of programmability allows tools to be quickly reconfigured for different hole size and material stack combinations. The tools are based on the proven Quackenbush 158, 230, and 900 series positive feed line. New parts have been kept to a minimum and the on-board memory module is designed to be retro-fittable to existing tools in the field.

The Leader In Aerospace Drilling

Whether you're working with the special machining requirements of CFRP components or have a general question regarding the latest in drilling technology, you can turn to the experts at Quackenbush for answers. Call 866-569-9449 or go to www.cooperpowertools.com.

Recoules® Quackenbush®

New Quackenbush® Adaptive Drilling System

Specifications

Model Number	Description	Max. Speed* RPM	Min. Speed RPM	Feed Rate Options	Hole Capacity Titanium
Controller					
642003PT	DMP-111-15 Drill Manager Pneumatic				
Drills					
932QA	Right Angle Adaptive Positive Feed	1200	400	.001”/.002”	7/16”
158-15QRA	Right Angle Adaptive Positive Feed	1200	400	.001”/.002”	7/16”
158QRA	Right Angle Adaptive Positive Feed	900	300	.001”/.002”	5/8”
230QRA	Right Angle Adaptive Positive Feed	900	300	.001”/.002”	5/8”
942QA	In-Line Adaptive Positive Feed	1200	400	.001”/.002”	7/16”
230QBA	In-Line Adaptive Positive Feed	1200	400	.001”/.002”	5/8”

**Based on 90 psi. inlet pressure to DMP*

Retrofit Services

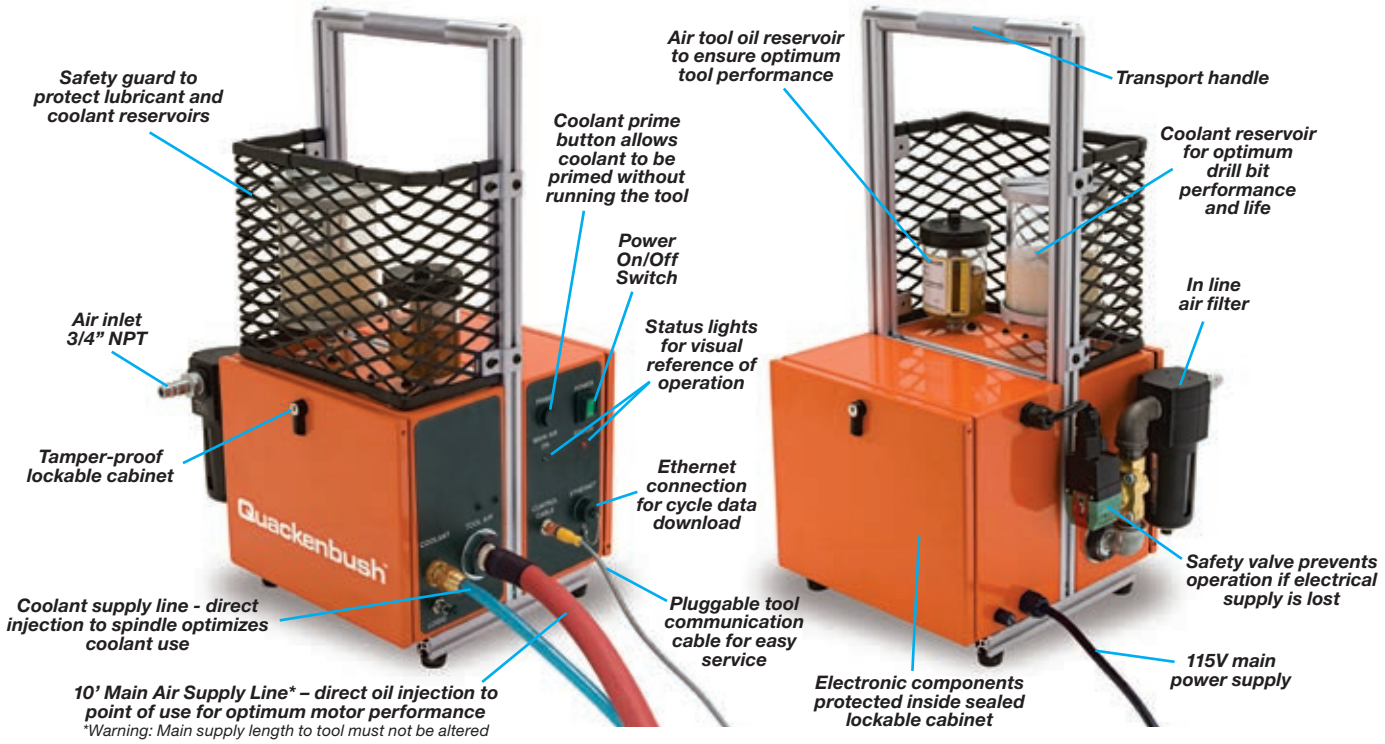
158 Series	Retrofit and rebuild Quackenbush 158 Series Positive Feed Drill
230 Series	Retrofit and rebuild Quackenbush 230 Series Positive Feed Drill
900 Series	Retrofit and rebuild Quackenbush 900 Series Positive Feed Drill

Controller Specifications

Electrical Supply:	115V 50/60Hz 2A
Pneumatic Supply:	90 psi min 140 psi max, clean dry air
Dimensions:	W 13” x D 15” x H 26”
Weight:	53 lbs.

Accessories

Part No.	Description	Connection
642069PT	Adaptive Interface Kit	USB to Tool Memory

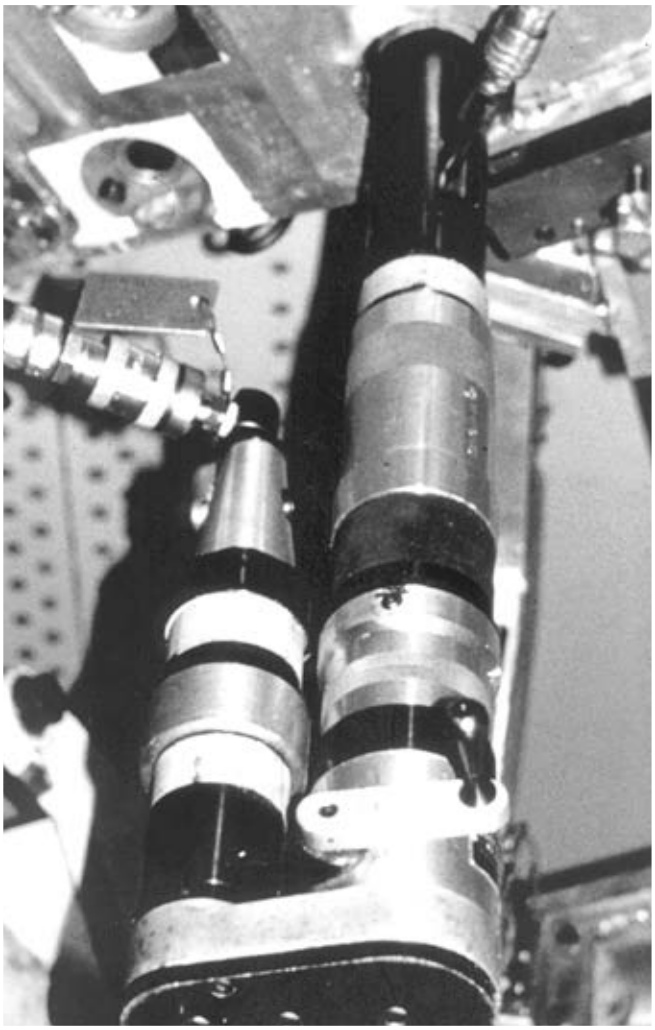


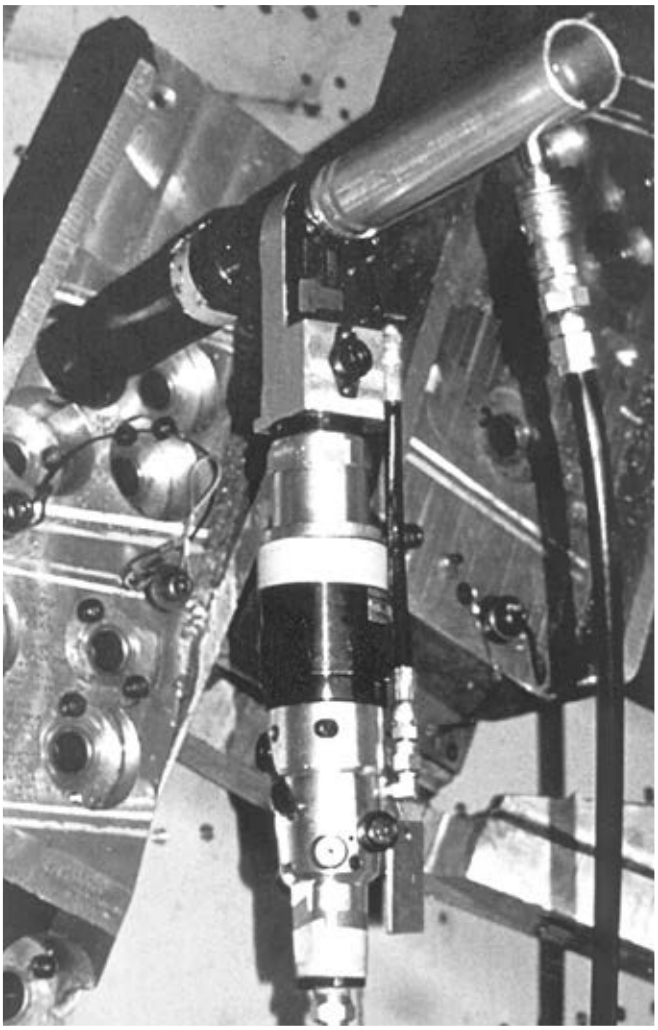
Recoules® Quackenbush®

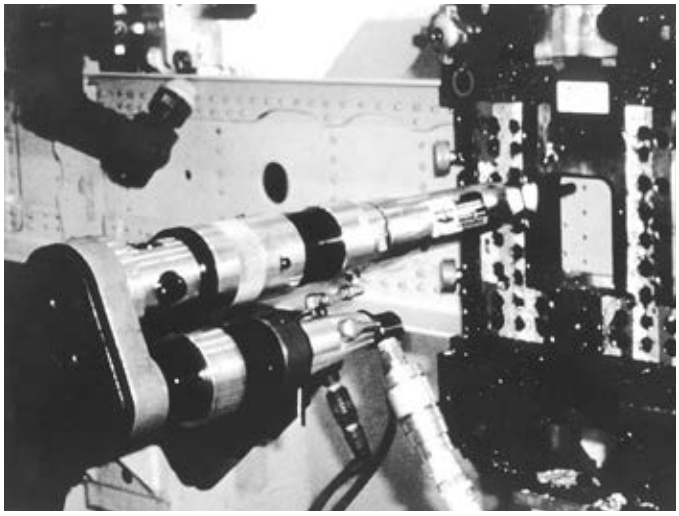
SP-1312-EN 0910 00M

Positive Feed Tools

ADVANCED DRILLING EQUIPMENT







How Positive Feed Drills Operate

Our in-line positive feed drills use two interconnected mechanisms: one to control the spindle rotation and one that controls the advancement or feed rate of the spindle.

The tool spindle is driven rotationally through an internal spline by a drive shaft ① connected directly to the motor through gearing. When the motor is

Our positive feed drill motors are available in piggyback, in-line and right angle configurations *(please see the following section for right angle tools).*

In general, positive feed drills are used for the large holes and heavy structures in the aircraft such as the spars ribs, landing gear, wings and fuselage.

A positive feed drill will advance the cutter at a fixed distance in relation to the revolution of the cutter. This is true regardless of the application.

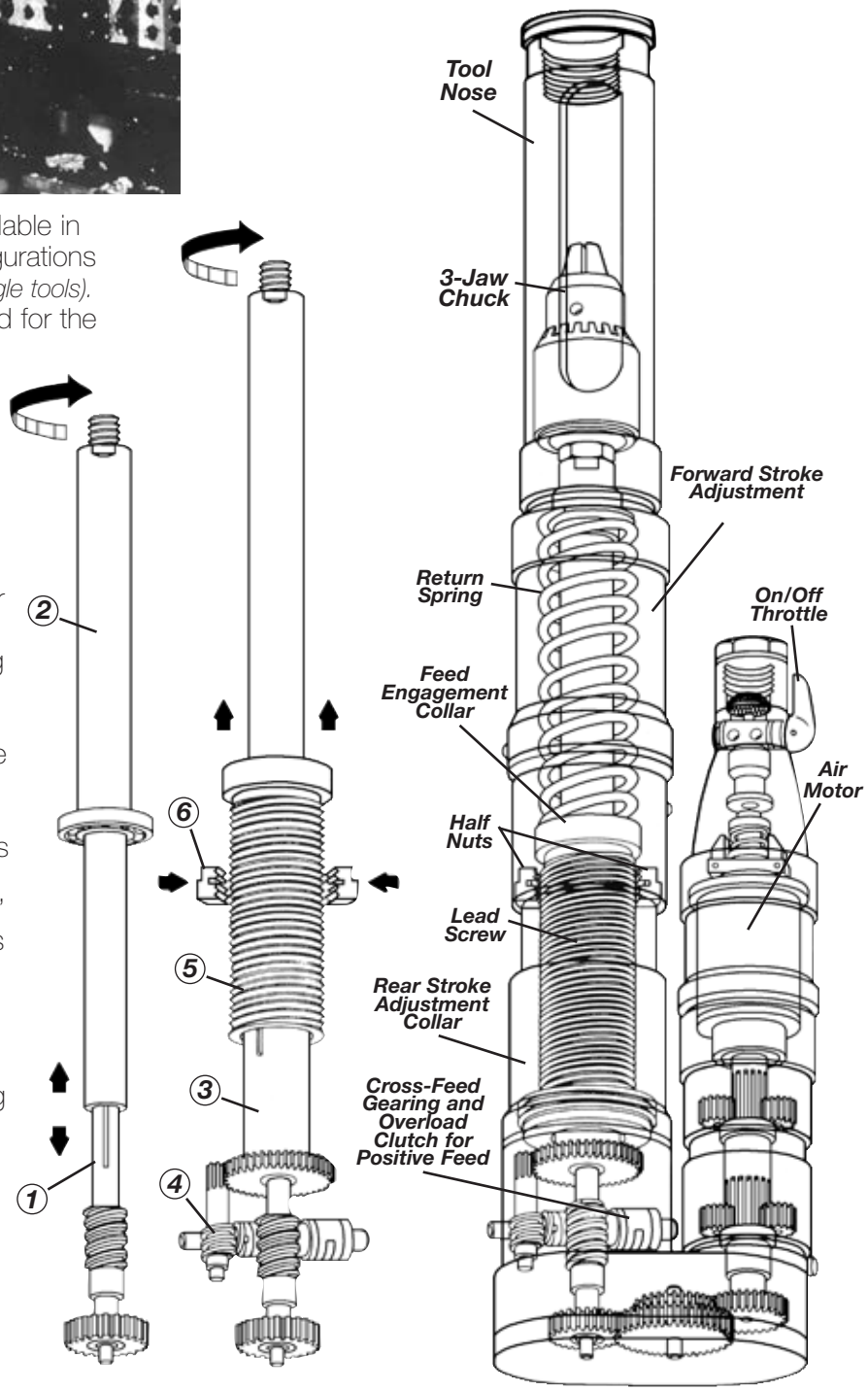
Since the cutter advances a precise distance with each revolution, the cutter does not rotate without cutting. This reduces heat and deformation, resulting in less chance of the material work hardening.

Another key benefit delivered by these drills is that surge at breakthrough is virtually eliminated. Because there is no surge of the cutter on the exit side burrs are reduced or eliminated.

These drills range in stroke from 1.25" to 7.50". They may be used on all types of material, and can drill holes from .125" to 2.50" in diameter in aluminum.

Our in-line drills are available in either a straight or piggy back design, and both are advantageous in tight operating circumstances in which a right angle tool might have clearance concerns.

Many of the accessories for our in-line and right angle tools are interchangeable, such as chucks, nose pieces, motors and gears.



turned on, the spindle will rotate at a speed determined by the motor and gearing. The spindle ② rotates with the drive shaft, yet is free to slide or telescope axially.

Surrounding part of the spindle is the lead screw driver ③ that has a gear affixed to one end. The gear on the lead screw driver is connected to the motor gearing by a worm and cross shaft arrangement ④ and turns the lead screw driver at a fixed ratio with respect to the spindle. The lead screw driver rotates when the motor is turned on, but cannot move axially.

The lead screw ⑤ telescopes over the lead screw driver. The lead screw is internally splined to the lead screw driver so that it rotates with it while being free to slide axially. The lead screw will rotate any time the motor is turned on, but not move axially until the feed is engaged.

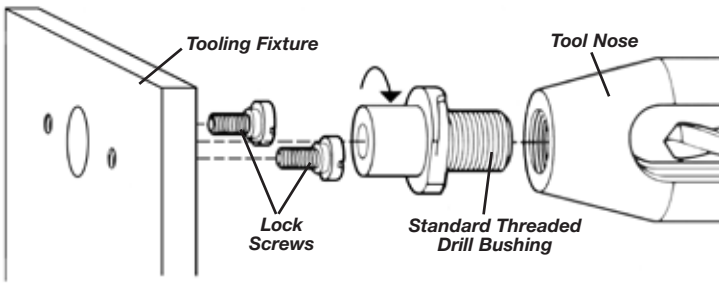
The positive feed is accomplished by engaging a pair of half nuts ⑥ (threaded nuts which have been sectioned) with the lead screw by rotating the feed engagement collar. The half nuts are held stationary by the housing. With the lead screw rotating and the half nuts engaged, the lead screw will advance and push the spindle forward.

Since both the feed mechanism and spindle rotation mechanism are driven from one source, a fixed rate of spindle advancement is achieved for each rotation of the spindle.

When the spindle has advanced to the predetermined depth, the retract stop is tripped, shifting the feed collar. This action releases the half nuts, and the spindle and lead screw are returned to the starting position ready for the next drilling cycle.

Taper-Lok Fixturing

Customized fixtures are constructed to accept Taper-Lok Bushing Tips. Advanced Drilling Equipment tools with the Bushing Tips are inserted into the fixture, twisted and cam-locked into place.



The Bushing Tip's tapered flanges fit under the shoulder of lock screws in the fixture. The Bushing Tip holds the tool in alignment and absorbs the thrust and torque of drilling. At the completion of the drilling cycle, the tools is rotated to unlock, withdrawn from the fixture and moved to the next position.

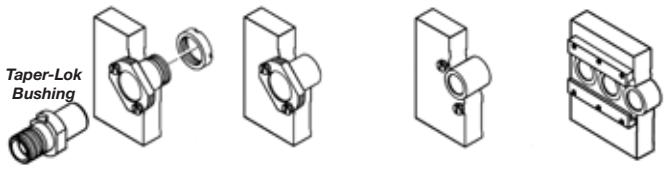
Several different types of Taper-Lok Fixturing are available. The following are the most common.

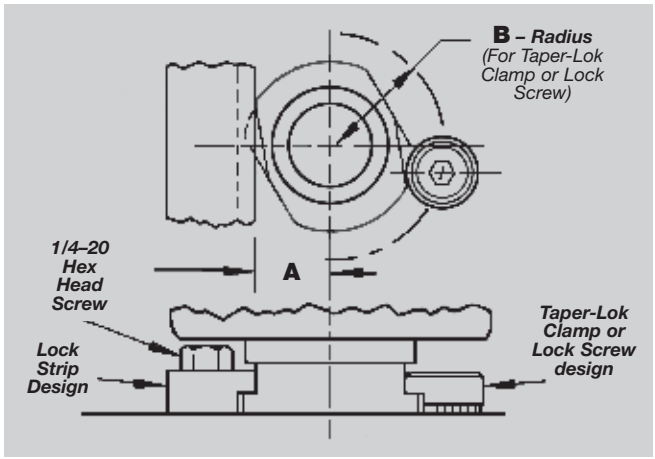
Lock Liners
Method for mounting to a fixture. A hole is bored in the jig to accomodate the lock liner bushing. The lock ring holds the lock liner bushing in position in the jig.

Direct Mounting
The Serrated Liner is used in potted or cast-in-place installations.

Direct Mounting
Most common mounting method has lock screws mounted directly into the fixture plate. The shank of the drill bushing tip fits directly into a bored hole in the fixture plate.

Lock Strip
This method for closely spaced holes employs a lock strip along each side of the row of holes in the fixture plate. The flanges on the Drill Bushing Tip lock under the extended edges of the lock strip.





Location Data for Taper-Lok Clamp, Lock Screw, and Lock Strip Mounting

Drill Bushing Tip Series	A	B	Tool Nose Thread (I.D.)
21000	.312	.625	3/4–16
22000	.609	.922	1–14
23000	.734	1.047	1 1/4–12
24000	.859	1.172	1 1/2–12
25000	None	1.562	2–16

Quackenbush™

15QD Series

15QDA-S150B Semi-Automatic Series

Capacity:
Aluminum – .375" (9.5mm)
Titanium – .3125" (7.9mm)
Steel – .3125" (7.9mm)

- **15 series motor develops 1.0 nominal horsepower.**
- **Positive mechanical feed provides fixed rate of feed with respect to spindle rotation.**
- **Overload clutch protects feed mechanism.**

15QDB-S125

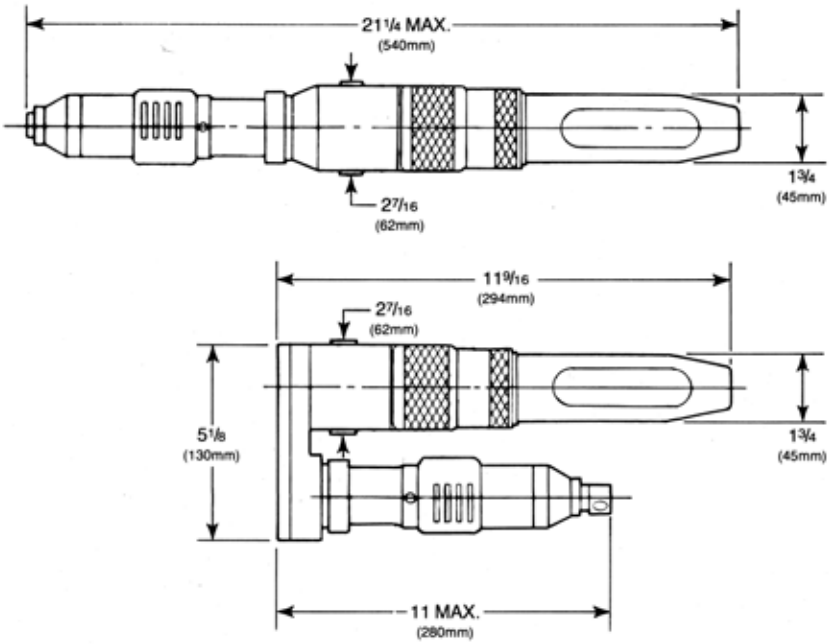
15QD-S125

Model	Motor Configuration	Maximum Stroke		Weight		Spindle Speeds	Feed Per Revolution	Chuck Capacity	Inlet	Minimum Hose Size
		in.	mm	lbs	kg					
15QD-S125	Straight	1.25	32	7	3.18	160, 250, 400, 800, 1400, 2000, 3000	.0005, .001, .002, .003, .004, .006, .008	.3125"	.375" NPT	.375"
15QDB-S125	Piggy Back	1.25	32	7	3.18	160, 250, 400,800, 1400, 2000, 3000	.0005, .001, .002, .003, .004, .006, .008	.3125"	.375" NPT	.375"
15QDA-S150B	Straight	1.5"	38	10	4.53	160, 250, 400, 800, 1400, 2000, 3000	.0005, .001, .002, .003, .004, .006, .008	.375"	.375" NPT	.375"
15QDAB-S150B	Piggy Back	1.5"	38	10	4.53	160, 250, 400, 800, 1400, 2000, 3000	.0005, .001, .002, .003, .004, .006, .008	.375"	.375" NPT	.375"

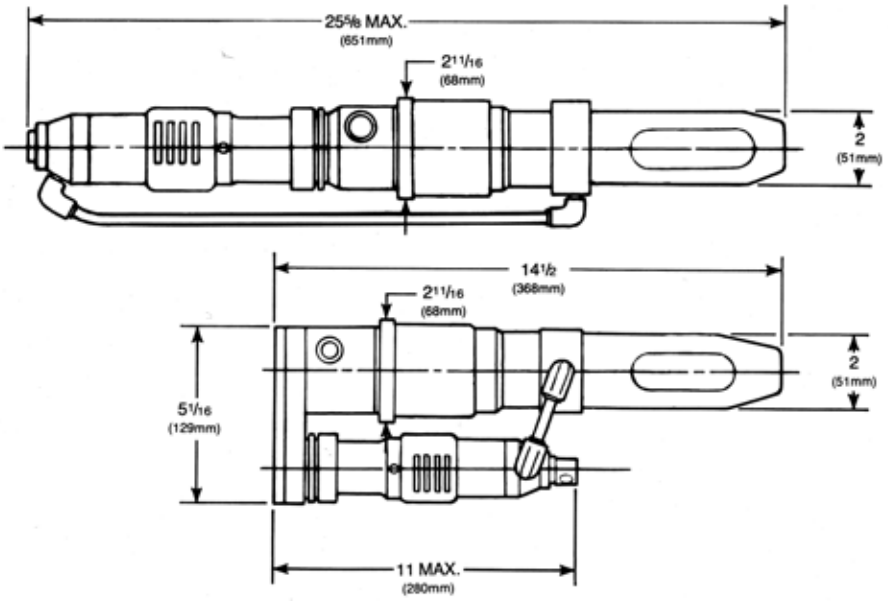
EXTRA EQUIPMENT:
3 Jaw Chuck 849108 and Key 849120.
Nose.

NOTE:
Specify Tool Nose when ordering.
Rated tool performance at 90 PSIG measured at tool inlet with motor running.
When selecting speeds and feeds, see page 3.
SEE PAGES 5-7 FOR SAFETY PRECAUTIONS.

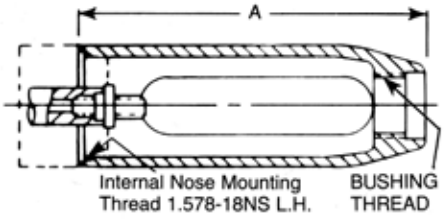
S125



S150

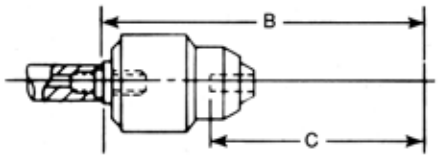


ALUMINUM TOOL NOSE



Bushing Thread	Length A	Part Number
.75-16LH	5.3125 (132mm)	619143
1 -14LH	5.4375 (138mm)	619142
1.25-12LH	5.4375 (138mm)	619271

3-JAW CHUCK



Bushing Thread	Dimension B	Dimension C	Desc.	Part Number
.75-16LH	4.625 (118mm)	3.3125 (84mm)	.375" Chuck	849108
1 -14LH	4.875 (124mm)	3.5625 (90mm)	Key	849120
1.25-12LH	4.875 (124mm)	3.5625 (90mm)		

Quackenbush™

158QGDA

Capacity:
Aluminum – .375" (9.5mm)
Titanium – .3125" (7.9mm)
Steel – .3125" (7.9mm)

Stroke:
Max – 1.5" (38mm)
Min. – .5625" (14mm)

- **158 series motor develops 1.6 nominal horsepower.**
- **Available in straight and piggy-back models with fixed and variable speed motors.**
- **Overload clutch protects feed mechanism.**

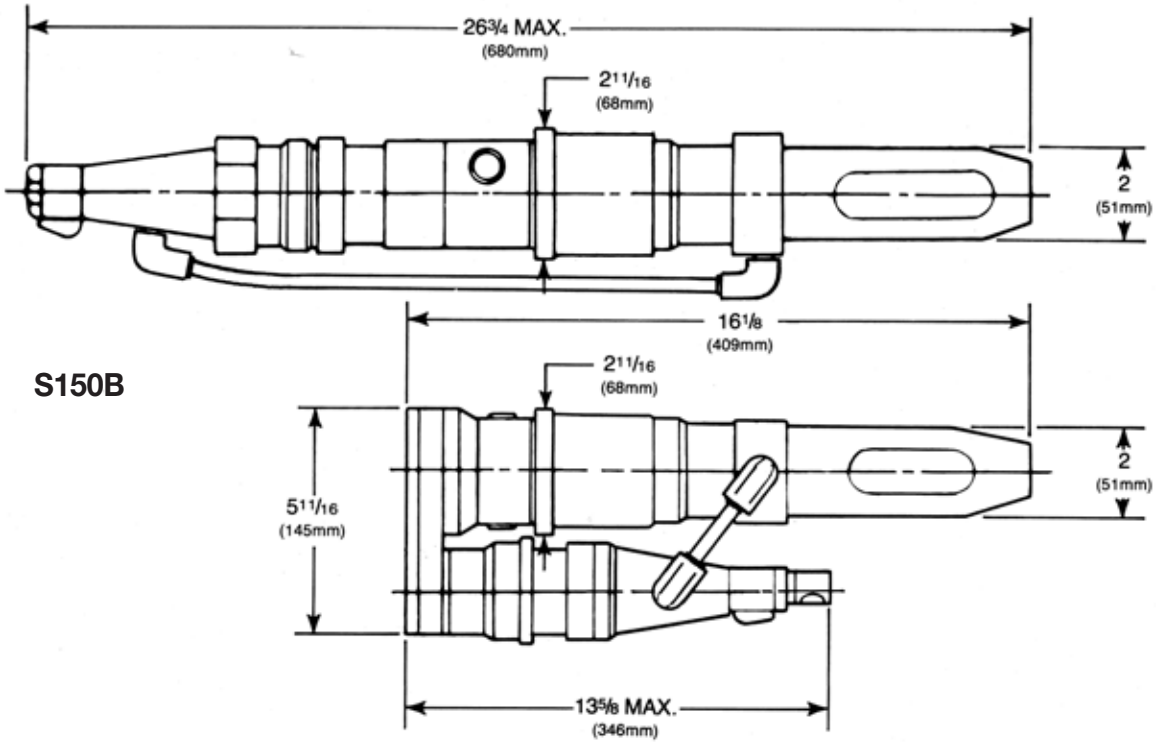
158QGDAB-S150B

158QGDA-S150B

Model	Motor Configuration	Maximum Stroke		Weight		Spindle Speeds	Feed Per Revolution	Chuck Capacity	Inlet	Minimum Hose Size
		in.	mm	lbs	kg					
158QGDA-S150B	Straight	1.5"	38	12	5.44	95, 135, 165, 190 215, 245, 265, 350, 380, 420, 445, 525, 700, 750, 850, 900 1100, 1450, 1500, 1745 1800, 2175, 2900, 3600	.0005, .001, .002, .003, .004, .006, .008	.375"	.375" NPT	.375"
158QGDAV-S150B VARIABLE SPEED	Straight	1.5"	38	12	5.44	95/245, 175, 445 350/850, 750/1800 1450/3600	.0005, .001, .002, .003, .004, .006, .008	.375"	.375" NPT	.375"
158QGDAB-S150B	Piggy Back	1.5"	38	12	5.44	55, 80, 95, 110, 125, 135, 150, 185, 250, 265, 310, 320, 400, 450, 535, 540, 640, 660, 900, 1100, 1460 1740, 2100, 2870, 3440	.0005, .001, .002, .003, .004, .006, .008	.375"	.375" NPT	.375"
158QGDABV-S150B VARIABLE SPEED	Piggy Back	1.5"	38	12	5.44	125/310, 265/640 450/1100, 1460/3440	.0005, .001, .002, .003, .004, .006,	.375"	.375" NPT	.375"

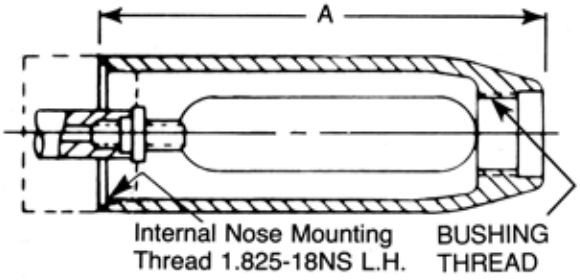
STANDARD EQUIPMENT:
Forward Stroke Adjustment Wrench 614190.
EXTRA EQUIPMENT:
Nose
3 Jaw Chuck 614929 and Key 849123.

NOTE:
Specify Tool Nose when ordering.
Rated tool performance at 90 PSIG measured at tool inlet with motor running.
When selecting speeds and feeds, see page 3.
SEE PAGES 5-7 FOR SAFETY PRECAUTIONS.



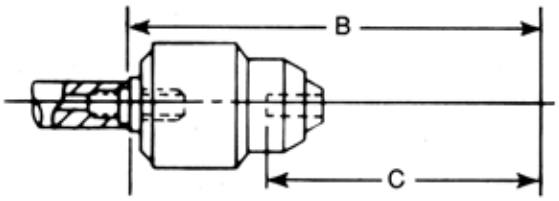
S150B

ALUMINUM TOOL NOSE



Bushing Thread	Length A	Part Number
.75 - 16LH	5.625 (143mm)	619662
1 -14LH	5.875 (149mm)	619683
1.25 -12LH	5.875 (149mm)	619704

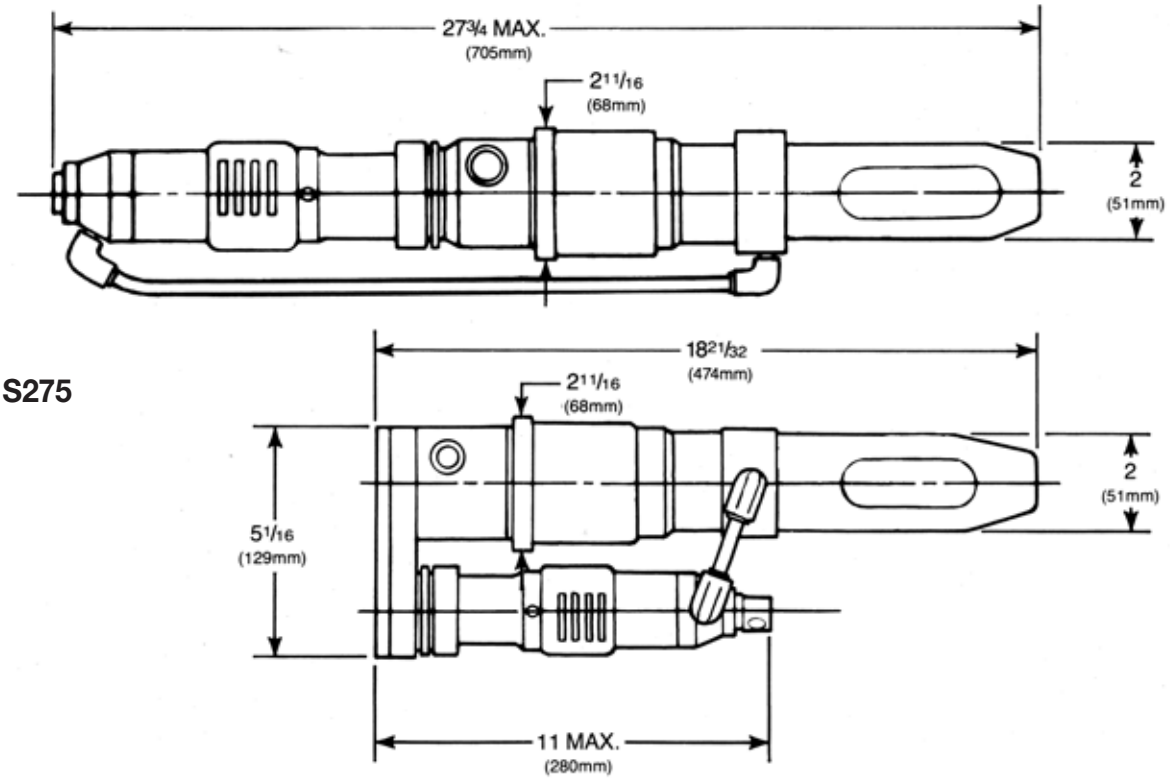
3-JAW CHUCK



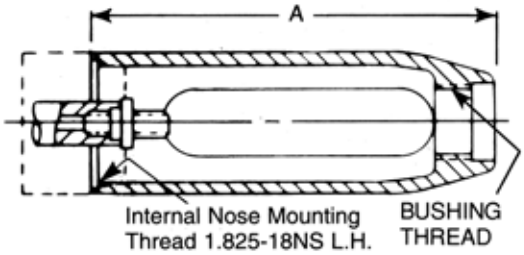
Bushing Thread	Dimension B	Dimension C	Desc.	Part Number
.75 - 16LH	5 (127mm)	3.5625 (90mm)	.375 Chuck	614929
1 -14LH	5.25 (134mm)	3.7813 (96mm)	Key	849123
1.25 -12LH	5.25 (134mm)	3.7813 (96mm)		

Model	Motor Configuration	Maximum Stroke		Weight		Spindle Speeds	Feed Per Revolution	Chuck Capacity	Inlet	Minimum Hose Size
		in.	mm	lbs	kg					
15QDA-S275B	Straight	2.75”	70	10	4.53	160, 250, 400, 800, 1400, 2000, 3000	.0005, .001, .002, .003, .004, .006, .008	.375”	.375” NPT	.375”
15QDAB-S275B	Piggy Back	2.75”	70	10.5	4.76	160, 250, 400, 800, 1400, 2000, 3000	.0005, .001, .002, .003, .004, .006, .008	.375”	.375” NPT	.375”

S275

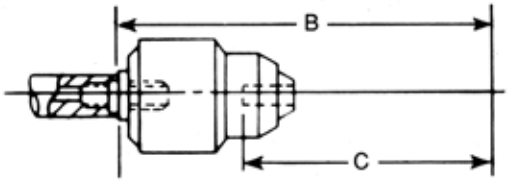


ALUMINUM TOOL NOSE



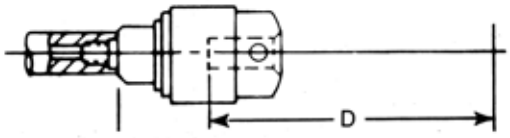
Bushing Thread	Length A	Part Number
.75 - 16LH	6.875 (175mm)	619954
1 -14LH	7.125 (181mm)	619955
1.25 - 12LH	7.125 (181mm)	619953

3-JAW CHUCK



Bushing Thread	Dimension B	Dimension C	Desc.	Part Number
.75 - 16LH	6 (152mm)	4.5313 (115mm)	.375" Chuck	614929
1 -14LH	6.25 (159mm)	5.625 (144mm)	Key	849123
1.25 - 12LH	6.25 (159mm)	5.625 (144mm)		

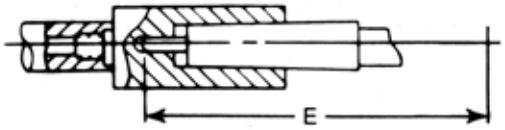
FLUID CHUCK



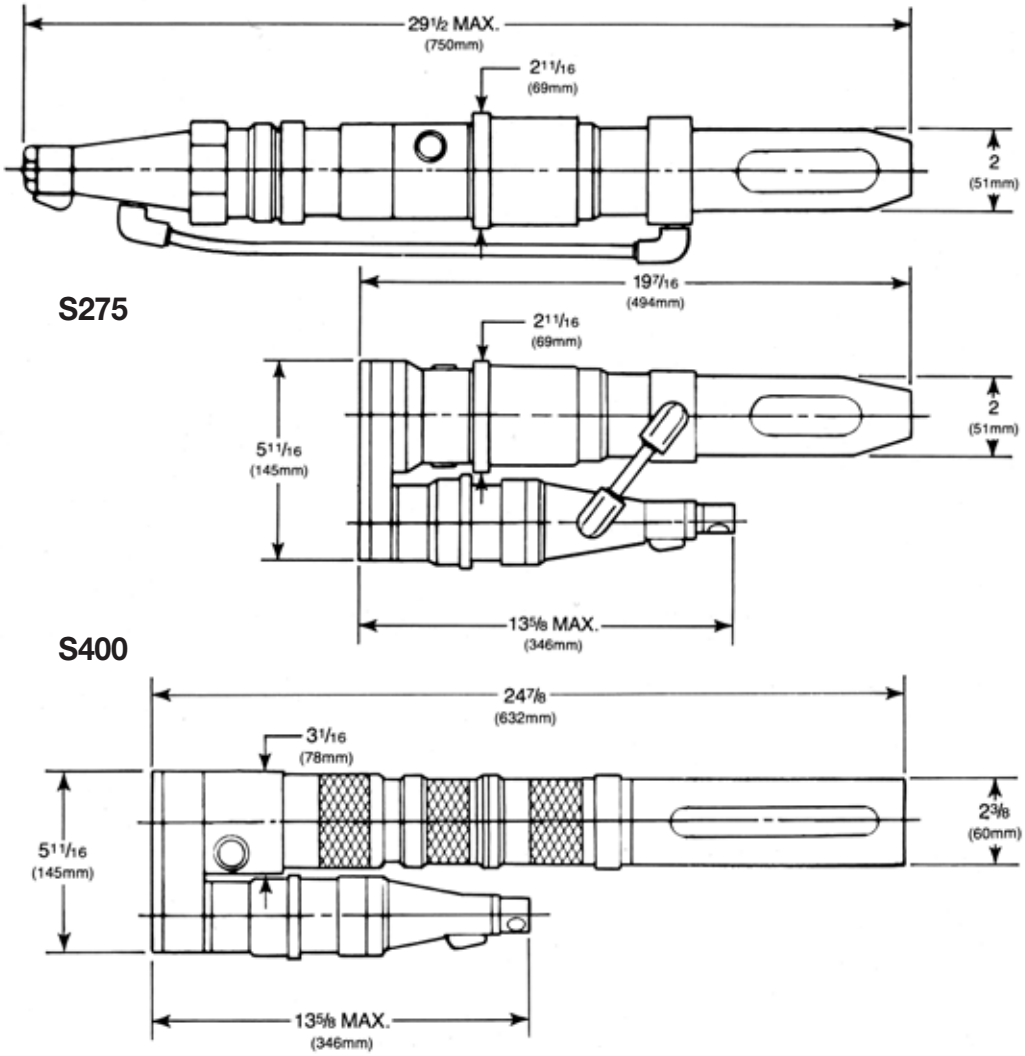
Bushing Thread	Dim. D Side Feed	Dim. D End Feed	Part Number*
.75 - 16LH	5.4688 (139mm)	4.6875 (119mm)	
1 -14LH	5.7188 (145mm)	4.9375 (125mm)	
1.25 - 12LH	5.7188 (145mm)	4.9375 (125mm)	

*See page 1-41 for Selection and Part Number

MORSE TAPER ADAPTER



Bushing Thread	Dim. E No. 1 MT 613542	Dim. E No. 2 MT 612934
.75 - 16LH	5.4688 (138mm)	5.625 (142mm)
1 -14LH	5.7188 (145mm)	5.8438 (148mm)
1.25 - 12LH	5.7188 (145mm)	5.8438 (148mm)



Model	Motor Configuration	Maximum Stroke		Weight		Spindle Speeds	Feed Per Revolution	Chuck Capacity	Inlet	Minimum Hose Size
		in.	mm	lbs	kg					
158QGDA-S275B	Straight	2 .75”	70	13	5.89	95, 135, 165, 175, 190, 215, 245, 265, 350, 380, 420, 445, 525, 700, 750, 850, 900, 1100, 1450, 1500, 1745 1800, 2175, 2900, 3600	.0005, .001, .002, .003, .004, .006, .008	.375”	.375” NPT	.375”
158QGAV-S275B Variable Speed	Straight	2 .75”	70	13	5.89	95/245, 75, 445, 350/850, 750/1800, 1450/3600	.0005, .001, .002, .003, .004, .006, .008	.375”	.375” NPT	.375”
158QGDAB-S275B	Piggy Back	2 .75”	70	15	6.8	125, 150, 185, 250, 265, 310, 320, 400, 450, 535, 540, 640, 660, 900, 1100, 1460, 1740, 2100, 2870, 3440	.0005, .001, .002, .003, .004, .006, .008	.375”	.375” NPT	.375”
158QGDABV-S275B Variable Speed	Piggy Back	2 .75”	70	15	6.8	125/310, 265/640 450/1100, 1460/3440	.0005, .001, .002, .003, .004, .006,	.375”	.375” NPT	.375”
158QGDB-S400	Piggy Back	4”	102	18.5	8.39	55, 80, 95, 110, 125, 135, 150, 185, 250, 310, 400, 535, 660, 900, 1100, 2100, 2870, 3440	.0005, .001, .002, .003, .004, .006, .008, .012, 016	.5”	.375” NPT	.5”
158QGDBV-S400 Variable Speed	Piggy Back	4”	102	18.5	8.39	55-135, 125-310, 265-640, 450-1100, 450-1100, 1460-3440	.0005, .001, .002, .003, .004, .006, .008, .012, 016	.5”	.375” NPT	.5”

Quackenbush™

158QGDB-RF-S400 Back Spotfacer Series

Stroke:
Max – 4" (101mm)
Min. – 1.75" (44mm)

- **158 series motor develops 1.6 nominal horsepower.**
- **Piggy-back motor mount reduces overhang.**
- **Length of stroke can be adjusted by rotating both the forward and rear stroke adjustment collars.**
- **Reverse feed is activated by rotating feed engagement collar.**
- **Spindle may be returned to starting position at any time during feed cycle by manually rotating feed engagement collar**
- **At end of stroke, spindle automatically returns to starting position.**
- **Available in single governed speeds and variable speed ranges.**
- **Overload clutch protects feed mechanism.**

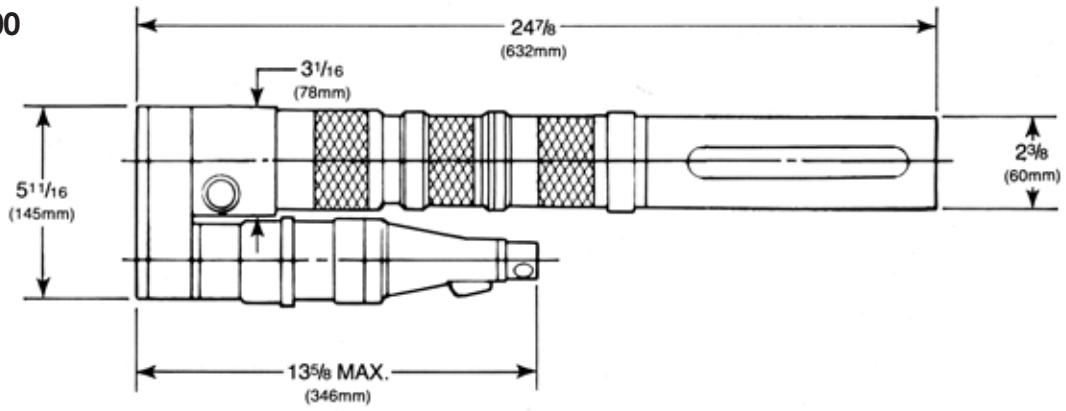
158QGDBV-RF-S400

Model	Motor Configuration	Maximum Stroke		Weight		Spindle Speeds	Feed Per Revolution	Chuck Capacity	Inlet	Minimum Hose Size
		in.	mm	lbs	kg					
158QGDB-RF-S400	Piggy Back	4"	102	18.5	8.39	55, 80, 95, 110, 125, 135, 150, 185, 250, 310, 400, 535, 660, 900, 1100, 2100, 2870, 3440	.0005, .001, .002, .003, .004, .006, .008, .012, 016	.5"	.375" NPT	.5"
158QGDBV-RF-S400 Variable Speed	Piggy Back	4"	102	18.5	8.39	55-135, 125-310, 265-640, 450-1100, 450-1100, 1460-3440	.0005, .001, .002, .003, .004, .006, .008, .012, 016	.5"	.375" NPT	.5"
158QGDB-S600	Piggy Back	6"	152.4	25	11.34	55, 80, 95, 110, 125, 135, 150, 185, 250, 310, 400, 535, 660, 900, 1100, 2100, 2870, 3440	.0005, .001, .002, .003, .004, .006, .008, .012, 016	.5"	.375" NPT	.5"
158QGDBV-S600 Variable Speed	Piggy Back	6"	152.4	25	11.34	55-135, 125-310, 265-640, 450-1100, 450-1100, 1460-3440	.0005, .001, .002, .003, .004, .006, .008, .012, 016	.5"	.375" NPT	.5"

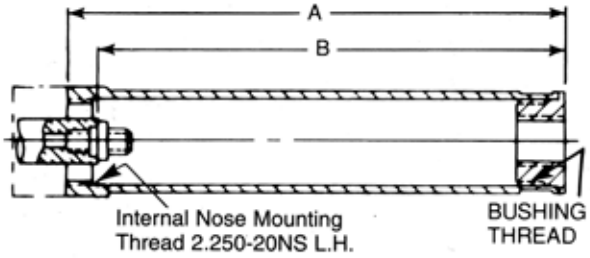
EXTRA EQUIPMENT:
Tool Nose
3 Jaw Chuck 849415 and Key 849121.

NOTE:
Specify Tool Nose when ordering.
Rated tool performance at 90 PSIG measured at tool inlet with motor running.
When selecting speeds and feeds, see page 3.
SEE PAGES 5-7 FOR SAFETY PRECAUTIONS.

S400

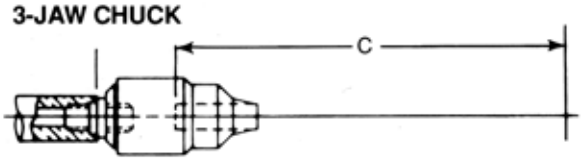


STEEL TOOL NOSE



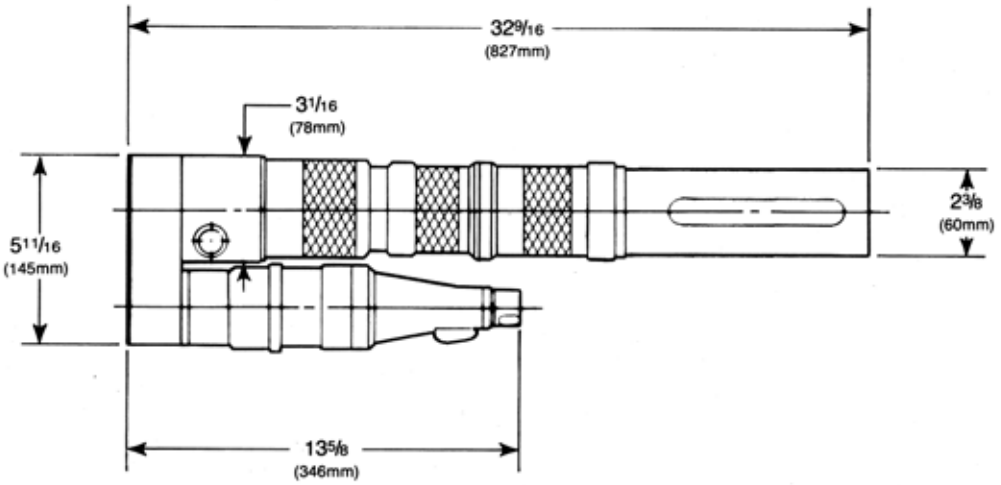
Bushing Thread	Length A	Length B	Part Number
.75 - 16LH	9.5 (241mm)	8.75 (227mm)	621235
1 - 14LH	9.5 (241mm)	8.75 (227mm)	621236
1.25 - 12LH	9.5 (241mm)	8.75 (227mm)	621237
1.5 - 12LH	9.5 (241mm)	8.75 (227mm)	621238
2 - 16LH	9.375 (238mm)	8.625 (223mm)	614751

3-JAW CHUCK



Bushing Thread	Dimension C	Desc.	Part Number
.75 - 16LH	3.2813 (83mm)	.5” Chuck	849415
1 - 14LH	3.2813 (83mm)	Key	849121
1.25 - 12LH	3.2813 (83mm)		
1.5 - 12LH	3.2813 (83mm)		
2 - 16LH	3.3438 (85mm)		

S600



Quackenbush™

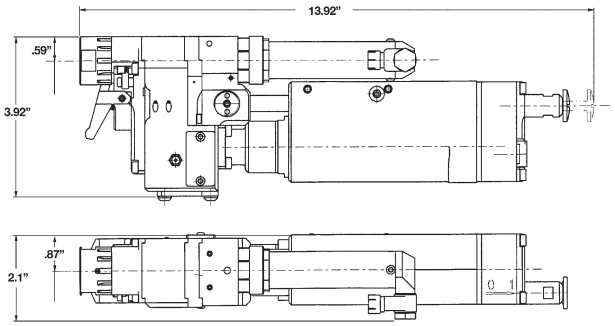
952QB
962QB

Capacity:
- **Aluminum - .5625”(14.3mm)**
- **Titanium - .4375” (11.1mm)**
- **Steel - .4375” (11.1mm)**

Stroke:
- **Unlimited**
- **Min. - .375” (9.5mm)**

- **0.9 and 1.3 nominal horsepower motors.**
- **Inline tool designed for close quarter operation.**
- **Utilizes spindles of varying lengths to provide unlimited hole depth capability.**
- **Utilizes spindles which accomodate threaded and straight shank cutters. Fluid spindle for threaded shank cutter only.**
- **Stroke is adjustable by positioning two stop collars.**
- **Spindle continues to rotate in forward directon on return stroke to eliminate withdrawal spiral in hole.**
- **Rapid spindle retraction.**
- **Spindle can be retracted at any point during feed cycle by depressing the manual return lever.**
- **Tool automatically shuts off at completion of drill cycle.**
- **952QB drill only, 962QB drill and countersink.**
- **Easily adaptable to Quackenbush 1/2”-22 OD thread spindle for 952QB.**

Options
- **Vacuum on nose and concentric collet**
- **Concentric collet**
- **Pneumatic counter**
- **Electronic back-counter**
- **Micro-pump**
- **Pistol grip handle**
- **Pistol grip handle with double trigger for concentric collet**



Model	Motor Configuration	HP	Max. Stroke in.	Max. Stroke mm	Weight lbs	Weight kg	Max. Length in.	Max. Length mm	Spindle Speeds	Feed Per Revolution Inches	Feed Per Revolution mm	Inlet	Min. Hose
952QB	Inline	0.9	No Limit		5.8	2.2	13.92	354	450, 800, 4500	.0005, .001, .002, .003, .004, .006	.013, .03, .05, .07, .10, .15	.250” NPT	.375”
952QB	Inline	1.3	No Limit		5.8	2.2	13.92	354	1300, 1600, 2000, 3200	.0005, .001, .002, .003, .004, .006	.013, .03, .05, .07, .10, .15	.250” NPT	.375”
962QB	Inline	0.9	No Limit		5.8	2.2	13.92	354	450, 800, 4500	.0005, .001, .002, .003, .004, .006	.013, .03, .05, .07, .10, .15	.250” NPT	.375”
962QB	Inline	1.3	No Limit		5.8	2.2	13.92	354	1300, 1600, 2000, 3200	.0005, .001, .002, .003, .004, .006	.013, .03, .05, .07, .10, .15	.250” NPT	.375”

Rated tool performance at 90 PSIG measured at tool inlet with motor running.

EXTRA EQUIPMENT:
Nose, spindle, spindle guard.

WHEN ORDERING TOOL:
Tool nose and spindle must be specified when tool is ordered.

952 Q B – XXXX – .XXXX – MS – B B – A – A – XXX

Tool Series
952 Inline
962 Inline *(Countersink)*

Quackenbush

Tool Style
B = Inline

Spindle Speed (RPM)
Select desired speed from catalog

.9 Nominal HP	1.3 Nominal HP
450 RPM	1300 RPM
800 RPM	1600 RPM
4500 RPM	2000 RPM
	3200 RPM

Feed Rate

05 = .0005 IPR	30 = .003 IPR
10 = .001 IPR	40 = .004 IPR
20 = .002 IPR	60 = .006 IPR

Motor Stop
MS = Motor Stop 952QB
DS = Depth Sensing 962QB

Spindle Thread

A = 1/4 - 28	D = M8 x 100 internal
B = 5/16 - 25	E = M6 x 100 internal
C = 3/8 - 24	F = 9/16 - 18

Spindle Stroke

A = 40mm (1.57")	E = 120mm (4.72")
B = 60mm (2.36")	F = 140mm (5.51")
C = 80mm (3.15")	G = 180mm (7.08")
D = 100mm (3.94")	H = 1/2-22 (specify length) (952QB only)

Options

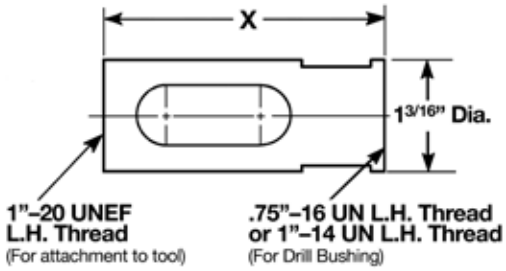
A = Micro pump w/counter	F = Handle w/trigger
B = Micro pump wo/counter	G = Handle wo/trigger
C = Counter	I = Indexer
D = Concentric collet	J = Large ID indexer (special 952 only)
E = HP booster (1300, 1600, 2000, 3200 RPM models only)	X = None

Accessories
A = Nose
B = Chuck
C = Other (specify)

Last three digits of material number

Quackenbush 952QB & 962QB Tool Noses & Spindle Assemblies

- When ordering a tool, specify one nose and spindle assembly from chart below. *(Spindle assembly includes spindle and spindle guard.)*
- Order Tool Nose Adapter (614722) to attach S125 & S300 Tool Noses.
- Order Tool Nose Adapter (614973) to attach S150 & S275 Tool Noses.
- Other Noses and Spindles are available upon request.
- Optional mounted lubricator with counter (22007057) and without counter (22007067) are available.
- Use spindle adapter 632759 to adapt 3/8" capacity three jaw chuck 849108 to spindles with 3/8"-24 internal threads.



Standard Tool Noses

Bushing Thread	Length X	Part Number
.75 - 16 UN LH	3.0"	614905
.75 - 16 UN LH	4.0"	614824
1" -14 UN LH	3.0"	624812
1" -14 UN LH	4.75"	614814

Fluid Spindle Assemblies

Stroke	Cutter End	Part Number
2.25"	.250" - 28	22005572
2.25"	.3125" - 24	22005582
2.25"	.375" - 24	22005592
3.00"	.375" - 24	22005594

Adapter Kits

Description	Part Number
Convert Inline tool to Right Angle	92050932
Convert Right Angle tool to Inline	92050952

Quackenbush™

230QGDAB-SU-MS Series

Capacity:
Aluminum – 1.25" (31.75mm)
Titanium – .875" (22.2mm)

Stroke:
Max – .125" (3.18mm)
Min. – Unlimited

- **230 series motor develops 2.3 nominal horsepower.**
- **Single push-button starts motor and engages drill feed mechanism.**
- **Externally replaceable shear pin provides gear protection if chips pack or cutter binds.**
- **Rapid advance with manual speed control and low torque clutch protection if cutter advances into workpiece.**
- **Easily adapted to oil hole drilling using a solid spindle and a fluid chuck, or with the use of an oil hole spindle and a fluid swivel.**
- **Stroke is adjustable by positioning the stop collar.**
- **Spindle continues to rotate in forward direction on return stroke to eliminate withdrawal spiral in hole.**
- **Rapid spindle retraction.**
- **Spindle can be retracted at any point during feed cycle by lifting retract lever.**
- **Precision depth control with automatic retract after preset dwell period. (When equipped with depth sensing nose assembly)**
- **Positive depth stop is adjustable for desired hole depth.**
- **Cutter automatically retracts if tool senses thrust overload.**
- **Motor shuts off automatically after retract.**

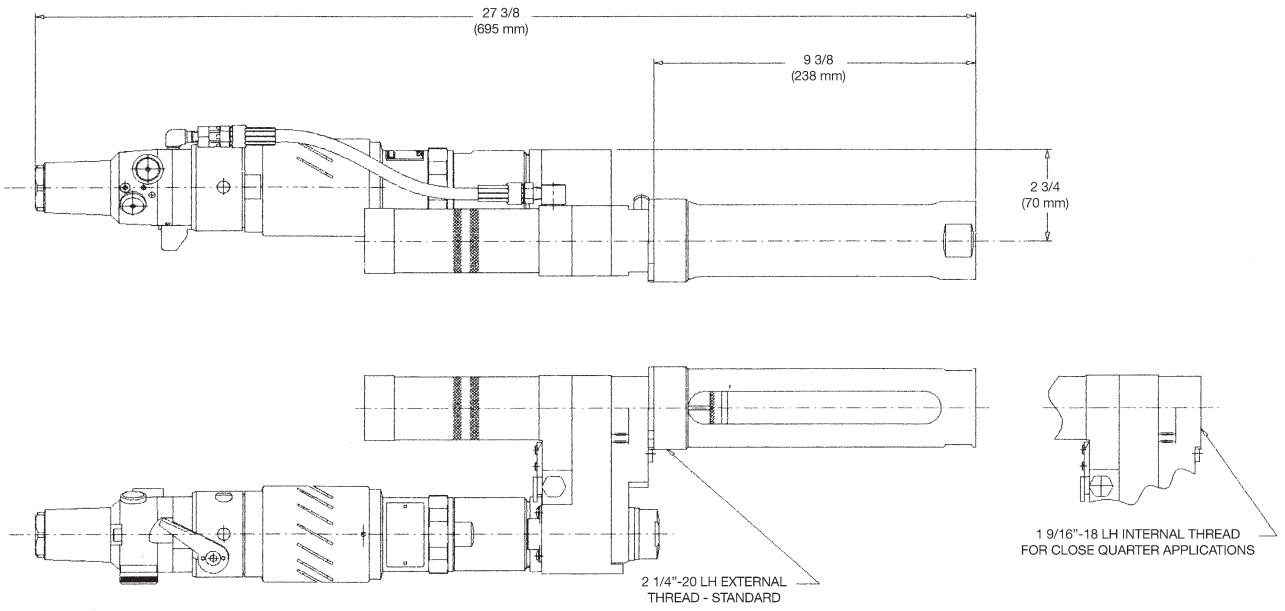
230QGDAB-SU-MS

Model	Motor Configuration	Maximum Stroke		Weight*		Length		Spindle Speeds	Feed Per Revolution	Inlet	Minimum Hose Size
		in.	mm	lbs	kg	in.	mm				
230QGDAB-SU-MS	Piggy Back	NO LIMIT		17.5	7.9	27 .375	695	75, 97, 120, 150, 188, 240,307,310	.0005, .001, .002, .003, .0045, .006, .008, .012	.5" NPT	.5"
230QGDAB-SU-MS	Piggy Back	NO LIMIT		16.25	7.4	25 .375	644	390, 480, 585, 680, 825, 960 1155, 1500	.0005, .001, .002, .003, .0045, .006, .008, .012	.5" NPT	.5"
230QGDABV-SU-MS	Piggy Back	NO LIMIT		18.8	8.2	27 7/8	707	75/187, 150/375	.0005, .001, .002, .003, .0045, .006, .008, .012	.5" NPT	.5"
230QGDABV-SU-MS	Piggy Back	NO LIMIT		16.75	7.6	25 7/8	657	330/780 600/1500	.0005, .001, .002, .003, .0045, .006, .008, .012	.5" NPT	.5"

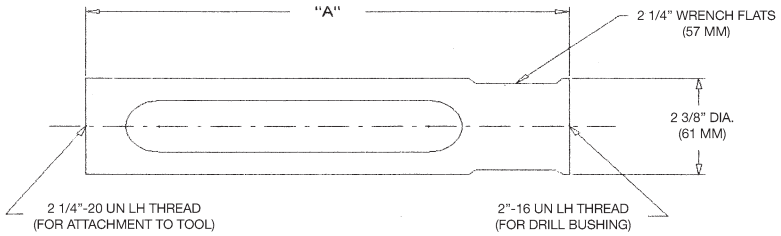
*Weight and Length will vary depending on rpm specified.
Rated tool performance at 90 PSIG measured at tool inlet with motor running.
When selecting speeds and feeds, see page 3.
SEE PAGES 5-7 FOR SAFETY PRECAUTIONS.

EXTRA EQUIPMENT:
Tool Nose, Spindle

WHEN ORDERING TOOL:
Tool nose and spindle must be specified.
Specify EITHER 2.25" L. H. External Thread OR 1.5625"-20 L.H. Internal Thread.

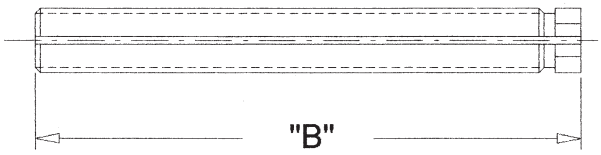


Standard Tool Nose



Standard Spindles

STANDARD SPINDLES



Steel Tool Noses (Select One)

Length "A"	Thread	Part No.
S400 Series		
9.5" (241mm)	.75" - 16 L.H.	621235
9.5" (241mm)	1" - 14 L.H.	621236
9.5" (241mm)	1.25" - 12 L.H.	621237
9.5" (241mm)	1.5" - 12 L.H.	621238
9.375" (238mm)	2" - 16 L.H.	614751
S600 Series		
11.5" (282mm)	1" - 14 L.H.	621244
11.5" (282mm)	1.25"- 12 L.H.	621245
11.5" (282mm)	1.5"- 12 L.H.	621246
11.375" (279m)	2" - 16 L.H.	614757

Spindles (Select One)

Spindle Type	Length "B"	Max. Stroke	Thread Description	Part No.
Oil Hole	9" (229mm)	4" (103mm)	.5625"-18 Internal Thread with Counterbore and 118° Angle	382599
Oil Hole	9" (229mm)	4" (103mm)	.625"-18 Internal Thread with Counterbore and 118° Angle	382346
Solid	9" (229mm)	4" (103mm)	No. 2 Short Morse Taper with side Knock-Out	382628

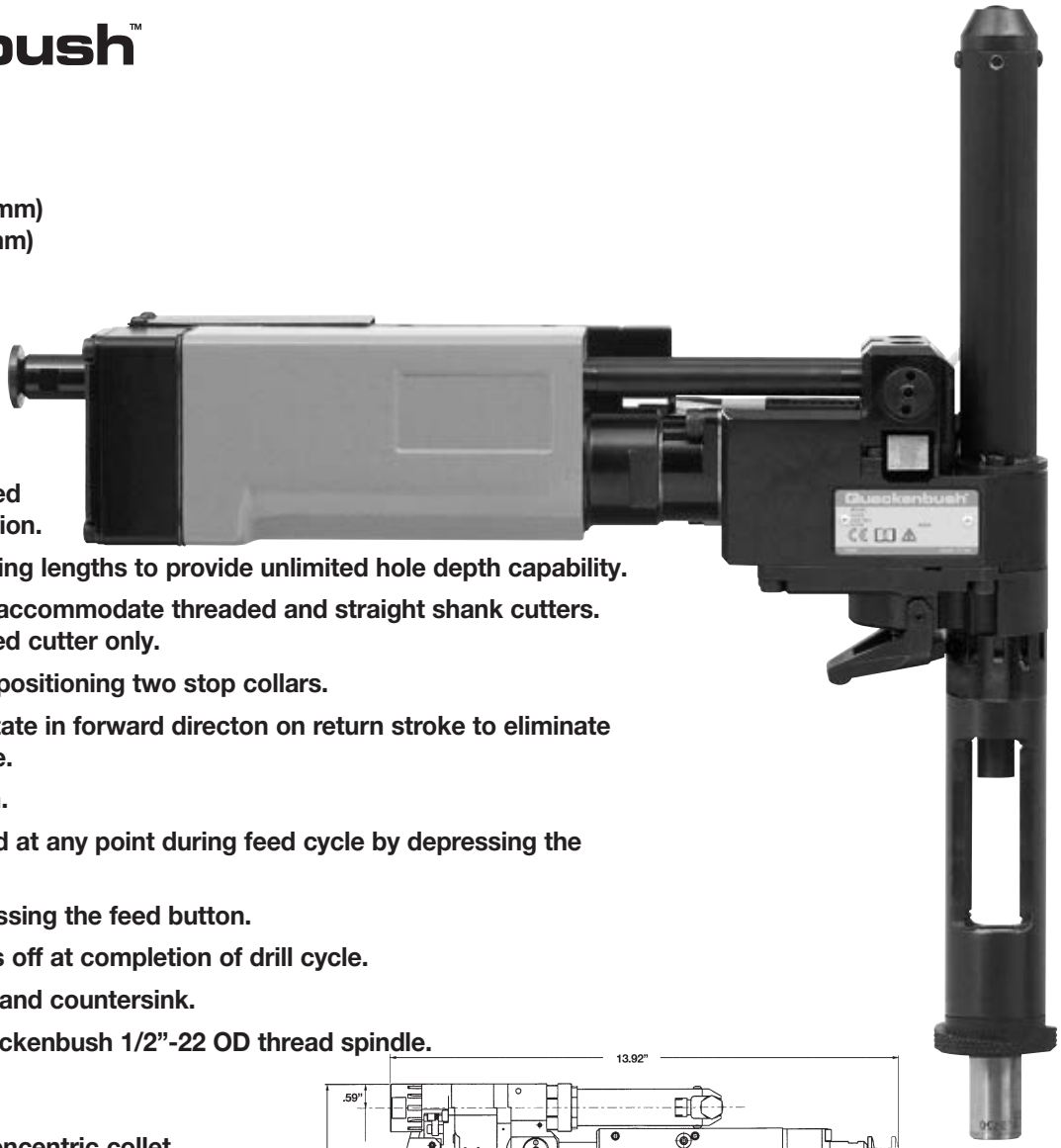
- 2.25"-20 L.H. Nose Thread Attachment on standard tool accepts S400 and S600 Tool Noses and accessories. For close quarter applications, a special tool with 1.5625"-20 L.H. Internal Nose Attachment Thread is available.
- With the 1.5625"-20 L.H. Internal Thread, order Nose Adapter (614244) to attach S150 and S275 (2" O.D.) Tool Noses and accessories, OR Nose Adapter (614228) to attach S400 and S600 (2.375" 0. D.) Tool Noses and accessories. (See pg. 2-21)
- Nose Indexers - 1.5625"-20 Nose Thread use (381326; for 2.25"-20 L.H. Nose Thread use (381327) (NOTE: Tool must be equipped with 1.5625"-20 L.H. Nose Attachment Threads.)
  New design indexers: 1 9/16-20 – 641261
  2.25-20 – 641262
- When adapting a 3-jaw chuck to .5625"-l8 Internal Thread Spindle, order Chuck Adapter (623643) for .75" cap. chuck OR Chuck Adapter (619400) for .5" cap chuck.
- Fluid Swivels used with oil hole spindles and selection of Fluid Chucks.
- Other Noses and Spindles are available at extra charge.

Quackenbush™

932QR
942QR

Capacity:
Aluminum - .5625”(14.3mm)
Titanium - .4375” (11.1mm)
Steel - .4375” (11.1mm)

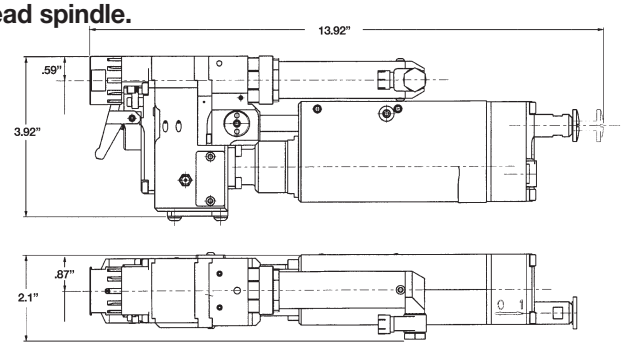
Stroke:
Unlimited
Min. - .375” (9.5mm)



- **0.9 and 1.3 nominal horsepower motors.**
- **Right angle tool designed for close quarter operation.**
- **Utilizes spindles of varying lengths to provide unlimited hole depth capability.**
- **Utilizes spindles which accommodate threaded and straight shank cutters. Fluid spindle for threaded cutter only.**
- **Stroke is adjustable by positioning two stop collars.**
- **Spindle continues to rotate in forward directon on return stroke to eliminate withdrawal spiral in hole.**
- **Rapid spindle retraction.**
- **Spindle can be retracted at any point during feed cycle by depressing the manual return lever.**
- **Feed is engaged by pressing the feed button.**
- **Tool automatically shuts off at completion of drill cycle.**
- **932QR drill, 942QR drill and countersink.**
- **Easily adaptable to Quackenbush 1/2”-22 OD thread spindle.**

Options

- **Vacuum on nose and concentric collet**
- **Concentric collet**
- **Pneumatic counter**
- **Electronic back-counter**
- **Micro-pump**
- **Handle on the upper side**



Model	Motor Configuration	HP	Max. Stroke in.	Max. Stroke mm	Weight lbs	Weight kg	Max. Length in.	Max. Length mm	Spindle Speeds	Feed Per Revolution Inches	Feed Per Revolution mm	Inlet	Min. Hose
932QR	Right Angle	0.9	No Limit		5.8	2.2	13.92	354	450, 800, 4500	.0005, .001, .002, .003, .004, .006	.013, .03, .05, .07, .10, .15	.250” NPT	.375”
932QR	Right Angle	1.3	No Limit		5.8	2.2	13.92	354	1300, 1600, 2000, 3200	.0005, .001, .002, .003, .004, .006	.013, .03, .05, .07, .10, .15	.250” NPT	.375”
942QR	Right Angle	0.9	No Limit		5.8	2.2	13.92	354	450, 800, 4500	.0005, .001, .002, .003, .004, .006	.013, .03, .05, .07, .10, .15	.250” NPT	.375”
942QR	Right Angle	1.3	No Limit		5.8	2.2	13.92	354	1300, 1600, 2000, 3200	.0005, .001, .002, .003, .004, .006	.013, .03, .05, .07, .10, .15	.250” NPT	.375”

Rated tool performance at 90 PSIG measured at tool inlet with motor running.

EXTRA EQUIPMENT:
Nose, spindle, spindle guard.

WHEN ORDERING TOOL:
Tool nose and spindle must be specified when tool is ordered.

932 | Q | R – XXXX – .XXXX – MS – B | B – A – A – XXX

Tool Series
932 Right Angle
942 Right Angle *(Countersink)*

Quackenbush

Tool Style
R = Right Angle

Spindle Speed (RPM)
Select desired speed from catalog

.9 Nominal HP	1.3 Nominal HP
450 RPM	1300 RPM
800 RPM	1600 RPM
4500 RPM	2000 RPM
	3200 RPM

Feed Rate

05 = .0005 IPR	30 = .003 IPR
10 = .001 IPR	40 = .004 IPR
20 = .002 IPR	60 = .006 IPR

Motor Stop
MS = Motor Stop 932QR
DS = Depth Sensing 942QR

Spindle Thread

A = 1/4 - 28	D = M8 x 100 internal
B = 5/16 - 25	E = M6 x 100 internal
C = 3/8 - 24	F = 9/16 - 18

Spindle Stroke

A = 40mm (1.57")	E = 120mm (4.72")
B = 60mm (2.36")	F = 140mm (5.51")
C = 80mm (3.15")	G = 180mm (7.08")
D = 100mm (3.94")	H = 1/2-22 (specify length) (932QR only)

Options

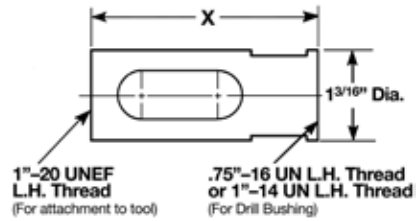
A = Micro pump w/counter	F = Handle w/trigger
B = Micro pump wo/counter	G = Handle wo/trigger
C = Counter	I = Indexer
D = Concentric collet	J = Large ID indexer (special 932QR only)
E = HP booster (1300, 1600, 2000, 3200 RPM models only)	X = None

Accessories
A = Nose
B = Chuck
C = Other (specify)

Last three digits of material number

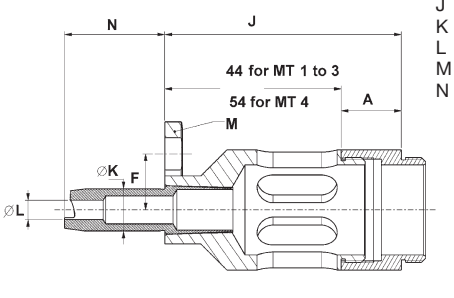
Quackenbush 932QR & 942QR Tool Noses & Spindle Assemblies

- When ordering a tool, specify one nose and spindle assembly from chart below. *(Spindle assembly includes spindle and spindle guard.)*
- Order Tool Nose Adapter (614722) to attach S125 & S300 Tool Noses.
- Order Tool Nose Adapter (614973) to attach S150 & S275 Tool Noses.
- Other Noses and Spindles are available upon request.
- Optional mounted lubricator with counter (22007057) and without counter (22007067) are available.
- Use spindle adapter 632759 to adapt 3/8" capacity three jaw chuck 849108 to spindles with 3/8"-24 internal threads.



Bayonet Nosepiece

Specify Shank Diameter and Cutter Guide Diameter in Nosepiece Term. Code. Specify overall length as Bayonet Nosepiece Length.



J Body Length
K Shank Diameter
L Cutter Guide Diameter
M Bayonet Lock Wing
N Bushing Length

Standard Tool Noses

Bushing Thread	Length X	Part Number
.75 - 16 UN LH	3.0"	614905
.75 - 16 UN LH	4.0"	614824
1" -14 UN LH	3.0"	624812
1" -14 UN LH	4.75"	614814

Fluid Spindle Assemblies

Stroke	Cutter End	Part Number
2.25"	.250" - 28	22005572
2.25"	.3125" - 24	22005582
2.25"	.375" - 24	22005592
3.00"	.375" - 24	22005594

Adapter Kits

Description	Part Number
Convert Inline tool to Right Angle	92050932
Convert Right Angle tool to Inline	92050952

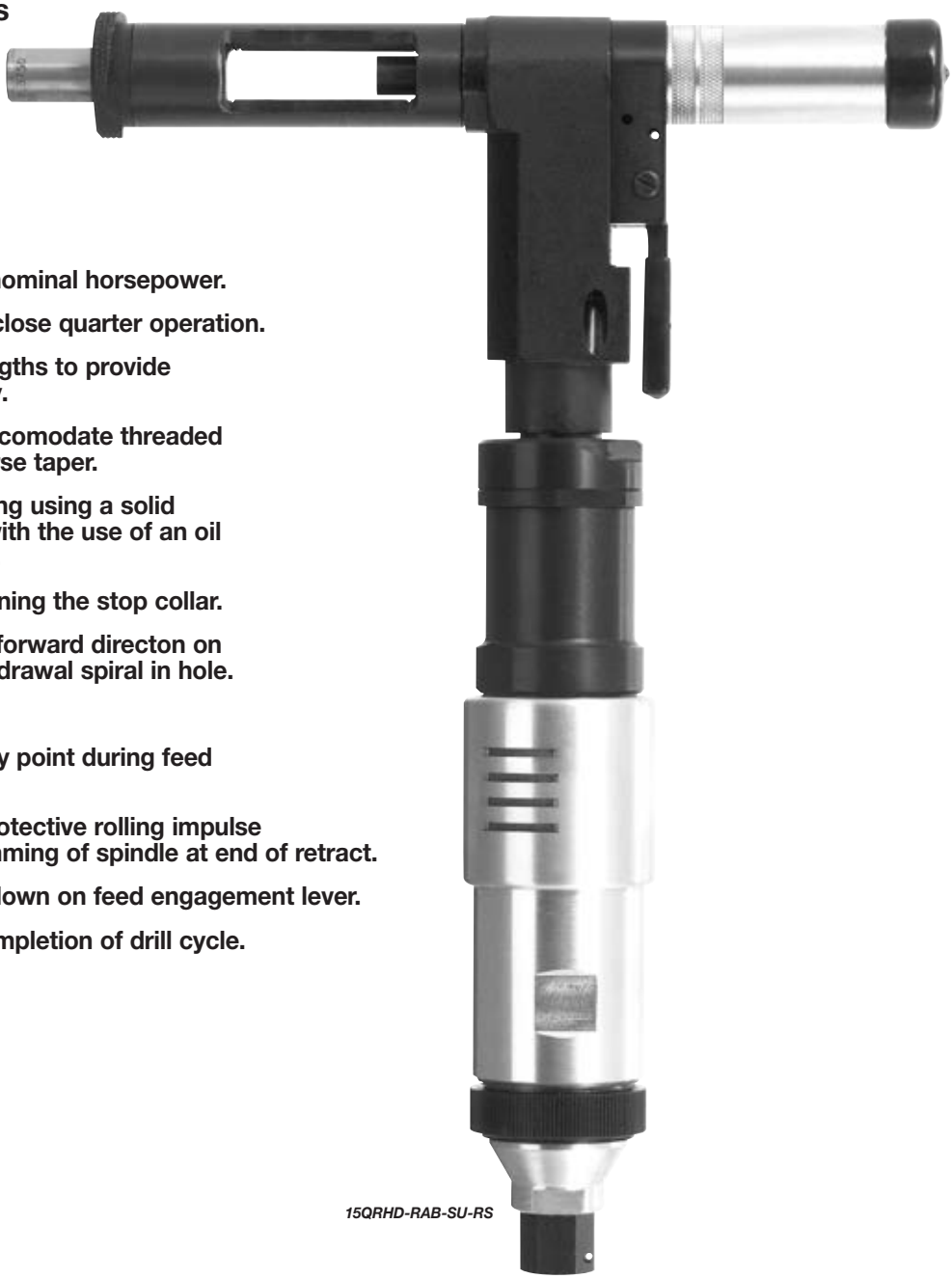
Quackenbush™

15QRHD-RAB-SU-RS Series

Capacity:
Aluminum – .5625" (14.3mm)
Titanium – .4375" (11.1mm)
Steel – .4375" (11.1mm)

Stroke:
Unlimited
Min. – .375" (9.5mm)

- **15 series motor develops 1.0 nominal horsepower.**
- **Right angle tool designed for close quarter operation.**
- **Utilizes spindles of varying lengths to provide unlimited hole depth capability.**
- **Tool utilizes spindles which accomodate threaded shank, straight shank and morse taper.**
- **Easily adapted to oil hole drilling using a solid spindle and a fluid chuck, or with the use of an oil hole spindle and a fluid swivel.**
- **Stroke is adjustable by positioning the stop collar.**
- **Spindle continues to rotate in forward directon on return stroke to eliminate withdrawal spiral in hole.**
- **Rapid spindle retraction.**
- **Spindle can be retracted at any point during feed cycle by lifting retract lever.**
- **Automatic retract stop with protective rolling impulse clutch prevents accidental jamming of spindle at end of retract.**
- **Feed is engaged by pressing down on feed engagement lever.**
- **Tool is manually shut off at completion of drill cycle.**

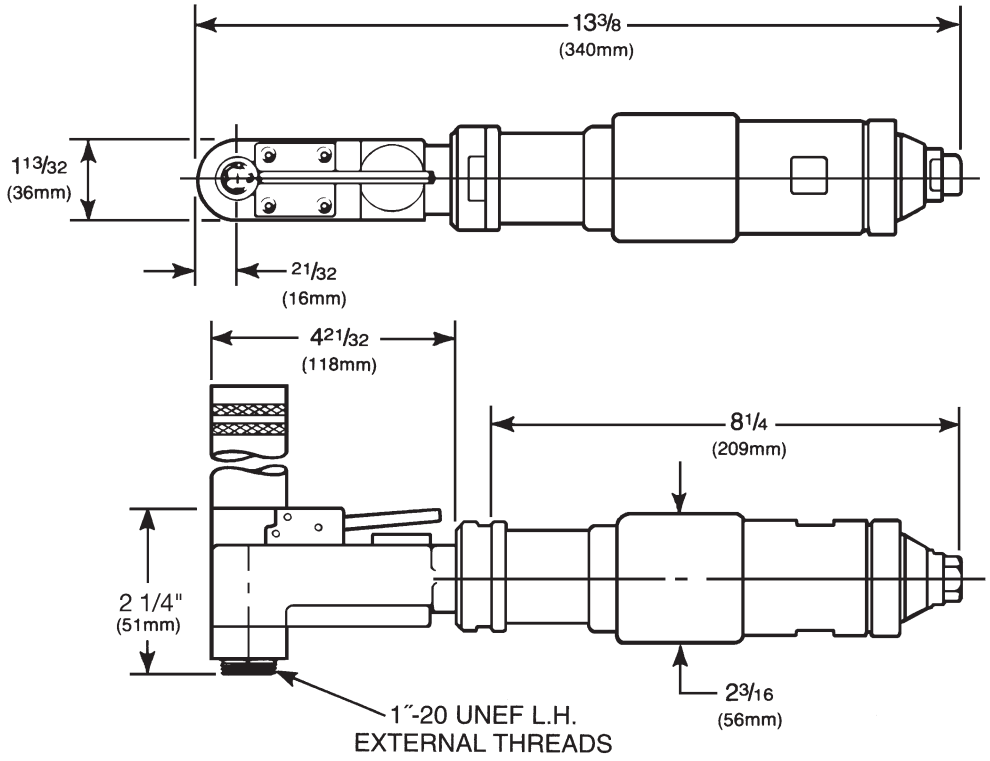


15QRHD-RAB-SU-RS

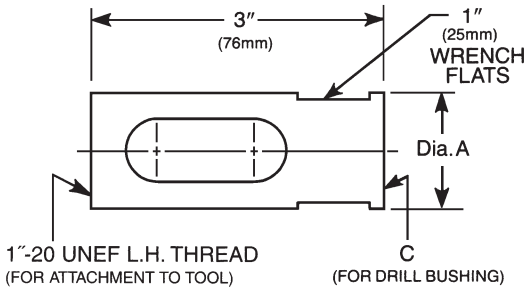
Model	Motor Configuration	Maximum Stroke		Weight		Maximum Length		Spindle Speeds	Feed Per Revolution	Inlet	Minimum Hose Size
		in.	mm	lbs	kg	in.	mm				
15HD-RAB-SU-RS	Right Angle	No Limit		5	2.27	13 3/8	34	165, 265, 335, 465, 660, 1000, 1650	.0005, .001, .002, .003, .006	.375" NPT	.375"

EXTRA EQUIPMENT:
Tool Noses, Spindles.
Rated tool performance at 90 PSIG measured at tool inlet with motor running.
Mist lubricator – 631889
SEE PAGES 5-7 FOR SAFETY PRECAUTIONS.

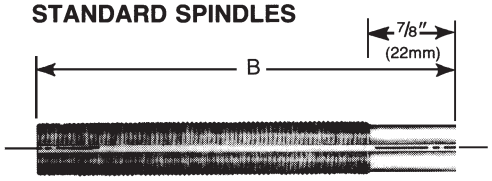
WHEN ORDERING TOOL:
Tool nose and spindle must be specified. Other tool noses and spindles are available at extra charge.



STANDARD TOOL NOSES



STANDARD SPINDLES



1/2–22 L.H.

STEEL TOOL NOSES (Select One)

Dia. "A"	Length	"C" Thread	Part No.
1.1875" (30mm)	3" (76mm)	.75"-16 L.H. (21000)	614905
1.25" (32mm)	3" (76mm)	1.0"-14 L.H. (22000)	614906

SPINDLES (Select One)

Spindle Type	Length "B"	Max. Stroke	Thread Description	Part No.
Solid	4" (101mm)	1.12" (29mm)	.25"-28 Internal Thread	623266
Solid	4" (101mm)	1.12" (29mm)	.375"-24 Internal Thread with Counterbore	615915

- Order Tool Nose Adapter (614722) to attach S125 & S300 Tool Noses (1.75" O.D.) and accessories.
- Order Tool Nose Adapter (614973) to attach S150 & S275 Tool Noses (2" 0. D.) and accessories.
- Order Chuck Adapter (619136) when utilizing 3-jaw chuck with .375 -24 Internal Thread Spindles.
- Fluid Swivel (631256) used with Oil Hole Spindles, and selection of Fluid Chucks.
- Fluid Chucks used with .375 -24 Internal Thread Spindles.
- Other Noses and Spindles are available as required.
- Nose Indexer (631249). New design 641244.

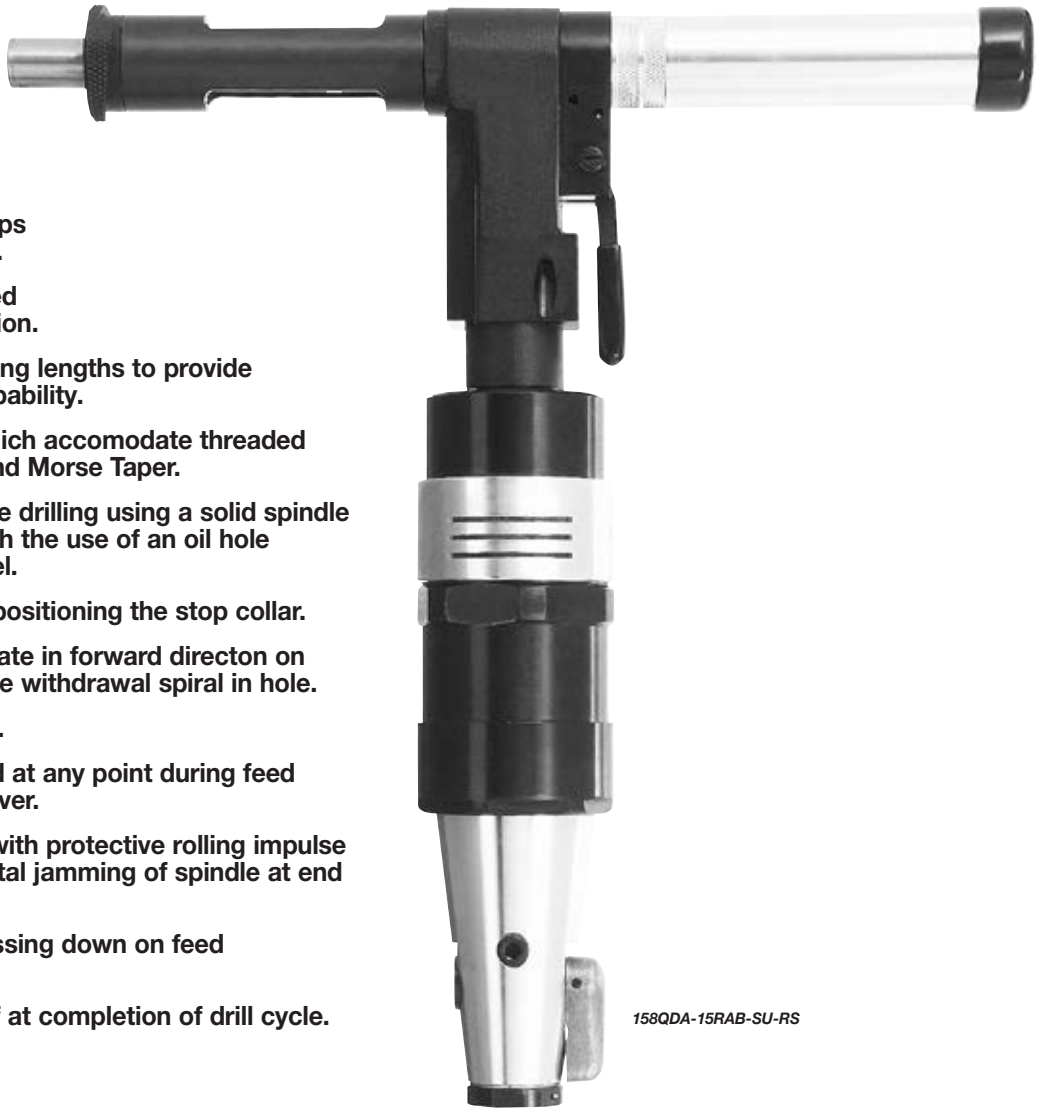
Quackenbush™

158QDA-15QRHD-SU-RS Series

Capacity:
Aluminum - .5625”
(14.28mm)

Stroke:
Unlimited
Min. - .375”

- **158 series motor develops 1.6 nominal horsepower.**
- **Right angle tool designed for close quarter operation.**
- **Utilizes spindles of varying lengths to provide unlimited hole depth capability.**
- **Tool utilizes spindles which accomodate threaded shank, straight shank and Morse Taper.**
- **Easily adapted to oil hole drilling using a solid spindle and a fluid chuck, or with the use of an oil hole spindle and a fluid swivel.**
- **Stroke is adjustable by positioning the stop collar.**
- **Spindle continues to rotate in forward directon on return stroke to eliminate withdrawal spiral in hole.**
- **Rapid spindle retraction.**
- **Spindle can be retracted at any point during feed cycle by lifting retract lever.**
- **Automatic retract stop with protective rolling impulse clutch prevents accidental jamming of spindle at end of retract.**
- **Feed is engaged by pressing down on feed engagement lever.**
- **Tool is manually shut off at completion of drill cycle.**

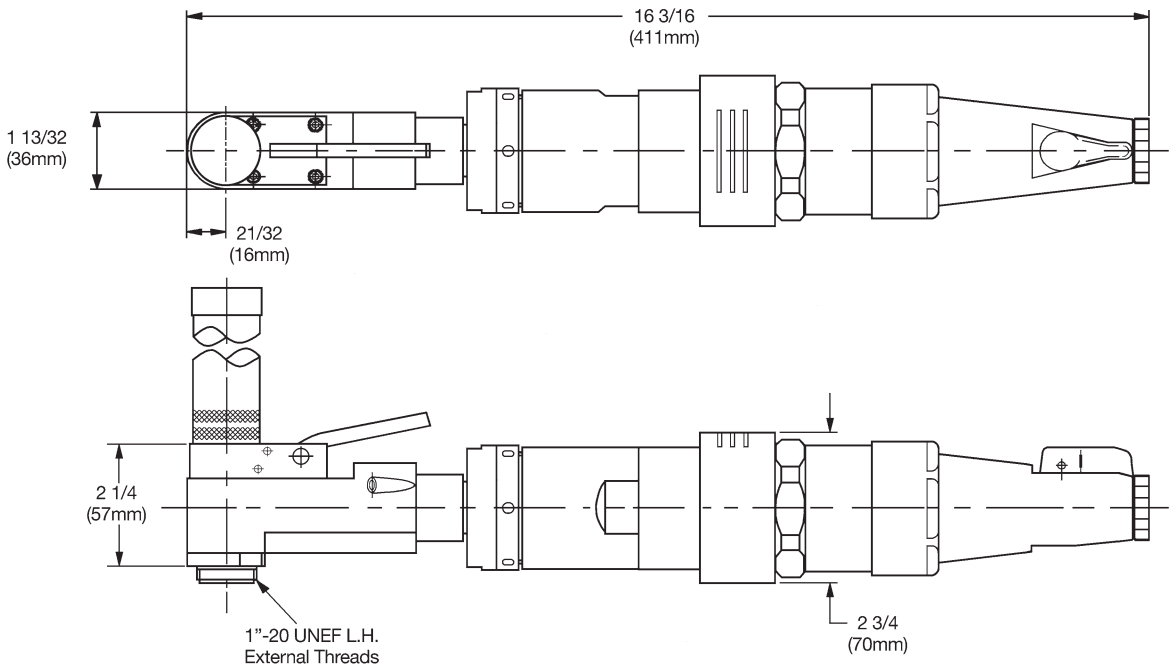


158QDA-15RAB-SU-RS

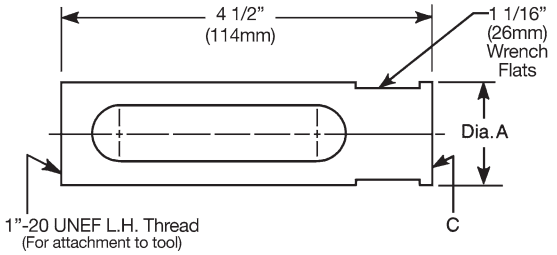
Model	Motor Configuration	Maximum Stroke		Weight		Maximum Length		Spindle Speeds	Feed Per Revolution	Inlet	Minimum Hose Size
		in.	mm	lbs	kg	in.	mm				
158QDA-15RAB-SU-RS	Right Angle	No Limit		9.25	4.2	16 3/16	411	110, 140, 230 290, 490, 600 1000, 1200 2000, 3000	.0005, .001, .002, .003	.375” NPT	.5”

EXTRA EQUIPMENT:
Tool Noses. Spindles.
Rated tool performance at 90 PSIG measured at tool inlet with motor running.
When selecting speeds and feeds, see page 3.
SEE PAGES 5-7 FOR SAFETY PRECAUTIONS.

WHEN ORDERING TOOL:
Select one tool nose and one spindle. Other tool noses and spindles are available at extra charge.



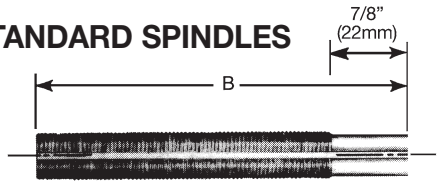
STANDARD STEEL TOOL NOSE (Part No. 615460)



STEEL TOOL NOSES (Select One)

Dia. "A"	Length	"C" Thread	Part No.
1.1875" (30mm)	4.5" (114mm)	.75"-16 L.H. (21000)	615460

STANDARD SPINDLES



1/2–22 L.H.

SPINDLES (Select One)

Spindle Type	Length "B"	Max. Stroke	Thread Description	Part No.
Solid	6" (152mm)	3.12" (79.4mm)	.375"-24 Internal Thread with Counterbore	615747
Oil Hole	6" (152mm)	3.12" (79.4mm)	.375"-24 Internal Thread with Counterbore	623812

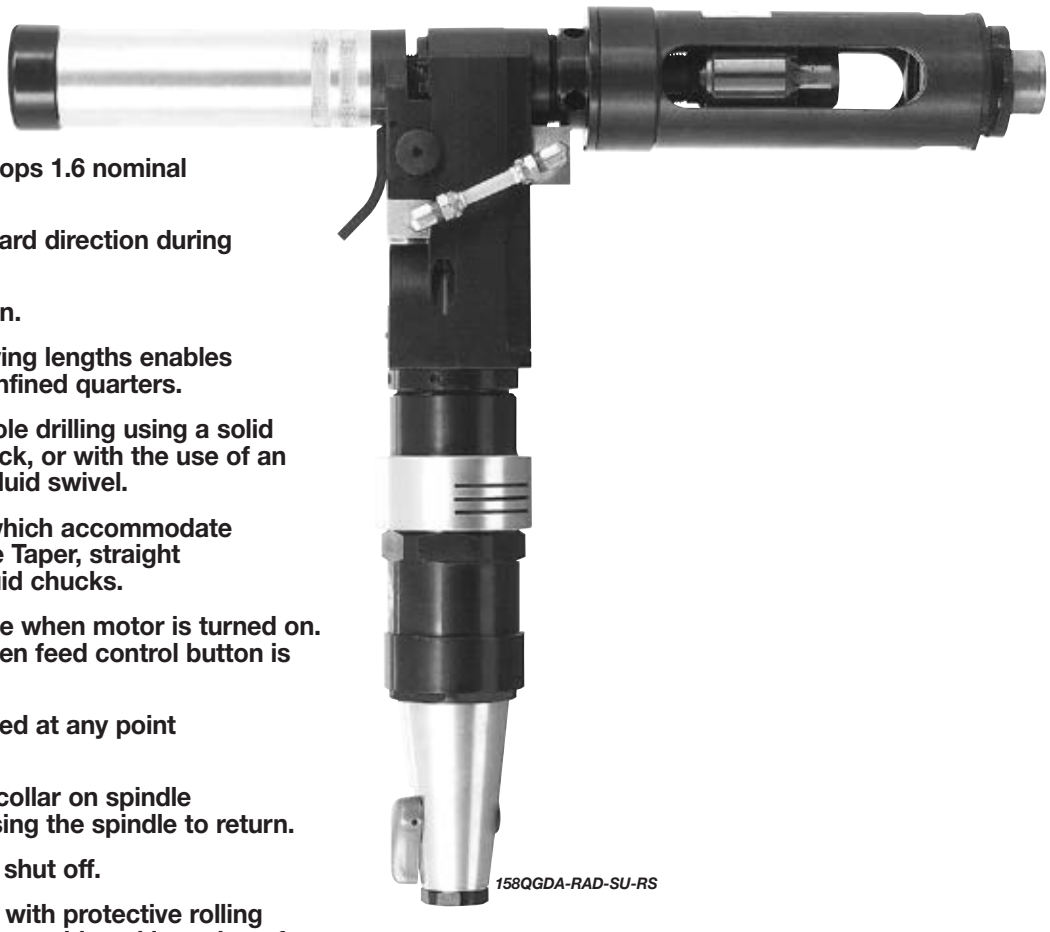
- Order Tool Nose Adapter (614722) to attach S125 & S300 Tool Noses (1.75" O.D.) and accessories.
- Order Tool Nose Adapter (614973) to attach S150 & S275 Tool Noses (2" 0. D.) andaccessories.
- Order Chuck Adapter (619136) when utilizing 3-jaw chuck with .375 -24 Internal Thread Spindles.
- Fluid Swivel (631256) when used with Oil Hole Spindles, and selection of Fluid Chucks used with .375 -24 Internal Thread Spindles.
- Other Noses and Spindles are available as required.
- Nose Indexer (631249). New design 641244.

Quackenbush™

158QGDA-RAD-SU-RS Series

Capacity:
Aluminum - 1.25” (32mm)
Titanium - 1” (25.4mm)
Steel - 1” (25.4mm)

Stroke:
Min. - .5” (12.7mm)
Max. - Unlimited



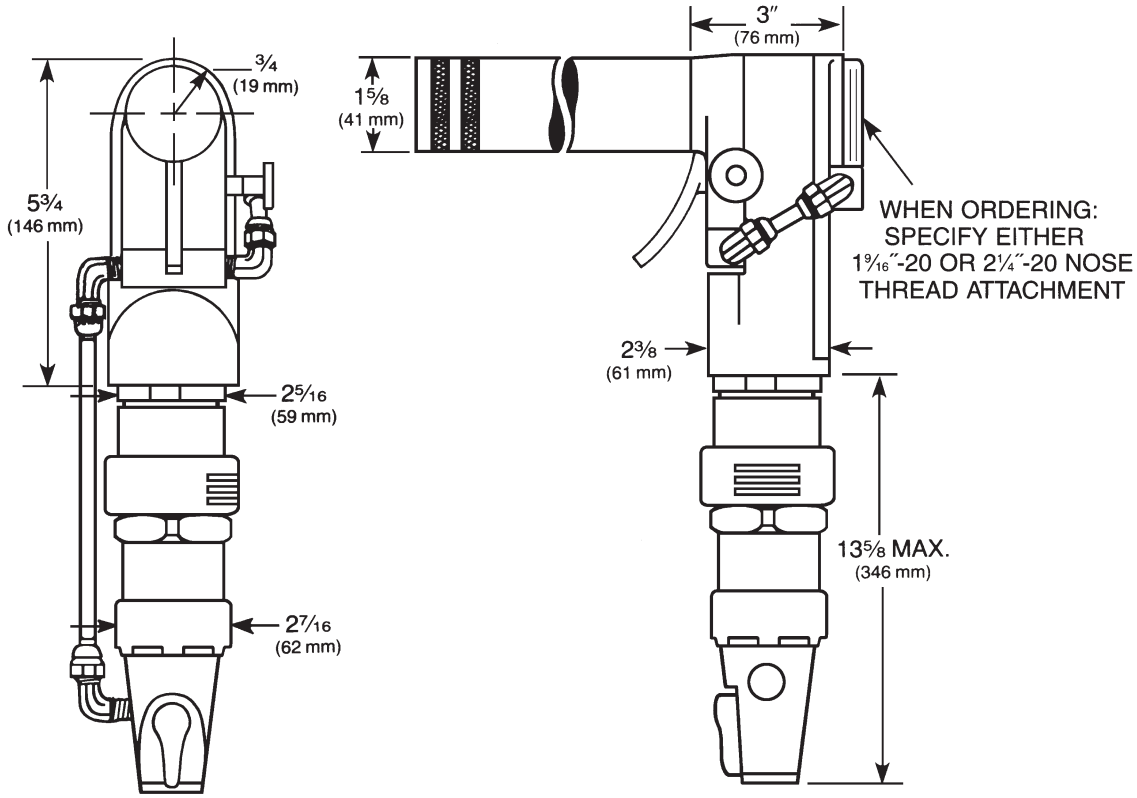
158QGDA-RAD-SU-RS

- **158 series motor develops 1.6 nominal horsepower.**
- **Spindle rotates in forward direction during return stroke.**
- **Rapid spindle retraction.**
- **Use of spindles of varying lengths enables tool to drill holes in confined quarters.**
- **Easily adapted to oil hole drilling using a solid spindle and a fluid chuck, or with the use of an oil hole spindle and a fluid swivel.**
- **Tool utilizes spindles which accommodate threaded shank, Morse Taper, straight shank, reamers and fluid chucks.**
- **Spindle begins to rotate when motor is turned on. Tool begins to feed when feed control button is depressed.**
- **Spindle may be retracted at any point during drilling cycle.**
- **At end of stroke, stop collar on spindle trips retract lever, causing the spindle to return.**
- **Tool must be manually shut off.**
- **Automatic retract stop with protective rolling impulse clutch prevents accidental jamming of spindle at end of retract.**
- **Spindle guard protects operator.**

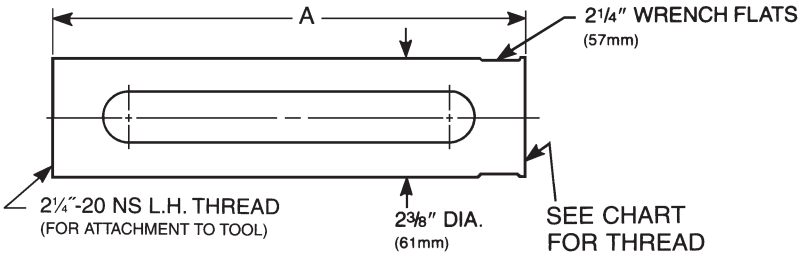
Model	Motor Configuration	Maximum Stroke		Weight		Spindle Speeds	Feed Per Revolution	Inlet	Minimum Hose Size
		in.	mm	lbs	kg				
158QGDA-RAD-SU-RS	Right Angle	No Limit		12.5	5.67	47, 56, 70, 94, 110, 120, 140, 185, 194, 230, 288, 380, 388, 460, 485, 570 760, 950	.0005, .001, .002, .0035, .0055, .0075	.375” NPT	.5”
158QGDAV-RAD-SU-RS	Right Angle	No Limit		12.5	5.67	47/120, 92/230 194/485, 380/950	.0005, .001, .002, .0035, .0055, .0075	.375” NPT	.5”

EXTRA EQUIPMENT:
Noses and spindles must be specified when ordering.
Rated tool performance at 90 PSIG measured at tool inlet with motor running.
When selecting speeds and feeds, see page 3.
Mist lubricator (631298-7) may be ordered.
SEE PAGES 5-7 FOR SAFETY PRECAUTIONS.

WHEN ORDERING TOOL:
Tool nose and spindle must be specified. Standard tool noses, spindle guards and spindles are provided when ordered with tool. Select one tool nose and one spindle. Other tool noses and spindles are available at extra charge.



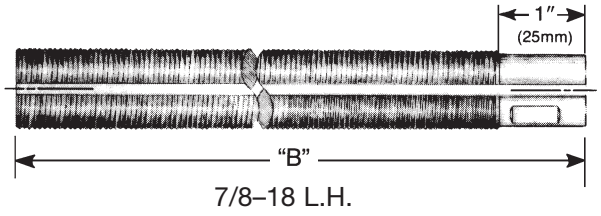
STANDARD STEEL TOOL NOSE



STEEL TOOL NOSES (Select One)

Length "A"	Thread	Part No.
S400 SERIES		
9.5" (241mm)	.75" - 16 L.H.	621235
9.5" (241mm)	1" - 14 L.H.	621236
9.5" (241mm)	1.25" - 12 L.H.	621237
9.5" (241mm)	1.5" - 12 L.H.	621238
9.375" (238mm)	2" - 16 L.H.	614751
S600 SERIES		
11.5" (282mm)	1" - 14 L.H.	621244
11.5" (282mm)	1.25"- 12 L.H.	621245
11.5" (282mm)	1.5"- 12 L.H.	621246
11.375" (279m)	2" - 16 L.H.	614757

STANDARD SPINDLES



SPINDLES (Select One)

Spindle Type	Length "B"	Max. Stroke	Thread Description	Part No.
Oil Hole	9.25" (235mm)	5.5" (140mm)	.5625"-18 Internal Thread with Counterbore and 118° Angle	623955
Oil Hole	9.25" (235mm)	5.5" (140mm)	.625"-18 Internal Thread with Counterbore and 118° Angle	615964
Solid	9" (229mm)	5.25" (133mm)	No. 2 Short Morse Taper with Side Knock-Out	614470
Solid	9" (229mm)	5.25" (133mm)	.5625"-18 Internal Thread with Counterbore	615319

- When adapting a 3-jaw chuck to .5625-18 internal thread spindle, order Chuck Adapter (623643) for .375" cap, chuck OR Chuck Adapter (619400) for .5" cap. chuck.
- Fluid Swivels used with oil hole spindles and selection of Fluid Chucks.
- Other Noses and Spindles are available on request.
- Nose Indexers
  1.5625 -20 (381326)
  2.25 -20 (381327) Use with 615705 nose adapter.
  New Design for 2.25-20: 641260

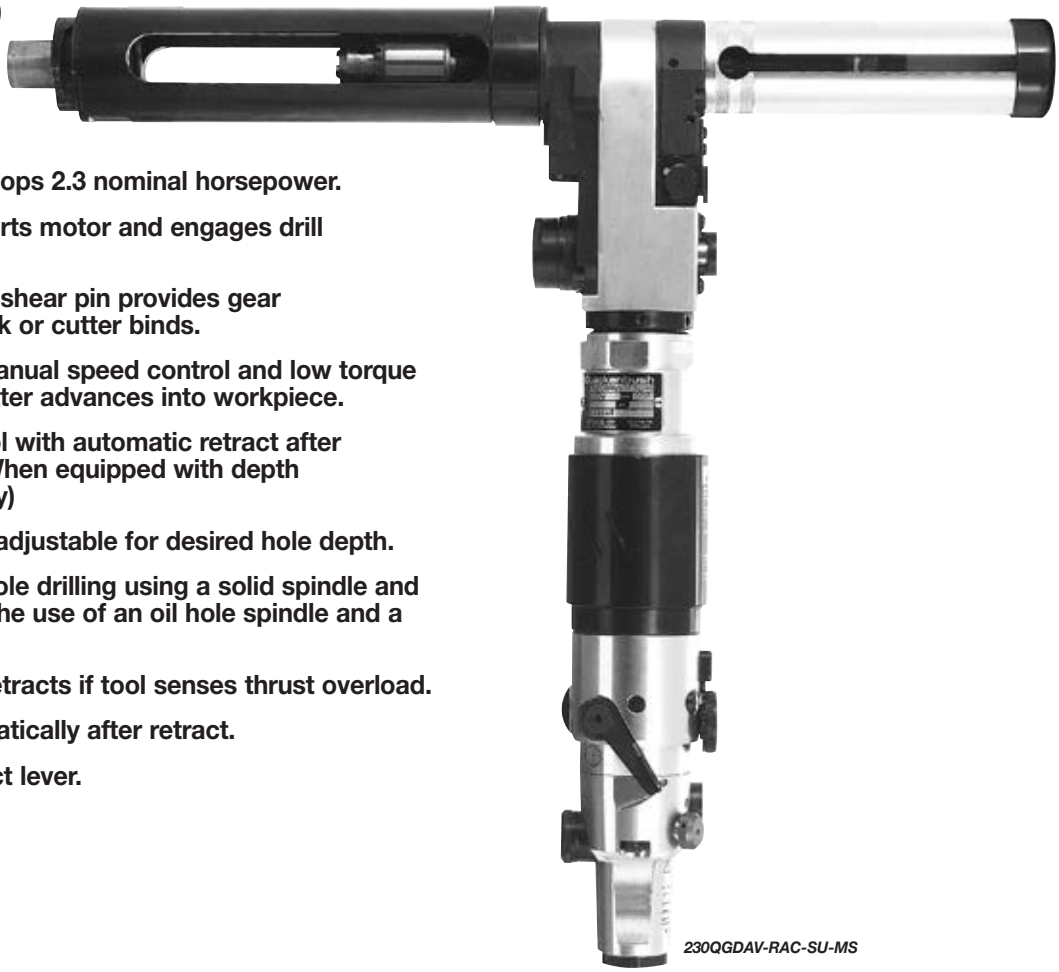
Quackenbush™

230QGDA-RAC-SU-MS Series

Capacity:
Aluminum – 1.375" (34.9mm)
Titanium – 1" (25.4mm)
Steel – 1" (25.4mm)

Stroke:
Min. – .125" (3.18mm)
Max. – Unlimited

- **230 series motor develops 2.3 nominal horsepower.**
- **Single push-button starts motor and engages drill feed mechanism.**
- **Externally replaceable shear pin provides gear protection if chips pack or cutter binds.**
- **Rapid advance with manual speed control and low torque clutch protection if cutter advances into workpiece.**
- **Precision depth control with automatic retract after preset dwell period. (When equipped with depth sensing nose assembly)**
- **Positive depth stop is adjustable for desired hole depth.**
- **Easily adapted to oil hole drilling using a solid spindle and a fluid chuck, or with the use of an oil hole spindle and a fluid swivel.**
- **Cutter automatically retracts if tool senses thrust overload.**
- **Motor shuts off automatically after retract.**
- **Auxiliary manual retract lever.**



230QGDAV-RAC-SU-MS

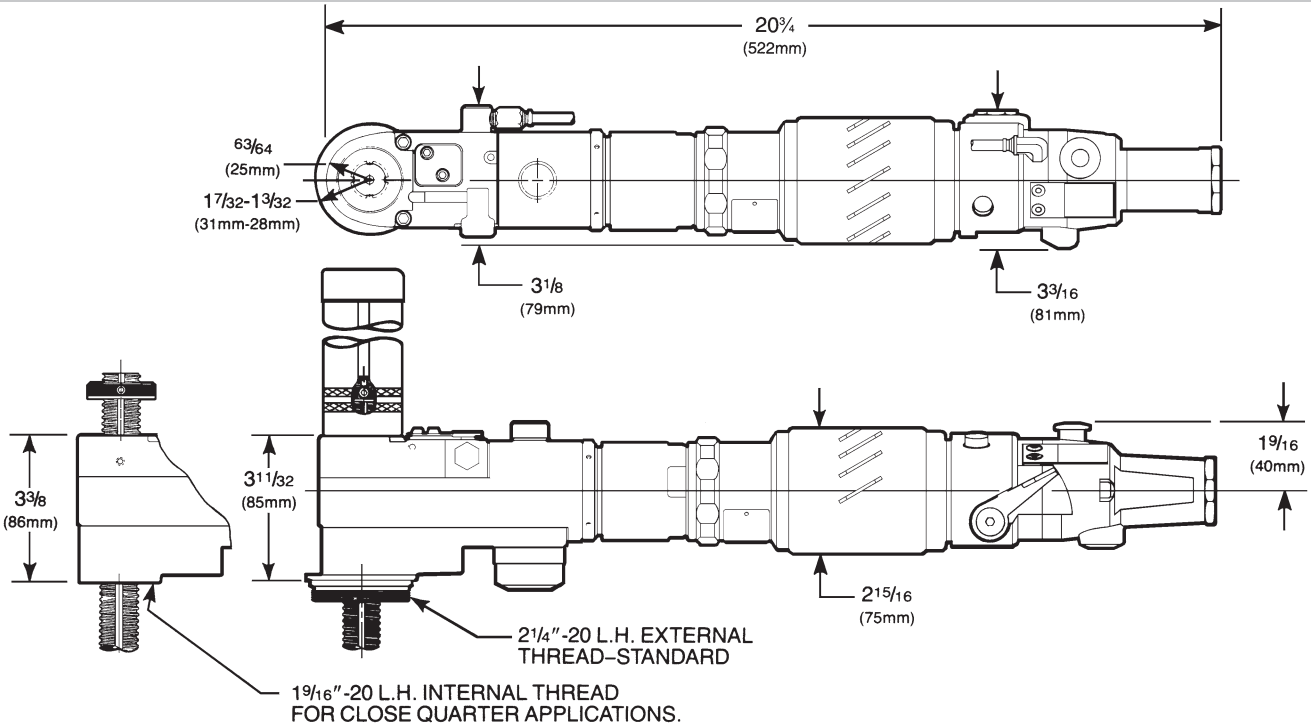
Model	Motor Configuration	Maximum Stroke		Weight*		Length*		Spindle Speeds	Feed Per Revolution	Inlet	Minimum Hose Size
		in.	mm	lbs	kg	in.	mm				
230QGDA-RAC-SU-MS	Right Angle	No Limit		17	7.7	20.75	527	50, 65, 80, 100, 125, 160, 205	.0005, .001, .002, .003, .0045, .006, .008, .012	.5" NPT	.5"
230QGDA-RAC-SU-MS	Right Angle	No Limit		15.75	7.1	18.75	476	260, 320, 390, 440, 550, 640, 770, 1000	.0005, .001, .002, .003, .0045, .006, .008, .012	.5" NPT	.5"
230QGDAV-RAC-SU-MS	Right Angle	No Limit		17.5	7.9	21.25	549	50/125 100/250	.0005, .001, .002, .003, .0045, .006, .008, .012	.5" NPT	.5"
230QGDAV-RAC-SU-MS	Right Angle	No Limit		16.25	7.4	19.25	489	210/520 420/1000	.0005, .001, .002, .003, .0045, .006, .008, .012	.5" NPT	.5"

*Weight and Length will vary depending on Gear Train.

NOTE:
Tool model with either the 2.25"-20 L.H. External Nose Attachment Thread (Standard) or the 1.5625"-20 Internal Thread (Special) must be specified when ordering.
Rated tool performance at 90 PSIG measured at tool inlet with motor running.
When selecting speeds and feeds, see page 3.

SEE PAGES 5-7 FOR SAFETY PRECAUTIONS.

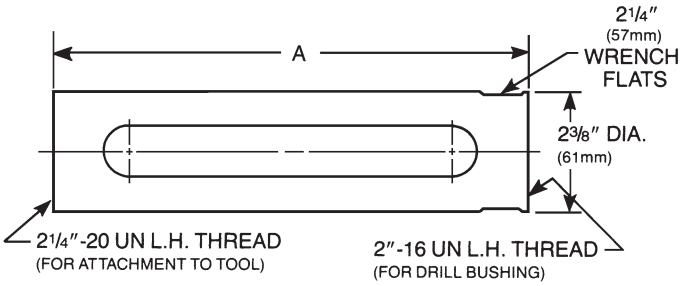
WHEN ORDERING TOOL:
Tool nose and spindle must be specified. Standard tool nose, spindle guard and spindle are provided when ordered with tool. Select one tool nose and one spindle. Specify EITHER 2.25"-20 External Thread OR 1.5625"-20 LH Internal Thread.



STEEL TOOL NOSES (Select One)

Length "A"	Thread	Part No.
S400 SERIES		
9.5" (241mm)	.75" - 16 L.H.	621235
9.5" (241mm)	1" - 14 L.H.	621236
9.5" (241mm)	1.25" - 12 L.H.	621237
9.5" (241mm)	1.5" - 12 L.H.	621238
9.375" (238mm)	2" - 16 L.H.	614751
S600 SERIES		
11.5" (282mm)	1" - 14 L.H.	621244
11.5" (282mm)	1.25"- 12 L.H.	621245
11.5" (282mm)	1.5"- 12 L.H.	621246
11.375" (279m)	2" - 16 L.H.	614757

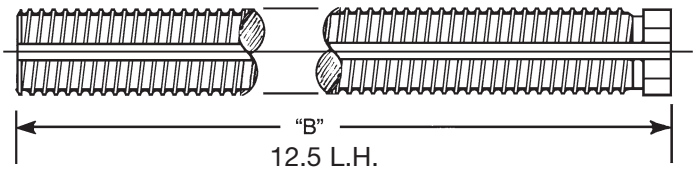
STANDARD TOOL NOSE



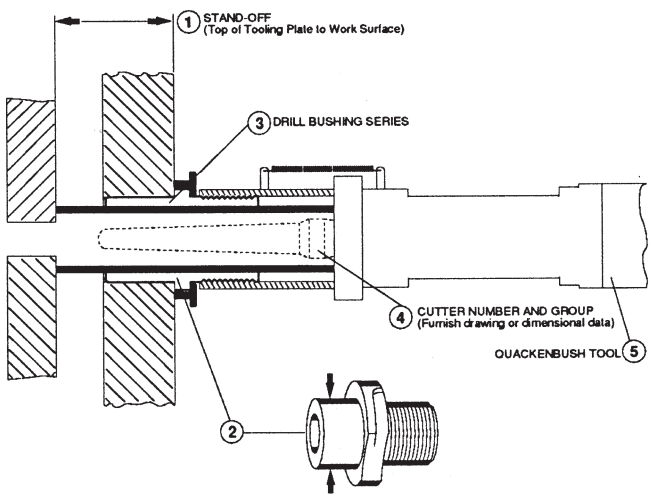
SPINDLES (Select One)

Spindle Type	Length "B"	Max. Stroke	Thread Description	Part No.
Oil Hole	9" (229mm)	4" (103mm)	.5625"-18 Internal Thread with Counterbore and 118° Angle	382599
Oil Hole	9" (229mm)	4" (103mm)	.625"-18 Internal Thread with Counterbore and 118° Angle	382346
Solid	9" (229mm)	4" (103mm)	No. 2 Short Morse Taper with Side Knock-Out	382628

STANDARD SPINDLE



- 2.25"-20 Nose Thread Attachment on standard tool accepts S400 and S600 Tool Noses and accessories.
- For close quarter applications, a special tool with 1.5625"-20 L.H. Internal Nose Attachment Thread is available.
- With the 1.5625"-20 L.H. Internal Thread, order Nose Adapter (614244) to attach S150 and S275 (2" O.D.) Tool Noses and accessories, OR Nose Adapter (614228) to attach S400 and S600 (2.375" O.D.) Tool Noses and accessories.
- Nose Indexers - For 1.5625"-20 nose threads use 381326; For 2.25"-20 use 381327 + 615705 Nose Adapter.
  New Design for 1.5625-20: 641261; 2.25-20: 641262
- When adapting a 3-jaw chuck to .5625 - 18 Internal Thread Spindle, order Chuck Adapter (623643) for .375" cap. chuck OR Chuck Adapter (619400) for .5" cap. chuck.
- Fluid Swivels used with oil hole spindles and selection of Fluid Chucks.
- Other Noses & Spindles are available at extra charge.



Depth and Dwell attachments are designed for each tooling application. The following information is required in order to obtain a quotation from the factory, Contact your local Quackenbush Specialist for assistance.

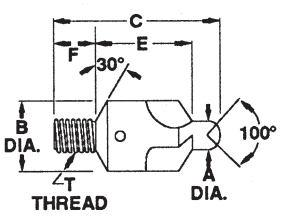
① Stand Off:_____ inches. (Minimum chip clearance .375")
② Drill Bushing Tip Outside Diameter: _____ inches.
③ Drill Bushing Series (Circle One):
- 2 Lock — 22,000, 23,00 & 24,000 Series
- 3 Lock — 25,000, 26,000 Series

④ Cutter Information:
- Style (reference drawings at bottom of this page):_____.
- Furnish cutter Drawing or Dimensional Data (reference drawings at bottom of this page)

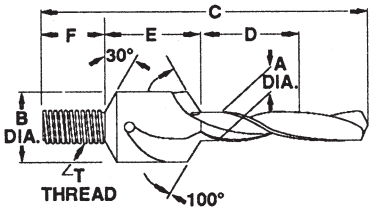
A _____ F _____
B _____ T _____ External Thread
C _____ or
D _____ T _____ Internal Thread
E _____ Fluid Spindle: Yes ____ No ____

⑤ Nose Indexer: Yes_____ No_____
⑥ Quackenbush Tool Model No. _____.

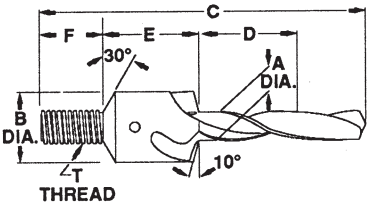
NOTE: • Important— If chip escape reliefs are required on the sensing sleeve, they must be specified when ordering. A drawing must be provided showing the exact location and type openings required.
• Some applications involving long cutters require that the tips of the cutter extend beyond the Dwell and Depth Attachment when the spindle is fully retracted.



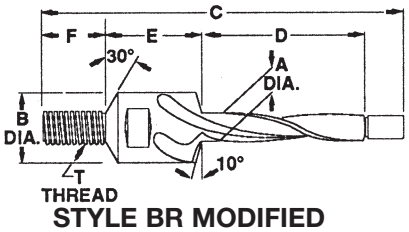
COUNTERSINK



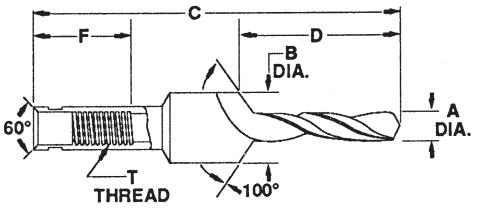
STYLE AR



STYLE BR



STYLE BR MODIFIED



INTERNAL THREAD

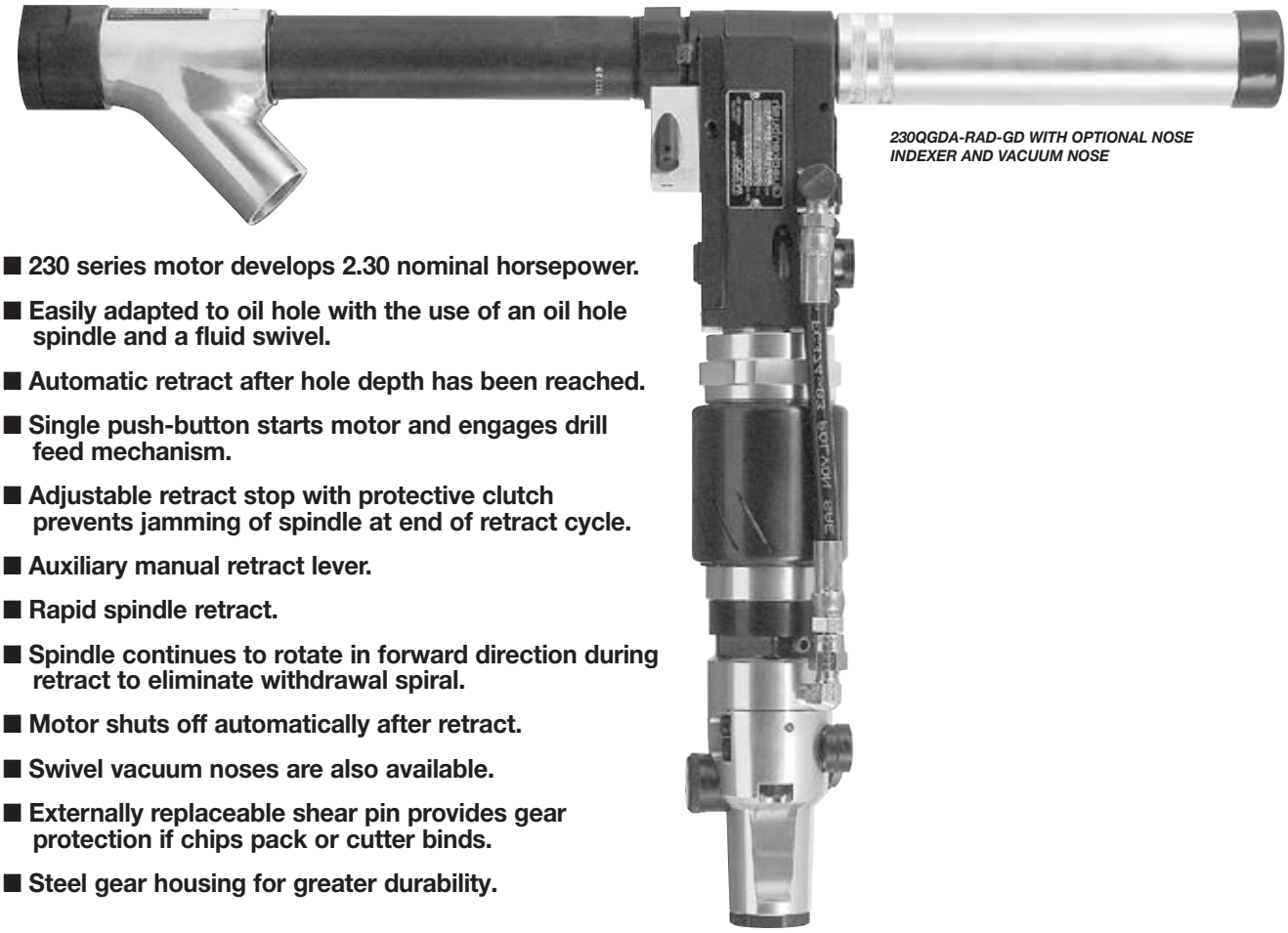
FOR OTHER CUTTER STYLES, FURNISH CUTTER DRAWING

Quackenbush™

230QGDA-RAD-GD Gun Drill Series

Capacity:
Aluminum – .75” (19.1mm)

Stroke:
Min. – .125” (3.2mm)
Max. – Unlimited



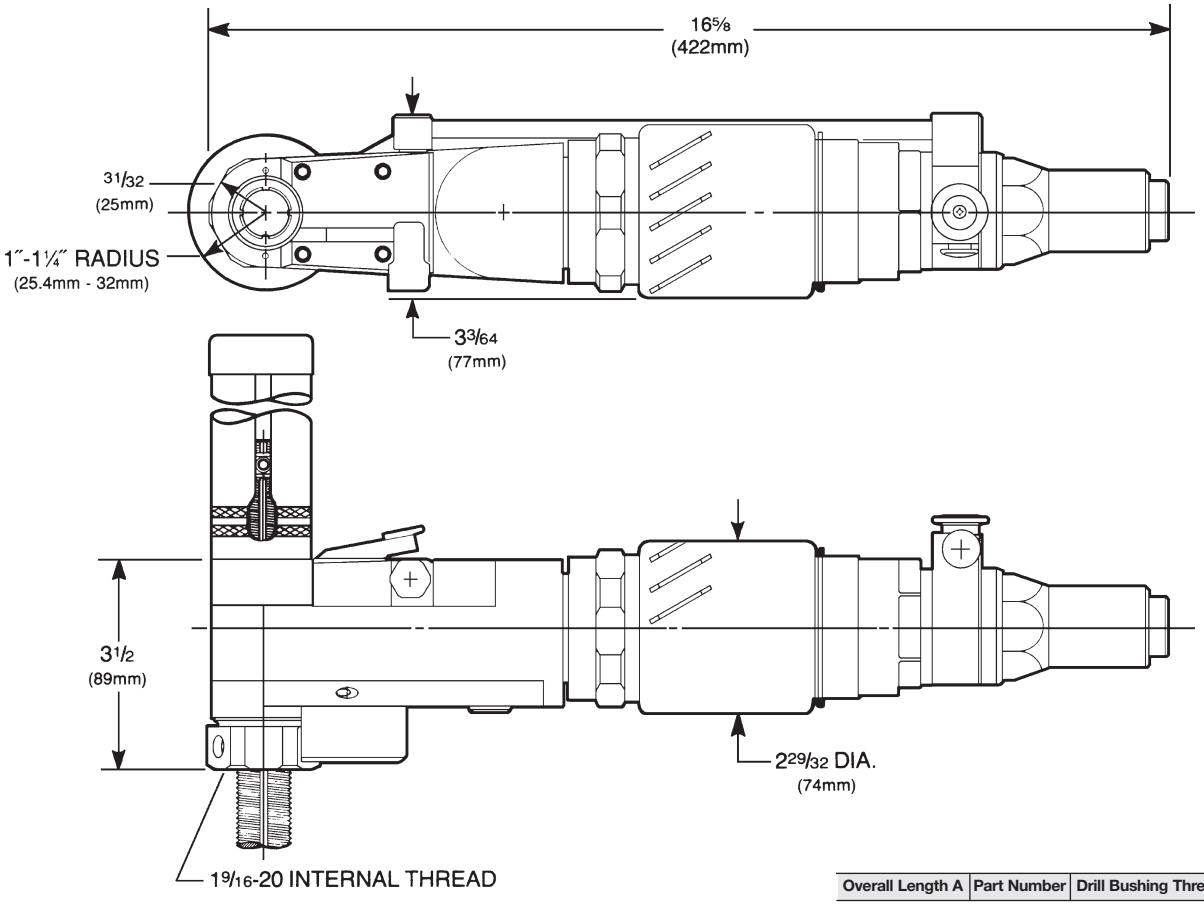
230QGDA-RAD-GD WITH OPTIONAL NOSE INDEXER AND VACUUM NOSE

- **230 series motor develops 2.30 nominal horsepower.**
- **Easily adapted to oil hole with the use of an oil hole spindle and a fluid swivel.**
- **Automatic retract after hole depth has been reached.**
- **Single push-button starts motor and engages drill feed mechanism.**
- **Adjustable retract stop with protective clutch prevents jamming of spindle at end of retract cycle.**
- **Auxiliary manual retract lever.**
- **Rapid spindle retract.**
- **Spindle continues to rotate in forward direction during retract to eliminate withdrawal spiral.**
- **Motor shuts off automatically after retract.**
- **Swivel vacuum noses are also available.**
- **Externally replaceable shear pin provides gear protection if chips pack or cutter binds.**
- **Steel gear housing for greater durability.**

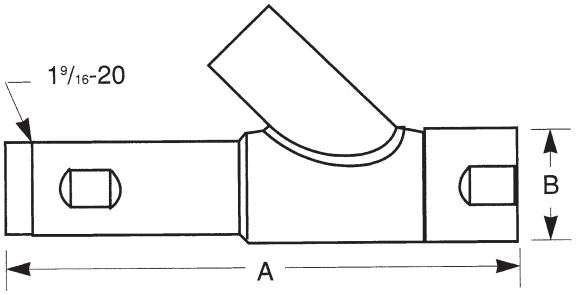
Model	Motor Configuration	Maximum Stroke		Weight*		Maximum Length		Spindle Speeds	Feed Per Revolution	Inlet	Minimum Hose Size
		in.	mm	lbs	kg	in.	mm				
230QGDA-RAD-GD	Right Angle	No Limit		13.25	5.95	15 7/8	403.23	1500, 1850, 2100	.0005, .001	.5” NPT	.5”

*Weight is tool without spindle and nose piece.
Rated tool performance at 90 PSIG measured at tool inlet with motor running.
When selecting speeds and feeds, see page 3.
Mist lubricator (631298) may be ordered.

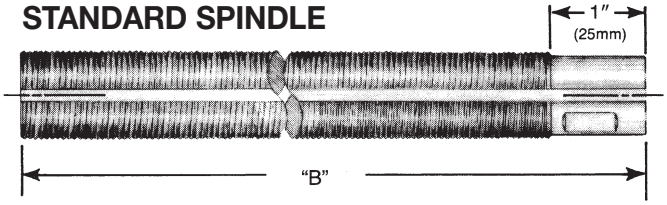
SEE PAGES 5-7 FOR SAFETY PRECAUTIONS.



Overall Length A	Part Number	Drill Bushing Thread Size B
7.50	631300	1.250-12 L.H.
8.50	631301	1.250-12 L.H.
9.50	631302	1.250-12 L.H.
11.50	631303	1.250-12 L.H.
7.50	631304	1.500-12 L.H.
8.50	631305	1.500-12 L.H.
9.50	631306	1.500-12 L.H.
11.50	631359	1.500-12 L.H.
8.50	631485	2.000-16 L.H.



STANDARD SPINDLE



SPINDLES (Select One)

Spindle Type	Length "B"	Max. Stroke	Thread Description	Part No.
Oil Hole	9.25" (235mm)	4.5" (114mm)	.5625"-18 Internal Thread with Counterbore and 118° Angle	623955
Oil Hole	9.25" (235mm)	4.5" (114mm)	.625"-18 Internal Thread with Counterbore and 118° Angle	615964

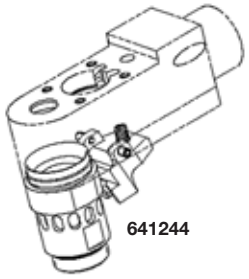
- Nose Indexer - 1.5625"-20 (381326)
- Fluid Swivels used with oil hole spindles and selection of Fluid Chucks.
- Other Noses and Spindles are available at extra charge.

Positive Feed Accessories

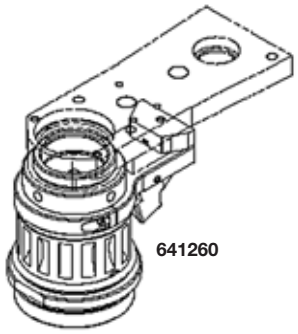
Nose Indexers for the 15HD, 158 & 230 Series Right Angle Drills

Quackenbush Drill	Model	Part No.	Length
15QRHD		22008159	1 3/8”
158QGDA-RAD-SU-RS	1 9/16-20	641261	2”
230QGDA-RA-SU-MS	2 1/4-20	641262	2 1/4”

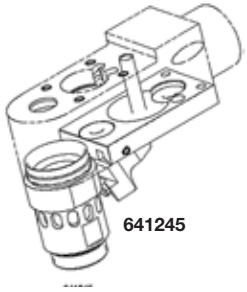
* Please consult your sales representative for the full range of mounting options, concentric collet, twist lock, template foot to suit your particular needs.



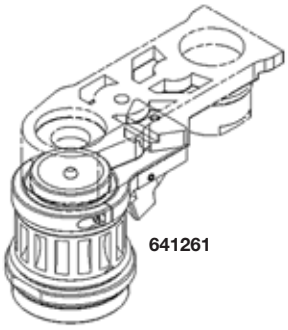
641244



641260



641245



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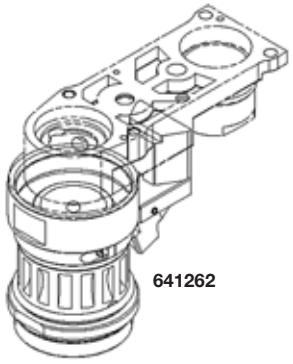
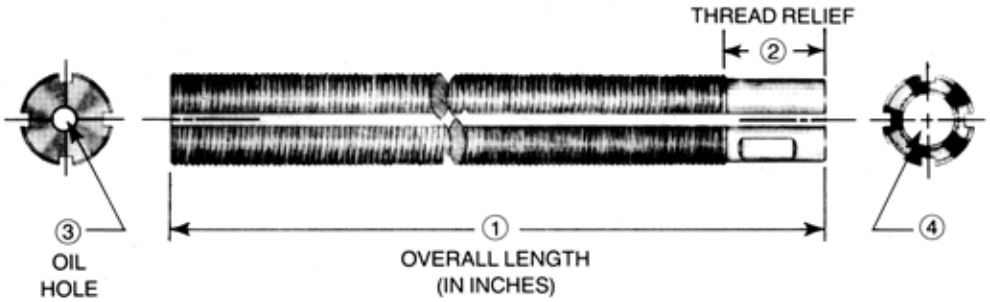


641262

* Please contact us with your particular nose requirement and we can check it against our extensive list of standard and special noses. If necesary, we can design one to suit.

How to order Spindles for Right Angle Tools



INFORMATION REQUIRED TO ORDER SPINDLES:

① OVERALL LENGTH:

Stroke _____ + 2.87" (73mm) for 15QDA-RA = _____ Overall Length
Stroke _____ + 3.50" (89mm) for 140QGDA-RA-SU-MS = _____ Overall Length
Stroke _____ + 3.75" (95mm) for 158QGDA-RA = _____ Overall Length
Stroke _____ + 4.93" (125mm) for 230QGDA-RA-MS = _____ Overall Length
Stroke _____ + 4.75" (121mm) for 230QGDA-RA-GD = _____ Overall Length
Stroke _____ + 4.93" (125mm) for 230QGDAB-MS = _____ Overall Length

② STANDARD SPINDLE THREAD RELIEF
.875" for 15QDA-RA and 140QGDA-RA
1" for 158QDA-RA
(.5625" flange width for 230QGDA-RA-MS)
1" for 230QDA-RA-GD
NOTE: Specify if Thread Relief is other than standard.

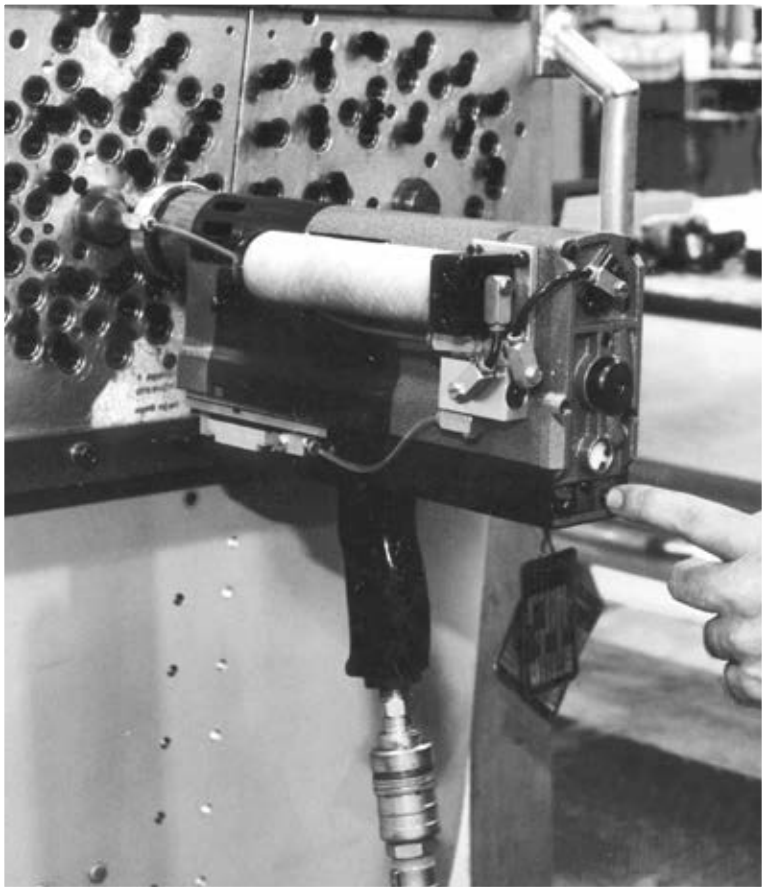
③ OIL HOLE REQUIRED? ❑ Yes ❑ No

NOTE: Spindle guards are highly recommended and are available for all spindles. Please specify when ordering.

④ END PREPARATION OF SPINDLE:
❑ INTERNAL THREAD:
(Provide drawing specifying thread, depth, angle and counterbore depth if required)
❑ STRAIGHT BORE:
Bore Diameter _____ inches
Depth _____ inches
❑ INTERNAL MORSE TAPER (for 158 and 230 Models only)
No. 1 Morse Taper ❑
No. 2 Morse Taper ❑

Peck Feed Drills

ADVANCED DRILLING EQUIPMENT



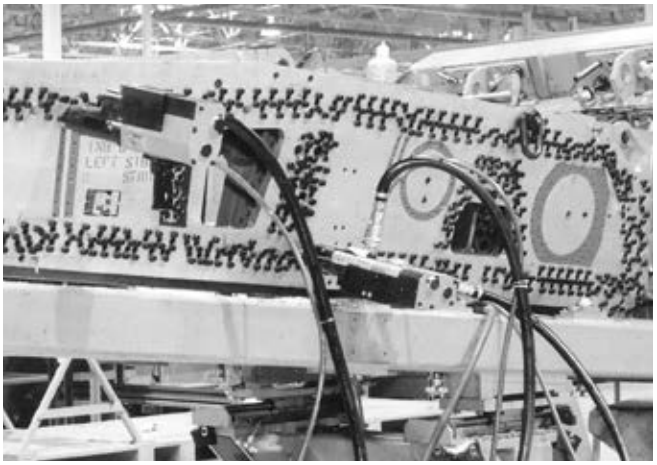
Our peck feed drills are a unique category unto themselves. These drills drill a short distance, then retract from the hole to clear the chips and dissipate heat, and then return to the hole and drill again, and repeat this in-and-out motion until the process is finished. This pecking motion gives the drill its name.

This is a unique advantage in the drilling of deep close-tolerance holes, especially in stacks of dissimilar materials.

With conventional drilling, drilling through aluminum into materials such as titanium extracts chips of the titanium out of the hole, which scratches the softer aluminum and deteriorates the hole quality. But by using the interrupted stroke of the peck drill, the chips are smaller and are far less likely to create problems.

This also reduces heat considerably, because the drill is not in the hole continuously, building up heat. Each time the drill retracts from the hole, it helps to dissipate heat, significantly reducing distortion and metallurgical change in the material.

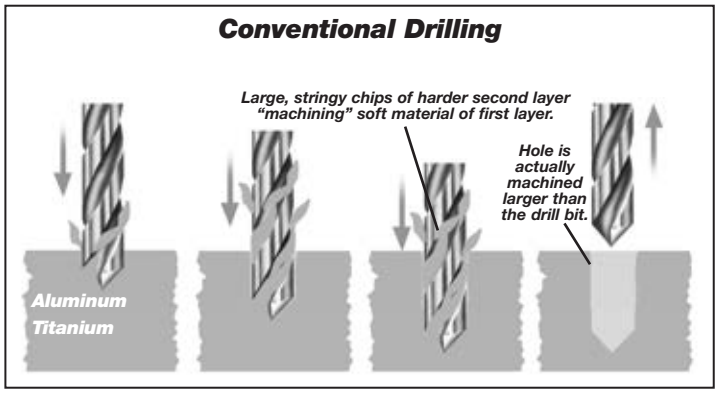
Because of their heat reduction capabilities, our peck drills have also been found to be highly productive in manufacturing environments that do not allow any type of lubrication or coolant.

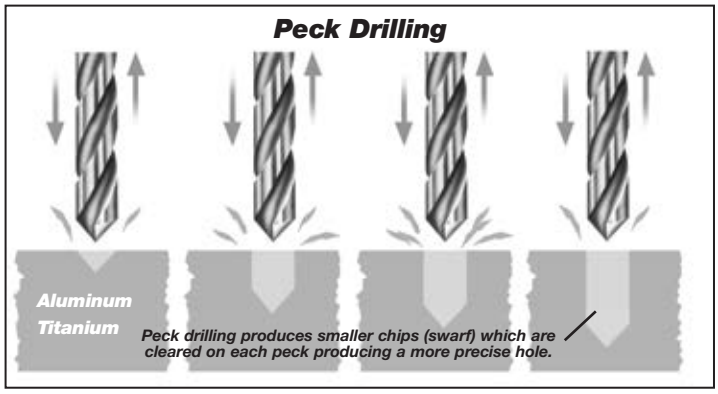


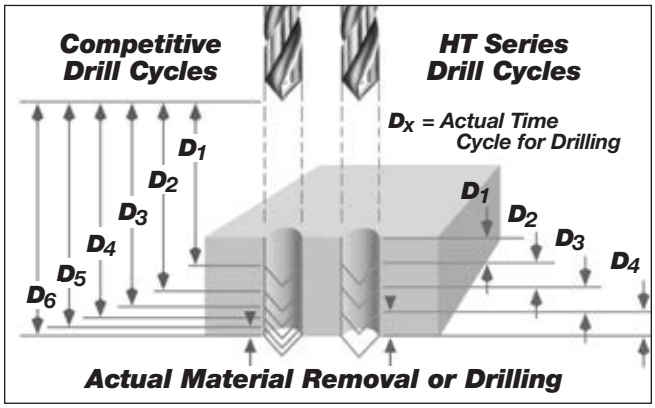
Equal Drill Time

Our HT Series Peck Feed Drills define state of the art in one shot, close tolerance hole drilling with portable tools.

During each peck, the peck timer circuit on competitive models combines the time to rapid advance, drill and retract. As you can see in the accompanying illustration, actual drill time is progressively reduced as the hole depth is







increased. With our HT Series drills, advancement and retraction times are separated from actual drill time, therefore the drill time is the same on each peck. The net result is increased performance.

Drill Capacities

Peck drilling allows much larger diameter holes to be drilled than conventional drilling with respect to motor horsepower. Maximum diameter capacity will depend on drill chosen, material to be drilled, and cutter geometry. The adjoining chart shows capacities of our HT Series drills.

Drill Capacities of the HT Series Peck Feed Drills

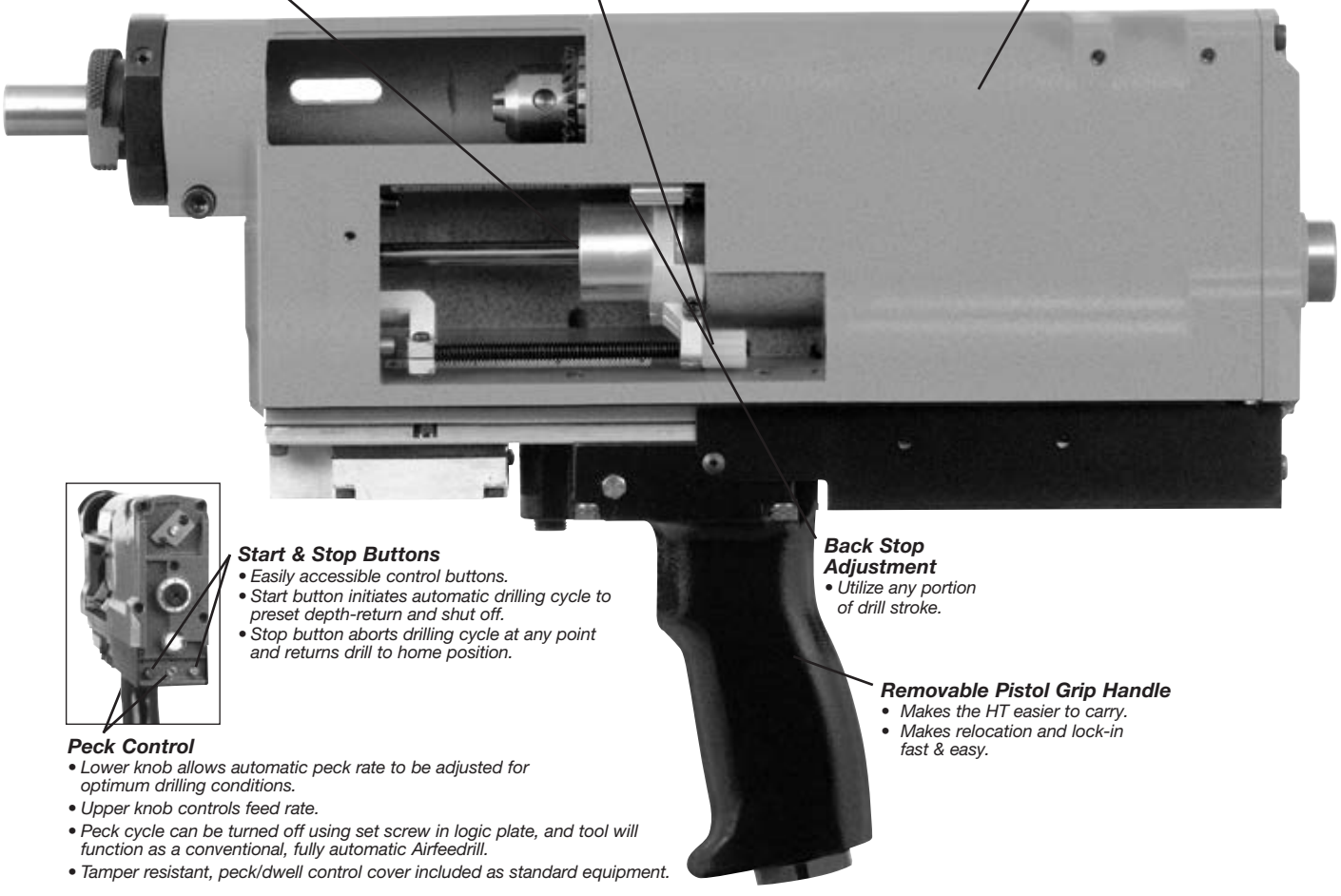
Series	HP	Aluminum	Titanium	Steel
HT3	1.1	1.3	1.0	1.0
HT4	0.7	0.5	0.4	0.4

HT Series Peck Feed Drill Performance Features & Benefits

Adjustable Set Back
- *Allows precise cutter point control while drilling.*
- *Improves hole quality.*
- *Prevents cutter breakage.*
- *Extends cutter life.*

Rapid Advance/Depth Controls
- *Adjustable rapid advance to workpoint.*
- *Depth control adjustable to complete tool cycle at any point*

Interchangeable Motor Cartridges
- *Quickly change RPM, HP, and spindle by exchanging a one-piece motor and gear cartridge.*



Start & Stop Buttons
- *Easily accessible control buttons.*
- *Start button initiates automatic drilling cycle to preset depth-return and shut off.*
- *Stop button aborts drilling cycle at any point and returns drill to home position.*

Back Stop Adjustment
- *Utilize any portion of drill stroke.*

Removable Pistol Grip Handle
- *Makes the HT easier to carry.*
- *Makes relocation and lock-in fast & easy.*

Peck Control
- *Lower knob allows automatic peck rate to be adjusted for optimum drilling conditions.*
- *Upper knob controls feed rate.*
- *Peck cycle can be turned off using set screw in logic plate, and tool will function as a conventional, fully automatic Airfeedrill.*
- *Tamper resistant, peck/dwell control cover included as standard equipment.*

Quackenbush™

HT3 Series

Capacity:
Aluminum – 1.25”
Titanium – 1”
Steel – 1”

- **1.10 Horsepower**
- **Adjustable, controlled feed rate**
- **Adjustable peck rate, depth control, and rapid advance**
- **Equal Drill Time**
- **4” Stroke**
- **One button start, fully automatic cycle**
- **Push button peck disable for non-peck advance at any time during the drilling cycle**
- **Reduces cost per hole**
- **Uses low cost cutters to produce high quality holes in dissimilar materials**
- **Eliminates most reaming operations**
- **Drills materials dry while maintaining acceptable hole quality and long cutter life.**
- **Remote start**
- **Rapid retract and re-entry minimizes cycle time**
- **Adjustable length nosepieces to fit cutter length**
- **Optional drill point lubricator to optimize hole quality**

Model	Spindle	Speed Code	Function	Stroke
HT3	B – .5” - 20 Male Thread, Jacobs Chuck C – .375” - 24 Female Thread D – .5625” - 18 Female Thread E – .75” - 16 Female Thread	120 – 12400 RPM 030 – 3000 RPM 021 – 2100 RPM 016 – 1600 RPM 007 – 650 RPM 005 – 475 RPM 003 – 300 RPM 002 – 150 RPM 001 – 80 RPM	E - Equal Drill Time	40 - 4”

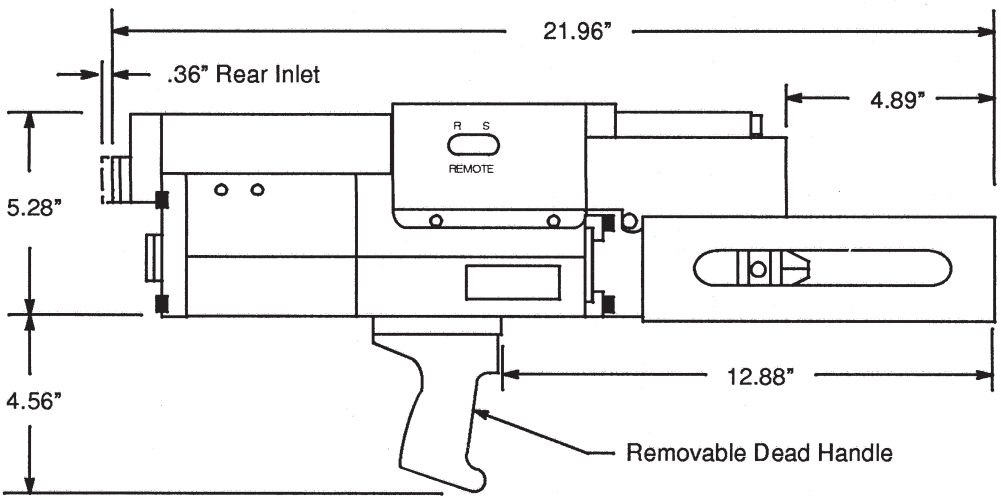
DRILL CAPACITIES:
Peck drilling allows much larger diameter holes to be drilled than conventional drilling with respect to motor horsepower. Maximum diameter capacity will depend on drill chosen, material, and cutter geometry.

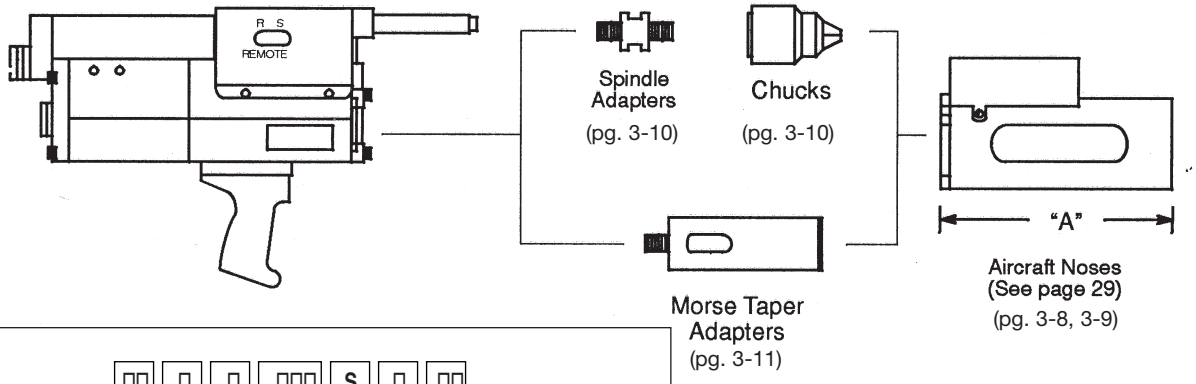
SPECIFICATIONS:

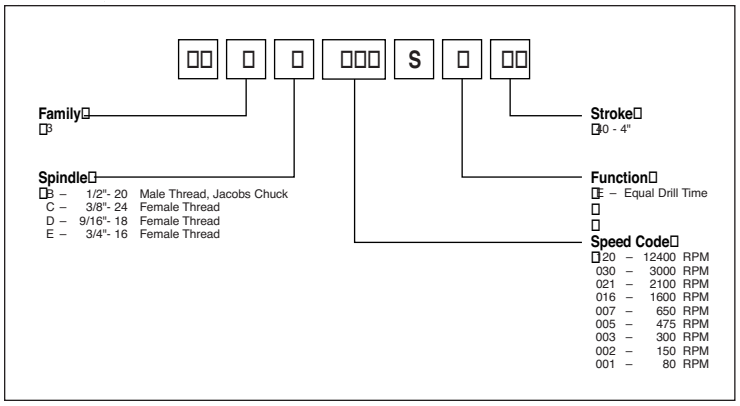
Recommended Air Pressure:	90 PSIG
Air Inlet Size:	.375” N.P.T.
Thrust @ 90 PSIG	630 lbs.
Weight:	18.6 lbs. (less nosepiece)

STANDARD EQUIPMENT
Removable dead handle
Hydraulic feed control
Adjustable set-back control

EXTRA COST ACCESSORIES
Fluid inducer
Nosepieces (Fixed or Adjustable)
Drill Point Lubricator
Morse taper adapters
Dwell Kit – 1025833
Concentric collet attachment


21.96"
.36" Rear Inlet
4.89"
R S
REMOTE
5.28"
12.88"
4.56"
Removable Dead Handle

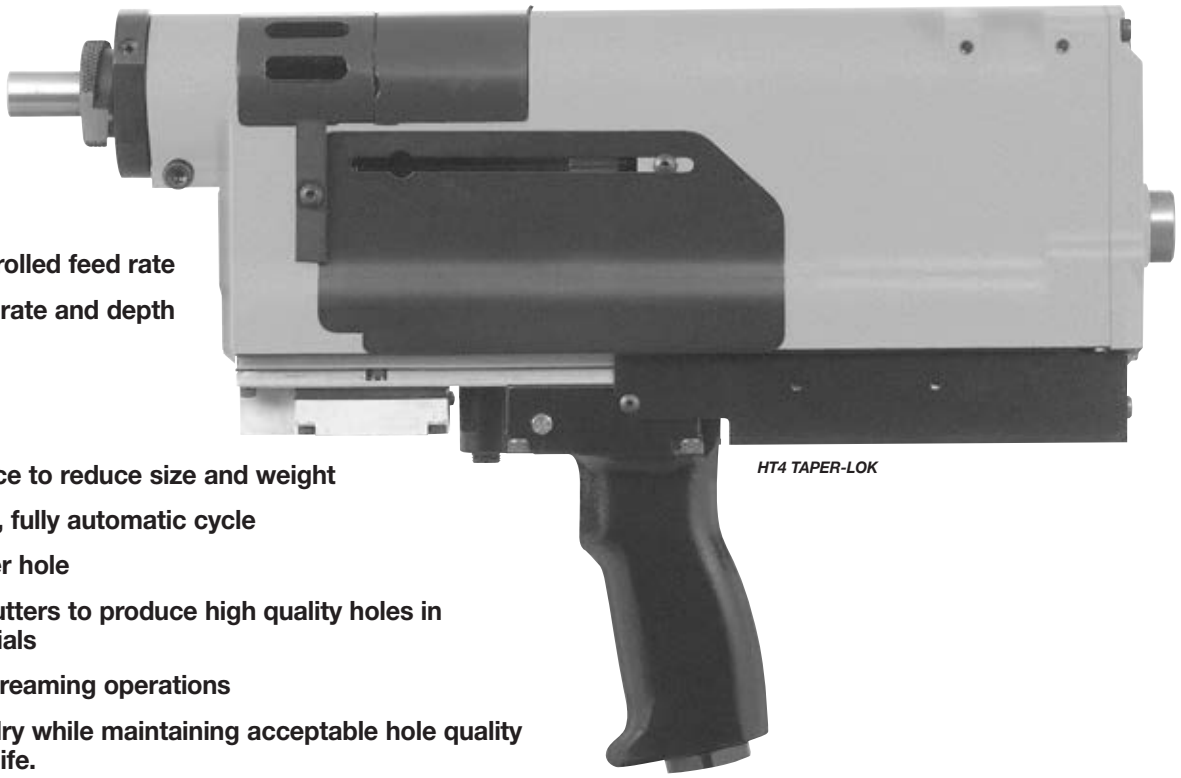

R S
REMOTE
Spindle Adapters
(pg. 3-10)
Chucks
(pg. 3-10)
"A"
Aircraft Noses
(See page 29)
(pg. 3-8, 3-9)
Morse Taper Adapters
(pg. 3-11)


□□ □ □ □□□ S □ □□
Family□
□3
Spindle□
□B – 1/2"- 20 Male Thread, Jacobs Chuck
C – 3/8"- 24 Female Thread
D – 9/16"- 18 Female Thread
E – 3/4"- 16 Female Thread
Stroke□
□0 - 4"
Function□
□E – Equal Drill Time
□
□
Speed Code□
□20 – 12400 RPM
030 – 3000 RPM
021 – 2100 RPM
016 – 1600 RPM
007 – 650 RPM
005 – 475 RPM
003 – 300 RPM
002 – 150 RPM
001 – 80 RPM

Quackenbush™

HT4 Series

Capacity:
Aluminum – .5”
Titanium – .375”
Steel – .375”



HT4 TAPER-LOK

- **.75 Horsepower**
- **Adjustable, controlled feed rate**
- **Adjustable peck rate and depth control**
- **Equal Drill Time**
- **3” Stroke**
- **Integral nosepiece to reduce size and weight**
- **One button start, fully automatic cycle**
- **Reduces cost per hole**
- **Uses low cost cutters to produce high quality holes in dissimilar materials**
- **Eliminates most reaming operations**
- **Drills materials dry while maintaining acceptable hole quality and long cutter life.**

Model	Spindle	Speed Code	Function	Stroke	Mounting Adapter		Chuck	Handle
					Single/Dbl. Gear	Triple/Diff. Gear		
HT4	A – .375” - 24 Male Thread, T – #1 Jacobs Taper**	220 – 22000 RPM** 110 – 11000 RPM* 057 – 5700 RPM 029 – 2900 RPM 015 – 1500 RPM 008 – 780 RPM 005 – 500 RPM 003 – 270 RPM* 001 – 150 RPM*	E - Equal Drill Time	30 - 3”	A – 21000 Series B – 22000 Series C – 23000 Series D – 24000 Series	E – 21000 Series F – 22000 Series G – 23000 Series H – 24000 Series K – Concentric Collet‡	A - .375” Capacity B - 0-.25” Capacity #1 Jacobs Taper** X - No Chuck F - Fluid Inducing	N - None P - Pistol Grip

* Triple or differential gearing
** 22000 RPM tool must be ordered with spindle ”T” and chuck“B”. “T” Spindle available only with Speed Code 220.

DRILL CAPACITIES:
Peck drilling allows much larger diameter holes to be drilled than conventional drilling with respect to motor horsepower. Maximum diameter capacity will depend on drill chosen, material, and cutter geometry.

SPECIFICATIONS:

Recommended Air Pressure:	90 PSIG
Air Inlet Size:	.375” N.P.T.
Thrust @ 90 PSIG	500 lbs.
Weight:	11.5 lbs.

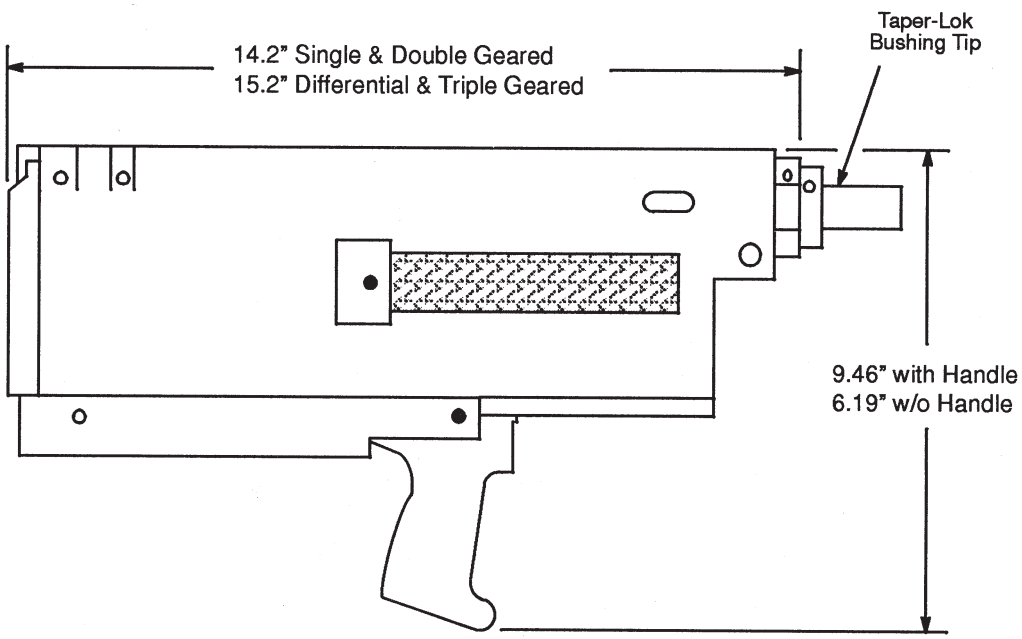
STANDARD EQUIPMENT
Pistol Grip Handle
Hydraulic feed control
Adjustable set back control
Tamper resistant covers
Nosepiece with lubrication port

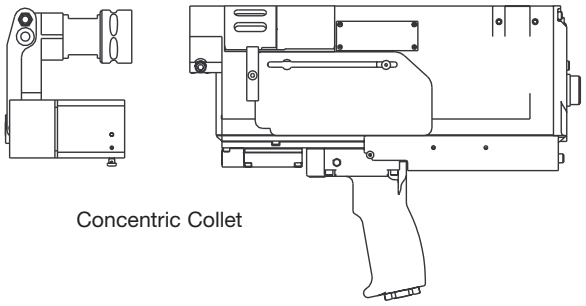
NOTE:
When ordering differential or triple geared models, to assure full 3” stroke, you must order proper mounting adapter. Two-inch stroke maximum will occur using standard adapter.
‡ Specify collet size and cutter diameter.

EXTRA COST ACCESSORIES
Drill Point Lubricator
Vacuum adapter
Concentric Collet attachment

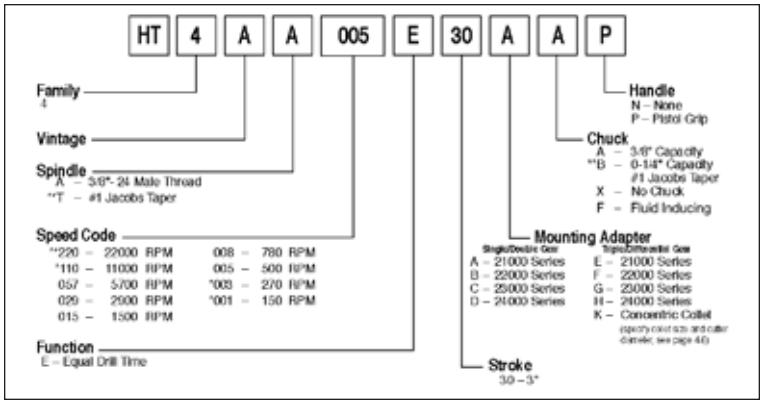
HT4 Series Dimensional Data & Accessories

When Ordering, specify:
1. Complete model number.
2. Concentric Collet code number.
3. Cutter guide diameter.





Concentric Collet



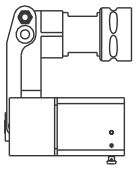
Peck Drills Accessories

HT3/HT4 Concentric Collet Attachment

Add to existing tool, order:

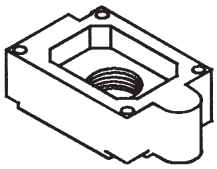
P/N CC-HT13 (for colleting sizes to 1" - HT3)
P/N CC-HT13M (for colleting sizes > 1" - HT3)
P/N CC-HT4 (for colleting sizes to 1" - HT4)
P/N CC-HT4M (for colleting sizes > 1" - HT4)

Specify:

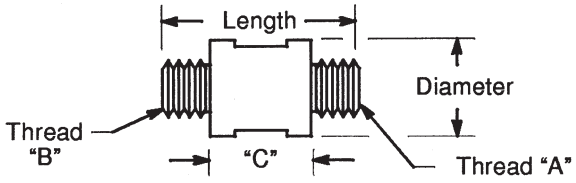


FHT4 Inlet Manifold

P/N 1110897

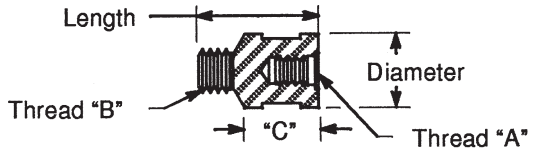


Spindle Adapters



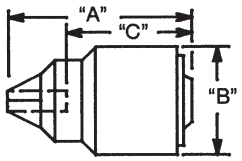
Part No.	Length	Dia.	"C"	Thd "A"	Thd "B"
1017808	2.15	.99	.99	.5625-18	.5-20
1018859	2.19	.62	1.43	.3125-24	.375-24
1018245	2.20	.99	.99	.375-24	.5625-18
1019072	2.92	1.12	.99	.7031-16	.375-16
1019506	1.44	.86	.25	.5-20	.5625-18
1110029	1.44	.86	.25	.375-24	.5625-18
1110112	1.87	.62	1.12	.375-24	.375-24
539011	1.14	.75	.25	.375-24	.5-20
539012	1.39	.88	.25	.5625-18	.5-20
539023	1.39	.75	.25	.375-24	.375-24

Spindle Adapters



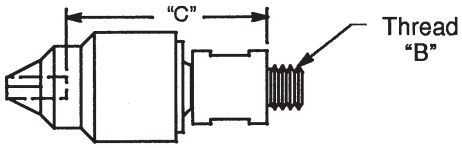
Part No.	Length	Dia.	"C"	Thd "A"	Thd "B"
1018243	1.37	.87	.84	.375-24	.5625-18

Jacobs Chucks



Part No.	Mount	Capacity	"A"	"B"	"C"
1005953	#OJT	.1563	1.09	0.85	0.59
1005078	.375"-24	.25	1.56	1.117	0.93
1001505	.375"-24	.25 HD	1.71	1.29	1.02
1004422	.375"-24	.375	2.16	1.67	1.09
1001252	.375"-24	.375	1.93	1.42	1.09
1009726	.375"-24	.5	2.42	1.79	1.28
1005398	.5"-20	.25	1.75	1.32	1.08
1005000	.5"-20	.375	1.93	1.42	1.13
1005020	.5"-20	.375	2.31	1.79	1.36
1000434	.5"-20	.5	2.42	1.79	1.28

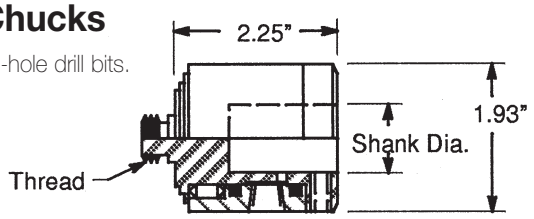
Chuck Assemblies



Assembly	Chuck	Adapter	"C"	Thd "B"
1025422	1001252	1018859	2.52	.3125-24
1025591	1001252	1110112	2.21	.375-24
1025427	1004422	1018245	2.08	.5625-18
1025473	1004422	1110029	1.34	.5625-18
1025301	1000434	1017808	2.27	.5-20
1025308	1000434	1019506	1.53	.5625-18

Fluid Chucks

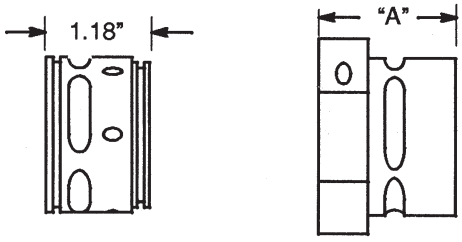
For using oil-hole drill bits.



Part No.	Thread	Shank Dia.
1018219	.5625"-18	1.00
1018220	.5625"-18	0.75
1018221	.375"-24	0.50

* Please contact us with your application and tooling information to determine the optimum concentric collet solution. Other options available eg. template foot, C clamp- please consult us for application assistance. Lubricators and Counters- available for all positive feed solutions.

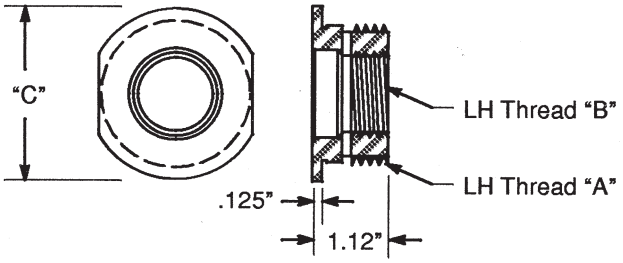
HT4 Mounting Adapters



without Lube Port | with Lubrication Port

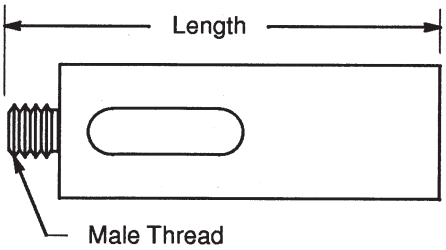
DBT Series	Part No.	Part No.	Dim "A"	Part No.	Dim "A"
21000	1110276	1110865	1.42"	1110450	2.06"
22000	1110277	1110866	1.42"	1110417	2.06"
23000	1110278	1110867	1.42"	1110451	2.06"
24000	1110279	1110868	1.42"	1110453	2.06"

Reducer Bushings (for Taper-Lok)



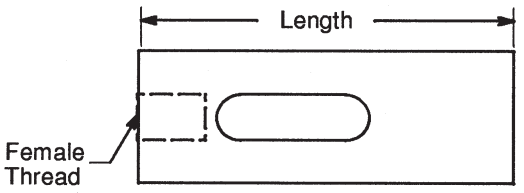
Part No.	"A"	"B"	"C"	TB	
				From	To
1110695	1"-14	.75"-16	1.38	22000	21000
1110700	1.5"-12	1.25"-12	1.94	24000	23000
1110699	1.5"-12	1"-14	1.93	24000	22000
1110696	1.25"-12	.75"-16	1.63	23000	21000
1110698	1.5"-12	.75"-16	1.94	24000	21000
1110697	1.25"-12	1"-14	1.63	23000	22000
1110701	2"-16	1.5"-12	2.50	25000	24000
537505	2"-16	1"-14	2.62	25000	22000
537506	2"-16	1.25"-12	2.62	25000	23000
537507	2"-16	1.5"-12	2.62	25000	24000

Morse Taper Adapter (Male Thd)



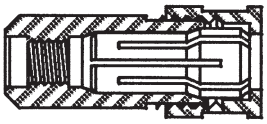
Part No.	Description	Thread	Length
1018117	#2 Morse Taper	.5625"-18	3.25"
1013853	#2 Morse Taper	.5625"-18	5.37"
1019070	#2 Morse Taper	.75"-16	5.50"
1013854	#3 Morse Taper	.5625"-18	5.93"
1019071	#3 Morse Taper	.75"-16	6.06"

Morse Taper Adapter (Female Thd)



Part No.	Description	Thread	Length
529279	#1 Morse Taper	1/2"-20	3.69"
527989	#2 Morse Taper	1/2"-20	4.12"

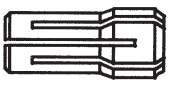
Series 200 Collet Assemblies



Part No.	Collet	Mounting Thd.
1025509	1/8"	3/8"-24
1025510	3/16"	3/8"-24
1025511	1/4"	3/8"-24
1025512	5/16"	3/8"-24
1025513	3/8"	3/8"-24

Note: Collet assembly includes specified collet.

Series 200 Collets



Part No.	Size	
	inches	mm
204	.125"	3.175
46-500-141	.1406"	3.571
205	.1563"	3.962
46-500-172	.1719"	4.369
206	.1875"	4.762
46-500-203	.2031"	5.159
207	.2188"	5.563
46-500-234	.2344"	5.944
208	.25"	6.350
46-500-265	.2656"	6.731
209	.2813"	7.137
46-500-297	.2969"	7.544
210	.3125"	7.950
46-500-328	.3281"	8.331
211	.3438"	8.738
46-500-359	.3594"	9.119
212	.375"	9.525
46-500-390	.3906"	9.906

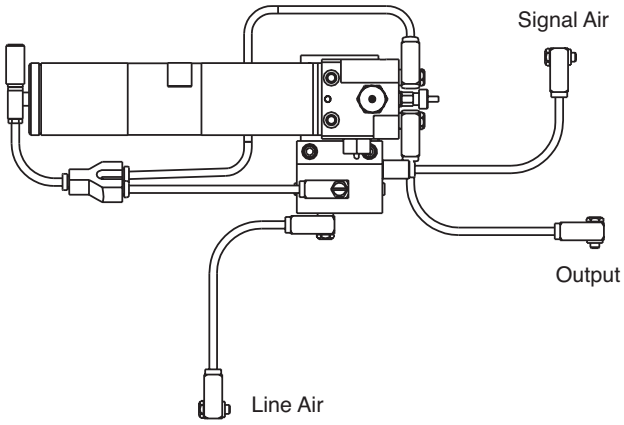
Add "C" to the part number for use with Thru-the-Spindle Coolant. Slots are filled with elastomer.

Peck Drills Accessories

Drill Point Lubricator

Utilizes PL-5 with special mounting bracket and shuttle valve.

Series	Fluid Oz. Capacity	Part Number
HT4	3.0	1026033
HT4	5.0	1026058
Lubricator Cover	41-049	



Dwell Kit: 1025833 - HT3 Series

Provides adjustable time at end of drilling stroke before automatic retraction.

HT4 Series Vacuum Pickup Attachment: 1025928

Remove chuck cover and mount over “window”. Has a port for 1.45” I.D. tubing.

Self-Colleting Tools

ADVANCED DRILLING EQUIPMENT

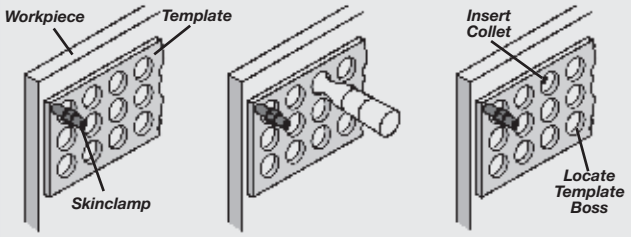
Introduction
Self Colleting Tools

Our self colleting drills provide rapid cycle times while producing quality holes and accurate countersinks. With stroke capacity from 1 inch to 3 inches, power capacity from 0.85 hp to 2.0 hp, and a full range of speeds, these self colleting tools are ideal for drilling and countersinking aircraft skin. Aluminum, laminates, and mixed stacks of aluminum or laminate over titanium or steel are well suited to the superb hole making capacity of these machines.

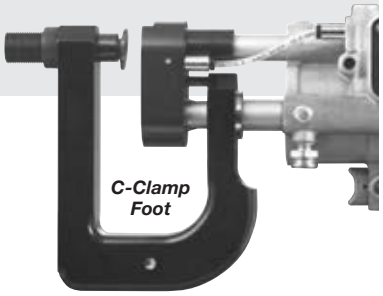
The drill/countersink cycle is automated, maximizing productivity with single trigger control. Each of these tools uses a variation of an expanding collet to clamp or fixture in a tooling plate or to clamp directly to he workpiece. This economizes and simplifies the fixturing required to mont and locate these tools.

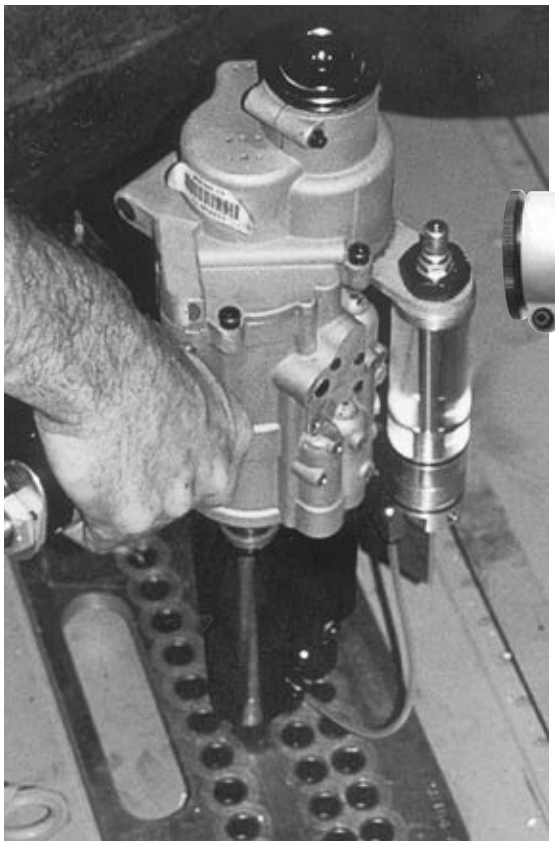
In the case of the variable spacing foot (also known as the template foot), the collet/ mandrel is inserted into a predetermined hole in the workpiece. The template boss is inserted into a template hole with the boss face on the workpiece. When the trigger

Operation

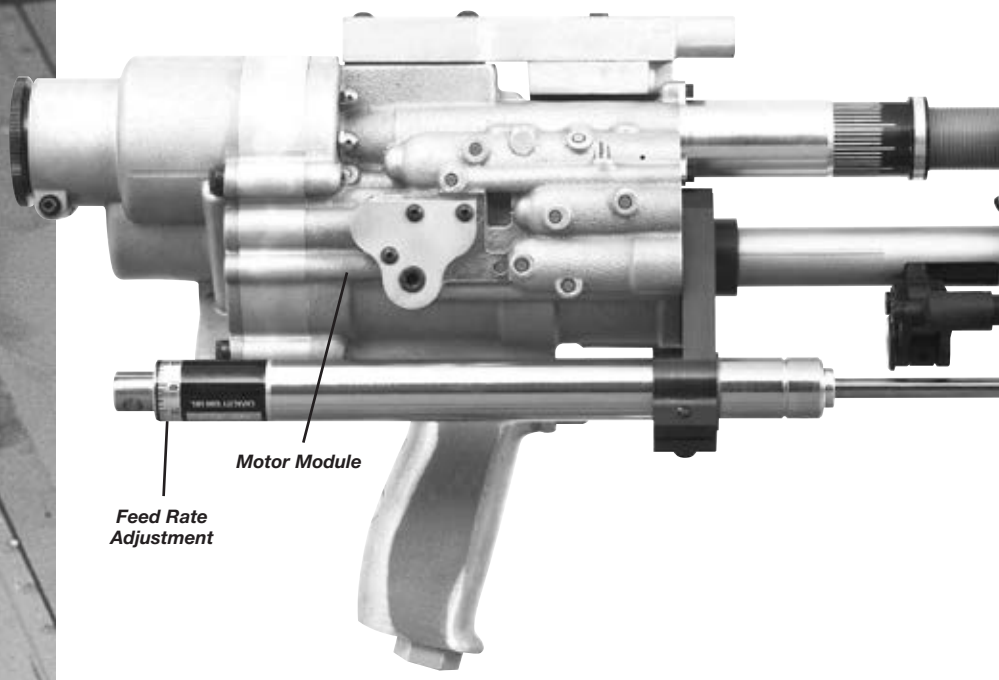


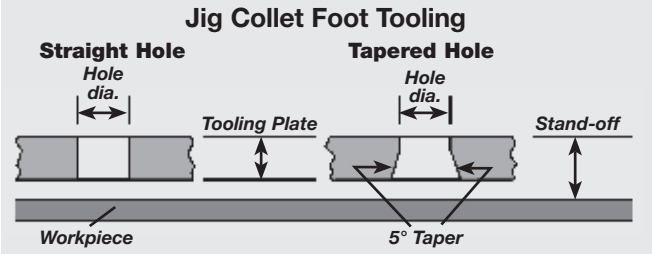
1. Position and clamp the drilling template on the workpiece.
2. Drill the first hole by conventional means.
3. Insert the Collet into the first hole and locate the Template Boss in the drilling template. Insure that the Collet/Mandrell extends through the workpiece.
4. Depress the trigger. Immediately, the Mandrel is drawn back and the Collet locks the tool to the work. Simultaneously, the motor starts and the tool feeds forward to a positive stop. The tool then retracts automatically and returns to its starting position.
5. Release the trigger; the motor shuts off and unclamping occurs.
6. Reposition the Boss and drill other holes within the colleting Range.
7. Withdraw the Collet/Mandrell and insert into a recently driled hole. Repeat steps 3 through 6.





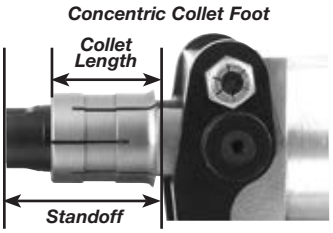
180SC-225 Q-Matic with Right Hand Template Foot



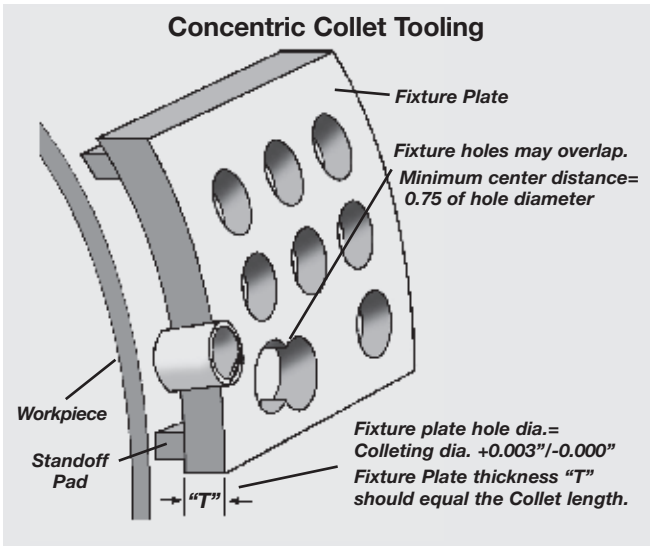


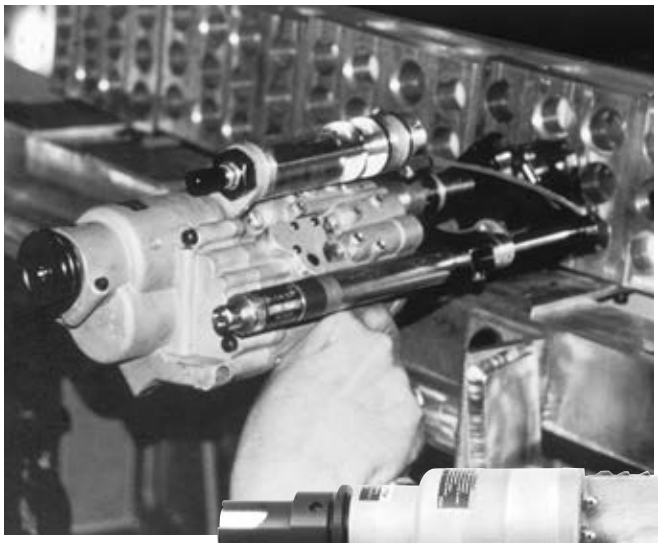
is actuated, the tool first clamps by expanding the collet on the mandrel. The tool automatically feeds to a preset depth, and then automatically retracts. After retracting, the tool unclamps. Remaining in the same clamping location, the tool can then be moved to the next clamp location and the process repeated.

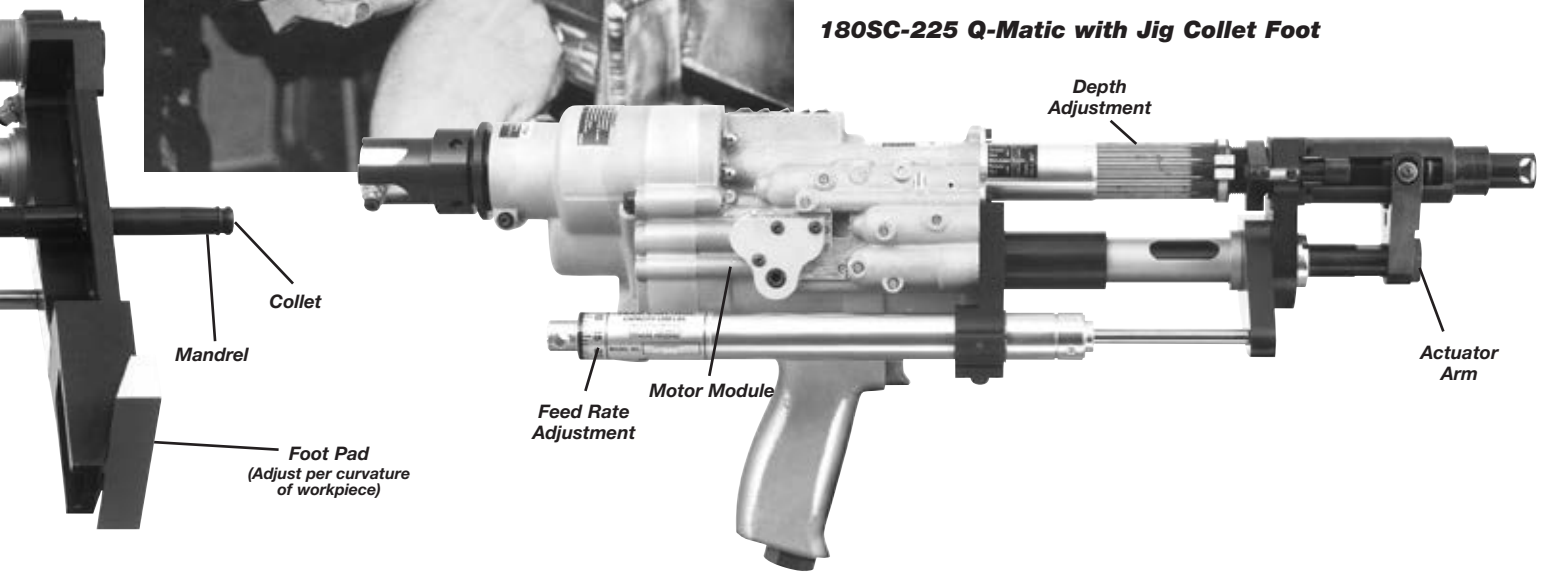
In the case of the jig collet and concentric collet, the expanding collet is co-axial with the tool spindle. The tool feeds to a preset depth, then automatically retracts. After retracting, the tool unclamps. The tool is then moved to the next location and the process is repeated.



In addition to the variable spacing foot, concentric collet, and jig collet foot, the C-clamp configuration is also available. This configuration is ideal for applications near the edge of surfaces.







180SC-225 Q-Matic with Jig Collet Foot

Self Colleting Machines

P2 Drill with Variable Spacing Foot

- **Light and compact - yet rigid and rugged**
- **Modular design - for easy setup and servicing**
- **Variety of spindle speeds and terminations to satisfy a wide range of applications**
- **Collet/Mandrel slides easily - very smooth operation**
- **Micro Depth Adjustment - countersink depths within ± .001"**
- **Infinitely adjustable feed rate**
- **1.0 Horsepower motor**
- **Adjustable foot pad for vertical holes regardless of surface curvature**
- **Variable Spacing Foot can be oriented in any position. No need for separate left and right hand versions.**
- **Quick release collet/mandrel assembly**
- **Rotating cutter/countersink guide for maximum cutter life and hole quality**

P2	V	A	C	1	C	X	X	2	187	C	X

TYPE
V = Variable Spacing Foot

VINTAGE
A, B, C, etc.

FUNCTION
C = Countersink D = Drill only

SPINDLE SPEED
1 = 5200 RPM 5 = 1300 RPM 8 = 6000 RPM
2 = 3200 RPM 6 = 800 RPM
3 = 1900 RPM 7 = 500 RPM

SPINDLE TERMINATION
A = Erickson 200 Collet Chuck
C = "Drivematic" (Erickson 300)
D = .25-28 x 0.375 "Spacematic"
E = .25-28 x 0.500 "Spacematic"
P = .375-24 Piloted External Thread

Note: Spindles D, E & P utilize 200 collet with spindle adapter.

CUTTER COLLET (Dia. inches)

200 Series (Spindle "A")

A = .125	G = .219	M = .313
B = .141	H = .234	N = .328
C = .156	I = .250	O = .343
D = .172	J = .266	P = .359
E = .188	K = .281	Q = .375
F = .203	L = .297	R = .391

300 Series (Spindle "C")
9 = .25

Cutters longer than .391 should have shank reduced.
Spindles D,E & P specify Q

CUTTER GUIDE (Dia. inches)
X = None (Spindle "C") W = .500 Q = .375 Z = Other

COLLET LENGTH (clamping, pg 4-8)
1 = 0-0.10 Grip 3 = 0.2-0.56 Grip
2 = 0-0.30 Grip 4 = 0.5-0.81 Grip

COLLET DIAMETER (clamping, pg 4-9, 4-10)

116	140	172	203	234	265	297
120	145	177	208	239	271	302
123	150	182	213	245	276	307
125	156	187	219	250	281	312
130	161	192	224	255	286	
135	166	197	229	260	291	

TEMPLATE BOSS (Dia. x Projection)

A = .500 x .062	K = .625 x .200
B = .500 x .100	L = .625 x .250
C = .500 x .150	M = .625 x .300
D = .500 x .175	N = .750 x .100
E = .500 x .200	O = .750 x .150
F = .500 x .250	P = .750 x .175
G = .625 x .062	Q = .750 x .200
H = .625 x .100	X = None
I = .625 x .150	Z = Prompt-Special
J = .625 x .175	Diameter

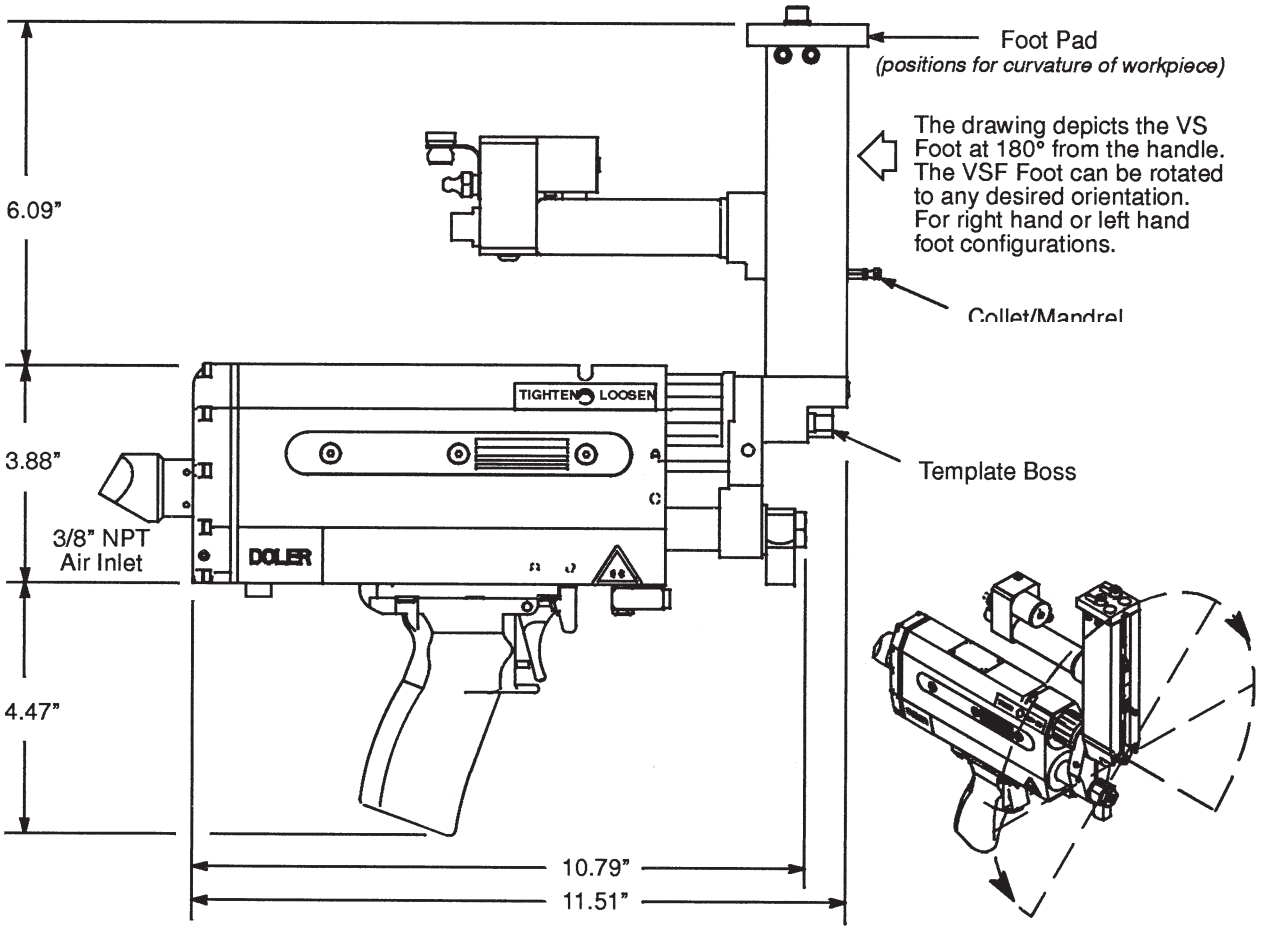
ACCESSORY CODE
A = Drill Point Lubricator & Vacuum
L = Drill Point Lubricator
M= Handling Ring
V = Vacuum adapter
X = None

*Note: Complete Check Sheet before placing order.

SPECIFICATIONS:
Power: 1.0 hp
Air Consumption: 30 scfm
Air Inlet Size: 3/8 NPT
Recommended Hose Size: 3/8" I.D.
Thrust: 230 lbs. @ 90 psig
Stroke (overall) 1"
Length: 13.2"
Weight: 9.7 lbs.
Hole Spacing Range: 0.74" to 3.0" (colleting hole to drilled hole)
Collet/Mandrel Stroke: 0.50"- Material thickness variation

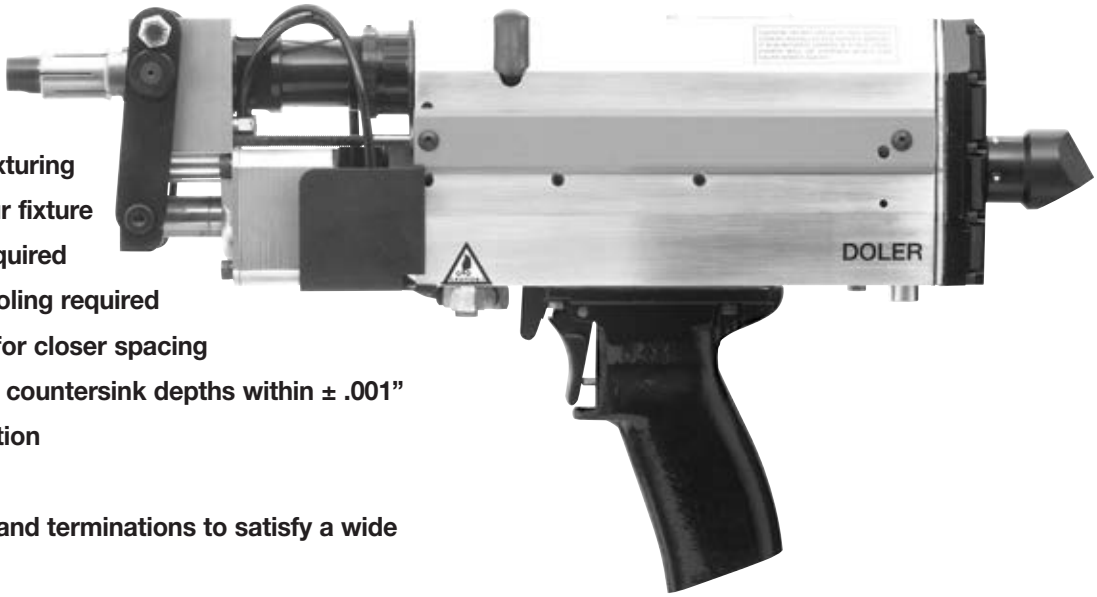
EXTRA COST ACCESSORIES
Vacuum Pickup Adapter
Drill Point Lubricator
Handling Ring

Dimensional Data - P2 Drill with Variable Spacing Foot



Self Colleting Machines

P2 Drill with Concentric Collet Foot



- **Simple and inexpensive fixturing**
- **Very rigid clamp up to your fixture**
- **No lock/unlock motion required**
- **No radial orientation of tooling required**

Bushing holes can overlap for closer spacing

- **Micro Depth Adjustment - countersink depths within ± .001”**
- **One or two handed operation**
- **1.0 Horsepower motor**
- **Variety of spindle speeds and terminations to satisfy a wide range of applications**

P2	K	A	C	1	A	I	22	1	312	X

TOOL TYPE
K = Concentric Collet

VINTAGE
A, B, C, etc.

FUNCTION
C = Countersink D = Drill only

SPINDLE SPEED
1 = 5200 RPM
2 = 3200 RPM
3 = 1900 RPM
5 = 1300RPM
6 = 800 RPM
7 = 500 RPM
8 = 6000 RPM

SPINDLE TERMINATION
A = Ericksom 200 Collet Chuck
D = .25-28 x 0.375 “Spacematic”
E = .25-28 x 0.500 “Spacematic”
P = .375-24 Piloted External Thread (P.E.T.)
Note: Spindles D, E & P utilize 200 series collet with spindle adapter.

CUTTER COLLET DIAMETER

A = .125”	H = .234”	O = .344”
B = .141”	I = .25”	P = .359”
C = .156”	J = .266”	Q = .375”
D = .172”	K = .281”	R = .391”
E = .187”	L = .297”	X = None
F = .203”	M = .313”	Z = Prompt-Special
G = .219”	N = .328”	Diameter

Note: Cutters larger than .391 should have shank reduced.

ACCESSORY CODE
A = Drill Point Lubricator & Vacuum
L = Drill Point Lubricator
M= Handling Ring
V = Vacuum adapter
X = None

CUTTER GUIDE DIAMETER
Specify size in inches.
Example: 312 = .312 inches
(Use cutter body dia. of drill/c’sink)
(Use drillbit dia. for drill only)‡

SPECIAL STANDOFF
0 = 0.00
1 = Standard (see chart)
2 = 1.50
3 = 2.00
4 = 2.25

CONCENTRIC COLLET SIZE

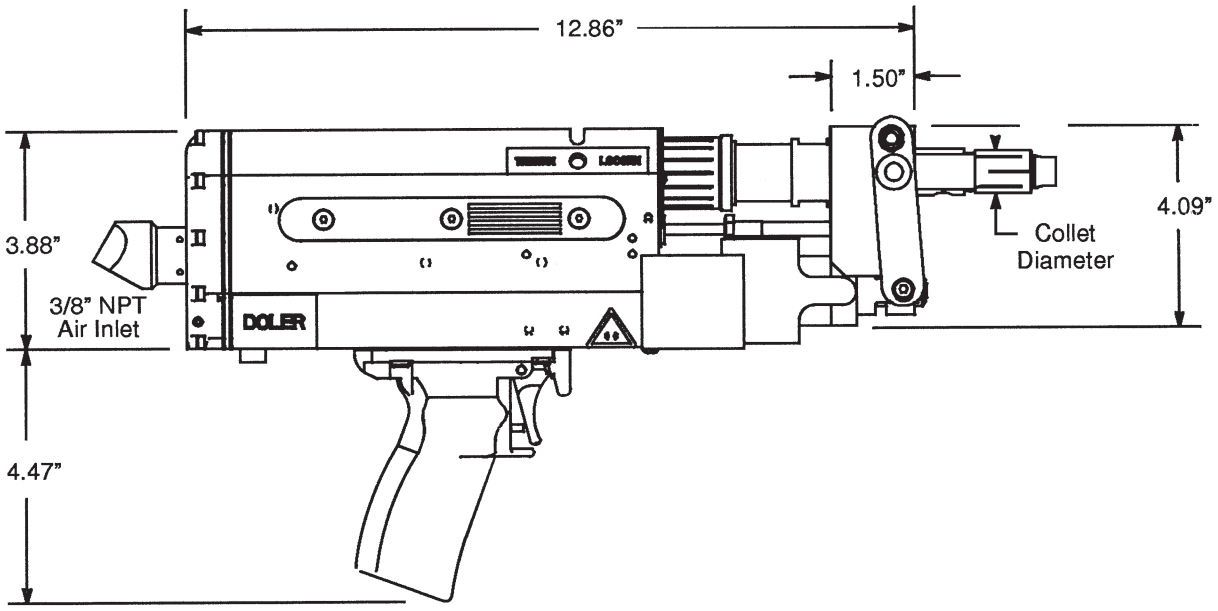
Code	Colleting Dia.	Collet Length	Standoff	Vacuum Port	Max. Cutter Dia.
20	.500	.50	.69	NO	.315
21	.500	1.00	1.38	NO	.199
60	.500	.50	.69	YES	.315
22	.594	1.00	1.38	NO	.335
62	.594	1.00	1.38	YES	.335
29	.625	.50	.69	NO	.437
69	.625	.50	.69	YES	.437
31	.625	1.00	1.38	NO	.365
23	.750	1.00	1.38	NO	.500
30	.750	.50	.69	NO	.547
63	.750	1.00	1.38	YES	.437
70	.750	.50	.69	YES	.547
24	.844	1.00	1.38	NO	.531
64	.844	1.00	1.38	YES	.531
25	.875	1.00	1.38	NO	.531
65	.875	1.00	1.38	YES	.531
26	1.000	1.00	1.38	NO	.587
66	1.000	1.00	1.38	YES	.587
28**	1.125	1.00	1.75	NO	.781
68**	1.125	1.00	1.75	YES	.781
27**	1.250	1.00	1.75	NO	.875
67**	1.250	1.00	1.75	YES	.875

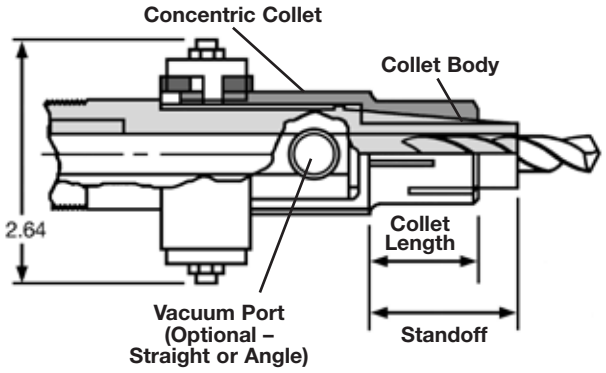
*Note: Complete Check Sheet before placing order.
**Note: Not available on P2 models.
‡ Must specify Drill and Collet Size when placing order

SPECIFICATIONS:
Power: 1.0 hp
Air Consumption: 30 scfm
Air Inlet Size: .375 NPT
Recommended Hose Size: .5” I.D.
Thrust: 230 lbs. @ 90 psig
Depth Accuracy: Repeatable within ± .001”
Stroke (overall): 1.0”
Length: 14.5” + Collet length
Weight: 9.0 lbs.

EXTRA COST ACCESSORIES:
Drill Point Lubricator
Handling Ring

Dimensional Data - P2 Drill w/ Concentric Collet Foot





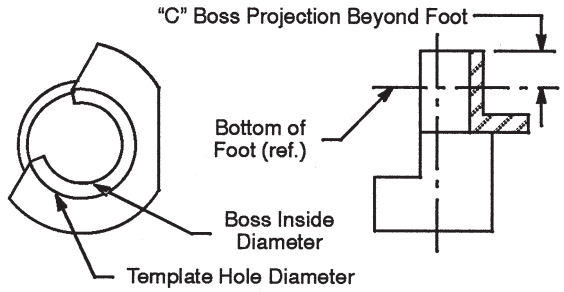
Standoff is the distance between the Concentric Collet shoulder and the end of the Collet body.

The holes in the Fixture Plate should be the nominal Collet diameter + .003, - .000.

When using Vacuum Collection, the Concentric Collet is moved outboard by .75”. A .50” diameter vacuum collector port is provided in front of the Foot. A separate vacuum system can be attached to the vacuum port.

Template Boss

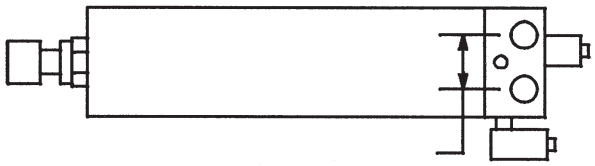
1. Determine Template Hole Diameter and Thickness.



2. Select the proper Template Boss from the chart below.
3. Boss projection "C" must be greater than Template Thickness.

Template Hole Dia.	Boss Projection "C"	Boss I.D.	Boss Part No.
.500	.062	.39	44-101-203
.500	.100	.39	44-101-212
.500	.150	.39	44-101-215
.500	.175	.39	44-101-255
.500	.200	.39	44-101-252
.500	.250	.39	44-101-261
.625	.062	.51	44-101-202
.625	.100	.51	44-101-211
.625	.150	.51	44-101-214
.625	.175	.51	44-101-223
.625	.200	.51	44-101-218
.625	.250	.51	44-101-260
.625	.300	.51	44-101-262
.750	.100	.64	44-101-210
.750	.150	.64	44-101-213
.750	.175	.64	44-101-282
.750	.200	.64	44-101-219

P2 Drill Point Lubricator



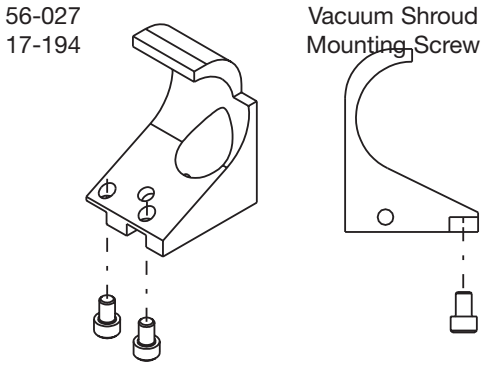
The Drill Point Lubricator provides lubricated air to the point of the cutter. The Doler PL Lubricator is mounted on the side of the P2 Main Module. The Drill Point Lubricator has a quick disconnect fitting for rapid no-mess refilling; use 80-503 Wall Tank to refill it or it can be is filled manually and requires no additional equipment.

Assembly No.	Description
85-043	For P2 Variable Spacing Foot Models
85-050	For P2 Concentric Collet Models

Note: Assembly number is the complete assembly including P2 mounting hardware.

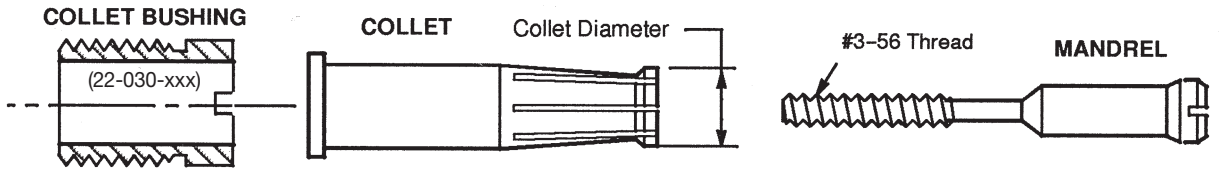
Vacuum Pickup Attachment

Assembly No.	Description



Collets and Mandrels

Standard Duty (Used in Doler P2 Variable Spacing Foot Drill)



Grip Range*	Length Code**	Base Collet Number	Collet Overall Length	Base Mandrel Number	Mandrel Overall Length
0 - 0.10	- 23	46-051-xxx	1.15	46-151-xxx	2.25
0 - 0.30	- 40	46-052-xxx	1.40	46-152-xxx	2.50
0.20 - 0.56	- 63	46-053-xxx	1.65	46-153-xxx	2.75
0.45 - 0.81	- 90	46-054-xxx	1.92	46-154-xxx	3.00

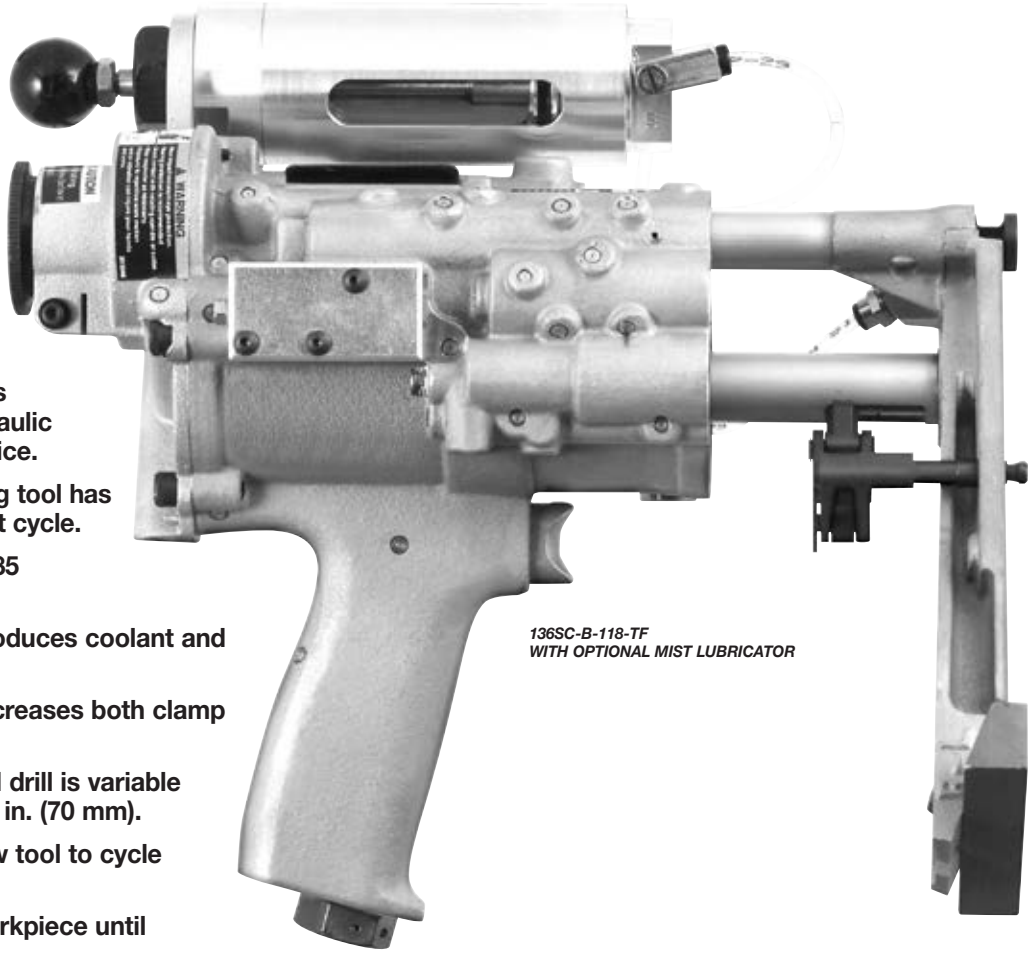
*Note: Complete Check Sheet before placing order.
1. Determine the maximum material thickness for the application. Select the Base Collet Number and Base Mandrel Number from the chart above.
2. Select the complete Collet and Mandrel number based on the pilot hole diameter in the workpiece.
3. Order Collet Bushing 22-030-xxx where xxx is the Collet diameter.

* NOTE: Material thickness or stack
** NOTE: The Collet Code is an old numbering system still used by many customers. It is provided for reference.

Quackenbush™

136SC Q-Matic Self-Colleting Drill Motor

Drill Capacity: .25” (6.4mm)
Countersink Capacity: .5” (12.7mm)



136SC-B-118-TF
WITH OPTIONAL MIST LUBRICATOR

- **Motor, clamp and retract mechanism are air-operated; feed rate is controlled by metering hydraulic fluid through adjustable orifice.**
- **Semi-automatic self-colleting tool has automatic clamp/drill/retract cycle.**
- **136 series motor develops .85 nominal horsepower.**
- **Optional mist lubricator introduces coolant and air blast to cutter.**
- **Booster pump accessory increases both clamp and feed pressures.**
- **Distance between collet and drill is variable from .5 in. (12.5 mm) to 2.75 in. (70 mm).**
- **Tool has trigger lock to allow tool to cycle without operator attention.**
- **Tool remains clamped to workpiece until operator releases trigger.**

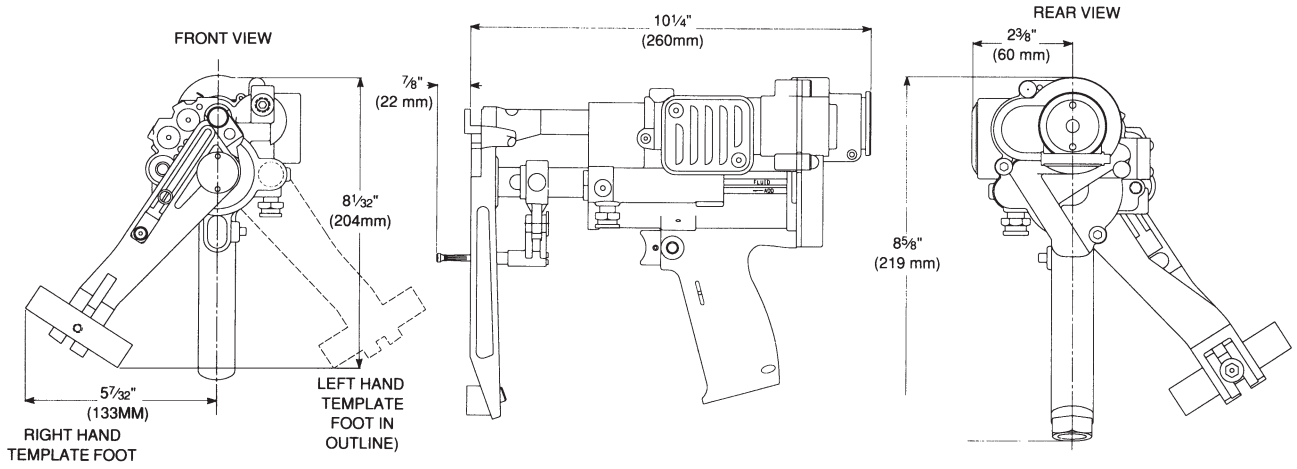
Model	Stroke		Feed Rate	Weight w/steel foot		Spindle Speeds (RPM)	Variable Distance Collet to Drill	Inlet	Minimum Hose Size
	Feed	Collet		lbs	kg				
136SC-B-118	1.125 in (28mm)	.5625 in (14mm)	.05 to 40 in/sec 1.25 to 10 mm/sec	7.0	3.2	400, 900, 2100, 3100, 6000, 7800, 11,500, 22,500	Min: .5 in (12.7mm) Max. 2.75 in (70mm)	.375” NPT	.5” (12.7mm)
136SC-150	1.5 in (30mm)	.5625 in (14mm)	.05 to 40 in/sec 1.25 to 10 mm/sec	8.0	3.6	400, 900, 2100, 3100, 6000, 7800, 11,500, 22,500	Min: .5 in (12.7mm) Max. 2.75 in (70mm)	.375” NPT	.5” (12.7mm)

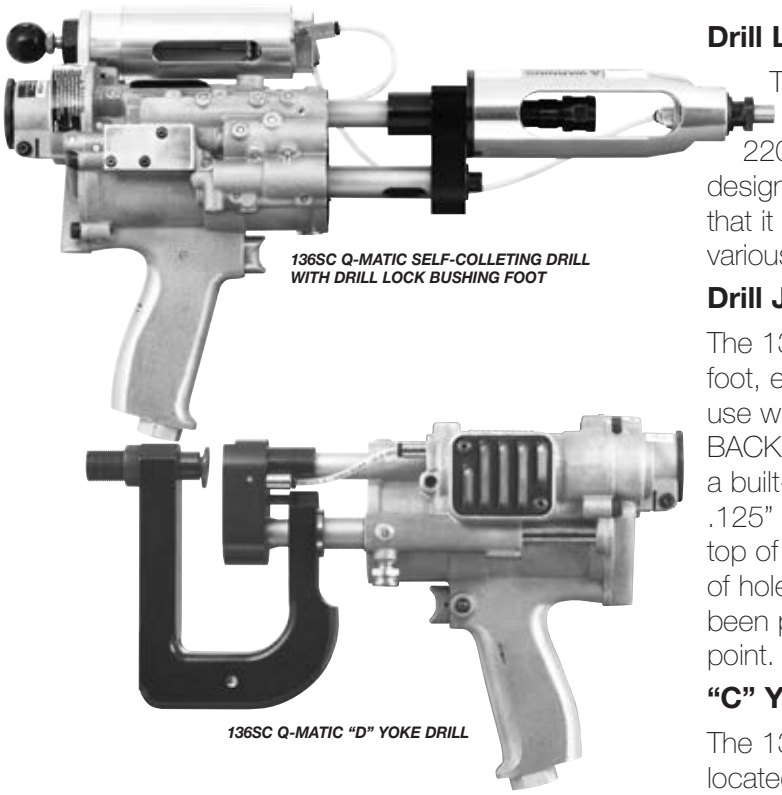
Rated tool performance at 90 PSIG measured at toll inlet with motor running.

INFORMATION REQUIRED FOR ORDERING SELF-COLLETING DRILL:

1. TOOL RPM
2. TYPE SPINDLE REQUIRED (Exact information concerning the cutter to be utilized in the drilling application must be provided in order to determine the proper spindle configuration. A drawing of the cutter should be provided for each application.)
3. FOOT TYPE REQUIRED:
   - Template Foot Right Hand OR Left Hand
   - Jig Collet Foot Depth Sensing OR Non-Depth Sensing
   - Drill Lock Bushing Foot 21000 series OR 22000 Series Bushing
4. TOOLING INFORMATION
   - Template Foot Models Template Boss Collet/Mandrel Assembly
   - Jig Collet Foot Models For depth sensing models, the stand-off distance must be provided.

Self Colleting Machines





136SC Q-MATIC SELF-COLLETING DRILL WITH DRILL LOCK BUSHING FOOT

136SC Q-MATIC "D" YOKE DRILL

Drill Lock Bushing Foot

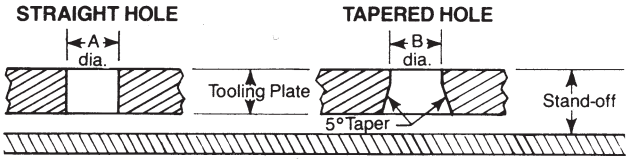
The versatile Q-Matic 136SC Drill is available with a foot which accepts standard 21000 and 22000 series lock-type drill bushings. This foot design increases the versatility of the Q-Matic Drill so that it may be locked onto the rigid tooling plate using various drill bushing tips and their accessories.

Drill Jig Collet Foot

The 136SC Q-Matic Drill is available with a jig collet foot, either with or without a depth sensing sleeve, for use with rigid tooling plates which have STRAIGHT or BACK TAPERED locating holes. This attachment, with a built-in sensing sleeve, will sense variations up to .125" in the distance between the work surface and the top of the tooling plate, which allows production drilling of holes with countersink to precise limits. A port has been provided in the foot to deliver coolant to the drill point.

"C" Yoke

The 136SC is available with a "C" Yoke for perimeter located holes.



INFORMATION REQUIRED TO ORDER JIG COLLET FOOT TOOLS:

(1) Specify tooling plate hole size—diameter A or B—in order to determine collet size (see standard collet size chart).

(2) When ordering depth sensing models, specify stand-off distance. (Top of tooling plate to work surface)

(3) When ordering for straight hole tooling plates, specify tooling plate thickness.

STANDARD COLLET SIZES

	Straight Hole A dia.	Tapered Hole .B dia.
Depth Sensing	1.000	.796
	.875	.670
Non-Depth Sensing	1.000	.796
	.875	.670
	.750	.640
	.625	.500

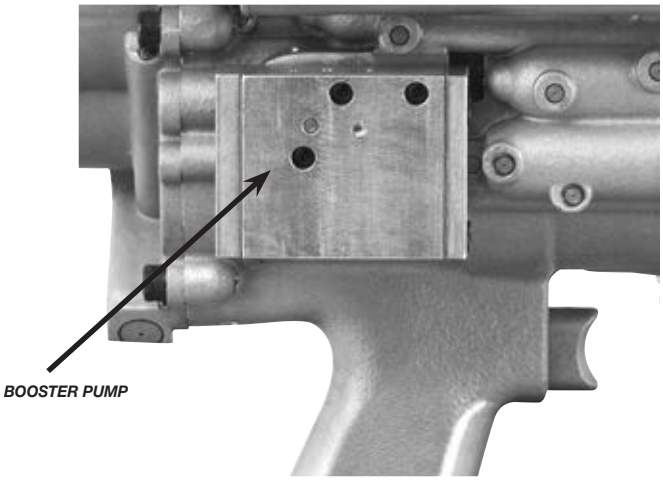
Special collets available upon request.

Quackenbush™

136SC-B-118 Q-Matic Self-Colleting Drill Motor

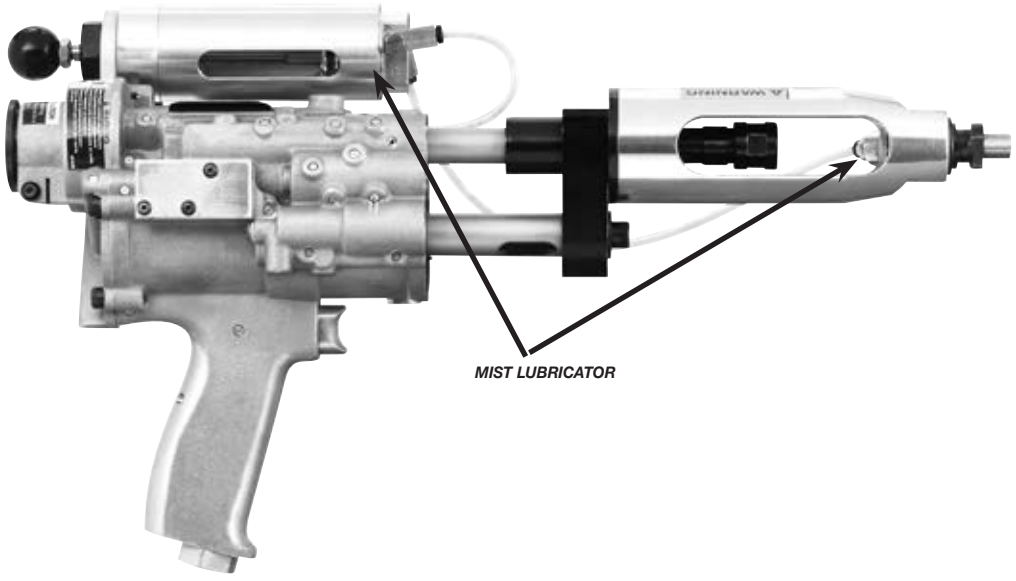
Booster Pump Assembly

For increased clamping and feed force, an optional Booster Pump (Part No. 621482) is available. The pump provides extra clamp and feed when required. The Booster Pump assembly will increase both clamp and feed forces by a factor of 2.5.



Mist Lubricator Assembly

A mist lubricator assembly is available to introduce coolant and air to the cutter. The lubricator is actuated by air from the accessory air tap on the motor side and only functions when the motor is running. The standard mist lubricator (Part No. 631878) can be filled with manually. Fill reservoir (622900) available for filling standard manual fill lubricator. The optional mist lubricator (Part No. 631879) is filled by a pressure pump.



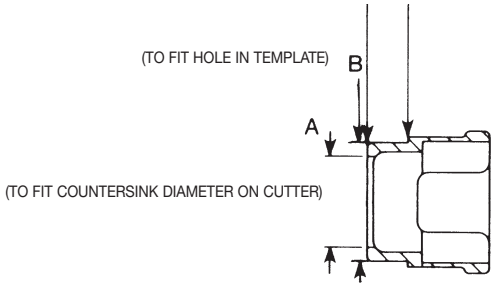
	Small	Large
Manual Fill	631878	
Pressure Fill	631879	631880

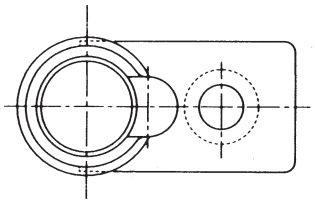
Template Boss

TEMPLATE BOSS
NOTE: TEMPLATE BOSSES ARE OPTIONAL AND ARE TO BE SPECIFIED BY CUSTOMER IF REQUIRED.

Application		Template Boss Part No.
B Template Hole Dia.	C Sink Dia.	Code No.
.434	.271	623573
.434	.286	623574
.434	.317	623575
.497	.271	623576
.497	.286	623577
.497	.317	623578
.497	.349	623579
.497	.380	623580
.622	.317	623581
.622	.349	623582
.622	.380	623583
.622	.411	623584
.622	.489	623585
.622	.505	623586

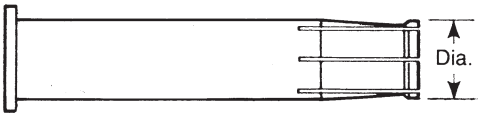
(TEMPLATE BOSS LENGTH IS .150.)



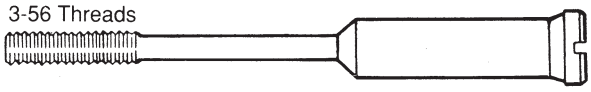


Collets and Mandrels

Collets and Mandrels are supplied as standard equipment with each tool and must be specified when ordered.



Typical Configuration of Collets for hole sizes up to .250 in.



Typical Configuration of Mandrels for hole sizes up to .250 in.

INFORMATION NECESSARY TO ORDER COLLETS AND MANDRELS HOLE SIZE AND COLLET LENGTH CODE

EXAMPLE; Application is to drill a .250 dia. hole in .500 thick material using a template with a thickness of .125 in. SELECT Template Boss (See Template Boss Length information above). This application requires a.150 length. Using Material Thickness Grip Range chart based on .500 material thickness, the collet and mandrel Length Code is EITHER -40 or -63

ORDER: 250-40 (Hole Size – Collet Length Code) or .250-63 collet/mandrel

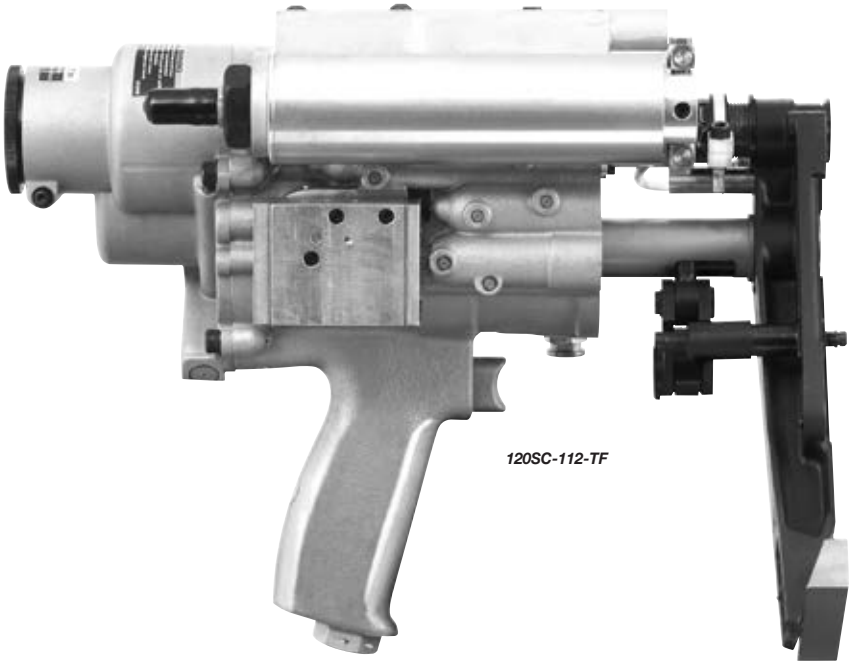
Material Thickness Grip Range	
Temp. Boss Length .150	Collet Length Code*
Series 1000 Standard Collets	
.00 - .37	– 23
.18 - .62	– 40
.43 - .87	– 63
.68 - 1.12	– 90

Quackenbush™

120SC Q-Matic Self-Colleting Drill

Drill Capacity: .4375" (11mm)
Countersink Capacity: 5/8" (15.9mm)

- **Semi-automatic self-colleting tool has automatic clamp/drill/retract cycle.**
- **Air motor, clamping and retract mechanism are air-operated; feed rate controlled by metering hydraulic fluid through an adjustable orifice.**
- **Spindle can be adjusted to .375 inch to allow for variations in cutter lengths.**
- **Spindle feed rate is adjustable from .05 in./sec. through .40 in./sec.**
- **Variable foot spacing is adjustable from 1.00 in. minimum through 3.50 in. maximum.**
- **Drill point coolant port is provided in pressure foot.**
- **Trigger lock feature permits tool to cycle without constant operator attention.**
- **Spindle continues to rotate in forward direction while tool retracts.**
- **Tool stays clamped to workpiece until operator releases trigger lock.**



120SC-112-TF

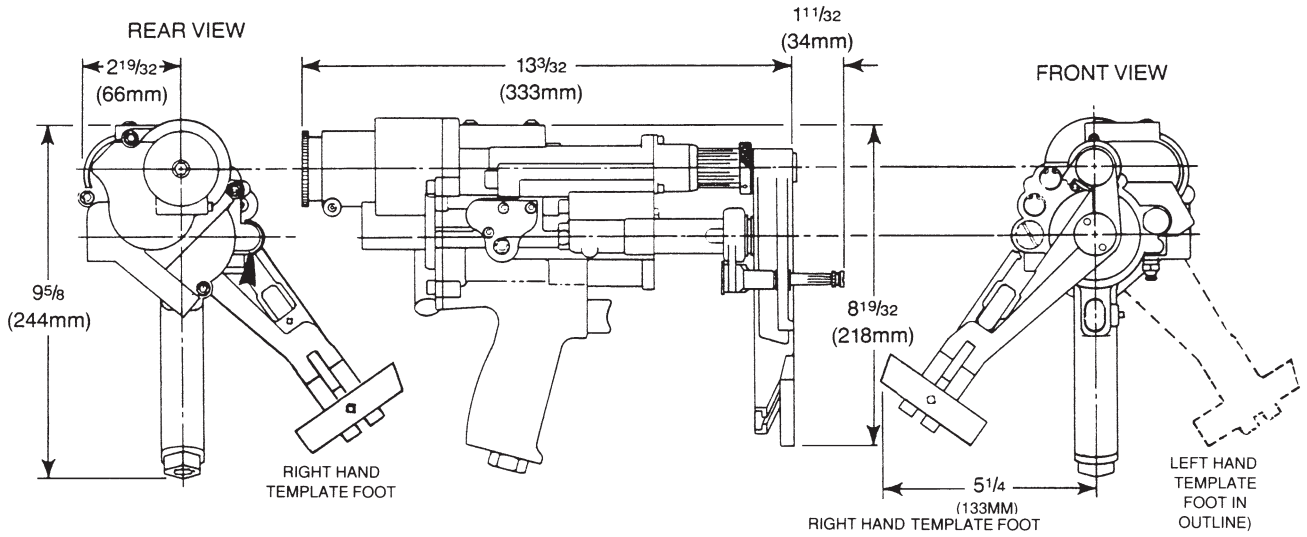
Model	Stroke		Feed Rate	Weight w/steel foot		Spindle Speeds (RPM)	Variable Distance Collet to Drill	Inlet	Minimum Hose Size
	Feed	Collet		lbs	kg				
120SC-112 (10SC)	1.125 in (28mm)	.5 in (12.5mm)	.05 to 4 in/sec	10.8	4.89	270, 470, 700, 900, 1150, 2200, 3500, 5500, 7000, 14000, 23500	Min: .875 in (22mm) Max. 3.50 in (89mm)	.375" NPT	.5" (12.7mm)
120SC-225	2.25 in (57mm)	.875 in (22.2mm)	Min. 1 min. per in. Max. 5 sec. per in.	13.0	5.89	270, 470, 700, 900, 1150, 2200, 3500, 5500, 7000, 14000, 23500	Min: 1 in (25.4mm) Max. 3.5 in (89mm)	.375" NPT	.5" (12.7mm)

Rated tool performance at 90 PSIG measured at toll inlet with motor running.

INFORMATION REQUIRED FOR ORDERING SELF-COLLETING DRILL:

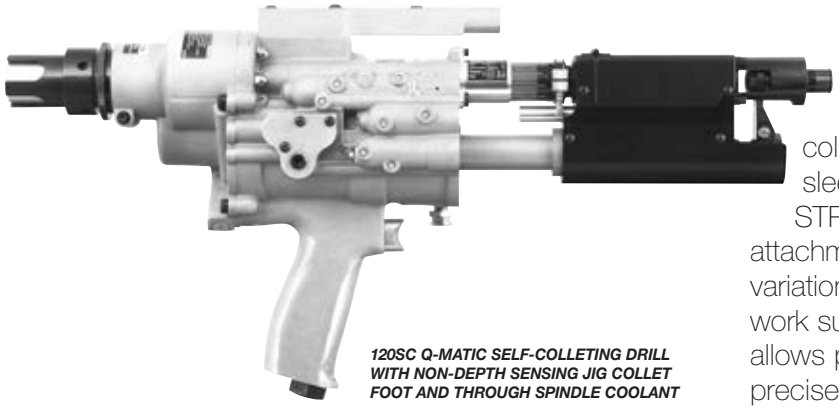
1. TOOL RPM
2. TYPE SPINDLE REQUIRED (Exact information concerning the cutter to be utilized in the drilling application must be provided in order to determine the proper spindle configuration. A drawing of the cutter should be provided for each application.)
3. FOOT TYPE REQUIRED:
   - Template Foot Right Hand OR Left Hand
   - Jig Collet Foot Depth Sensing OR Non-Depth Sensing
   - Drill Lock Bushing Foot 21000 series OR 22000 Series Bushing
4. TOOLING INFORMATION
   - Template Foot Models
     Template Boss
     Collet/Mandrel Assembly
   - Jig Collet Foot Models
     For depth sensing models, the stand-off distance must be provided.
     Collet/Mandrel Assembly

Self Colleting Machines



Drill Lock Bushing Foot

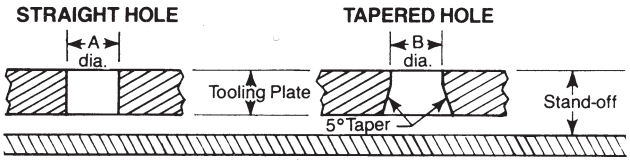
The versatile Q-Matic 120SC Drill is available with a foot which accepts standard 21000 and 22000 series lock-type drill bushings. This foot design increases the versatility of the Q-Matic Drill so that it may be locked onto the rigid tooling plate using various drill bushing tips and their accessories.



120SC Q-MATIC SELF-COLLETING DRILL WITH NON-DEPTH SENSING JIG COLLET FOOT AND THROUGH SPINDLE COOLANT

Drill Jig Collet Foot

The 120SC Q-Matic Drill is available with a jig collet foot, either with or without a depth sensing sleeve, for use with rigid tooling plates which have STRAIGHT or BACK TAPERED locating holes. This attachment, with a built-in sensing sleeve, will sense variations up to .125" in the distance between the work surface and the top of the tooling plate, which allows production drilling of holes with countersink to precise limits. A port has been provided in the foot to deliver coolant to the drill point.



INFORMATION REQUIRED TO ORDER JIG COLLET FOOT TOOLS:

(1) Specify tooling plate hole size—diameter A or B—in order to determine collet size (see standard collet size chart).

(2) When ordering depth sensing models, specify stand-off distance. (Top of tooling plate to work surface)

(3) When ordering for straight hole tooling plates, specify tooling plate thickness.

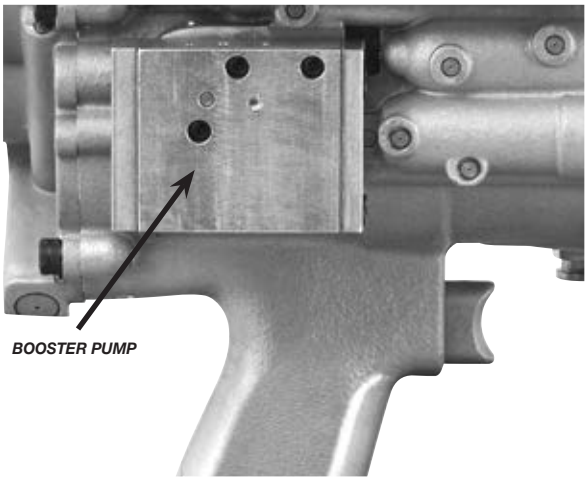
STANDARD COLLET SIZES

	Straight Hole A dia.	Tapered Hole .B dia.
Depth Sensing	1.000	.796
	.875	.670
Non-Depth Sensing	1.000	.796
	.875	.670
	.750	.640
	.625	.500

Special collets available upon request.

Quackenbush™

120SC-D-112 Q-Matic Self-Colleting Drill Motor



Booster Pump Assembly

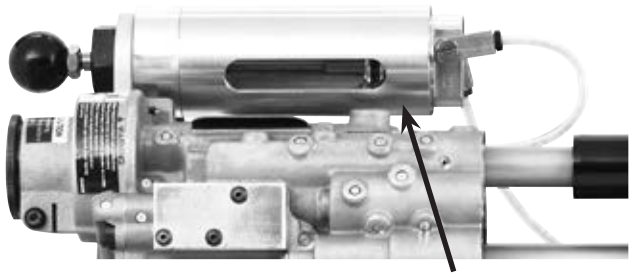
For increased clamping and feed force, an optional Booster Pump (Part No. 621482) is available. The pump provides extra clamp and feed force when drilling Titanium or taper drilling applications.

The Booster Pump assembly will increase both clamp and feed forces by a factor of 2.5. The pump is easily installed on the Q-Matic Drill by replacing the cover supplied with the tool with the Booster Pump using the three screws supplied with the pump.

Mist Lubricator Assembly

A mist lubricator assembly is available to introduce coolant and air to the cutter. The lubricator is actuated by air from the accessory air tap on the motor side and only functions when the motor is running. The standard mist lubricators (Part No. 641109 and 641081) are filled with a hand pump. The optional mist lubricators (Part No. 641110 and 641082) are filled by a pressure pump.

	Small	Large
Manual Fill	641109	641081
Pressure Fill	641110	641082



Jig Collet Foot Attachments

Depth Sensing Jig Collet Foot

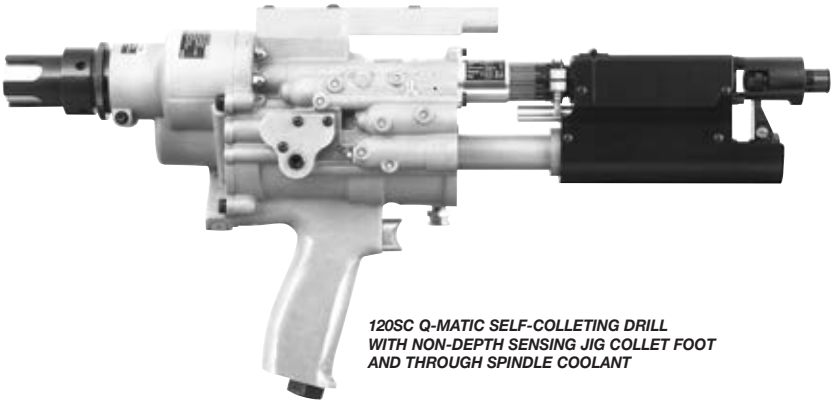
Depth sensing jig collet foot is used for accurately drilling and countersinking hole layouts utilizing a simple fixture plate. The cutter passes centrally through the drillmotor collet to produce holes concentric with the fixture plate holes. The depth sensing sleeve will drill and accurately countersink with fixture-to-workpiece variations of up to .125". Coolant and air blast port is fitted to the foot.

User must specify template hole and drill-countersink size as well as drill-countersink configuration.

Non Depth Sensing Jig Collet Foot

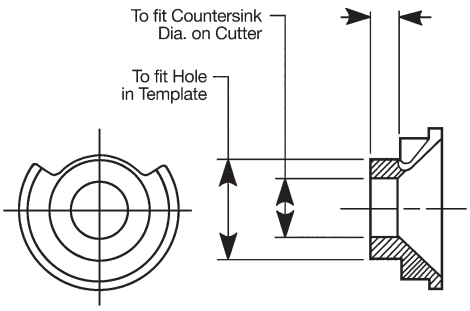
Non-depth sensing jig collet foot is similar to the above foot without depth sensing capability. This foot is used for straight drilling applications where "rough" depth sensing only is required. This foot grips straight shank drills utilizing an "O-W" type collet.

User must specify template hole and drill size.



120SC Q-MATIC SELF-COLLETING DRILL WITH NON-DEPTH SENSING JIG COLLET FOOT AND THROUGH SPINDLE COOLANT

Template Boss



NOTE: WHEN ORDERING TOOLS, TEMPLATE BOSSES MUST BE SPECIFIED.

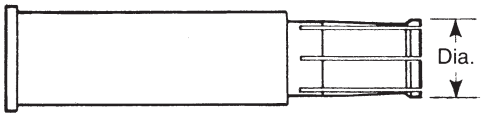
Application		Template Boss Part No.	
B Template Hole Dia.	C Sink Dia.	With .150 Boss Length	With .200 Boss Length
.437	.271	622723-5	622740
.437	.286	622724-3	622741
.437	.317	622725-0	622742
.500	.271	622726-8	622743
.500	.286	622727-6	622744
.500	.317	622728-4	622745
.500	.349	622729-2	622746
.500	.380	622730-0	622747
.625	.317	622731-8	622748
.625	.349	622732-6	622749
.625	.380	622733-4	622750
.625	.411	622734-2	622751
.625	.489	622735-9	622752
.625	.505	622736-7	622753
.750	.505	622737-5	622754
.750	.625	622738-3	622755
.8750	.625	622739-1	622756

TEMPLATE BOSS LENGTH:
- Use .150 Length for Template Thickness to .125
- Use .200 Length for Template Thickness to .187

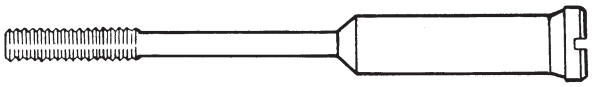
NOTE:
Template Boss Length must exceed template thickness.

Collets and Mandrels

Collets and Mandrels are supplied as standard equipment with each tool and must be specified when ordered.



Typical Configuration of Collets for hole sizes up to .375 in.



Typical Configuration of Mandrels for hole sizes up to .375 in.

INFORMATION NECESSARY TO ORDER COLLETS AND MANDRELS HOLE SIZE AND COLLET LENGTH CODE

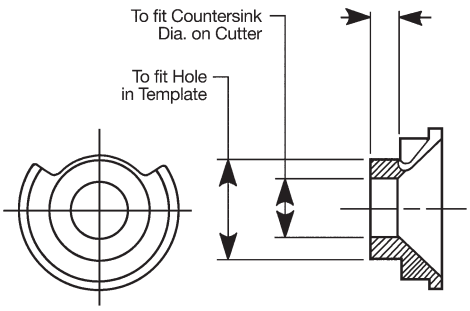
EXAMPLE: Application is to drill a .375 dia. hole in .500 thick material using a template with a thickness of .130 in. SELECT Template Boss (See Template Boss Length information above). This application requires a.200 length. Using Material Thickness Grip Range chart based on .500 material thickness, the collet and mandrel Length Code is EITHER -63 or -90.

ORDER: 375-63 or .375-90 collet/mandrel

Hole Size — Collet Length Code

Material Thickness Grip Rnge				Collet Length Code
Using .100 & .150 Boss Length		Using .200 Boss Length		
Min	Max	Min	Max	
.00	.59	.00	.54	63
.05	.84	.00	.79	90
.30	1.09	.25	1.04	115
.55	1.34	.50	1.29	140

Template Boss



NOTE: WHEN ORDERING TOOLS, TEMPLATE BOSSES MUST BE SPECIFIED.

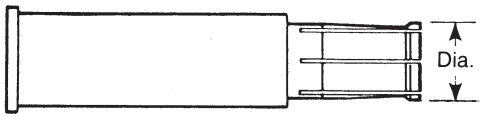
Application		Template Boss Part No.	
B Template Hole Dia.	C Sink Dia.	With .150 Boss Length	With .200 Boss Length
.500	.375	624087	623896
.625	.500	623708	623897
.750	.625	623720	623898
.875	.750	623716	623899
1.000	.781	623725	
1.000	.875	624034	

TEMPLATE BOSS LENGTH:
- Use .150 Length for Template Thickness to .125
- Use .200 Length for Template up to .187

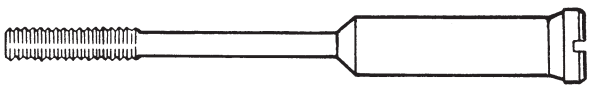
NOTE:
Template Boss Length must exceed template thickness.

Collets and Mandrels

Collets and Mandrels are supplied as standard equipment with each tool and must be specified when ordered.



Typical Configuration of Collets for hole sizes up to .375 in.



Typical Configuration of Mandrels for hole sizes up to .375 in.

INFORMATION NECESSARY TO ORDER COLLETS AND MANDRELS HOLE SIZE AND COLLET LENGTH CODE

EXAMPLE: Application is to drill a .375 dia. hole in .500 thick material using a template with a thickness of .130 in. SELECT Template Boss (See Template Boss Length information above). This application requires a.200 length. Using Material Thickness Grip Range chart based on .500 material thickness, the collet and mandrel Length Code is EITHER -63 or -90.

ORDER: 375-63 (Hole Size: 375; Collet Length Code: 63) or .375-90 collet/mandrel

Material Thickness Grip Range				Collet Length Code
Using .100 & .150 Boss Length		Using .200 Boss Length		
Min	Max	Min	Max	
.00	.59	.00	.54	63
.05	.84	.00	.79	90
.30	1.09	.25	1.04	115
.55	1.34	.50	1.29	140
.80	1.59	.75	1.54	163
1.05	1.84	1.00	1.79	190
1.30	2.09	1.25	2.04	215
1.55	2.34	1.50	2.29	240

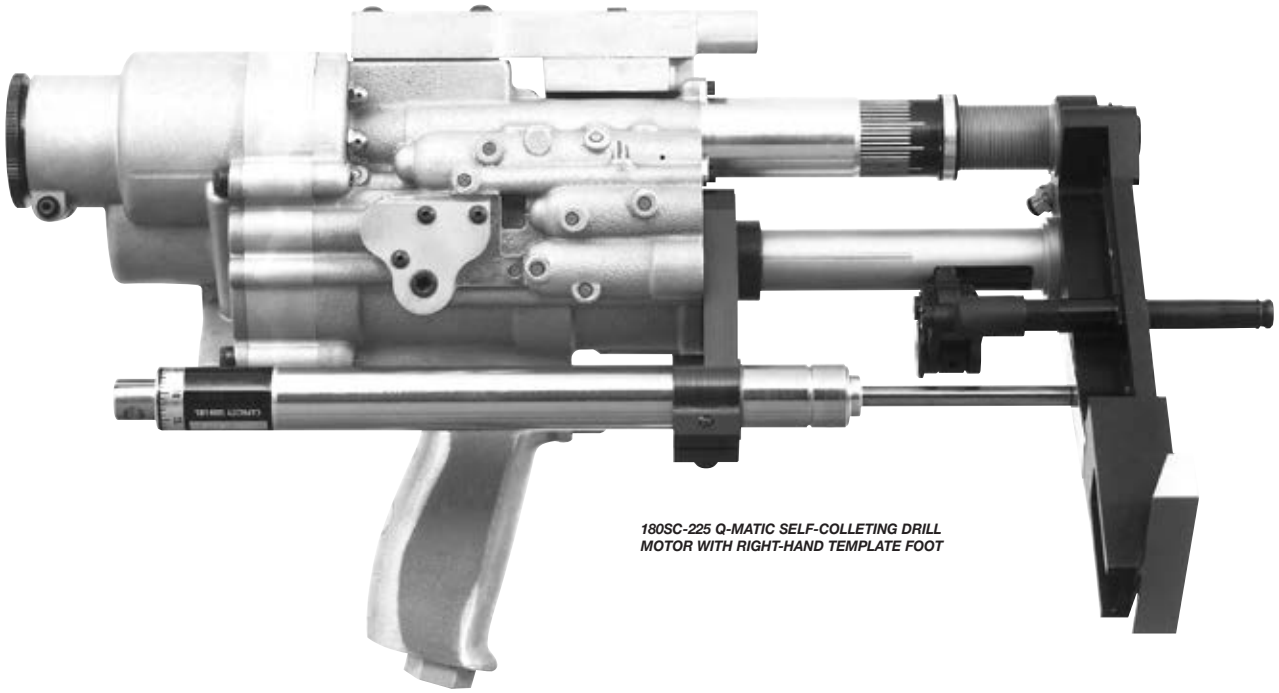
Quackenbush™

180SC-225 Q-Matic Self-Colleting Drill Motor

Drill Capacity: .5625" (14.3mm)
Countersink Capacity: .875" (22.2mm)

Feed Stroke: 2.25" (57.2mm)
Clamp Stroke: .875" (22.2mm)

- **Semi-automatic self-colleting tool has automatic clamp/drill/retract cycle.**
- **Air motor, clamping and retract mechanism are air-operated; feed rate controlled by external hydraulic feed control cylinder.**
- **Tool has feed stroke of 2.25" (57.2mm); collet stroke of .875"**
- **Variable foot spacing is adjustable from 1.00 in. minimum through 3.50 in. maximum.**
- **Drill point coolant port is provided in pressure foot.**
- **Trigger lock feature permits tool to cycle without constant operator attention.**
- **Spindle continues to rotate in forward direction while tool retracts.**
- **Tool stays clamped to workpiece until operator releases trigger locks.**



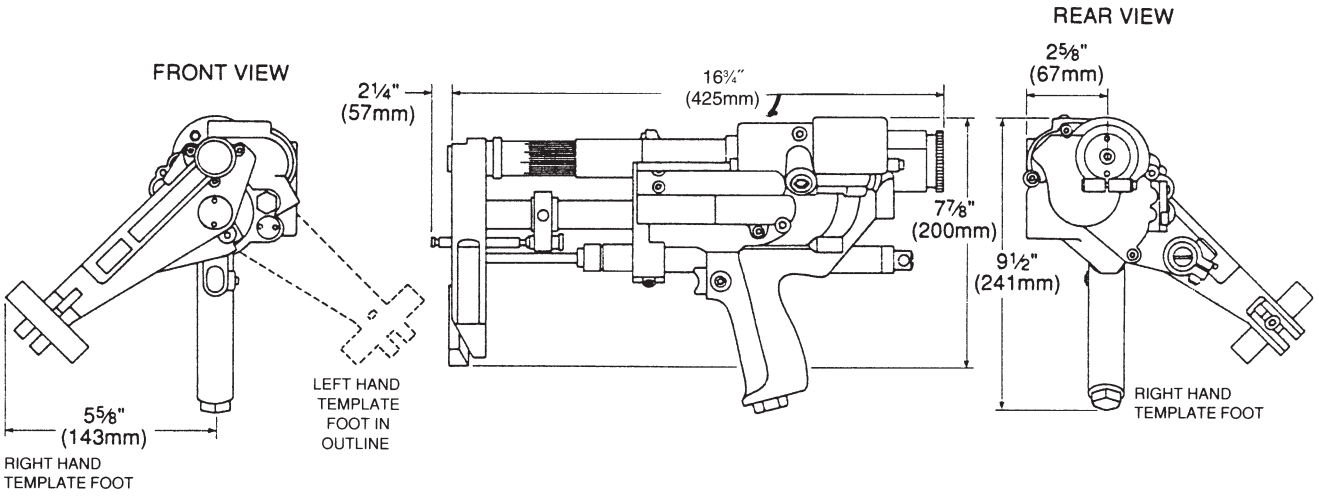
180SC-225 Q-MATIC SELF-COLLETING DRILL MOTOR WITH RIGHT-HAND TEMPLATE FOOT

Model	Stroke		Feed Rate	Weight w/steel foot		Spindle Speeds (RPM)	Variable Distance Collet to Drill	Inlet	Minimum Hose Size
	Feed	Collet		lbs	kg				
180SC-225	2.25 in (57mm)	.5 in (12.5mm)	Min. 1 min. per in. Max. 5 sec. per in.	14.5	6.52	240, 420, 650, 850 1050, 2000, 3100 4900, 6300, 12500, 21,000	Min: 1 in (25.4mm) Max. 3.5 in (89mm)	.375" NPT	.5" (12.7mm)

Rated tool performance at 90 PSIG measured at toll inlet with motor running.

INFORMATION REQUIRED FOR ORDERING SELF-COLLETING DRILL:

1. TOOL RPM
2. TYPE SPINDLE REQUIRED (Exact information concerning the cutter to be utilized in the drilling application must be provided in order to determine the proper spindle configuration. A drawing of the cutter should be provided for each application.)
3. FOOT TYPE REQUIRED:
   - Template Foot Right Hand OR Left Hand
   - Jig Collet Foot Depth Sensing OR Non-Depth Sensing
   - Drill Lock Bushing Foot 21000 series OR 22000 Series Bushing
4. TOOLING INFORMATION
   - Template Foot Models
     Template Boss
     Collet/Mandrel Assembly
   - Jig Collet Foot Models
     For depth sensing models, the stand-off distance must be provided.
     Collet/Mandrel Assembly



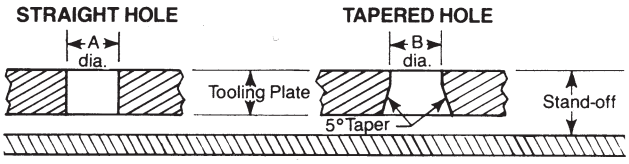
Drill Lock Bushing Foot Model

The versatile Q-Matic 180SC-225 Drill is available with a foot which accepts standard 21000 and 22000 series lock-type drill bushings. This foot design increases the versatility of the Q-Matic Drill so that it may be locked onto the rigid tooling plate using various drill bushing tips and their accessories.

180SC-225 Q-MATIC SELF-COLLETING DRILL WITH JIG COLLET FOOT, THROUGH SPINDLE LUBRICATOR AND SPECIAL SWIVEL RING SUSPENSION ATTACHMENT.

Drill Jig Collet Foot Model

The 180SC-225 Q-Matic Drill is available with a jig collet foot, either with or without a depth sensing sleeve, for use with rigid tooling plates which have STRAIGHT locating holes or back TAPERED locating holes. This attachment with a built-in sensing sleeve, will sense variations up to .125" in the distance between the work surface and the top of the tooling plate, which allows production drilling of holes with a countersink to precise limits. A port has been provided in the foot to deliver coolant to the drill point.



INFORMATION REQUIRED TO ORDER JIG COLLET FOOT TOOLS:

(1) Specify tooling plate hole size—diameter A or B—in order to determine collet size (see standard collet size chart).

(2) When ordering depth sensing models, specify stand-off distance. (Top of tooling plate to work surface)

(3) When ordering for straight hole tooling plates, specify tooling plate thickness.

STANDARD COLLET SIZES

	Straight Hole A dia.	Tapered Hole .B dia.
Depth Sensing	1.000	.796
	.875	.670
Non-Depth Sensing	1.000	.796
	.875	.670
	.750	.640
	.625	.500

Special collets available upon request.

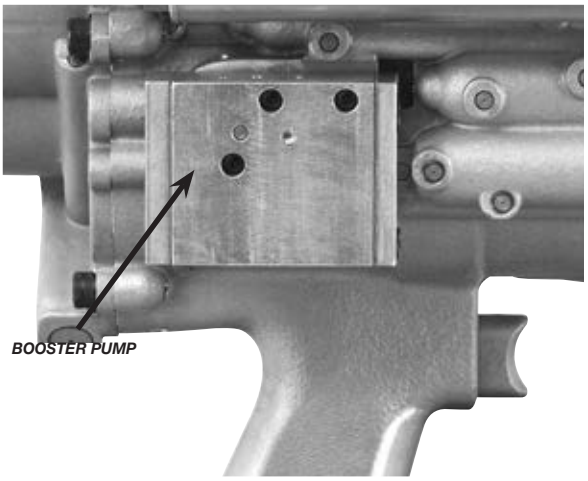
Quackenbush™

180SC-225 Q-Matic Self-Colleting Drill Motor

Booster Pump Assembly

For increased clamping and feed force, an optional Booster Pump (Part No. 621950) is available. The pump provides extra clamp and feed force when drilling Titanium or taper drilling applications.

The Booster Pump assembly will increase both clamp and feed forces by a factor of 2.5. The pump is easily installed on the Q-Matic Drill by replacing the cover supplied with the tool with the Booster Pump using the three screws supplied with the pump.

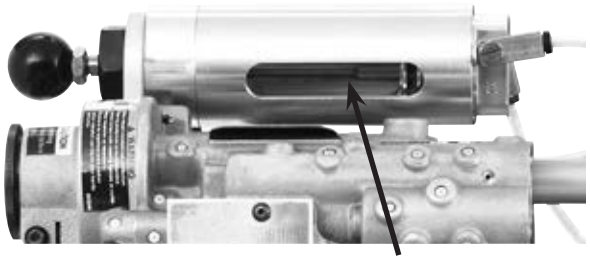


Mist Lubricator Assembly

A mist lubricator assembly is available to introduce coolant and air to the cutter. The lubricator is actuated by air from the accessory air tap on the motor side and only functions when the motor is running. The standard mist lubricators (Part No. 641109 and 641081) are filled with a hand pump.

The optional mist lubricatosr (Part No. 641110 and 641082) are filled by a pressure pump.

	Standard	Large
Manual Fill	641109	641081
Pressure Fill	641110	641082



Jig Collet Foot Attachments

Depth Sensing Jig Collet Foot

Depth sensing jig collet foot is used for accurately drilling and countersinking hole layouts utilizing a simple fixture plate. The cutter passes centrally through the drillmotor collet to produce holes concentric with the fixture plate holes. The depth sensing sleeve will drill and accurately countersink with fixture-to-workpiece variations of up to .125". Coolant and air blast port is fitted to the foot.

User must specify template hole and drill-countersink size as well as drill-countersink configuration.

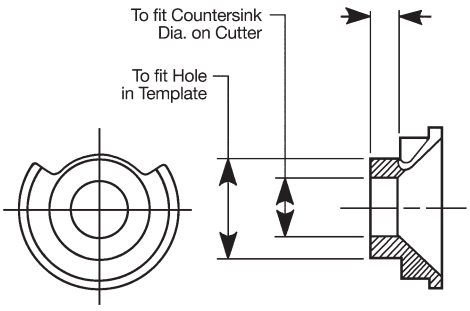
Non Depth Sensing Jig Collet Foot

Non depth sensing jig collet foot is similar to the above foot without depth sensing capability. This foot is used for straight drilling applications where "rough" depth sensing only is required. This foot grips straight shank drills utilizing an "O-W" type collet.

User must specify template hole and drill size.

180SC-225 Q-MATIC SELF-COLLETING DRILL WITH JIG COLLET FOOT, THROUGH SPINDLE LUBRICATOR AND SPECIAL SWIVEL RING SUSPENSION ATTACHMENT.

Template Boss



NOTE: WHEN ORDERING TOOLS, TEMPLATE BOSSES MUST BE SPECIFIED.

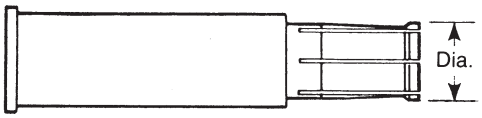
Application		Template Boss Part No.	
B Template Hole Dia.	C Sink Dia.	With .150 Boss Length	With .200 Boss Length
.500	.375	624087	623896
.625	.500	623708	623897
.750	.625	623720	623898
.875	.750	623716	623899
1.000	.781	623725	
1.000	.875	624034	

TEMPLATE BOSS LENGTH:
- Use .150 Length for Template Thickness to .125
- Use .200 Length for Template up to .187

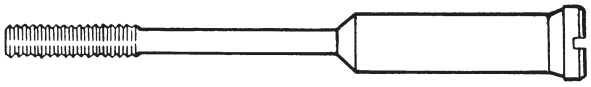
NOTE:
Template Boss Length must exceed template thickness.

Collets and Mandrels

Collets and Mandrels are supplied as standard equipment with each tool and must be specified when ordered.



Typical Configuration of Collets for hole sizes up to .375 in.



Typical Configuration of Mandrels for hole sizes up to .375 in.

INFORMATION NECESSARY TO ORDER COLLETS AND MANDRELS HOLE SIZE AND COLLET LENGTH CODE

EXAMPLE: Application is to drill a .375 dia. hole in .500 thick material using a template with a thickness of .130 in. SELECT Template Boss (See Template Boss Length information above). This application requires a.200 length. Using Material Thickness Grip Range chart based on .500 material thickness, the collet and mandrel Length Code is EITHER -63 or -90.

ORDER: 375-63 or .375-90 collet/mandrel

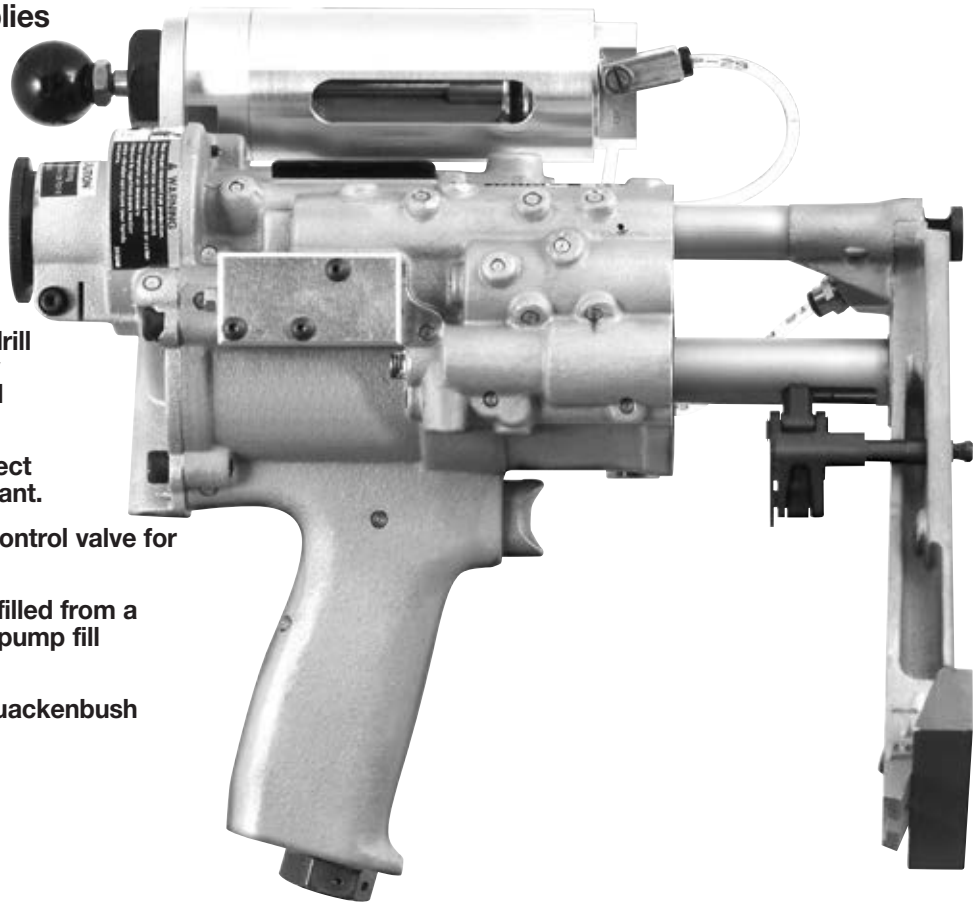
Hole Size — 375 — Collet Length Code — 63

Material Thickness Grip Range				Collet Length Code
Using .100 & .150 Boss Length		Using .200 Boss Length		
Min	Max	Min	Max	
.00	.59	.00	.54	63
.05	.84	.00	.79	90
.30	1.09	.25	1.04	115
.55	1.34	.50	1.29	140
.80	1.59	.75	1.54	163
1.05	1.84	1.00	1.79	190
1.30	2.09	1.25	2.04	215
1.55	2.34	1.50	2.29	240

Quackenbush™

Mist Lubricator Assemblies

- **Light-weight, self-contained unit features positive pressure, metered flow to drill point.**
- **Unit has lubricant capacity for 2000 holes without refilling.**
- **System is automatically activated when tool is in drill cycle, continues to supply lubricant to drill point until trigger is released.**
- **Position of drill has no affect upon unit supplying lubricant.**
- **Unit has adjustable flow control valve for metering lubricant flow.**
- **Mist lubricator is easily refilled from a 2 quart external lubricant pump fill reservoir (622900).**
- **Universal design fits all Quackenbush self-colleting tools.**



MANUAL FILL MIST LUBRICATOR ASSEMBLY SHOWN MOUNTED ON MODEL 136SC-B-118TF

ORDERING INFORMATION

Mist Lubricator for Quackenbush Tools	Manual Fill	Pressure Fill
10 QNPD	631887	631888
136 SC Standard Capacity	631878	631879
136 SC Large Capacity	631878	631880
15SC & 153SC Standard Capacity	631881	631882
15SC & 153SC Large Capacity	631883	631884
120SC & 180SC Standard Capacity	641109	641110
120SC & 180SC Large Capacity	641081	641082

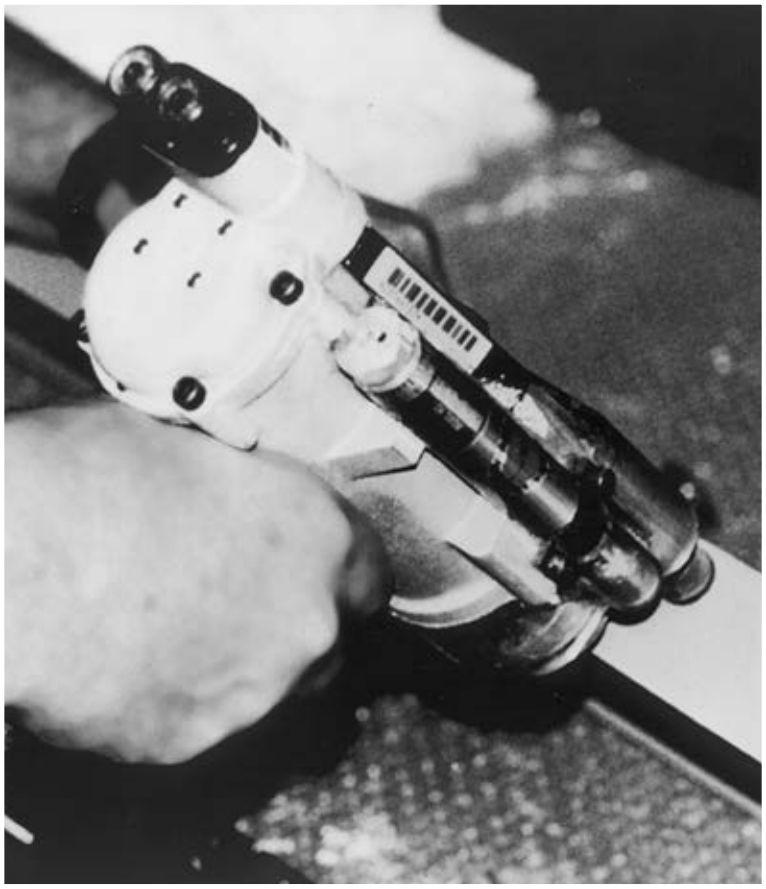
Q-MATIC Hydraulic Filler-Bleed Unit

- **Completely self-contained unit makes filling and bleeding Q-Matic tools simple, quick, clean.**
- **Closed loop hydraulic system keeps fluid loss at a minimum.**
- **Clear tubing in return line makes air bubbles visible.**
- **Returned fluid is filtered before entering reservoir, ensuring fluid is free of contaminants.**
- **Hydraulic hose, pendant control are bundled together for easy, convenient use.**
- **Pump reservoir has 2 quart (1.91 L) capacity, can service up to 70 refills for 15QNPD; 30 refills for 136SC-112 and 25 refills for 15SC-112 & 120SC-112.**

Model	Code No.	Fluid Pressure	Current	Amp. Draw @115V	Weight
Q-Matic Hydraulic Filler/Bleed Unit	621989	200psi	115V/AC 50/60 cycle	9.5 amps	29 lbs. (13.1 kg)
	641530		220V/AC		

Specialty Tools

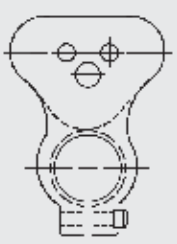
ADVANCED DRILLING EQUIPMENT



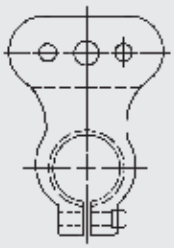
Introduction
Specialty Tools

Advanced Drilling Equipment from Apex Tool Group is the most complete and comprehensive line of drilling systems available to the aerospace industry. This includes a line of specialty drills that are designed to help manufacturers accomplish specific tasks with tools that have been developed or modified to meet the unique requirements of the industry.

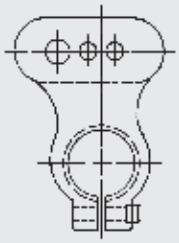
An example is the Nut Plate Drill designed to accommodate the nut plate fastener that is used in countless applications in aircraft manufacturing – out on the wings, in the fuselage, beneath the cockpit, in the lavatories and overhead bins – including where there is a need for repeated access to facilitate periodic inspections and maintenance.



Mickey Mouse Foot



Double Wing Foot



Single Wing Foot

Mickey Mouse Fastener

Double Wing Fastener

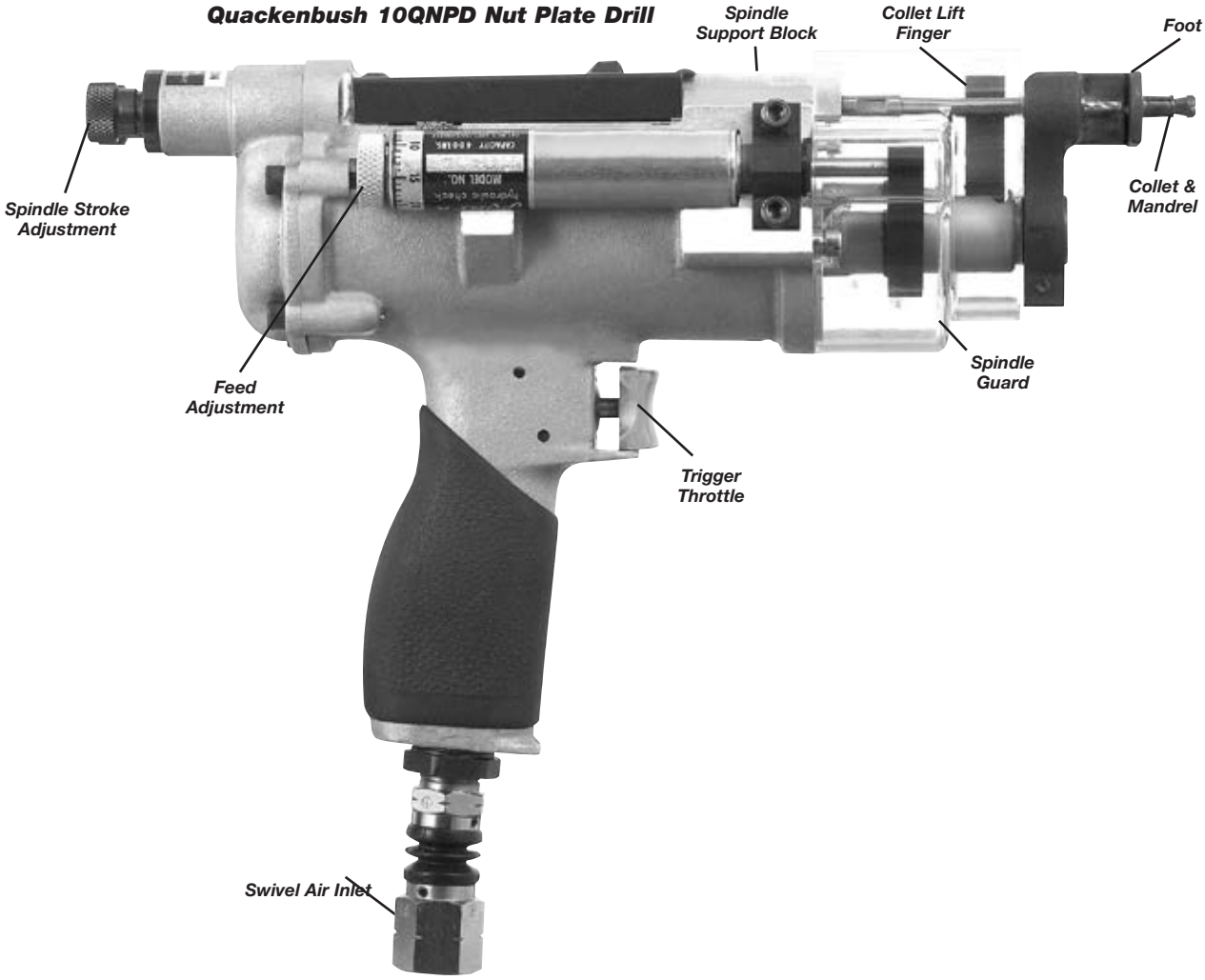
Single Wing Fastener

Typically, any structure requiring the use of nut plate fasteners is designed with pre-spaced, pre-drilled holes. The location and size of these holes is determined by the type of nut plate fastener required.

The collet/mandrel assembly of the nut plate drill is inserted into a pre-drilled hole which allows for the precision drilling of the two holes required for attaching Single Wing, Double Wing and Mickey Mouse.

Our nut plate drills can drill holes for all three types of nut plate fasteners by simply changing the spindle support block, lift finger and pressure foot.

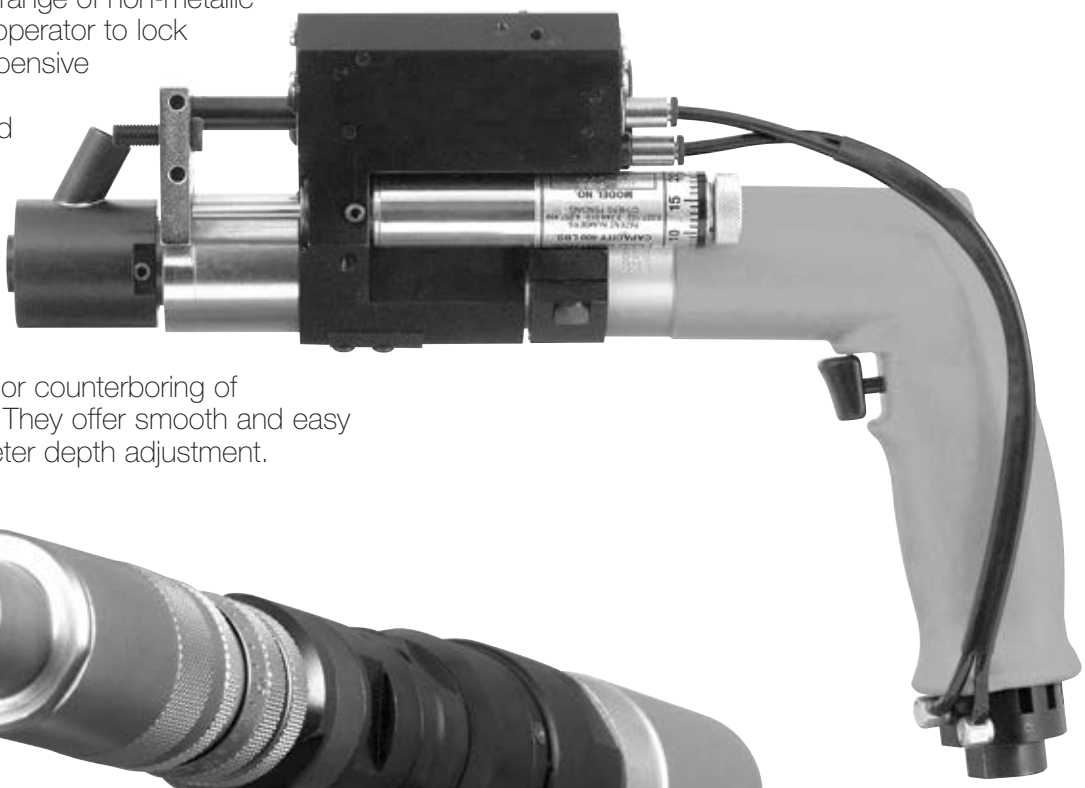
Quackenbush 10QNPD Nut Plate Drill



Our CD Drill, or composite drill, is designed to be used in the expanding range of non-metallic materials. It allows the operator to lock into a fixture or an inexpensive jig such as a template, providing a precise feed rate for enhanced performance and longer drill bit life.

The Quackenbush 60 QBSF-5 Back Spotfacer tools provide precision spot facing, countersinking, or counterboring of the rear side of a hole. They offer smooth and easy operation with micrometer depth adjustment.

Doler CD4



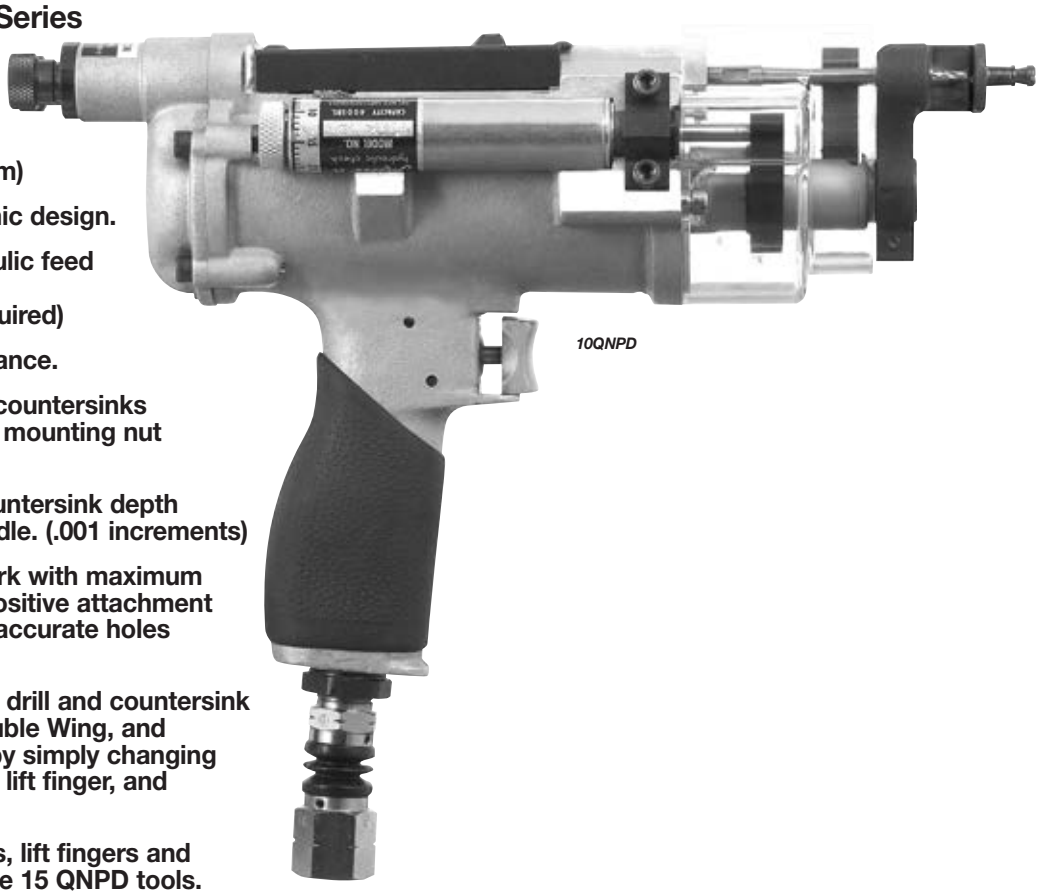
Quackenbush 60 QBSF-5 Back Spotfacer

Quackenbush™

10QNPD Nut Plate Drill Series

Capacity: Drill - .125” (3mm)
Countersink: .25” (6mm)

Feed Stroke: .625” (15mm)
Clamp Stroke: .4375” (11.1mm)



10QNPD

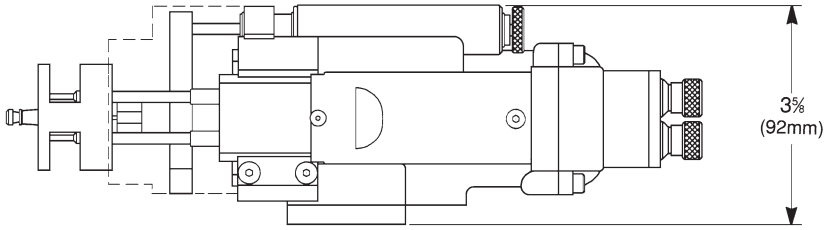
- **New light weight ergonomic design.**
- **Adjustable external hydraulic feed rate control device. (no hydraulic bleeding required)**
- **Designed for low maintenance.**
- **Simultaneously drills and countersinks the two holes required for mounting nut plate fasteners.**
- **Individual, self-locking countersink depth adjustments on each spindle. (.001 increments)**
- **Expanding collet grips work with maximum holding force, providing positive attachment in order to produce more accurate holes and countersinks.**
- **Single tool can be used to drill and countersink holes for Single Wing, Double Wing, and Mickey Mouse fasteners by simply changing the spindle support block, lift finger, and pressure foot.**
- **Uses same support blocks, lift fingers and pressure feet used with the 15 QNPD tools.**
- **Available in 600 and 6000 rpm models with easy gear box conversions. (no increase in tool length)**
- **Variable spindle-to-spindle spacing provides wide range from minimum of .300 in. to 1.000 in. maximum in .001 increments.**
- **Fixed spindle spacings up to 1.125 in. are available.**
- **10 QNPDM “Mini” nutplates availalbe in 6000 RPM model. Minimum spindle to spindle spacing for “mini” is .219”**

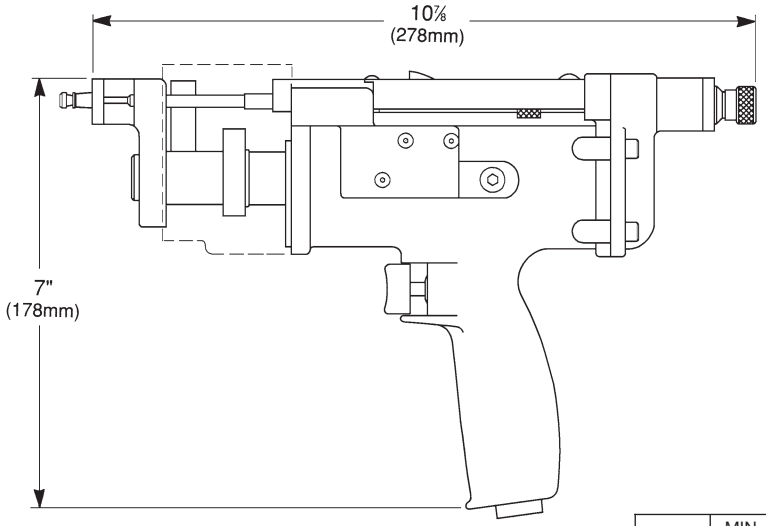
Model	Stroke	Weight	Spindle Speeds (RPM)	Inlet	Min. Hose Size
10QNPD	Feed Stroke .60 in. (15mm) Clamp Stroke: 7/16 in. (11mm)	5.0 lbs. (2.26kg)	600, 6000	.375 in. NPT	.375 in.

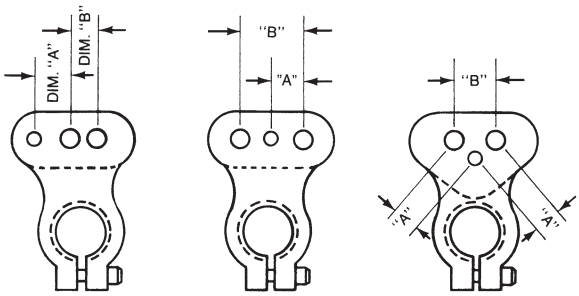
NOTE: Tool equipped with Foot, Collet and Mandrel Drills are not supplied with tool.
Rated tool performance a 90 PSIG measured at tool inlet with motor running.

OPTIONAL EXTRA CHARGE ACCESSORIES
BOOSTER PUMP ASSEMBLY: 621482
Increases both clamp and feed forces by a factor of 2.5
MIST LUBRICATOR ASSEMBLY: Introduces coolant and air to the cutter.

HAND FILL: 621972
PRESSURE FILL: 621973



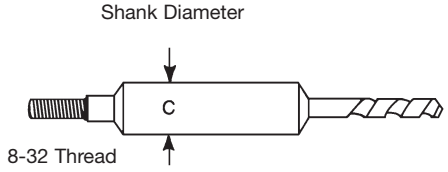




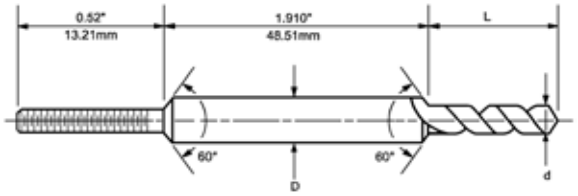
		SINGLE WING	DOUBLE WING	MICKY MOUSE
"A"	MIN	.344	-	.212
	MAX	.679	-	.500
"B"	MIN	.312	.343	.300
	MAX	1.000	1.125	1.000

INFORMATION NECESSARY TO ORDER NUT PLATE DRILL

1. Tool rpm _____
2. Type of foot _____
3. Collet to spindle spacing (A) _____
4. Spindle to spindle spacing (B) _____
5. Drill Shank Diameter (C) _____
6. Pilot Hole Diameter: _____
Min._____
Max. _____
7. Thickness of material to be drilled _____



DRILL BIT
Drill bits are not supplied with tool.



Drill-Countersinks for 10QNPD Nutplate Drill Motors

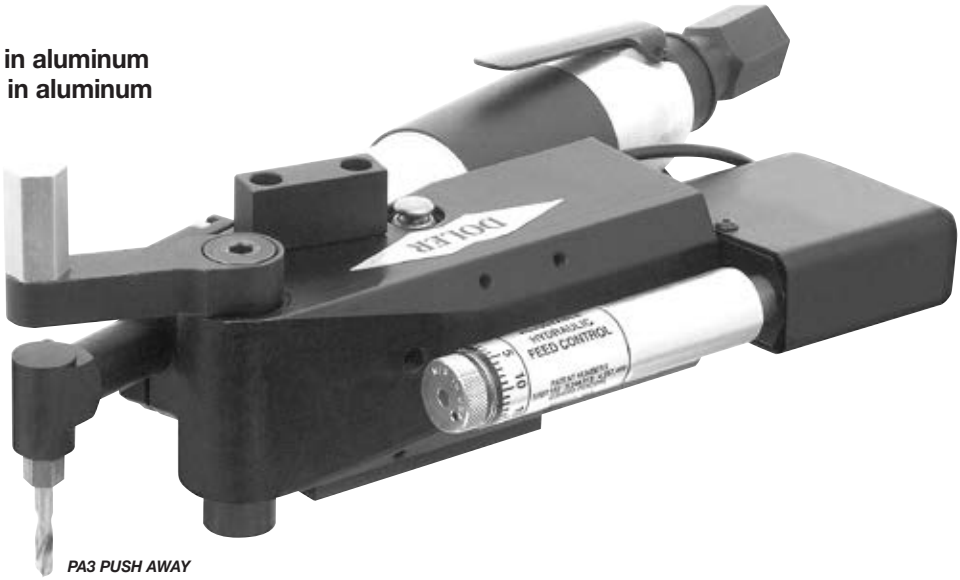
Part No.	Type	Material	Diameter				C'sink	Drill Length		External
			Shank (D)		Drill (d)					
			in.	mm	in.	mm	Angle*	in.	mm	Thread
32820010	WD40 100 25	Aluminum alloy	0.1875	4.76	0.0980	2.49	100°	0.295	7.49	8-32
32820110	WD40 100 35	Aluminum alloy	0.1875	4.76	0.0980	2.49	100°	0.420	10.67	8-32
32822010	WD40 M3 100 25	Steel titanium	0.1875	4.76	0.0980	2.49	100°	0.295	7.49	8-32
32822110	WD40 M3 100 35	Steel titanium	0.2500	6.35	0.0980	2.49	100°	0.420	10.67	8-32
32820115	WDS40 100 35	Aluminum alloy	0.2500	6.35	0.0980	2.49	100°	0.420	10.67	8-32
32820125	WD30 100 35	Aluminum alloy	0.2500	6.35	0.1285	3.26	100°	0.420	10.67	8-32
32822125*	WD30 M3 100 35	Steel titanium	0.2500	6.35	0.1285	3.26	100°	0.420	10.67	8-32

**Note: Available on request only. Other WD and WDS series drill-countersinks available on request. Please specify the part and series numbers when ordering.*

All cutters require a minimum order of 10 pieces.

PA & PB Angle Drills

- **PA - Thrust for drilling small holes in aluminum**
  PB - Thrust for drilling large holes in aluminum and holes in titanium and steel
- **Compact Power Feed**
- **Accessible into very confined areas**
- **Modular design**
- **Variety of angle heads, speeds, spindles, and yoke sizes.**
- **0.9 hp motor**
- **Infinitely adjustable feed control**
- **Drill point lubricator to maximize hole quality**



PA3 PUSH AWAY

PA	2	–	523	B	–	C	2	X	X

BASIS MODEL (XX)
PA = 70 lbs. Thrust
PB = 160 lbs. Thrust

STYLE (X)
2 = Squeeze Yoke
3 = Push Away
5 = Taperlock or Short Yoke

ANGLE HEAD‡ – SPINDLE – SPEED (XXX)
(Select one three digit number)

No.	Spindle	Speed	No.	Spindle	Speed	No.	Spindle	Speed
Buckeye Heavy Duty Angle (500 Series)								
527	.25-28	300	534	.5625-40*	1,000	541	.3125-24	3,500
526	.25-28	500	533	.5625-40*	1,300	548	.3125-24	4,500
525	.25-28	750	532	.5625-40*	2,100	557	.375-24	300
524	.25-28	1,000	531	.5625-40*	3,500	556	.375-24	500
523	.25-28	1,300	538	.5625-40*	4,500	555	.375-24	750
522	.25-28	2,100	547	.3125-24	300	554	.375-24	1000
521	.25-28	3,500	546	.3125-24	500	553	.375-24	1300
528	.25-28	4,500	545	.3125-24	750	552	.375-24	2100
537	.5625-40*	300	544	.3125-24	1,000	551	.375-24	3500
536	.5625-40*	500	543	.3125-24	1,300	558	.375-24	4500
535	.5625-40*	750	542	.3125-24	2,100			
Buckeye Mini Angle (600 Series)								
627	.25-28	450	637	.5625-40*	450	647	.3125-24	450
626	.25-28	750	636	.5625-40*	750	646	.3125-24	750
625	.25-28	1,100	635	.5625-40*	1,100	645	.3125-24	1.100
624	.25-28	1,400	634	.5625-40*	1,400	644	.3125-24	1,400
623	.25-28	1,850	633	.5625-40*	1,850	643	.3125-24	1,850
622	.25-28	3,000	632	.5625-40*	3,000	642	.3125-24	3,000
621	.25-28	5,000	631	.5625-40*	5,000	641	.3125-24	5,000
628	.25-28	6,000	638	.5625-40*	6,000	648	.3125-24	6,000
Erickson Collet Spindle (300 Series w/ 500 Series Angle Head)								
827	**	300	824	**	1,000	821	**	3,500
826	**	500	823	**	1,300	828	**	4,550
825	**	750	822	**	2,100			

TAPERLOCK SERIES (X)
X = Not applicable Series
1 = 21000 Series
2 = 22000 Series
3 = 23000 Series
7 = Mini Taper-lok

ACCESSORY CODE (X)
X = None
L = Drill Point Lubricator

YOKE DEPTH (X)
1 = 1.5 (#5 Style)
2 = 4.5 (#2 Standard)
3 = 5.3 (#2 Optional)
4 = 7.2 (#Optional)
0 = N/A (#3 Style)

YOKE WIDTH (X)

Model Code	500 Series	600 Series	800 Series
A	1.3	1.5	NA
B	2.1	2.3	NA
C	3.1	3.3	1.9
D	4.6	4.8	3.4
E	6.8	7.0	NA
O	N/A #3 Style		

THRUST ACTUATOR (X)
B = Button
T = Toggle
C = Combined with Motor Lever
(Use with taper-lok only)

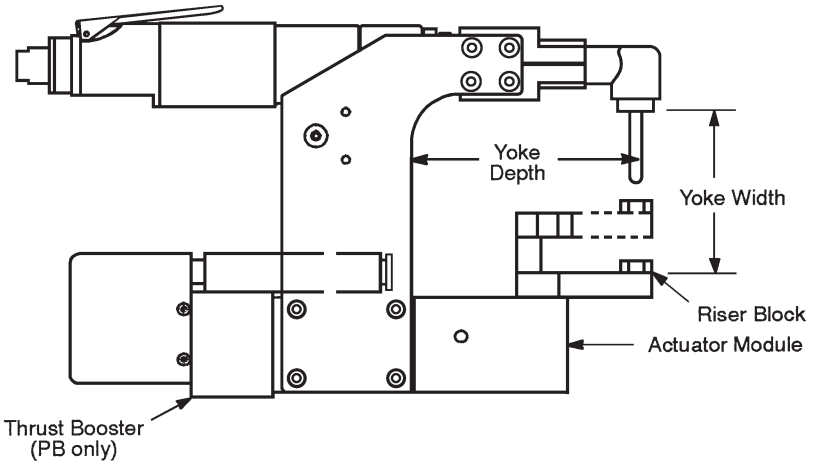
* Use with Collet Page 5-10
** Erickson 300 Collet Chuck
‡ See page 5-10 for Angle Head Dimensions.

SPECIFICATIONS:
Air Consumption:35 scfm
Air Inlet Size: .375 NPT
Recommended Hose Size: .5" I.D.
Power: 0.9 HP

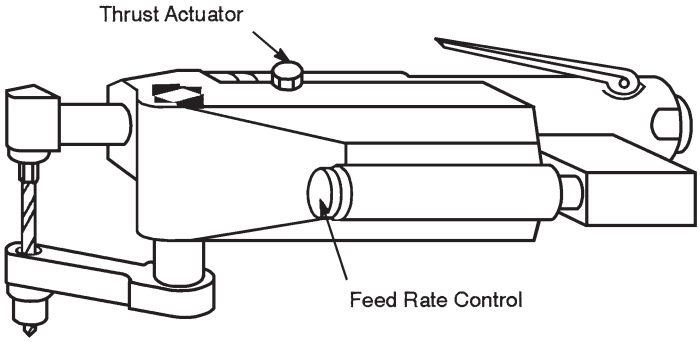
Thrust: 70 lbs. (PA) 160 lbs. (PB)
Stroke: 1.25"
Feed Rate: Infinite Adjustment
Spindle: See chart
Weight: PA2 - 7.5 lbs.
PA5 - 5.7 lbs.
PB2 - 8.9 lbs.
PB5 - 7.1 lbs.

EXTRA COST ACCESSORIES
26-014-xxx Riser Block (xxx=block height)
Quick Adjustable Yoke
Mini Taper-lok Bushing
Drill Point Lubricator

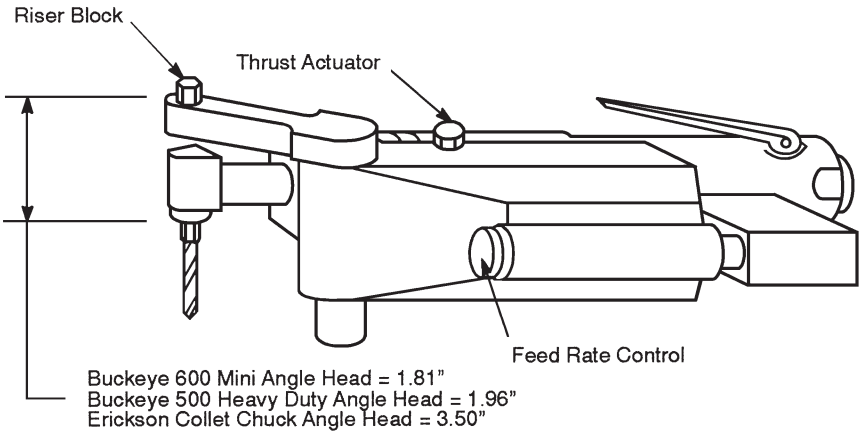
PA2 & PB2 Style



PA5 & PB5 Style



PA3 & PB3 Style

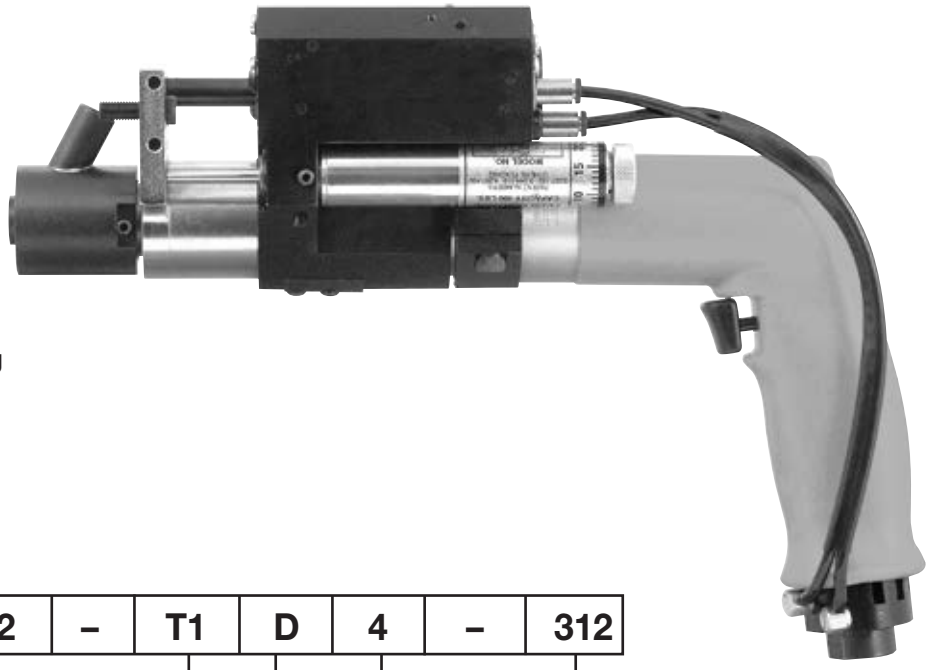


TOOL SELECTION:

1. The PA is suitable for drilling aluminum to 1/4” diameter. Use the PB for larger holes in aluminum and for drilling titanium, inconel, steel, etc.
2. If space permits, the collet spindle is generally preferred because conventional straight shank drill bits can be used and cutter runout is minimal.
3. Use the compact angle if space constraints require it.
4. The toggle thrust actuator is normally used for slow speed drilling where cycle times are relatively long.
5. Drill point lubrication will normally improve hole quality and extend cutter life. Use bendable steel tubing from PL500 luber to drillpoint.

CD Portable Drills

- **Compact portable Airfeed Drill**
- **Lightweight and comfortable grip**
- **Variety of speeds and strokes**
- **0.9 or 1.3 HP motors**
- **Great for composite drilling and countersinking**



CD	1	42	–	T1	D	4	–	312

STROKE

1 - 1" Stroke 2 - 2" Stroke

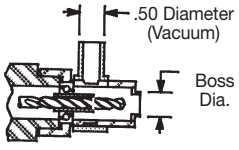
POWER/SPINDLE SPEED (XX)

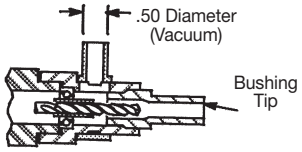
4 - 0.9 HP
- 1 - 500 RPM
- 2 - 800 RPM
- 3 - 1300 RPM
- 4 - 1900 RPM
- 5 - 3200 RPM
- 6 - 5200 RPM
- 7 - 6200 RPM
- 9 - 20000 RPM

5 - 1.3 HP
- 3 - 1000 RPM
- 4 - 1700 RPM
- 6 - 4500 RPM
- 7 - 5400 RPM
- 9 - 18000 RPM

V - 0.7 HP Variable Speed
- 1 - 150-550 RPM
- 2 - 400-1200 RPM
- 3 - 700-2400 RPM

NOSEPIECE (XX)





Code	Vacuum	Boss Dia.	Boss Proj.
xx	No nosepiece		
B1	Yes	0.500	0.05
B2	Yes	0.500	0.10
B3	Yes	0.625	0.05
B4	Yes	0.625	0.10
B5	Yes	0.750	0.05
B6	Yes	0.750	0.10

CUTTER DIAMETER (XXX)

Specify size in inches.
Example: 312 = .312 inches
(Use cutter body dia. of drill/c'sink
(Use drillbit dia. for drill only)
XXX = Not Applicable

SPINDLE (X)

1 = .25" Jacobs Chuck
2 = 1/4"-28 x .375" "Spacematic"
3 = 1/4"-28 x .500" "Spacematic"
4 = Erickson 200 Chuck

COUNTERSINK OR DRILL ONLY (X)

C = Countersink (positive depth stop)
D = Drill only

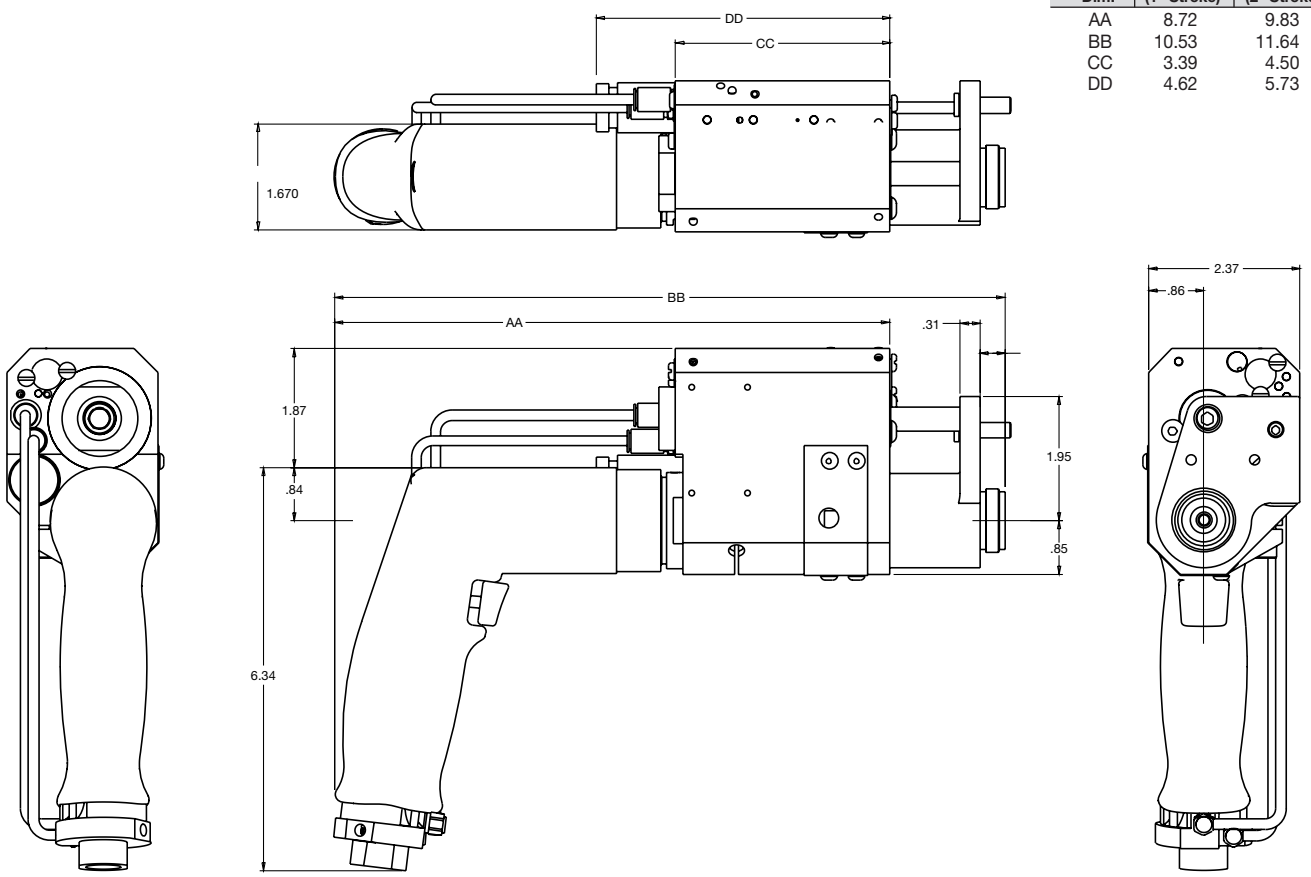
Code	Vacuum	Cutter Guide	Taperlock Series
P1	Yes	No	21000
P2	Yes	No	22000
P3	Yes	No	23000
P6	Yes	Yes	21000
P7	Yes	Yes	22000
P8	Yes	Yes	23000
T1	No	No	21000
T2	No	No	22000
T3	No	No	23000
T4	No	No	24000
T6	No	Yes	21000
T7	No	Yes	22000
T8	No	Yes	23000
M1	No	Yes	Mini
51	Yes	No	21000 Swivel Vac.

SPECIFICATIONS:
Air Consumption: 30 scfm
Air Inlet Size: .375 NPT
Recommended Hose Size: ..5" I.D.
Power: 0.9 or 1.3 HP
Thrust: 90 lbs. (1" stroke) 120 lbs. (2" stroke)
Stroke: 1" or 2"
Depth Accuracy: Adjustable within .001
Weight: 5.8 lbs. (1" stroke)
7.0 lbs. (2" stroke)

EXTRA COST ACCESSORIES
Drill Point Lubricator
Dead Handle
Nose Piece

Dimensional Data - CD Portable Drills

Dim.	CD-1 (1" Stroke)	CD-2 (2" Stroke)
AA	8.72	9.83
BB	10.53	11.64
CC	3.39	4.50
DD	4.62	5.73



Template Boss

Cutter Guide Bushing is mounted in a sealed ball bearing which greatly reduces wear, extends bushing life and maintains hole accuracy.

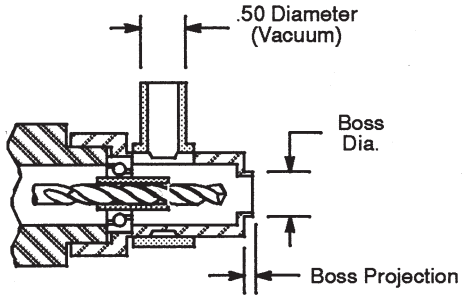
The vacuum port connects to a central vacuum system, or shop vacuum, or the optional Venturi Vacuum.

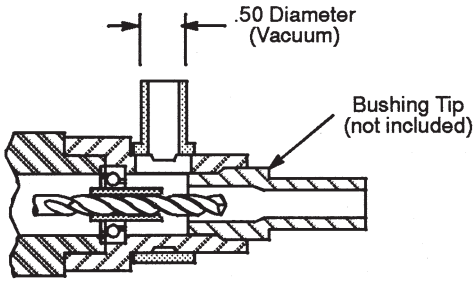
The Template Boss is used with a Strip Template to locate the drill point. The Boss must extend through the Template and contact the workpiece to maintain accurate countersink depths.

Taper-Lok Nosepiece

Mini Twistlock or Taper-Lok with or without cutter guide, with or without a vacuum port.

When using a cutter guide, enlarge the I.D. of the Bushing Tip to avoid cutter contact. Normally used with PCD cutters.





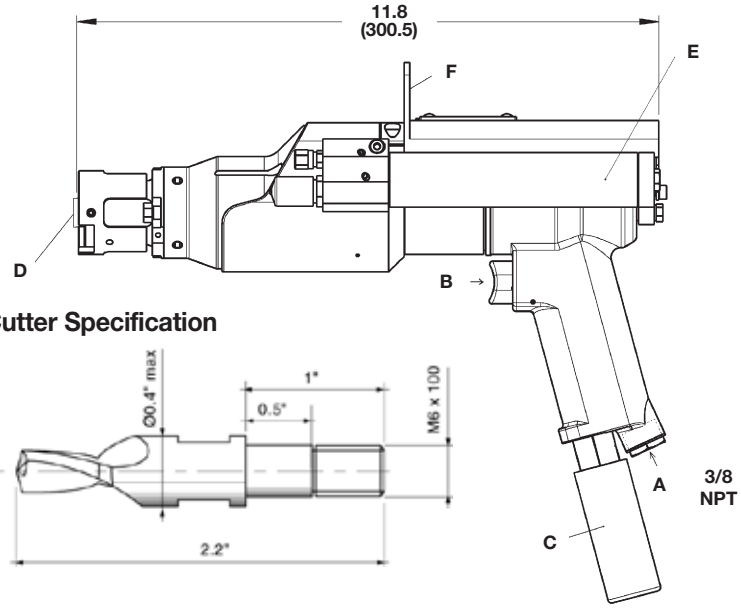
Quackenbush™

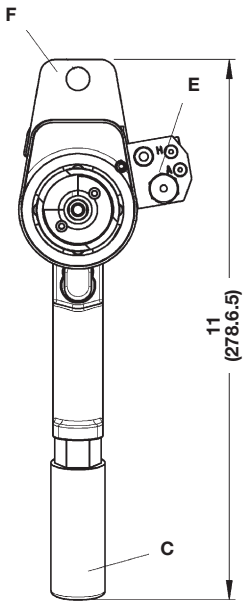
120QP-21500 Self Feed Drill

Capacity* (Diameter):
Aluminum – .20" (5mm) Hole
.38" (10mm) Countersink

- **Precision power feed drilling**
  High speed, precision spindle - no burrs
  Use with simple templates with required hole locations
- **Sealed hydraulic feedrate control, infinitely adjustable with micrometer depth control**
- **Spring-loaded collar to assure hole perpendicularity**
- **Optional:**
  Drill point lubricator for improved hole quality
  Vacuum dust collection port for composite materials
  Recoules premium-quality cutters**
- **"C" Foot Clamping - contact Sales Manager or Factory**
- **Concentric Collet Clamping - contact Sales Manager or Factory**

* Not to be used for titanium or steel
**Order separately. With Recoules cutter, hole tolerance of 30 microns (.0012) can be achieved.



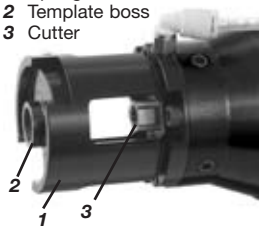


A Air inlet
B On/off trigger
C Air exhaust
D Template boss
E Drill point lubricator
F Balancer bracket

Cutter Specification

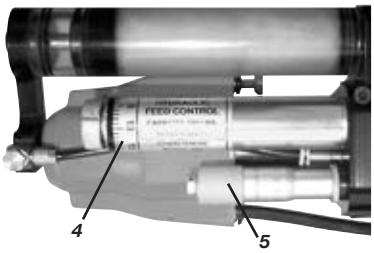
Template Boss Area

1 Spring-loaded Collar
2 Template boss
3 Cutter



Depth Adjustment Area

4 Feed control
5 Micrometer depth control



Model QP120-21500	Spindle Speed	Spindle Termination	Template Boss	Accessories

Spindle Speed
15,000

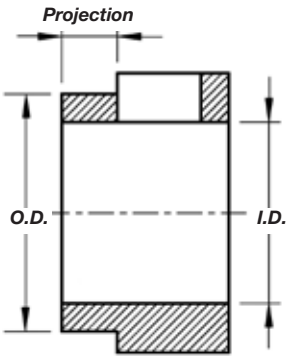
Spindle
M6 X 100 mm Internal Thread with pilot dia.

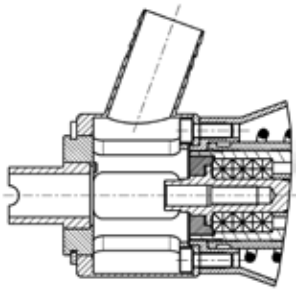
Template Boss Specify Diameter and Projection.

O.D. in./mm	I.D. in./mm	Projection in./mm	Part Number
.500/12.70	.413/10.50	.157/4.00	90258058
.532/13.50	.413/10.50	.157/4.00	90258040
.531/13.50	.413/10.50	.276/7.00	90258048
.551/14.00	.413/10.50	.256/6.50	90258049
.551/14.00	.413/10.50	.433/11.00	90258034
.551/14.00	.413/10.50	.512/13.00	90258044
.571/14.50	.413/10.50	.157/4.00	90258041
.571/14.50	.413/10.50	.276/7.00	90258046
.591/15.00	.413/10.50	.157/4.00	90258042
.591/15.00	.413/10.50	.276/7.00	90258047
.625/15.88	.413/10.50	.157/4.00	90258031
.630/16.00	.413/10.50	.157/4.00	80258052
.630/16.00	.413/10.50	.984/25.00	90258051
.669/17.00	.413/10.50	.512/13.00	90258045
.669/17.00	.512/13.00	.157/4.00	90258043
.709/18.00	.559/14.20	.157/4.00	90258033
.709/18.00	.559/14.20	.315/8.00	90258036
.709/18.00	.559/14.20	.512/13.00	90258050

*Contact Factory for Boss with Vacuum Port

Accessories
Drill Point Lubricator R, Air Mist
Vacuum Dust Collector
Air Inlet Adapter - 3/8 NPT





Optional Vacuum Dust Collector Template Boss

Designate Boss diameter and Projection.

SPECIFICATIONS:
Air Inlet = 3/8 NPT
Power = 1.2 HP (0.9 KW)
Thrust = 55 lbs. (25daN)
Weight = 5.8 lb. (2.62 Kg)

Air Consumption = 40 CFM (1100 L/Min)
Stroke = 1.0 inch (25 mm)
Depth Repeatability = .001 inch (0.025 mm)
Noise = 80 dBA

At all times verify that guards are in place and secure. Operators must understand and follow Safety Practices.

Quackenbush™

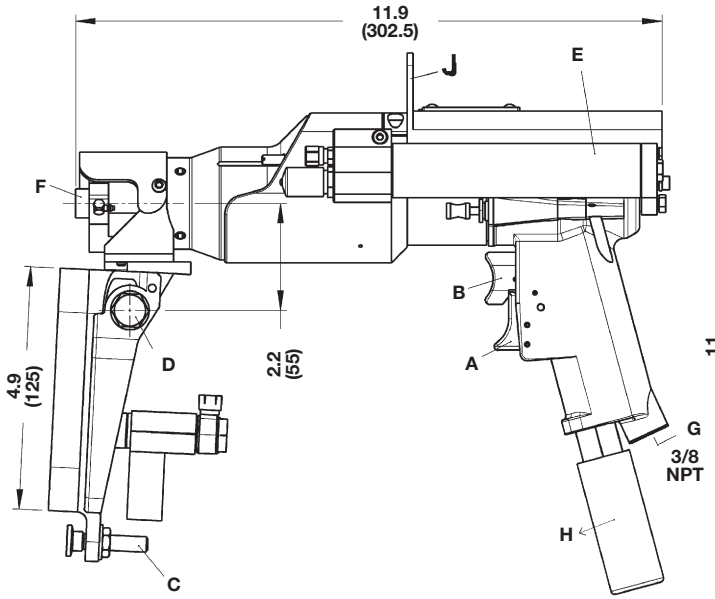
120QP-21501 Self Feed Drill with Vacuum Clamping

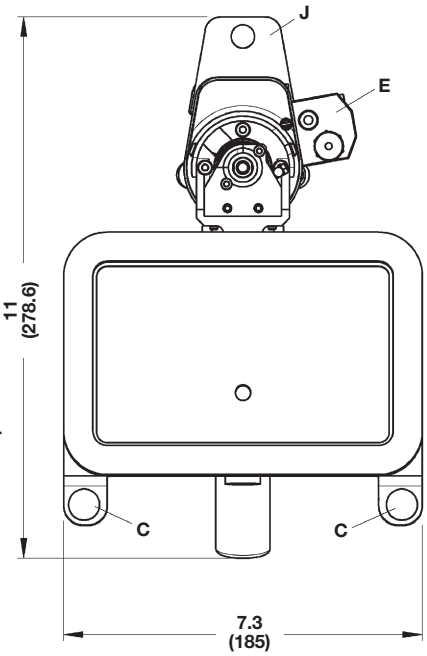
Capacity (Diameter):
***Aluminum – .20" (5mm) Hole**
.38" (10mm) Countersink

- **Precision power feed drilling**
  High speed, super precision spindle - no burrs between materials
  Use with simple template with required hole locations
- **Clamps to workpiece with leveling vacuum pad**
  Custom made vacuum pad to suit application
  No obstructions or holes (voids) permitted in clamping area
- **Sealed hydraulic feedrate control, infinitely adjustable with micrometer depth control**
- **Dual Triggers:**
  Lower trigger actuates vacuum clamp
  Upper trigger actuates motor and feed
- **Optional**
  Drill point lubricator improves hole quality
  Recoules premium-quality cutters**

*Not to be used for titanium or steel
**Order separately. With Recoules cutter, hole tolerance of 30 microns (.0012) can be achieved.

120QP-21501

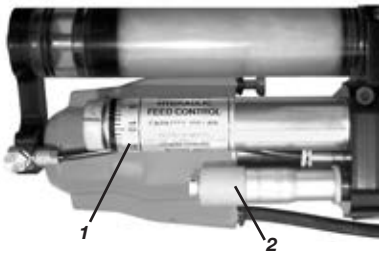




A Vacuum clamp trigger
B Motor/feed trigger
C Vacuum pad leveling screws
D Vacuum pad adjustment screw
E Drill point lubricator
F Template boss
G Air inlet
H Air exhaust
J Bracket for balancer

Depth Adjustment Area

1 Feed control
2 Micrometer depth control



Model QP120-21501	Spindle Speed	Spindle Termination	Template Boss	Vacuum Foot	Accessories

Spindle Speed
15,000

Spindle
M6 X 100 mm Internal Thread with pilot dia.

Template Boss Specify Diameter and Projection

O.D. in./mm	I.D. in./mm	Projection in./mm	Part Number
BOSS DIAMETER			
.531/13.50	.413/10.50	.276/7.00	90258048
.571/14.50	.413/10.50	.276/7.00	90258046
.591/15.00	.413/10.50	.276/7.00	90258047

Accessories
Drill point lubricator R, air mist
Vacuum dust collector
Air inlet adapter - 3/8 NPT

Vacuum Clamping Foot
Illustration = 4.9 x 7.3 in. (125 x 185 mm)
Spindle to front edge of Pad = 2.4 in. (62mm)
Vacuum clamping foot is normally custom designed to suit particular application

Vacuum Clamping Foot

A flexible seal around periphery of pad allows for some variation in contour.

Vacuum pad adjustment and levelling screws set cutter centerline perpendicular to work surface.

Area of pad must be minimum of 30 square inches (200 square centimeters).

Contact local Sales Manager or Factory for assistance.

SPECIFICATIONS:
Air Inlet = 3/8 NPT
Power = 1.2 HP (0.9 KW)
Thrust = 55 lbs. (25 daN)
Weight = 7.8 lbs. (3.5 Kg)

Air Consumption = 40 CFM (1100 L/Min)
Stroke = 1.0 inch (25 mm)
Depth Repeatability = .001 inch (0.025 mm)
Noise = 80 dBA

At all times verify that guards are in place and secure. Operators must understand and follow Safety Practices.

Quackenbush™

60QBSF-5 Back Spotfacer

Capacity (Diameter):
Aluminum – 1.18" (30mm)
Titanium – .75" (20mm)
Steel – .75" (20mm)

- **Precision spot facing, countersinking, or counterboring of the rear side of a hole.**
- **Smooth and easy operation.**
  Insert pilot (spindle) thru hole.
  Reach around and lock cutter on to pilot.
- **Manually squeeze feed levers to pull cutter into workpiece.**
- **Micrometer depth adjustment**
- **Maintains distance from front surface to spot face.**
- **Variety of bayonet cutters – order separately from back page**
- **Note: Cutters must be left hand cut if acquired from another supplier**

Model Number	Power & Speed
60QBSF-5	

Power & Speed
.6 Horsepower
500 rpm

SPECIFICATIONS:
Air Inlet = 1/4 NPT
Weight = 4.9 lbs (2.2 Kg)
Air Consumption = 30 CFM (850 l/Min)
Max. Stroke = .4 inch (10 mm)
Depth Repeatability = within .001 inch (0.025 mm)

GENERAL INFORMATION:
Order Pilot Spindle & Cutter separately:
Operators must understand and follow Safety Practices at all times.

Quackenbush™

70QVBSF-7 Back Spotfacer

Capacity (Diameter):
Aluminum – 1.18" (30mm)
Titanium – .75" (20mm)
Steel – .75" (20mm)

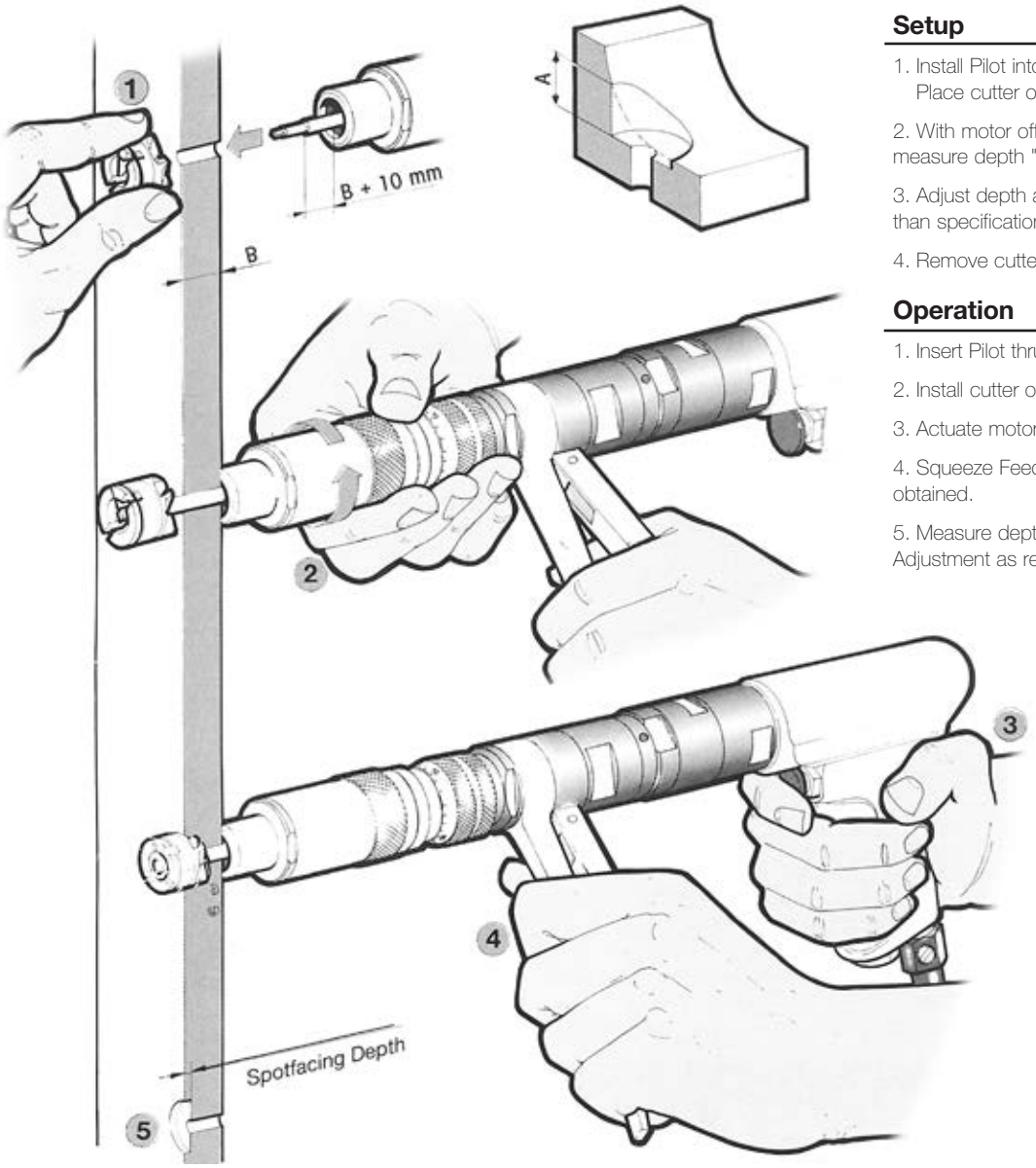
- **Precision spot facing, countersinking, or counterboring of the rear side of a hole.**
- **Smooth and easy operation. Insert pilot (spindle) thru hole. Reach around and lock cutter on to pilot.**
- **Manually squeeze feed levers to pull cutter into workpiece.**
- **Governed variable speed motor**
- **Micrometer depth adjustment**
- **Maintains distance from front surface to spot face.**
- **Variety of bayonet cutters – order separately from back page**
- **Note: Cutters must be left hand cut if acquired from another supplier**

Model Number	Power & Speed
70QVBSF-7	

Power & Speed
.7 Horsepower
Variable Speed
(150-550 rpm)

SPECIFICATIONS:
Air Inlet = 1/4 NPT
Weight = 5.4 lbs (2.4 Kg)
Air Consumption = 30 CFM (850 l/Min)
Max. Stroke = .59 inch (15 mm)
Depth Repeatability = within .001 inch (0.025 mm)

GENERAL INFORMATION:
Order Pilot Spindle & Collet separately.
No charge items. Cutters are extra charge items.
Operators must understand and follow Safety Practices at all times.

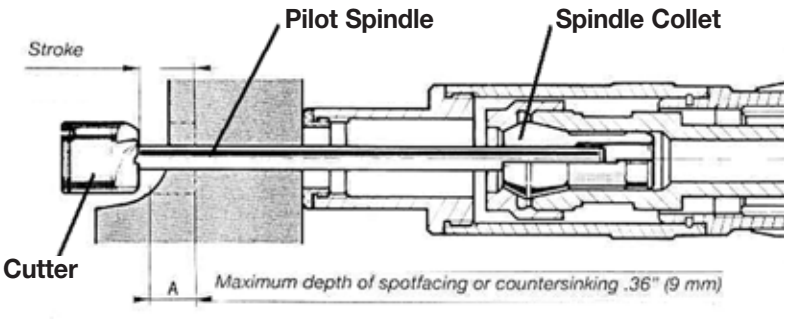


Setup

1. Install Pilot into Spindle Collet.
   Place cutter on pilot and twist to lock.
2. With motor off, squeeze Feed Lever and measure depth "A".
3. Adjust depth adjustment to slightly greater than specification.
4. Remove cutter.

Operation

1. Insert Pilot thru Workpiece.
2. Install cutter on to pilot.
3. Actuate motor trigger.
4. Squeeze Feed Lever until full depth is obtained.
5. Measure depth "A"; adjust Depth Adjustment as required.



Ordering Information

When ordering a Quackenbush Back Spotfacer tool, it is necessary to also order the Spindle Collet, Pilot Spindle and Cutter. These parts are not automatically shipped with the tool.

1. Specify Tool Model Number
2. Specify Spindle Collet Part Number
   (Note: Collet diameter must equal Pilot Spindle diameter)
3. Specify Pilot Spindle Part Number
4. Specify Cutter Number.

Spindle Collets

(No charge item – Order separately)

Diameter		Part Number
MM	Inch	
2.00	0.078	70110200
2.50	0.098	70110250
3.00	0.118	70110300
3.50	0.138	70110350
4.00	0.158	70110400
4.80	0.188	70110480
5.00	0.197	70110500
5.50	0.217	70110550
6.00	0.236	70110600
6.35	0.250	70110635
7.94	0.312	70110794
9.52	0.375	70110952

Collet diameter must equal pilot spindle diameter.

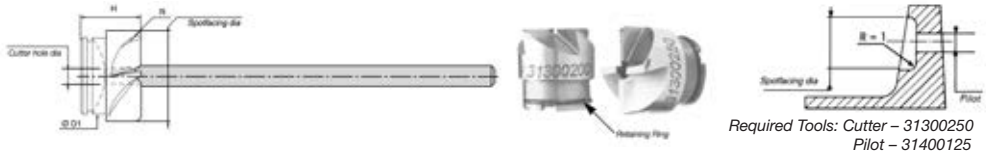
Pilot Spindle – Bayonet Lock

(No charge item – Order separately)

Cutter Hole Dia.	Pilot Spindle Dia. 0 -0.02		Pilot Part Number
	mm	Inch	
3	3	.118	31400000
3	3.2	.126	31400004
3	3.5	.137	31400005
3	3.9	.153	31400010
3	4	.157	31400015
3	5	.196	31400020
4	4	.157	31400100
4	4.5	.177	31400105
4	4.8	.188	31400110
4	5	.196	31400115
4	5.4	.212	31400120
4	6	.236	31400125
5	5	.196	31400200
5	6	.236	31400210
5	7	.275	31400225
5	8	.314	31400230
6	6	.236	31400300
6	6.3	.248	31400305
6	7	.275	31400315
6	8	.314	31400320
6	9	.354	31400325
6	9.5	.374	31400330
6	10	.393	31400335

Back Spotfacing Cutters with, Bayonet Lock – High Speed Cobalt Steel

(Extra charge item)



Required Tools: Cutter – 31300250
Pilot – 31400125

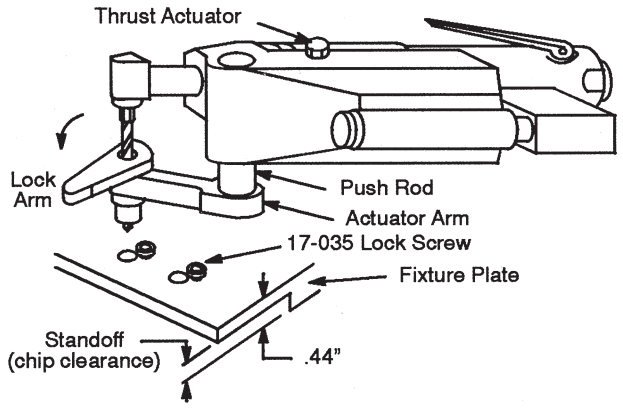
Ring Number	Spotfacing Diameter		Standard Radius R mm	H mm	Cutter Hole Diameter		Cutter Number
	mm	Inch			mm	Ø D1	
91825010	8	.315	0.5	10	3	8	31300000
91825010	10	.394	0.5	10	3	8	31300025
91825015	12	.472	0.5	10	3	10	31300050
91825015	12.7	.500	1	10	3	10	31300075
91825015	13	.512	1	10	3	10	31300100
91825015	14	.551	1	10	3	10	31300125
91825015	14	.551	1	16	4	10	31300150
91825025	15	.591	1	16	4	14	31300175
91825025	16	.630	1	16	4	14	31300200
91825025	17	.670	1	16	4	14	31300225
91825025	18	.709	1	16	4	14	31300250
91825025	19	.748	1	16	4	14	31300275
91825025	20	.787	1	16	4	14	31300300
91825035	22	.866	2	18	5	20	31300325
91825035	24	.945	2	18	5	20	31300350
91825035	26	1.024	2	20	6	20	31300375*
91825035	28	1.102	2	20	6	20	31300400*
91825035	30	1.181	2	20	6	20	31300425*
91825035	32	1.260	2	20	6	20	31300450*

Back Countersink Cutters, 4 Flutes with Bayonet Lock – High Speed Cobalt Steel (Extra charge item)

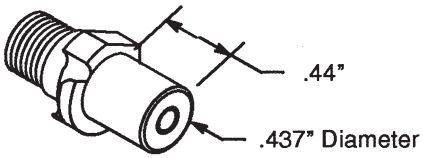
Required Tools: Cutter – 31305250
Pilot – 31400125

Ring Number	Spotfacing Diameter		H mm	Cutter Hole Diameter mm	Cutter Number α: 90°	Cutter Number α: 100°	Cutter Number α: 120°
	mm	Inch					
91825010	8	.315	10	3	31305000*	31306000	31307000
91825010	10	.394	10	3	31305025*	31306025	31307025
91825020	12	.472	10	3	31305050*	31306050	31307050
91825020	12.7	.500	10	3		31306075	
91825020	13	.512	10	3		31306100	
91825025	14	.551	10	3		31300125	
91825025	14	.551	16	4	31305150*	31306150	31307150
91825025	15	.591	16	4		31306175	
91825030	16	.630	16	4	31305200*	31306200	31307200
91825030	17	.669	16	4		31306225	
91825030	18	.709	16	4	31305250*	31306250	31307250

PA-5 with Mini-Twistlok Bushing Tips



Mini Twistlok Bushing Tip

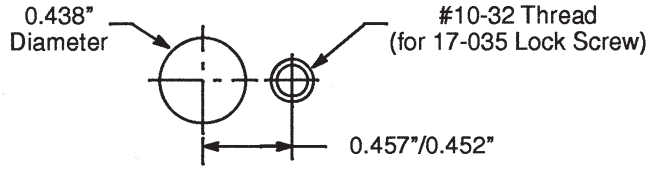


Part Number: 22-703-XXX

Insert the cutter guide diameter for "XXX". Example: 22-700-250 has a .250 guide diameter. Maximum cutter diameter is .313.

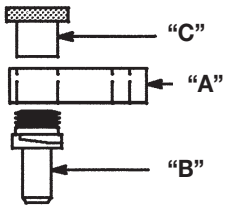
Miniature version of Taper-lok Bushing Tips.

Fixture Hole Specification for Mini Twistlok



21000 & 22000 Series Bushing Tips for PA-5

Similar operation as with Mini-Twistlok Tips. Use industry standard 21000 or 22000 Bushing Tips.

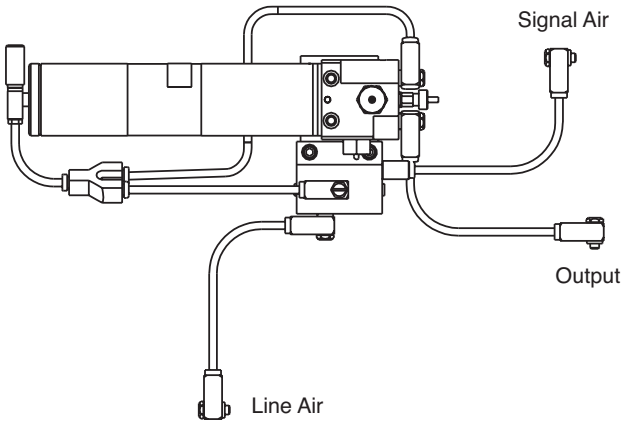


Ref.	Description	Part No.
A	Actuator Arm 21000 Series	58-258
	Actuator Arm 22000 Series	58-430
B	Bushing Tip	— —
C	Twistlok Collar 21000 Series	27-116-1
	Twistlok Collar 22000 Series	27-183

Collets for Drills - .5625"- 40 Spindles

Number	Drill Size	Number	Drill Size	Number	Drill Size
1005180	.0625	1006049	49	1006199	29
1005181	.0781	1006316	48	1005967	28
1005182	.0938	1006393	47	1005872	27
1005183	.1094	1005875	46	1006373	26
1005184	.125	1006028	45	1006318	25
1005185	.1406	1006297	44	1006372	24
1005186	.1563	1006394	43	1006315	23
1005187	.1719	1006058	42	1005926	22
1005188	.1875	1005928	41	1005682	21
1005994	60	1005684	40	1005876	20
1006523	59	1006395	39	1006035	19
1006524	58	1006396	38	1005964	18
1006525	57	1006397	37	1005977	17
1006526	56	1006398	36	1006346	16
1006527	55	1006027	35	1006399	15
1006528	54	1005874	34	1006400	14
1006408	53	1006401	33	1005927	13
1006446	52	1006050	32	1005871	12
1006412	51	1005873	31	1006001	11
1005685	50	1003904	30	1005681	10

PL-500 Drill Point Lubricator



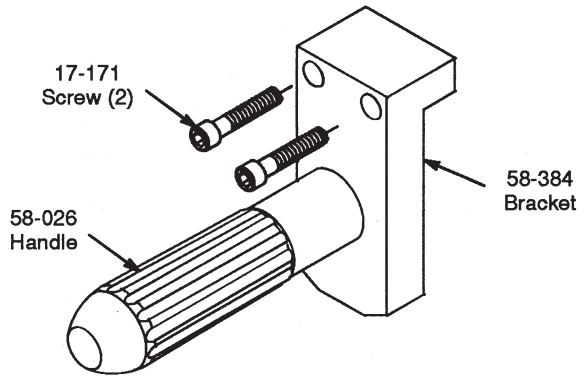
Complete Assembly (including mountig brackets)

85-049 - CD drill
85-045 - PA/PB2
85-046 - PA/PB5

Provides lubricated air to the point of the cutter. Mounts on the side of the CD. Has a quick disconnect fitting for rapid no-mess refilling, use 80-503 Wall Tank to refill or, it can be filled manually and requires no additional equipment.

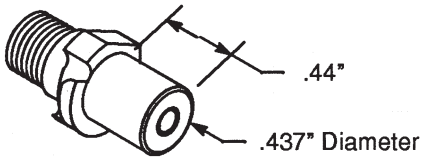
Dead Handle

Part Number: 80-922



Attach directly to Inner Housing to provide for two-handed operation.

Mini Twistlok Bushing Tip



Part Number: 22-700-XXX

Insert the cutter guide diameter for "XXX". For example: 22-700-250 has a .250 guide diameter. Maximum cutter diameter is .313.

Miniature version of Taper-lok Bushing Tips.

Spindle Adapters
(use with Jacobs Chuck)

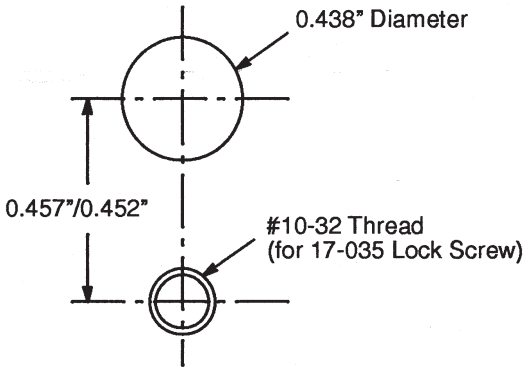
Part Number: 32-074

For .25"-28 x .375 "Spacematic" cutters.

Special Application Nosepieces

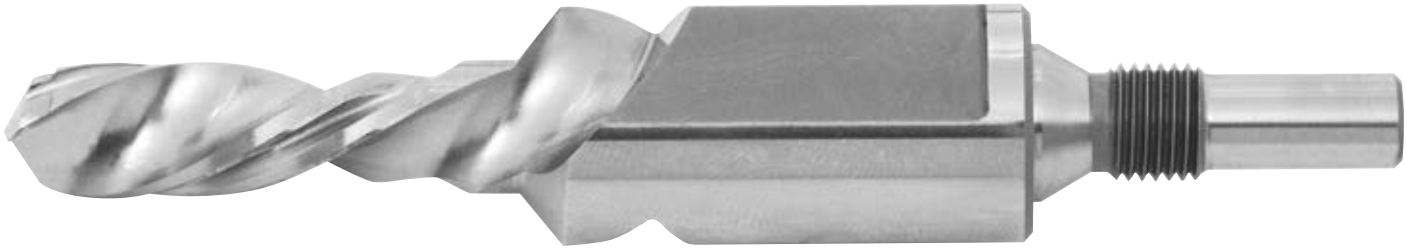
Part No.	Description
27-135	For drilling seat tracks, without countersinks
27-136	For drilling seat tracks, with countersinks

Fixture Hole Specification for Mini Twistlok



Cutters

ADVANCED DRILLING EQUIPMENT



Recoules RC Series are top quality drills, reamers and drill/countersink cutters for use with aerospace drilling equipment.

Cutters can be made to customer specification, or designed by Recoules for a specific application and tool. Our cutters are manufactured from the finest materials using precision machinery and highly skilled machinists.

Cutters manufactured to customer specification are not guaranteed for hole quality unless so stated. For optimum results, cutter must be used on specified tool, with recommended cutter lubrication, properly installed and managed.

Recoules™

Cutters will be quoted upon request. Specify quantity. Higher quantities will yield lower unit cost. Cutter's cannot be returned for credit unless defective.

Thru-the-Cutter lubrication is best. Lubricant is routed from rear of Cutter, through the flutes and to the cutting edge where it is most beneficial.

For customer-designed cutters, Recoules may have to make minor modifications to accommodate manufacturing equipment. Recoules will advise such with quotation.

For Recoules-designed cutters, sample workpiece materials may also be required.


A11N


F11-U


B51-Q


C41-V


C31-M

E11-R


D22-T


C21-S

Cutter Mounting Style	Oil Hole	Type Of Cutter	Cutter Material	Specification Source

Cutter Mounting Style (See page R-28 for details)

A1 =	Straight Round Shank - for gripping in Chuck	
B1 =	1/4 - 28	External Thread with 120° taper
B2 =	5/16 - 24	External Thread with 120° taper
B3 =	3/8 - 24	External Thread with 120° taper
B4 =	7/16 - 20	External Thread with 120° taper
B5 =	9/16 - 18	External Thread with 120° taper
B6 =	5/8 - 18	External Thread with 120° taper
B7 =	M6 x 100	External Thread with 120° taper
B8 =	M10 x 100	External Thread with 120° taper
C1 =	M6 x 100	External Thread at rear, with pilot dia. and square face, standard wrench flat
C2 =	M8 x 100	External Thread at rear, with pilot dia. and square face, standard wrench flat
C3 =	M10 x 100	External Thread at rear, with pilot dia. and square face, standard wrench flat
C4 =	M12 x 100	External Thread at rear, with pilot dia. and square face, standard wrench flat
C5 =	M16 x 100	External Thread at rear, with pilot dia. and square face, standard wrench flat
D1 =	5/16-24	Pilot diameter at rear, external thread, 60° taper (PET)
D2 =	3/8-24	Pilot diameter at rear, external thread, 60° taper (PET)
E1 =	1/4-28	Internal thread with 60°
E4 =	3/8-16	Internal taper & counterbore (Spacematic)
F1 =	1/4-28	E Style Cutters with stepped rear dia.
F4 =	3/8-16	E Style Cutters with stepped rear dia.
H2 thru H7		Similar to C Style except wrench flats accept telescoping wrench

Specification Source

Customer Drawing with complete specifications.

Cutter design by Recoules
Application information provided by customer
(See page 6-27 for details)

Cutter Material

M42 High Speed Steel
Micrograin Carbide

Type of Cutter (See page 6-29 for details)

M	Drill Only - 2 Flute
N	Ream Only - pre-hole required
P	Drill + Reamer - 2/4 style
Q	Square Drill (Gun Drill)
R	Drill + Countersink
S	Full Drill + Ream + Countersink
T	Short Drill + Ream + Countersink
U	Ream + Countersink - pre-hole required
V	Taperlock Ream / C'sink - pre-hole req'd "S" points are not available

Solid or Oil-hole

Solid
Oil Hole (for thru-the-cutter lubrication)

The following mounting styles are not available from Apex Tool GroupTools: Morse Taper, Fluid Chuck, Nutplate

Cutters designed by Recoules for a specifc application require the following information:

Identification - Name or Number:
Customer Identification name or number

_____

First Workpiece Material and Thickness:
Identify first material drilled
- Aircraft alloy alluminum - advise alloy number
- Aircraft alloy titanium - advise alloy number
- Stainless Steel - advise alloy number
- Mild Steel - hardness less than 28 Rc
- Alloy Steel - advise alloy number & hardness
- Composite - advise fiber, resin and properties
- Other - advise material properties

Alloy Number_____

Thickness = _____ maximum (inch or mm)

Second Workpiece Material:
Identify second material drilled
Use same code as above

Alloy Number_____

Thickness = _____ maximum (inch or mm)

Additional Materials or Voids:
Advise if additional materials or open spaces are included.

_____

_____

_____

_____

Hole Diameter:
Advise the exact minimum and maximum acceptable hole diameter - inch or metric

Min. _____ Max. _____

Countersink - if applicable:
Advise Countersink maximum diameter and angle:

Diameter: Min. _____ Max. _____

Angle: Min. _____ Max. _____

Pre-Hole:
Yes____ Hole diameter_____

No ____

Quantity Required:
Specify quantity or quantities to quote.

_____

Used on ADE Tool
- Peck Drill
- Positive Feed
- Self Clamping - Variable Spacing
- Self Clamping - Concentric Collet
- Portable Self Feed (CD or 21500)
- Flexirec
- Other_____

Model Number_____

Type of Lubrication:
- Water Soluable Coolant
- Water only
- Acculube/Boelube type Lubricant
- None
- Other - Specify_____

Brand & Type_____

Additional information required:
Other hole quality parameters such as finish, roundness, straightness. Special conditions or specifications. Taperlock Group and specifications.

_____

_____

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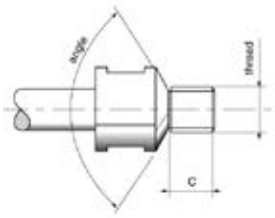
Recommendation for requesting Quotation: Photo copy this catalog page. Fill in the blanks for each block. Add any supplemental information needed to completely define the application requirement.

Recoules™

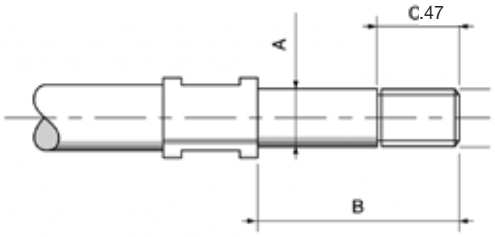
Mounting Style A - Straight Shank

Mounting Style B - Ext'l Thread with 120° Taper



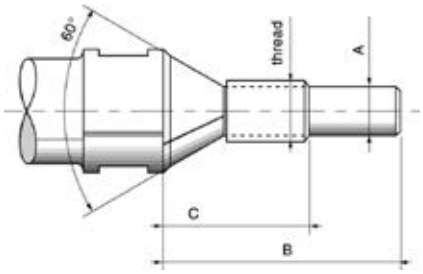
Code	Thread	C
B1	1/4-28	0.32
B2	5/16-24	0.39
B3	3/8-24	0.47
B4	7/16-20	0.47
B5	9/16-18	0.63
B6	5/8-18	0.63
B7	M6 x 100	0.32
B8	M8 x 100	0.32
B9	M10 x 100	0.39

Mounting Style C - External Thread with Pilot Diameter and Square Face



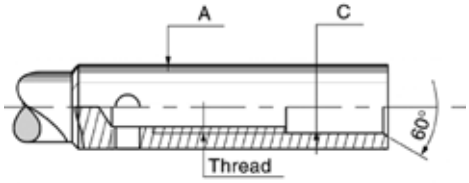
Code	Thread	A	B
C1	M6 x 100	0.244	0.98
C2	M8 x 100	0.323	1.38
C3	M10 x 100	0.402	1.38
C4	M12 x 100	0.480	1.58
C5	M16 x 100	0.638	1.58

Mounting Style D - Pilot Diameter with External Thread and 60° Taper (PET)



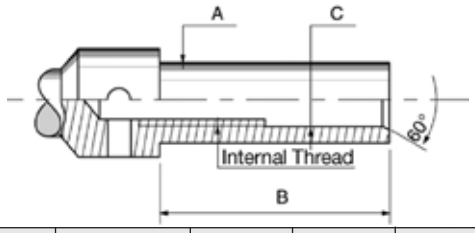
Code	Thread	A	B	C
D1	5/16 - 24	0.250	1.060	0.44
D2	3/8 - 24	0.300	1.145	0.52

Mounting Style E - Internal Thread with 60° Internal Taper & Counterbore ("Spacematic" Style)



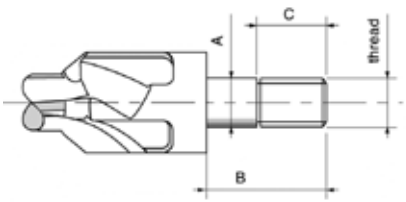
Code	Thread	A	C
E1	1/4 - 28	0.375	0.26
E2	1/4 - 28	0.500	0.26
E3	1/4 - 28	0.625	0.26
E4	3/8 - 16	0.625	0.39

Mounting Style F - Same as Style E with reduced diameter at rear for Guide Bushing



Code	Thread	A	B	C
F1	1/4 - 28	0.375	1.22	0.26
F2	1/4 - 28	0.500	1.22	0.26
F3	1/4 - 28	0.625	1.22	0.26
F4	3/8 - 16	0.625	1.22	0.39

Mounting Style H - External Thread with Pilot Diameter & Square Face Wrench Slots for telescoping Wrench



Code	Thread	A	B	C
H2	M8 x 100	0.393	0.63	0.32
H3	M10 x 100	0.492	0.78	0.39
H4	M12 x 100	0.551	0.94	0.47
H6	M14 x 100	0.630	1.10	0.55
H7	M18 x 100	0.787	1.10	0.55

Recoules™

Cutter M - Drill Only

Split Point is standard

Cutter N - Ream Only: pre-hole required

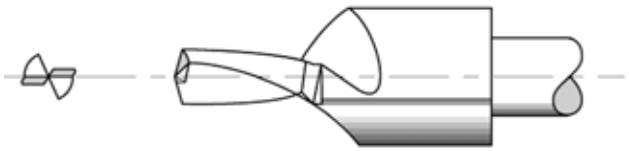
Left hand spiral is standard. Chip is pushed forward and does not damage hole finish or size.

Cutter Q - Square Drill (Gun Drill type)

Square Drill is rigid and permits good lubricant and chip flow. Especially good for precision deep holes and good surface finish. Use in positive feed only.
Countersink is available.

Cutter P - Drill + Reamer

Drill / Reamer produces very accurate hole in one operation.
Split Point is standard



Cutter R - Drill + Countersink

Drill plus Countersink produces standard hole and countersink in one operation. Split Point is standard.

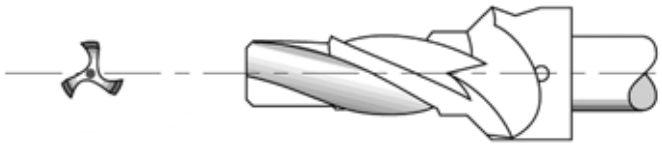
Cutter S - Full Drill + Ream + Countersink

Full Drill plus Ream plus Countersink is very accurate. Requires relatively long stroke. Drill portion clears workpiece before ream begins. Ream portion is left hand spiral - pushes chip forward and does not damage hole finish or size.

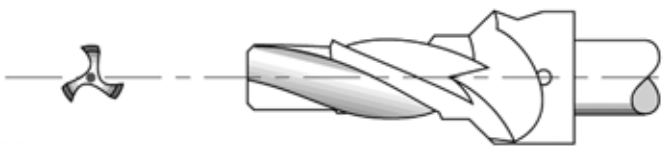
Cutter T - Short Drill + Ream + Countersink

Same as Cutter P with countersink
Accurate hole / countersink with minimum stroke. Split point is standard.

Cutter U - Ream + Countersink



Pre-hole is required
Use when one-shot is not suitable



Cutter V - Taperlock Ream + Countersink

Straight pre-hole is required
Taperlock specifications are based on Briles standards. However, many variations exist and complete specifications are required.

Recoules puts great emphasis on point geometry and accuracy.
Split point is standard.
"S" shape point is not available.

General Drilling Recommendations

Best Hole Quality

- Thru-the-cutter lubrication; High quality cutter lubricant at manufacturer's recommended rate.
- Drill geometry with split point, 2/4 drill / reamer flute design.
- Review benefits of peck and positive feed.
- For aluminum, use high speed with low feed rate.
- For titanium, steel, etc., use machining handbook rates for initial trials.
- Verify adequate flow path for chips thru flutes, tool, and fixture.
- Recondition cutters before cutting edge breaks or excessive wear occurs.
- Maintain tool in very good condition.
- Test drill in coupon (sample material) before using in production.
- Personnel must be well-trained and competent
- "One Shot" operation is usually attainable, but requires very close attention to details
- Verify Cutter quality, proper lubrication rate, replace Cutter before becoming dull, replace Bushings and service tool regularly.
- "Two Shot" operation - drill followed by ream requires less detailed attention.
- Two operations will produce virtually any hole specification.

Composite Materials

These materials vary widely in fiber type, resin type and manufacturing method. Cutter lubrication is always beneficial but may not be permitted. Expermentation is required to optimize drill geometry, speeds and cutter material.

Stacks of Different Materials

Speeds and feedrates must be lowest and slowest of materials in the stack. Peck Drilling is usually advantageous.

Cutter Material

Micrograin Carbide is best for drilling / reaming titanium and carbon fiber. Can also be used for aluminum. More holes per sharpening. M42 High Speed Steel is recommended for drilling precision holes/countersinks in aluminum.

Cutter Cost

Some cutter types cost much more than others. It is best to compare cutter costs by the number of holes generated per sharpening, production time, number of operations required and quality of holes.

Reconditioning Cutters

Reconditioning is very difficult and tedious. Close attention to detail is mandatory.

Microstop Drill Cages

ADVANCED DRILLING EQUIPMENT

Recoules™

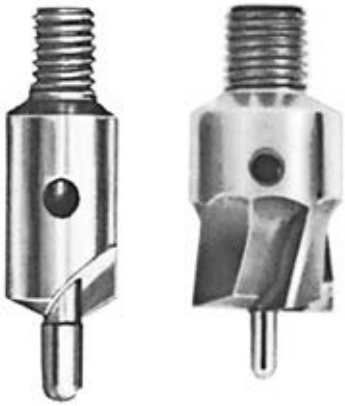
RB 156
M6 x 1 Metric

Bulk:
Shank:-Ø 4,8 mm - .188" dia
Tool attachment:-M6 x 1
Stroke:-3,5 mm - .14"
Body off:-25 mm - 1" dia
Overall length:-
maxi: 55 mm - 2.16"
mini: 51 mm - 2"
Weight:-75 g.

Advantages:
- **Different mounting bases and overall dimensions reduced for very restricted areas.**

Precision:
- **Cemented, hardened and ground chrome-nickel steel spindle mounted on a self lubricating bronze body and a ball-thrust bearing.**
- **Ground centring-cone of the cutter (120°) for perfect concentricity.**
- **Microstop depth adjustment (1 scale division = .001").**
- **Safety locking ensured by a locknut equipped with a seal. This patented feature allows an easy loosening of the locknut without damage to the drill-cage.**

Using Cutters of .394" dia.
M6 x 1 Ground Thread



Basic Drill-Cage

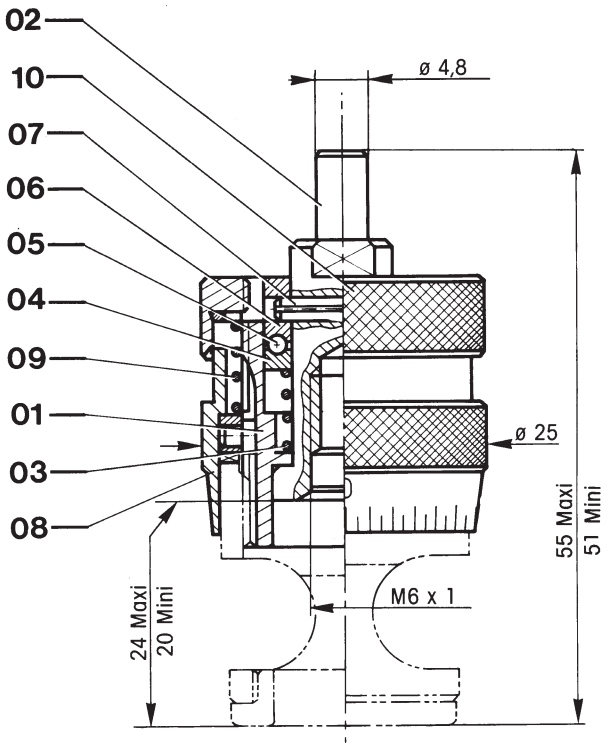
Tapped Mounting Base
90.815.170

Offset Mounting Base
90.815.175

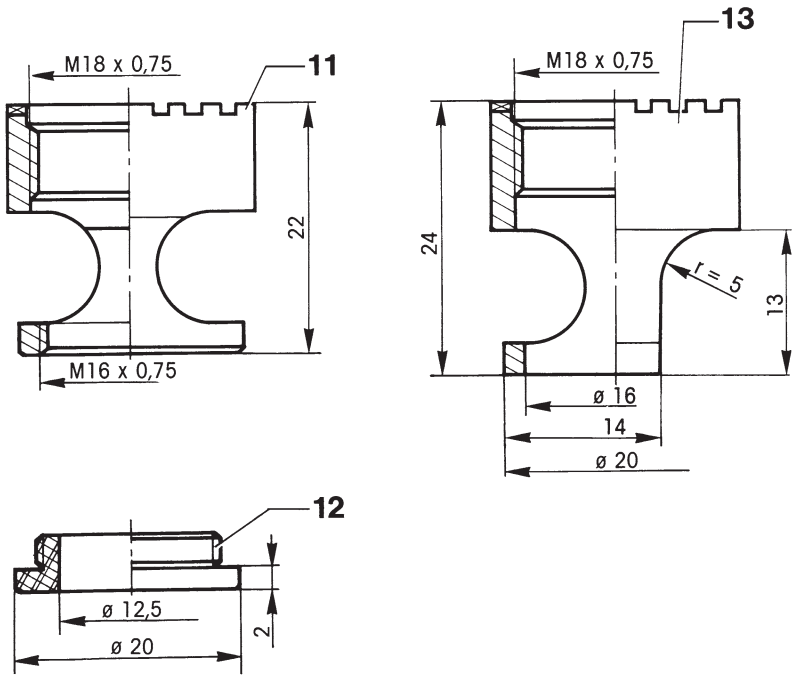
Nylon Nose Piece
90.825.005

Basic Drill-Cage	Tapped Mounting Base 90.815.170	Nylon Nose Piece 90.825.005	Offset Mounting Base 90.815.175			Microstop Drill-Cage Assembly Codification
•	•	•				10.000.010
•			•			10.000.100

To order, please indicate codification number of the complete drill-cage assembly.



Code Reference	REP Index	NB Quantity	Description
90.505.005	01	1	BODY
90.025.005	02	1	SPINDLE
93.430.040	03	1	SPRING
90.280.005	04	1	BALL THRUST BEARING
90.245.100	05	18	BALL 2 MM DIA
93.440.020	06	1	LOCK WASHER
91.218.110	07	1	PIN
94.215.005	08	1	VERNIER ASSEMBLY
93.430.035	09	1	SPRING
90.495.005	10	1	LOCKNUT
90.815.170	11	1	TAPPED MOUNTING BASE
90.825.005	12	1	NYLON NOSE PIECE
90.815.175	13	1	OFFSET MOUNTNG BASE



For spare parts, please indicate codification number.

Recoules™

RB 206
M6 x 1 Metric

Bulk:
Shank:-Ø 6 mm - .236" dia
Tool attachment:-M6 x 1
Stroke:-6 mm - .236"
Body off:-Ø 21 mm - .826" dia
Overall length:-
maxi: 101 mm - 3.97"
mini: 95 mm - 3.74"
Weight:-110 g.

Advantages:
- **Different mounting bases and overall dimensions reduced for very restricted areas.**

Precision:
- **Cemented, hardened and ground chrome-nickel steel spindle mounted on a self lubricating bronze body and a ball-thrust bearing.**
- **Ground centring-cone of the cutter (120°) for perfect concentricity.**
- **Microstop depth adjustment (1 scale division = .001")**
- **Safety locking ensured by a locknut equipped with a seal. This patented feature allows an easy loosening of the locknut without damage to the drill-cage.**

Using Cutters of .394" dia.
M6 x 1 Ground Thread

Basic Drill-Cage

Mounting Base
Flat Bearing
90.815.005

Mounting Base
Offset Bearing
*90.815.015**

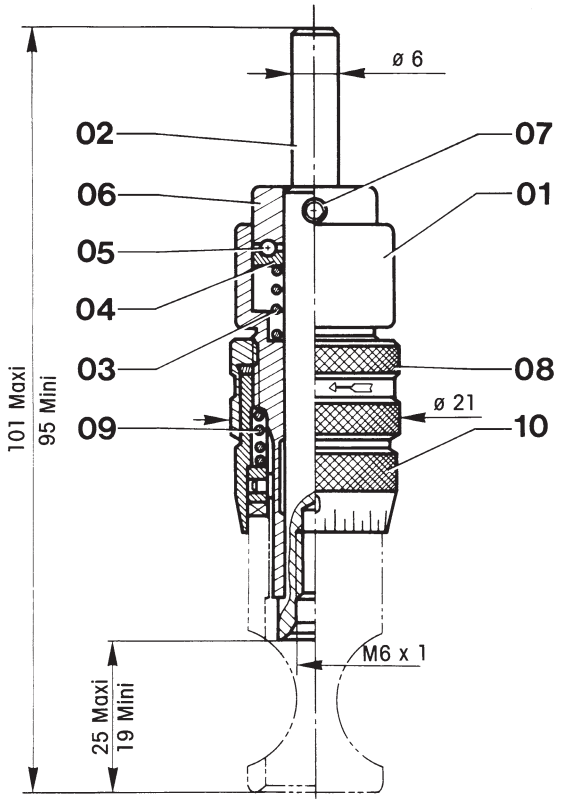
Tapped Mounting Base
90.815.020

Nylon Nose Piece
Flat Bearing
90.825.005

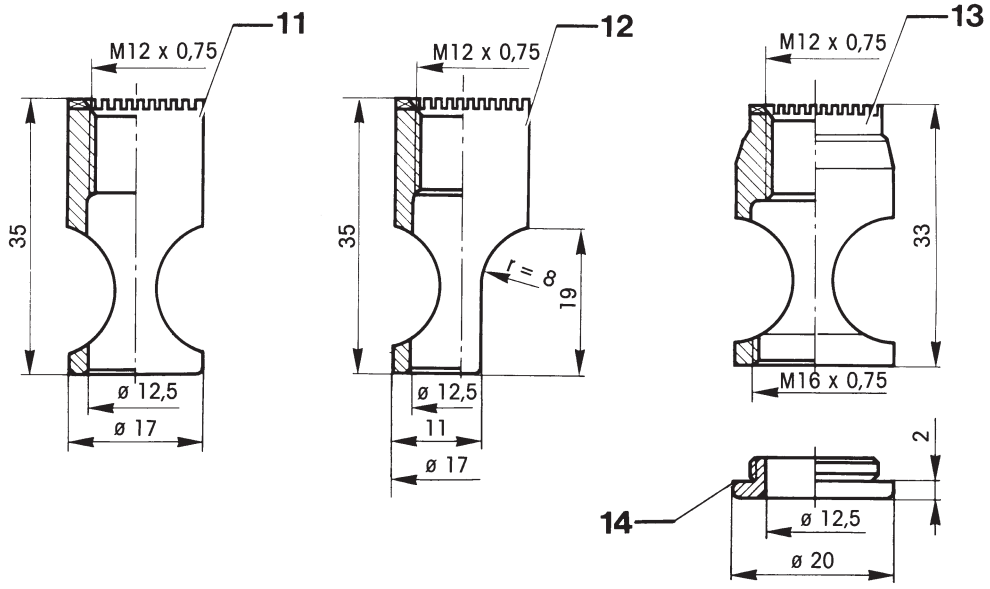
Basic Drill-Cage	Mounting Base Flat Bearing 90.815.005	Mounting Base Offset Bearing 90.815.015	Tapped Mounting Base 90.815.020	Nylon Nose Piece 90.825.005		Microstop Drill-Cage Assembly Codification
•	•					10.005.000
•		•				10.005.200*
•			•	•		10.005.305

To order, please indicate codification number of the complete drill-cage assembly.

*On request only.



Code Reference	REP Index	NB Quantity	Description
90.505.010	01	1	BODY
90.025.015	02	1	SPINDLE
93.430.005	03	1	SPRING
90.280.010	04	1	BALL THRUST BEARING
90.245.100	05	18	BALL 2 MM DIA
93.440.005	06	1	LOCK WASHER
91.218.230	07	1	PIN
90.495.010	08	1	LOCKNUT ASSEMBLY
93.430.045	09	1	SPRING
94.215.010	10	1	VERNIER ASSEMBLY
90.815.005	11	1	MOUNTING BASE FLAT BEARING
90.815.015	12	1	MOUNTING BASE OFFSET BEARING
90.815.020	13	1	TAPPED MOUNTING BASE
90.825.005	14	1	NYLON NOSE PIECE FLAT BEARING



For spare parts, please indicate codification number.

Recoules™

RBI 206
1/4”- 28 Inches

Bulk:
Shank:-Ø 6 mm - .236” dia
Tool attachment:-1/4” - 28
Stroke:-6 mm - .236”
Body off:-Ø 21 mm - .826” dia
Overall length:-
maxi: 101 mm - 3.97”
mini: 95 mm - 3.74”
Weight:-110 g.

Advantages:
- **Different mounting bases and overall dimensions reduced for very restricted areas.**

Precision:
- **Cemented, hardened and ground chrome-nickel steel spindle mounted on a self lubricating bronze body and a ball-thrust bearing.**
- **Ground centring-cone of the cutter (120°) for perfect concentricity.**
- **Microstop depth adjustment (1 scale division = .001”)**
- **Safety locking ensured by a locknut equipped with a seal. This patented feature allows an easy loosening of the locknut without damage to the drill-cage.**

Using Cutters of .394” dia.
1/4” - 28 Ground Thread

Basic Drill-Cage

Mounting Base
Flat Bearing
90.815.005

Mounting Base
Offset Bearing
*90.815.015**

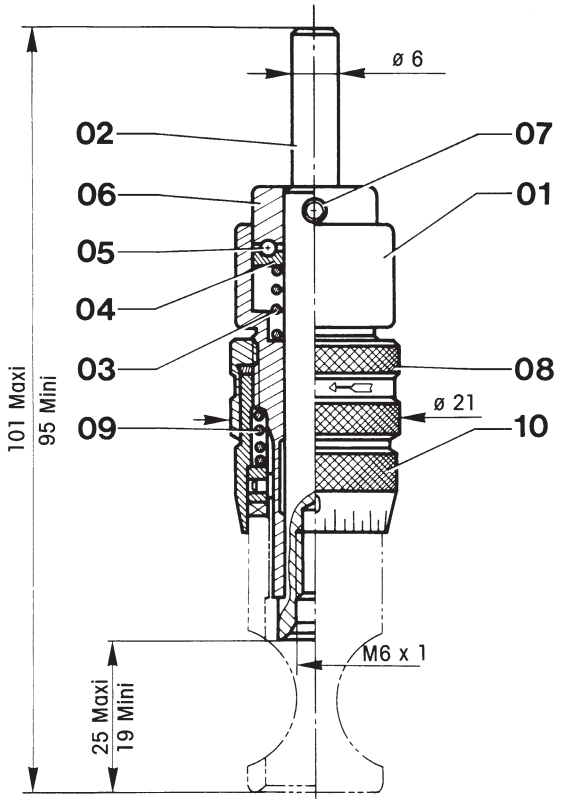
Tapped Mounting Base
90.815.020

Nylon Nose Piece
Flat Bearing
90.825.005

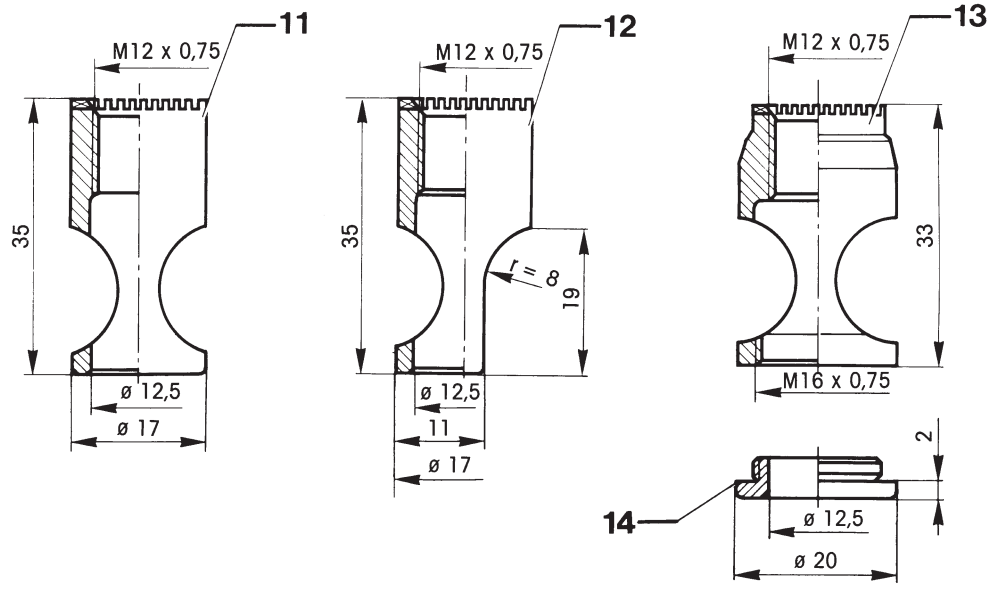
Basic Drill-Cage	Mounting Base Flat Bearing 90.815.005	Mounting Base Offset Bearing 90.815.015	Tapped Mounting Base 90.815.020	Nylon Nose Piece 90.825.005		Microstop Drill-Cage Assembly Codification
•	•					10.005.050
•		•				10.005.250*
•			•	•		10.005.355

To order, please indicate codification number of the complete drill-cage assembly.

*On request only.



Code Reference	REP Index	NB Quantity	Description
90.505.010	01	1	BODY
90.025.016	02	1	SPINDLE
93.430.005	03	1	SPRING
90.280.010	04	1	BALL THRUST BEARING
90.245.100	05	18	BALL 2 MM DIA
93.440.005	06	1	LOCK WASHER
91.218.230	07	1	PIN
90.495.010	08	1	LOCKNUT ASSEMBLY
93.430.045	09	1	SPRING
94.215.010	10	1	VERNIER ASSEMBLY
90.815.005	11	1	MOUNTING BASE FLAT BEARING
90.815.015	12	1	MOUNTING BASE OFFSET BEARING
90.815.020	13	1	TAPPED MOUNTING BASE
90.825.005	14	1	NYLON NOSE PIECE FLAT BEARING



For spare parts, please indicate codification number.

Recoules™

RB 256
M6 x 1 Metric

Bulk:
Shank:-Ø 6 mm - .236" dia
Tool attachment:-M6 x 1
Stroke:-7,5 mm - .3"
Body off:-Ø 28 mm - 1.1" dia
Overall length:-
maxi: 98 mm - 3.85"
mini: 91 mm - 3.58"
Weight:-165 g.

Advantages:
- **Different mounting bases available and reduced overall dimensions.**

Precision:
- **Cemented, hardened and ground chrome-nickel steel spindle mounted on a self lubricating bronze body and a ball-thrust bearing.**
- **Ground centring-cone of the cutter (120°) for perfect concentricity.**
- **Microstop depth adjustment (1 scale division = .001")**
- **Safety locking ensured by a locknut equipped with a seal. This patented feature allows an easy loosening of the locknut without damage to the drill-cage.**

Using Cutters of .394" dia.
M6 x 1 Ground Thread

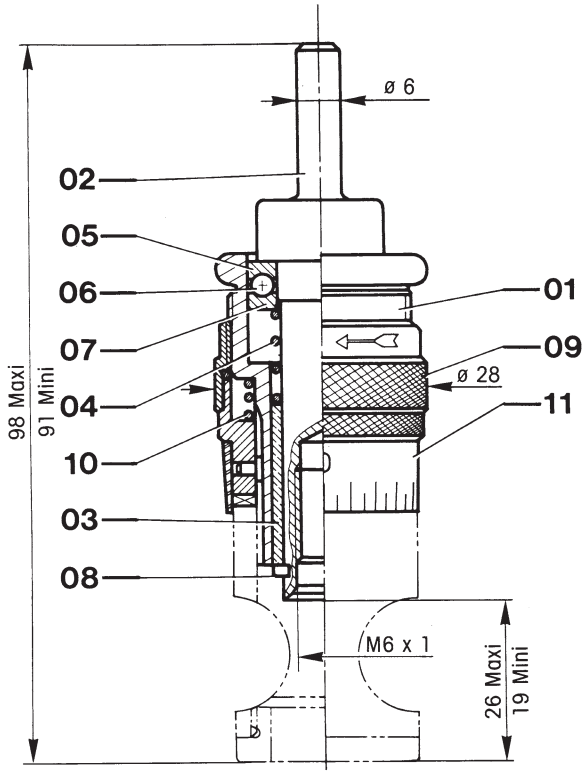
Basic Drill-Cage

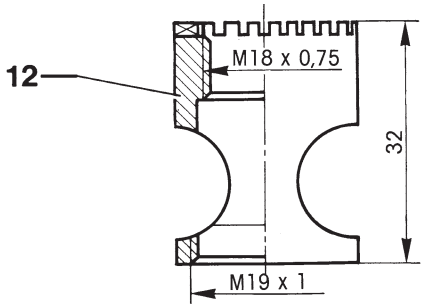
Hard Chrome Steel Nose
90.825.015

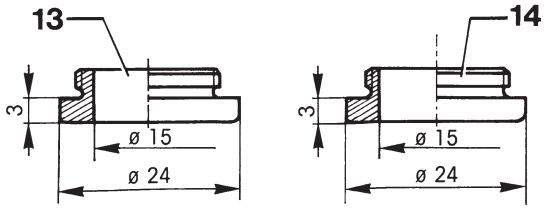
Nylon Nose Piece
90.825.020

Basic Drill-Cage	Hard Chrome Steel Nose 90.825.015	Nylon Nose Piece 90.825.020			Microstop Drill-Cage Assembly Codification
•	•				10.010.010
•		•			10.010.015

To order, please indicate codification number of the complete drill-cage assembly.







Code Reference	REP Index	NB Quantity	Description
90.505.020	01	1	BODY
90.025.025	02	1	SPINDLE
90.205.280	03	1	BRONZE BUSHING
93.430.045	04	1	SPRING
90.280.015	05	1	BALL THRUST BEARING
90.245.130	06	20	BALL 2,5 MM DIA.
90.280.020	07	1	BALL THRUST BEARING
90.013.029	08	1	CIRCLIPS
90.495.015	09	1	LOCKNUT
93.430.015	10	1	SPRING
94.215.015	11	1	VERNIER
90.815.060	12	1	TAPPED MOUNTING BASE
90.825.015	13	1	HARD CHROME STEEL NOSE PIECE
90.825.020	14	1	NYLON NOSE PIECE

For spare parts, please indicate codification number.

Recoules™

RBI 256
1/4" -28 Inches

Bulk:
Shank:-Ø 6 mm - .236" dia
Tool attachment:-1/4" - 28
Stroke:-7,5 mm - .3"
Body off:-Ø 28 mm - 1.1" dia
Overall length:-
maxi: 98 mm - 3.85"
mini: 91 mm - 3.58"
Weight:-165 g.

Advantages:
- **Different mounting bases available and reduced overall dimensions.**

Precision:
- **Cemented, hardened and ground chrome-nickel steel spindle mounted on a self lubricating bronze body and a ball-thrust bearing.**
- **Ground centring-cone of the cutter (120°) for perfect concentricity.**
- **Microstop depth adjustment (1 scale division = .001")**
- **Safety locking ensured by a locknut equipped with a seal. This patented feature allows an easy loosening of the locknut without damage to the drill-cage.**

Using Cutters of .394" dia.
1/4" - 28 Ground Thread

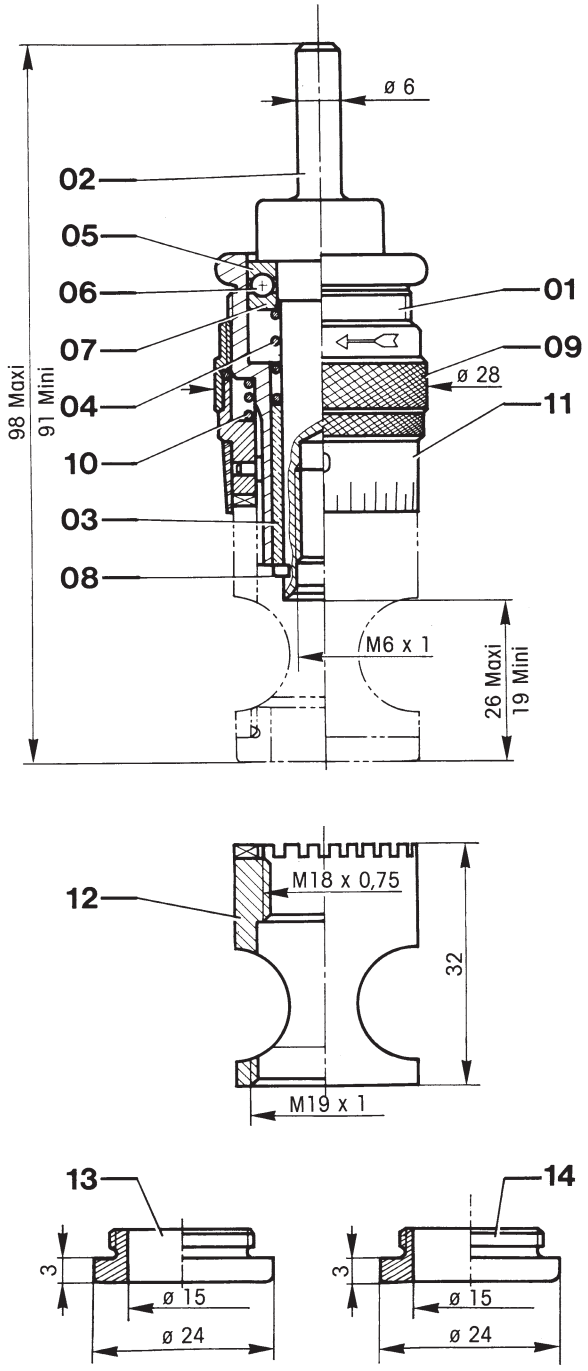
Basic Drill-Cage

Hard Chrome Steel Nose
90.825.015

Nylon Nose Piece
90.825.020

Basic Drill-Cage	Hard Chrome Steel Nose 90.825.015	Nylon Nose Piece 90.825.020			Microstop Drill-Cage Assembly Codification
•	•				10.010.110
•		•			10.010.115

To order, please indicate codification number of the complete drill-cage assembly.



Code Reference	REP Index	NB Quantity	Description
90.505.020	01	1	BODY
90.025.095	02	1	SPINDLE
90.205.280	03	1	BRONZE BUSHING
93.430.045	04	1	SPRING
90.280.015	05	1	BALL THRUST BEARING
90.245.130	06	20	BALL 2,5 MM DIA.
90.280.020	07	1	BALL THRUST BEARING
90.013.029	08	1	CIRCLIPS
90.495.015	09	1	LOCKNUT
93.430.015	10	1	SPRING
94.215.015	11	1	VERNIER
90.815.060	12	1	TAPPED MOUNTING BASE
90.825.015	13	1	HARD CHROME STEEL NOSE PIECE
90.825.020	14	1	NYLON NOSE PIECE

For spare parts, please indicate codification number.

Recoules™

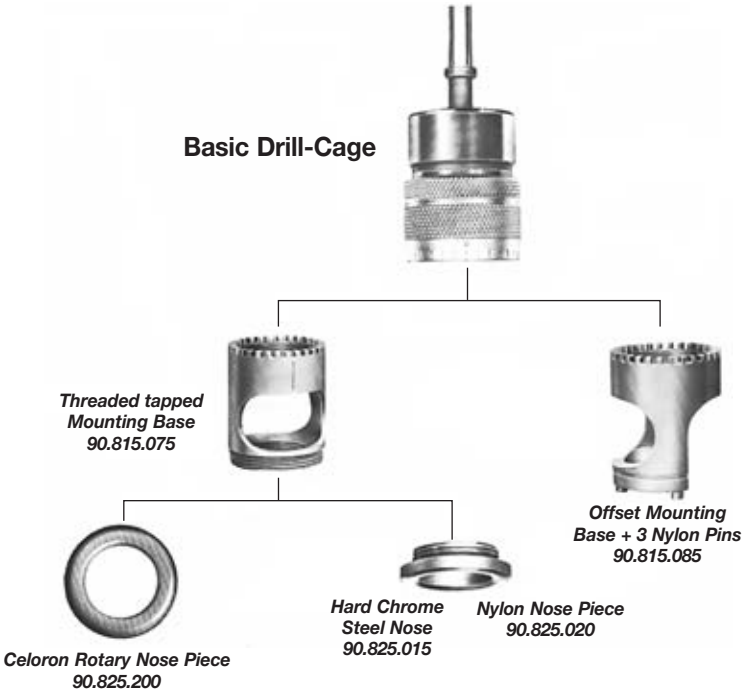
RB 257
M6 x 1 Metric

Bulk:
Shank:-Ø 6 mm - .236" dia
Tool attachment:-M6 x 1
Stroke:-6 mm - .236"
Body off:-Ø 29 mm - 1.141" dia
Overall length:-
maxi: 92 mm - 3.62"
mini: 88 mm - 3.46"
Weight:-155 g.

Advantages:
- **Different mounting bases available and reduced overall dimensions.**

Precision:
- **High precision drill-cage, body in special treated chromed steel, fully ground throughout. This ball mounted drill-cage includes two needle bearings for best utilization.**
- **Any wrong position of the hand holding the drilling machine is offset by the ball system and it has been specially designed for countersinking and spotfacing perfectly perpendicular to the bearing surfaces and concentric with the reamings of rivet and screw holes.**
- **Ground centring-cone of the cutter (120°) for perfect concentricity.**
- **Safety locking of microstop depth adjustment (one scale division = .001")**
- **Rotation and translation movements separated for best accuracy.**

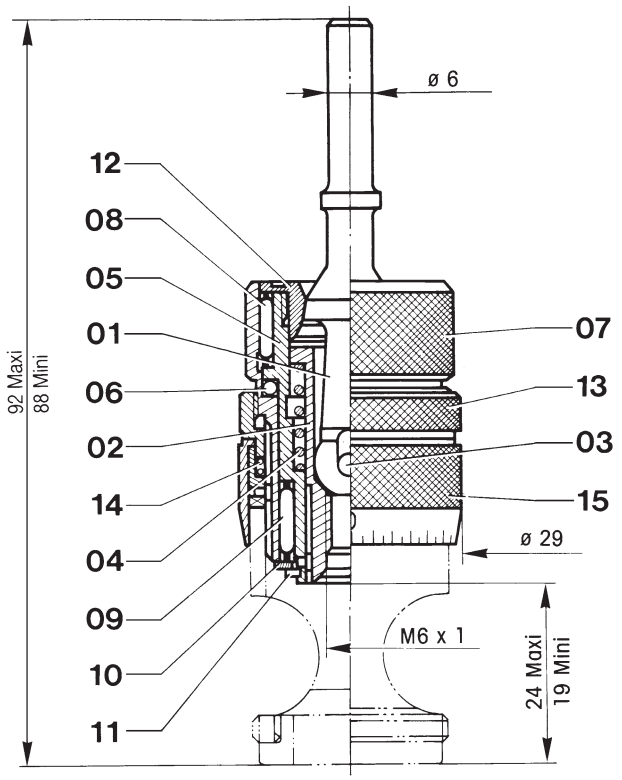
Using Cutters of .394" dia.
M6 x 1 Ground Thread



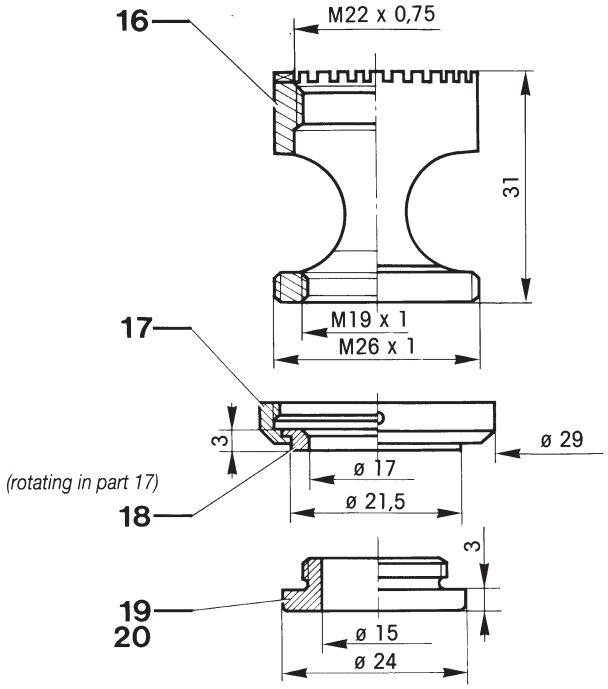
Basic Drill-Cage	Threaded + Tapped Base 90.815.075	Celoron Rotary Nose 90.825.200	Hard Chrome Steel Nose 90.825.015	Nylon Nose Piece 90.825.020	Offset Base + 3 Nylon Pins 90.815.085			Microstop Drill-Cage Assembly Codification
•	•	•						10.015.010
•	•		•					10.015.015
•	•			•				10.015.020
•					•			10.015.200*

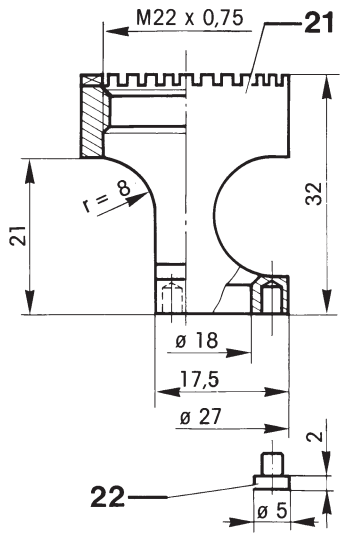
To order, please indicate codification number of the complete drill-cage assembly.

*On request only.



Code Reference	REP Index	NB Quantity	Description
90.025.030	01	1	SPINDLE
91.015.005	02	1	SLEEVE
91.215.010	03	1	PIN
93.430.045	04	1	SPRING
90.620.005	05	1	BUSH
90.245.100	06	31	BALL 2 MM DIA.
90.505.025	07	1	BODY
90.405.295	08	1	NEEDLE CAGE
90.405.165	09	1	NEEDLE CAGE
93.440.010	10	1	WASHER
93.605.050	11	1	CIRCLIPS
90.255.005	12	1	PLUG
90.495.020	13	1	LOCKNUT
93.430.020	14	1	SPRING
94.215.020	15	1	VERNIER ASSEMBLY
90.815.075	16	1	THREADED + TAPPED BASE
90.225.005	17	1	RING
90.825.210	18	1	ROTARY NOSE PIECE
90.825.015	19	1	HARD CHROME STEEL NOSE PIECE
90.825.020	20	1	NYLON NOSE PIECE
90.815.084	21	1	OFFSET MOUNTING BASE
93.045.015	22	3	NYLON PIN





For spare parts, please indicate codification number.

Recoules™

RB 306
M8 x 1 Metric

Bulk:
Shank:-Ø 6 mm - .236" dia
Tool attachment:-M8 x 1
Stroke:-7,5 mm - .3"
Body off:-Ø 28 mm - 1.1" dia
Overall length:-
maxi: 98 mm - 3.85"
mini: 91mm - 3.58"
Weight:-175 g.

Advantages:
- **This cage has been designed for use with cutters of more than -.394" dia. (10 mm).**

Precision:
- **Cemented, hardened and ground chrome-nickel steel spindle mounted on a self lubricating bronze body and a ball-thrust bearing.**
- **Ground centring-cone of the cutter (120°) for perfect concentricity.**
- **Microstop depth adjustment (1 scale division = .001")**
- **Safety locking ensured by a locknut equipped with a seal. This patented feature allows an easy loosening of the locknut without damage to the drill-cage.**

For use With M8 x 1 Ground Thread Cutters

Basic Drill-Cage

Threaded Mounting Base 90.815.090

Threaded Mounting Base 90.815.095

Hard Chrome Steel Nose 90.825.050

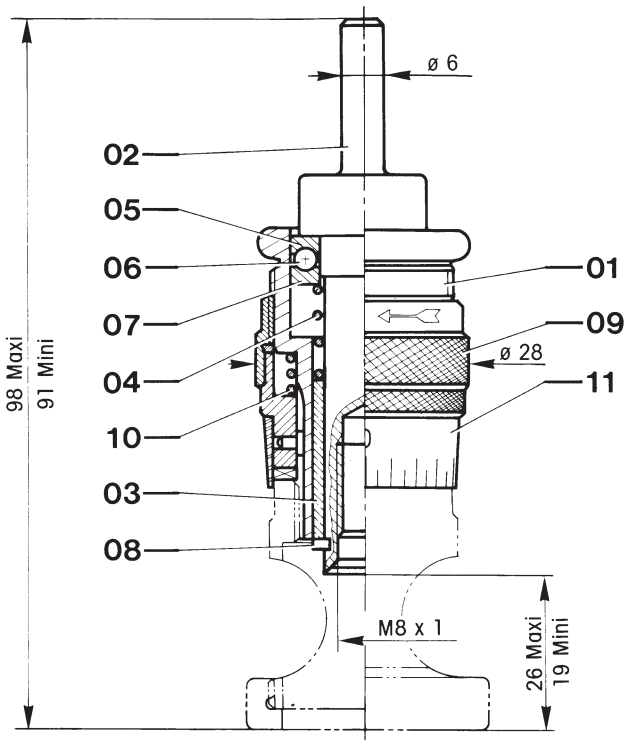
Nylon Nose Piece 90.825.055

Hard Chrome Steel Nose 90.825.080

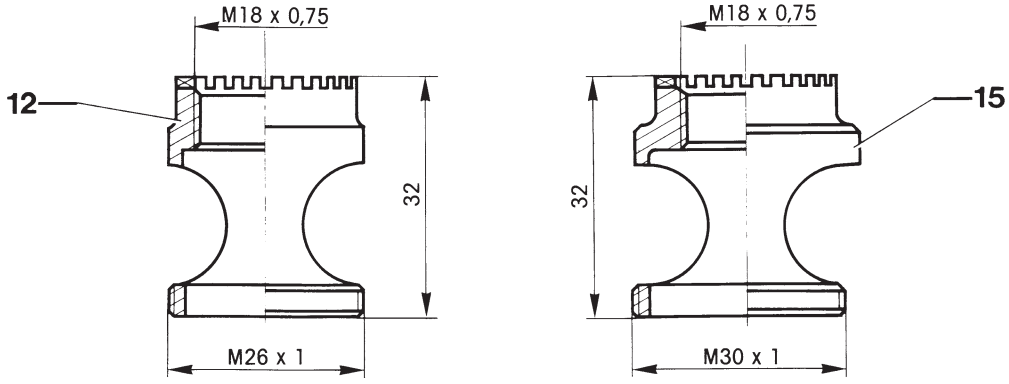
Nylon Nose Piece 30.825.085

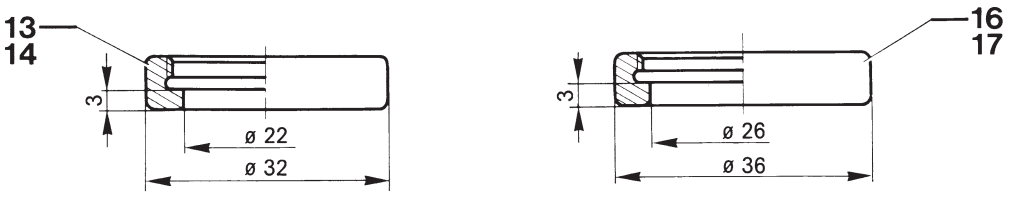
Basic Drill-Cage	Mounting Base 90.815.090	Steel Nose Piece 90.825.050	Nylon Nose Piece 90.825.055	Mounting Base 90.815.095	Steel Nose Piece 90.825.080	Nylon Nose Piece 90.825.085			Microstop Drill-Cage Assembly Codification
•	•	•							10.025.010
•	•		•						10.025.015
•				•	•				10.025.105
•				•		•			10.025.110

To order, please indicate codification number of the complete drill-cage assembly.



Code Reference	REP Index	NB Quantity	Description
90.505.020	01	1	BODY
90.025.035	02	1	SPINDLE
90.205.280	03	1	BRONZE BUSHING
93.430.045	04	1	SPRING
90.280.015	05	1	BALL THRUST BEARING
90.245.130	06	20	BALL 2,5 MM DIA.
90.280.020	07	1	BALL THRUST BEARING
90.013.029	08	1	CIRCLIPS
90.495.015	09	1	LOCKNUT ASSEMBLY
93.430.015	10	1	SPRING
94.215.015	11	1	VERNIER ASSEMBLY
90.815.090	12	1	THREADED MOUNTING BASE
90.825.050	13	1	HARD CHROME STEEL NOSE PIECE
90.825.055	14	1	NYLON NOSE PIECE
90.815.095	15	1	THREADED MOUNTING BASE
90.825.080	16	1	HARD CHROME STEEL NOSE PIECE
90.825.085	17	1	NYLON NOSE PIECE





For spare parts, please indicate codification number.

Ball Type Microstop Drill-Cage
RB 307 Metric

Recoules™

RB 307
M8 x 1 Metric

Bulk:

Shank:-Ø 6 mm - .236" dia
Tool attachment:-M8 x 1
Stroke:-7 mm - .275"
Body off:-Ø 29 mm - 1.141" dia
Overall length:-
maxi: 92 mm - 3.62"
mini: 88 mm - 3.46"
Weight:-155 g.

For use With M8 x 1 Ground Thread Cutters

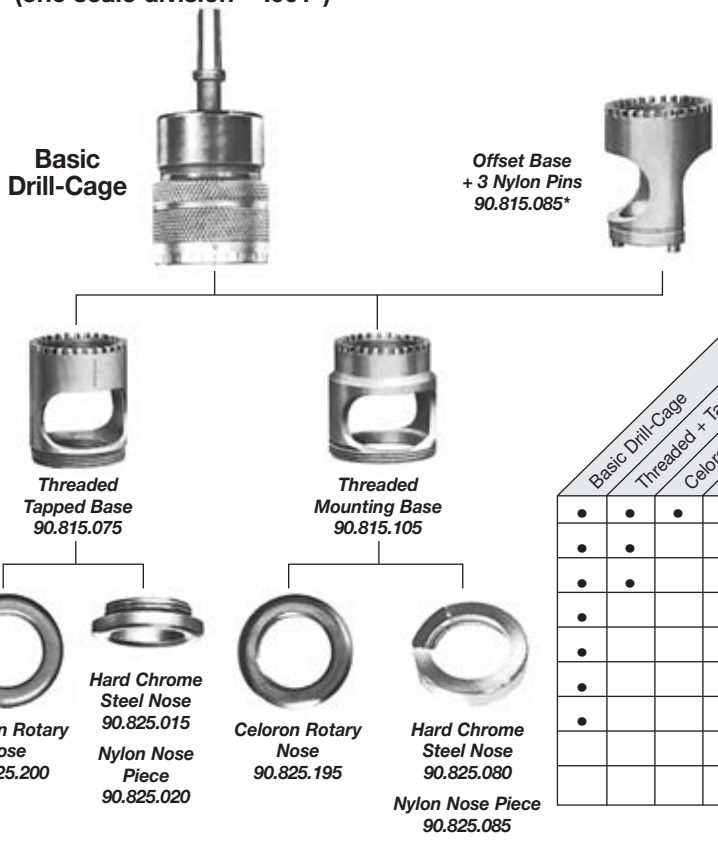
Advantages:
■ **Different mounting bases available and reduced overall dimensions.**

Precision:
■ **High precision drill-cage, body in special treated chromed steel, fully ground throughout. This ball mounted drill-cage includes two needle bearings for best utilization.**

■ **Any wrong position of the hand holding the drilling machine is offset by the ball system, and it has been specially designed for countersinking and spotfacing perfectly perpendicular to the bearing surfaces and concentric with the reamings of rivet and screw holes.**

■ **Ground centring-cone of the cutter (120°) for perfect concentricity.**

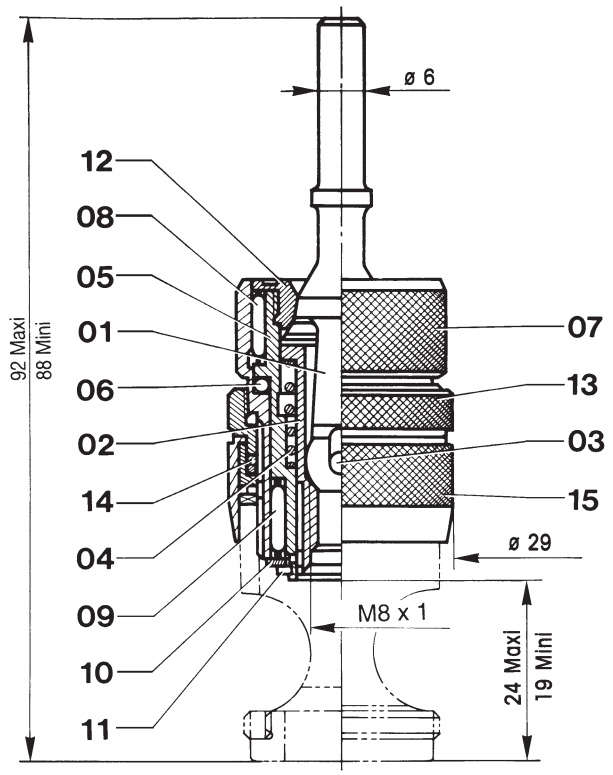
■ **Safety locking of microstop depth adjustment (one scale division = .001")**



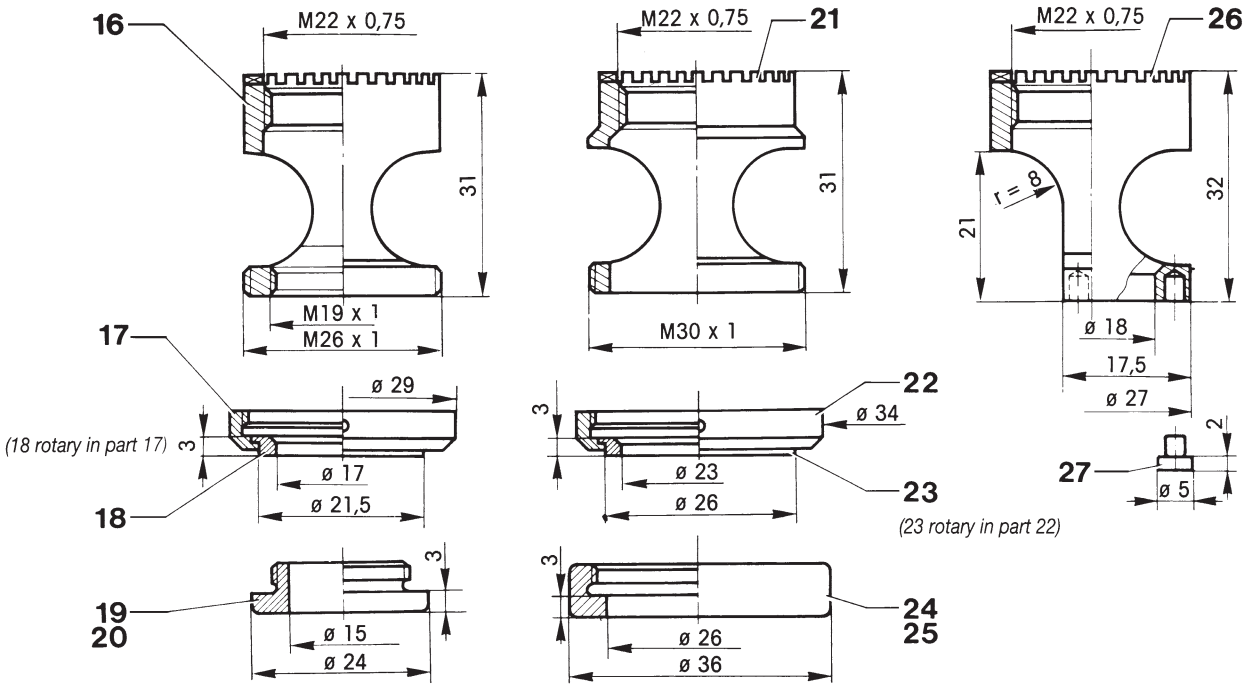
Basic Drill-Cage	Threaded + Tapped Base 90.815.075	Celoron Rotary Nose 90.825.200	Hard Chrome Steel Nose 90.825.015	Nylon Nose Piece 90.825.020	Threaded Mounting Base 90.815.105	Celoron Rotary Nose Piece 90.825.195	Hard Chrome Steel Nose 90.825.080	Nylon Nose Piece 90.825.085	Offset Base + 3 Nylon Pins 90.815.085	Microstop Drill-Cage Assembly Codification
•	•	•								10.020.010
•	•		•							10.020.015
•	•			•						10.020.020
•					•	•				10.020.105
•					•		•			10.020.110
•					•			•		10.020.115
•									•	10.020.200*

To order, please indicate codification number of the complete drill-cage assembly.

*On request only.



Code Reference	REP Index	NB Quantity	Description
90.025.030	01	1	SPINDLE
91.015.010	02	1	SLEEVE
91.215.010	03	1	PIN
93.430.045	04	1	SPRING
90.620.005	05	1	BUSH
90.245.100	06	31	BALL 2 MM DIA.
90.505.025	07	1	BODY
90.405.295	08	1	NEEDLE CAGE
90.405.165	09	1	NEEDLE CAGE
93.440.010	10	1	WASHER
93.605.050	11	1	CIRCLIPS
90.255.005	12	1	PLUG
90.495.020	13	1	LOCKNUT
93.430.020	14	1	SPRING
94.215.020	15	1	VERNIER ASSEMBLY
90.815.075	16	1	THREADED + TAPPED BASE
90.225.005	17	1	RING
90.825.210	18	1	ROTARY NOSE PIECE
90.825.015	19	1	HARD CHROME STEEL NOSE PIECE
90.825.020	20	1	NYLON NOSE PIECE
90.815.105	21	1	THREADED MOUNTING BASE
90.225.010	22	1	RING
90.825.205	23	1	ROTARY NOSE PIECE
90.825.080	24	1	HARD CHROME STEEL NOSE PIECE
90.825.085	25	1	NYLON NOSE PIECE
90.815.084	26	1	OFFSET MOUNTING BASE
93.045.015	27	3	NYLON PIN



For spare parts, please indicate codification number.

Ball Type Microstop Drill-Cage
RBI 307 Inches

Recoules™

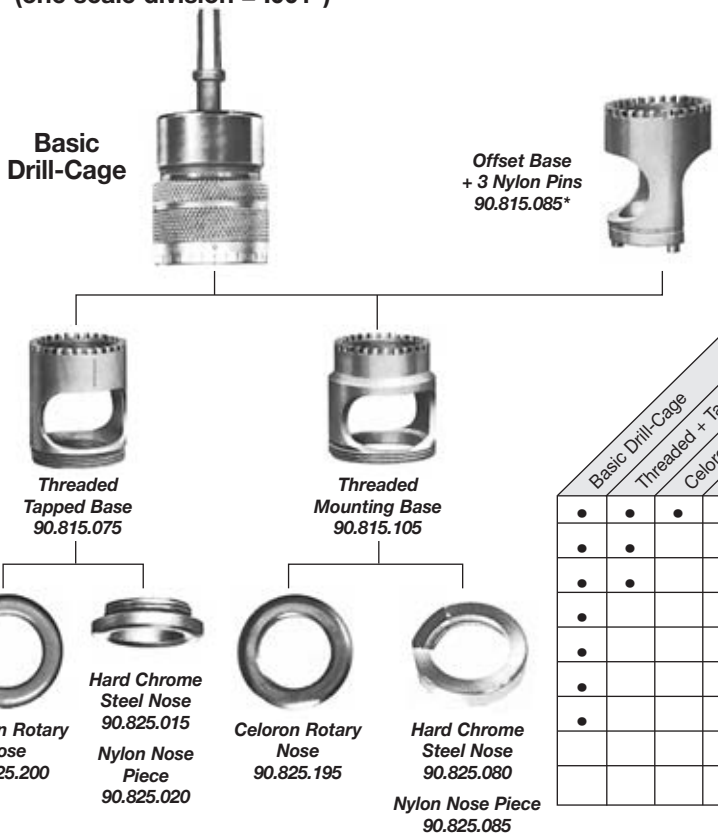
RBI 307
1/4" - 28 Inches

Bulk:
Shank:-Ø 6 mm - .236" dia
Tool attachment:-1/4" - 28
Stroke:-7 mm - .275"
Body off:-Ø 29 mm - 1.141" dia
Overall length:-
maxi: 92 mm - 3.62"
mini: 88 mm - 3.46"
Weight:-155 g.

For use With 1/4" - 28 Ground Thread Cutters

Advantages:
- **Different mounting bases available and reduced overall dimensions.**

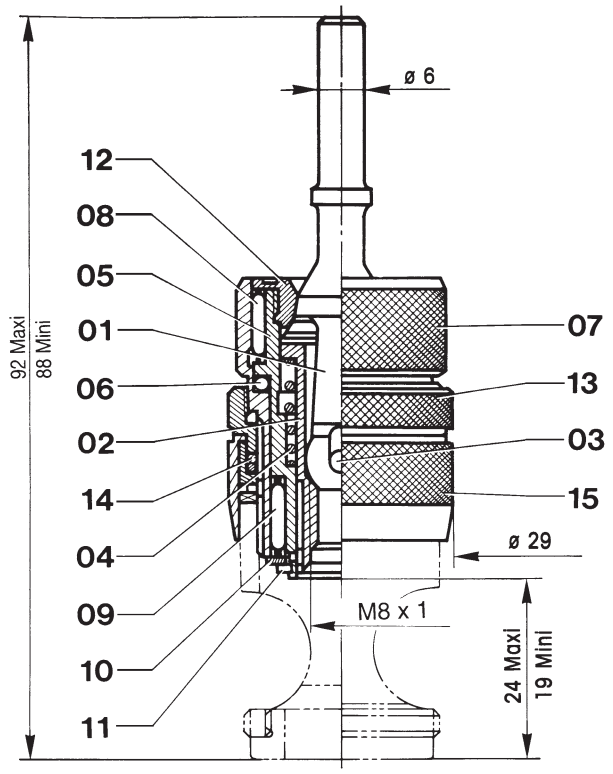
Precision:
- **High precision drill-cage, body in special treated chromed steel, fully ground throughout. This ball mounted drill-cage includes two needle bearings for best utilization.**
- **Any wrong position of the hand holding the drilling machine is offset by the ball system, and it has been specially designed for countersinking and spotfacing perfectly perpendicular to the bearing surfaces and concentric with the reamings of rivet and screw holes.**
- **Ground centring-cone of the cutter (120°) for perfect concentricity.**
- **Safety locking of microstop depth adjustment (one scale division = .001")**



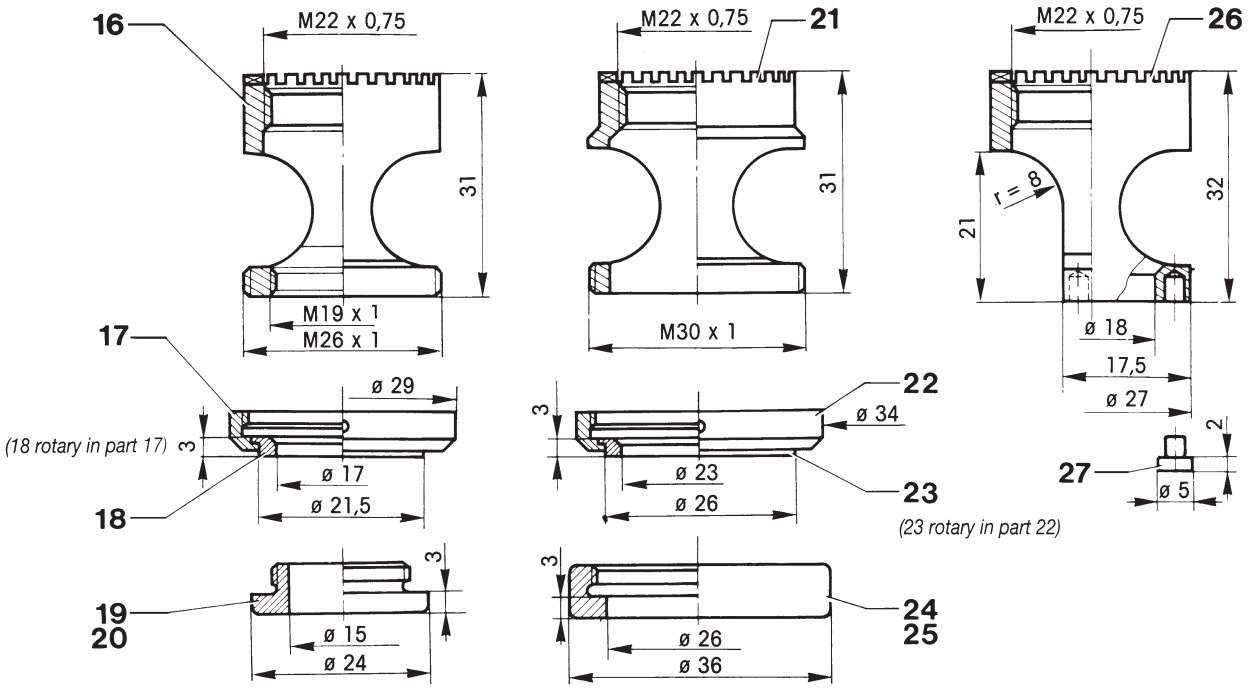
Basic Drill-Cage	Threaded + Tapped Base 90.815.075	Celoron Rotary Nose 90.825.200	Hard Chrome Steel Nose 90.825.015	Nylon Nose Piece 90.825.020	Threaded Mounting Base 90.815.105	Celoron Rotary Nose Piece 90.825.195	Hard Chrome Steel Nose 90.825.080	Nylon Nose Piece 90.825.085	Offset Base + 3 Nylon Pins 90.815.085	Microstop Drill-Cage Assembly Codification
•	•	•								10.020.060
•	•		•							10.020.065
•	•			•						10.020.070
•					•	•				10.020.155
•					•		•			10.020.160
•					•			•		10.020.165
•									•	10.020.250*

To order, please indicate codification number of the complete drill-cage assembly.

*On request only.



Code Reference	REP Index	NB Quantity	Description
90.025.030	01	1	SPINDLE
91.015.006	02	1	SLEEVE
91.215.010	03	1	PIN
93.430.045	04	1	SPRING
90.620.005	05	1	BUSH
90.245.100	06	31	BALL 2 MM DIA.
90.505.025	07	1	BODY
90.405.295	08	1	NEEDLE CAGE
90.405.165	09	1	NEEDLE CAGE
93.440.010	10	1	WASHER
93.605.050	11	1	CIRCLIPS
90.255.005	12	1	PLUG
90.495.020	13	1	LOCKNUT
93.430.020	14	1	SPRING
94.215.020	15	1	VERNIER ASSEMBLY
90.815.075	16	1	THREADED + TAPPED BASE
90.225.005	17	1	RING
90.825.210	18	1	ROTARY NOSE PIECE
90.825.015	19	1	HARD CHROME STEEL NOSE PIECE
90.825.020	20	1	NYLON NOSE PIECE
90.815.105	21	1	THREADED MOUNTING BASE
90.225.010	22	1	RING
90.825.205	23	1	ROTARY NOSE PIECE
90.825.080	24	1	HARD CHROME STEEL NOSE PIECE
90.825.085	25	1	NYLON NOSE PIECE
90.815.084	26	1	OFFSET MOUNTING BASE
93.045.015	27	3	NYLON PIN



For spare parts, please indicate codification number.

Recoules™

RB 406
M10 x 1 Metric

Bulk:

Tool attachment:-M10 x 1
Stroke:-14 mm - .551”
Body off:-Ø 36 mm - 1.417” dia
Overall length:-
maxi: 163 mm - 6.417”
mini: 136mm - 5.354”
Weight:-545 g.

Advantages:

- **This drill-cage has been especially designed for use with cutters of 7/8” to 1 1/2” dia.**
- **Different mounting bases available and reduced overall dimensions.**

Precision:

- **Removable adaptor with two possibilities of use:**
  A.-Chuck-clamping of the straight shank with three wrench flats,
  B.-Direct fitting on the spindle without using the drill chuck.
  This gives perfect concentricity and noticeably reduces the length and weight of the drill-and-tool assembly. Results are higher performance, improved machining and much less fatigue for the operator.
- **Cemented, hardened and ground chrome-nickel steel spindle mounted on three needle-bearings and a ball thrust bearing.**
- **Microstop depth adjustment each scale division corresponding to a displacement of .001”.**
- **Safety locking ensured by a locknut equipped with a seal.**
  This patented feature allows an easy loosening of the locknut without damage to the drill-cage.

For Use With M10 x 1 Ground Thread Cutters

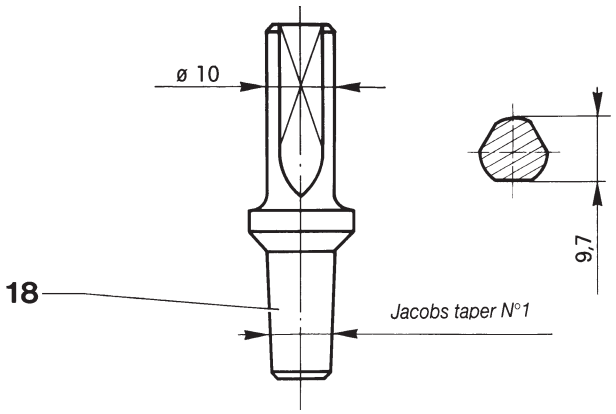
Basic Drill-Cage

Mounting Base 90.815.150

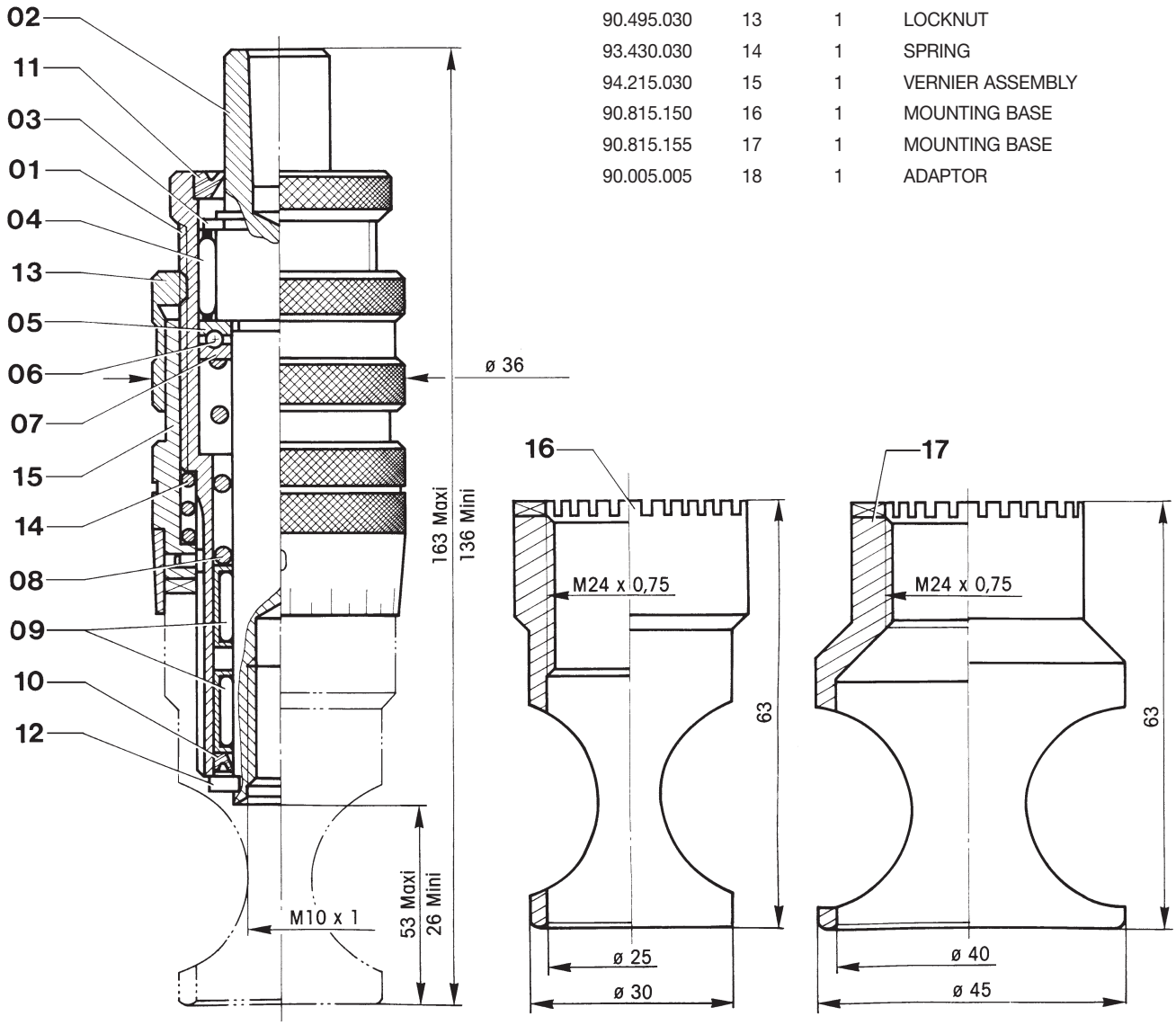
Mounting Base 90.815.155

Basic Drill-Cage + Adaptor	Mounting Base 90.815.150	Mounting Base 90.815.155			Microstop Drill-Cage Assembly Codification
•	•				10.030.010
•		•			10.030.105

To order, please indicate codification number of the complete drill-cage assembly.



Code Reference	REP Index	NB Quantity	Description
90.505.035	01	1	BODY
90.025.045	02	1	SPINDLE
93.605.065	03	1	CIRCLIPS
90.405.270	04	1	NEEDLE CAGE
90.280.025	05	1	BALL THRUST BEARING
90.245.130	06	23	BALL 2,5 MM DIA.
90.280.030	07	1	BALL THRUST BEARING
93.430.055	08	1	SPRING
90.615.085	09	2	NEEDLE BEARING
90.230.085	10	1	SEAL RING
90.230.120	11	1	SEAL RING
90.430.005	12	1	U-LINK
90.495.030	13	1	LOCKNUT
93.430.030	14	1	SPRING
94.215.030	15	1	VERNIER ASSEMBLY
90.815.150	16	1	MOUNTING BASE
90.815.155	17	1	MOUNTING BASE
90.005.005	18	1	ADAPTOR



For spare parts, please indicate codification number.

Recoules™

RB 356 HP 21 & RB 356 HP 38

M6 x 1 Metric

Bulk:

RB 356 HP 21

Tool attachment:	M6 x 1
Stroke:	21 mm - .826”
Body off:	Ø 27 mm - 1.063” dia.
Overall length:	maxi: 136 mm - 5.354”
	mini: 116 mm - 4.567”
Weight:	300 g.

RB 356 HP 38

Tool attachment:	M6 x 1
Stroke:	38 mm - 1.500”
Body off:	Ø 27 mm - 1.063” dia.
Overall length:	maxi: 183 mm - 7.204”
	mini: 168 mm - 6.614”
Weight:	375 g.

Advantages:

- Mounted on three needle bearings, this high precision drill-cage ensures perfect concentricity.
- Removable adaptor with two possibilities of use:
  A.-Chuck-clamping of the straight shank with three wrench flats,
  B.-Direct fitting on the spindle without using the drill chuck.
  This gives perfect concentricity and noticeably reduces the length and weight of the drill and tool assembly.
  Results are higher performance, improved machining and much less fatigue for the operator.
- Cemented, hardened and ground chrome-nickel steel spindle mounted on three needle bearings and a ball thrust bearing. Body of specially treated chrome steel.
- Ground centring-cone of the cutter (120°) for perfect concentricity.
- Microstop depth adjustment: (1 scale division = .001”).
- Safety locking ensured by a locknut equipped with a seal. This patented feature allows an easy loosening of the locknut without damage to the drill-cage.

For Use With Cutters of M6 x 1 Ground Thread

On request all our cutter attachments can be 1/4” - 28 thread.

Basic Drill-Cage

RB 356HP 21

RB 356HP 38

Drill Bush Mounting Base 90.815.120

Mounting Base Flat Bearing 90.815.125

Threaded Mounting Base 90.815.135

Mounting Base Flat Bearing 90.815.070

Tripod Fitted with Three Nylon Studs 90.815.165

Nylon Nose Piece Flat Bearing 90.825.175

Available on separate order:

Drill Bush

Spanner for Fitting of Drill Bushes 90.469.020

How to order a drill bush:

example: drill bush of 3,17 mm dia.

A. Basic Code: 10.110

+

B. Bush Dia in 100th of mm: 317

=

10.110.317
Code to indicate

RB 356 HP 21

Basic Drill-Cage + Adaptor	Drill Bush Mounting Base 90.815.120	Mounting Base Flat Bearing 90.815.125	Tripod + 3 Nylon Studs 90.815.165	Threaded Mounting Base 90.815.135	Nylon Nose Piece 90.825.175	Mounting Base Flat Bearing 90.815.070	Microstop Drill-Cage Assembly Codification
•							10.040.000
•	•						10.040.100
•		•					10.040.200
•		•	•				10.040.210
•				•	•		10.040.405
•			•				10.040.505
•						•	10.040.600

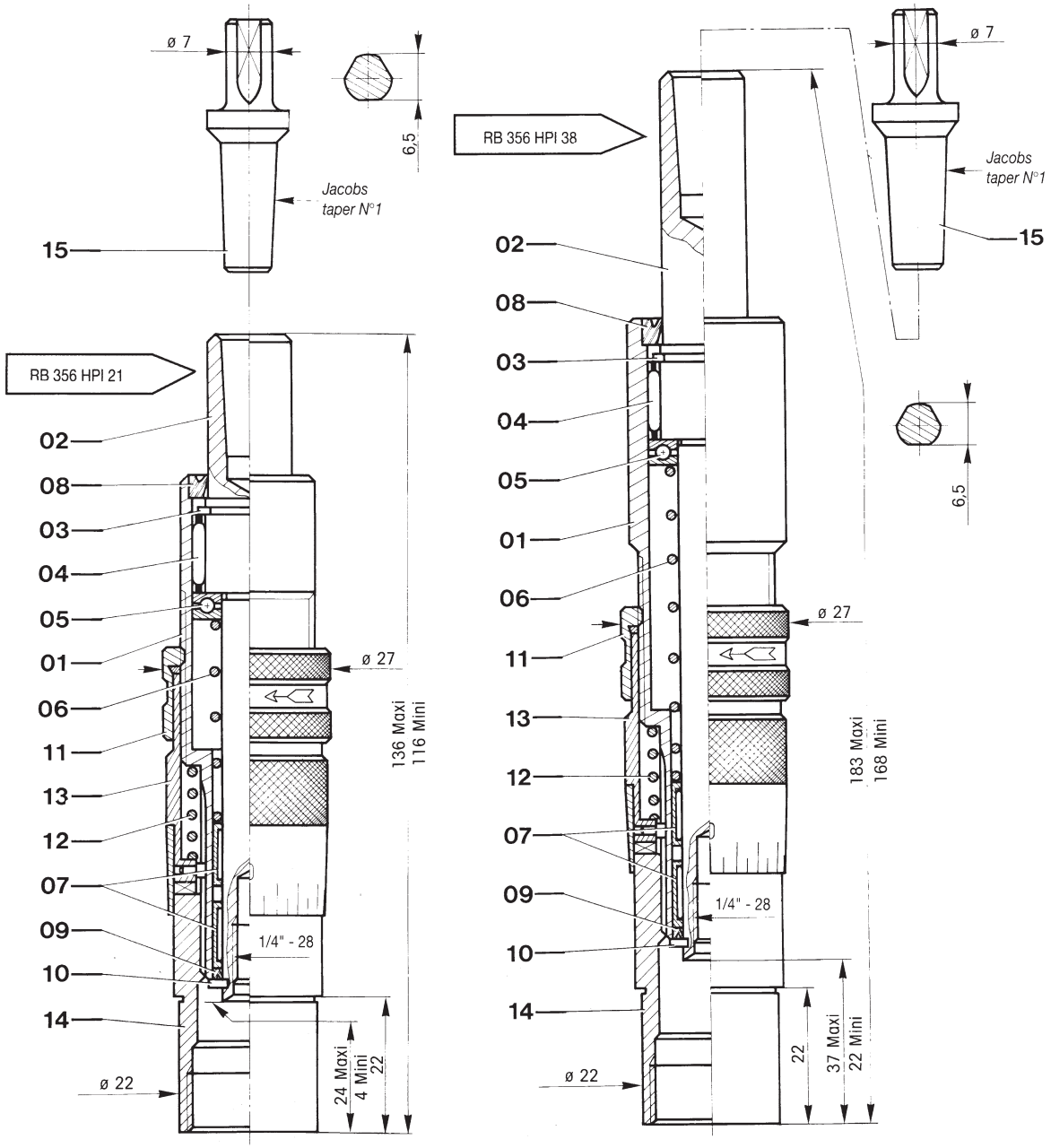
RB 356 HP 38

Basic Drill-Cage + Adaptor	Drill Bush Mounting Base 90.815.120	Mounting Base Flat Bearing 90.815.125	Tripod + 3 Nylon Studs 90.815.165	Threaded Mounting Base 90.815.135	Nylon Nose Piece 90.825.175	Mounting Base Flat Bearing 90.815.070	Microstop Drill-Cage Assembly Codification
•							10.045.000
•	•						10.045.100
•		•					10.045.200
•		•	•				10.045.210
•				•	•		10.045.405
•			•				10.045.505
•						•	10.045.600

For spare parts, please indicate codification number.

Microstop Drill-Cage for Drilling, Reaming & Countersinking

RB 356 HP 21 & RB 356 HP 38 Metric



RB 356 HP 21

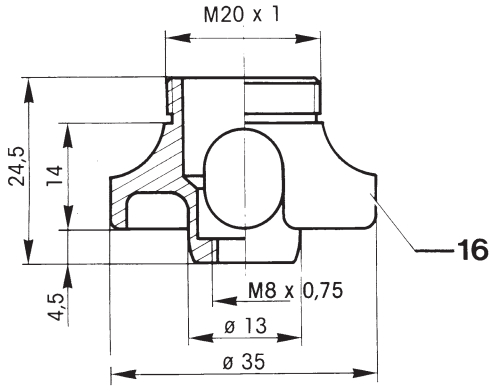
Code Reference	REP Index	NB QTY	Description
90.505.050	01	1	BODY
90.025.065	02	1	SPINDLE
93.605.050	03	1	CIRCLIPS
90.405.170	04	1	NEEDLE CAGE
90.280.035	05	1	BALL THRUST BEARING
93.430.070	06	1	SPRING
90.615.050	07	2	NEEDLE BUSHES
90.230.085	08	1	SEAL RING
90.230.045	09	1	SEAL RING
90.456.030	10	1	CIRCLIPS
90.495.035	11	1	LOCKNUT
93.430.035	12	1	SPRING
94.215.035	13	1	VERNIER ASSEMBLY
90.815.115	14	1	MOUNTING BASE
90.005.010	15	1	ADAPTOR

RB 356 HP 38

Code Reference	REP Index	NB QTY	Description
90.505.045	01	1	BODY
90.025.060	02	1	SPINDLE
93.605.050	03	1	CIRCLIPS
90.405.170	04	1	NEEDLE CAGE
90.280.035	05	1	BALL THRUST BEARING
93.430.065	06	1	SPRING
90.615.050	07	2	NEEDLE BUSHES
90.230.085	08	1	SEAL RING
90.230.045	09	1	SEAL RING
90.456.030	10	1	CIRCLIPS
90.495.035	11	1	LOCKNUT
93.430.035	12	1	SPRING
94.215.035	13	1	VERNIER ASSEMBLY
90.815.065	14	1	MOUNTING BASE
90.005.010	15	1	ADAPTOR

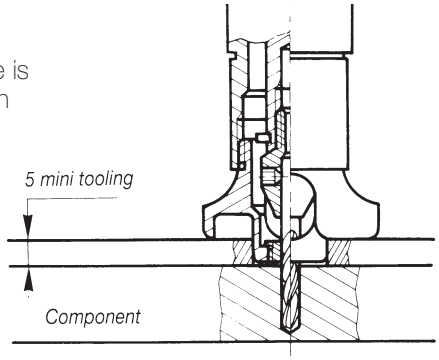
Adaptations

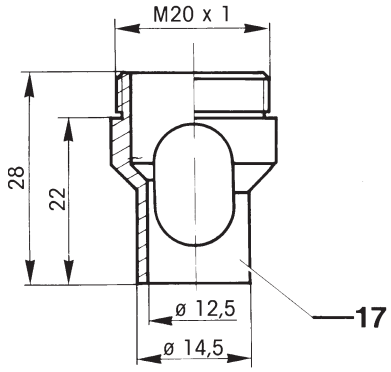
Code Reference	REP Index	NB QTY	Description
90.815.120	16	1	MOUNTING BASE
90.815.125	17	1	MOUNTING BASE
90.815.160	18	1	MOUNTING BASE
90.825.190	19	3	NYLON STUD
94.235.324	20	3	SCREW
94.232.085	21	1	SCREW
90.815.135	22	1	MOUNTING BASE
90.825.175	23	1	NYLON NOSE PIECE
90.815.070	24	1	MOUNTING BASE



Drilling Application

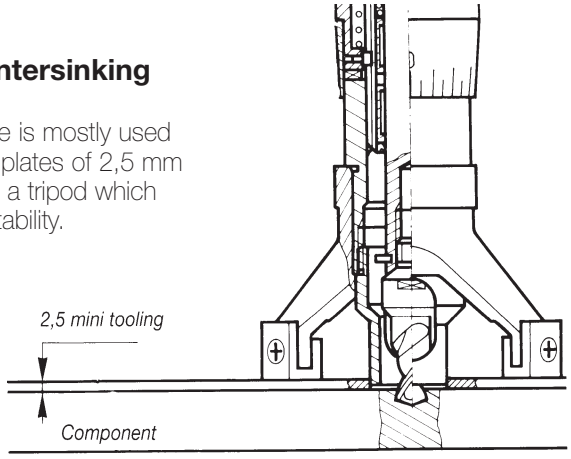
This drill bush mounting base is used with bushes codification number 10.110 + Ø.

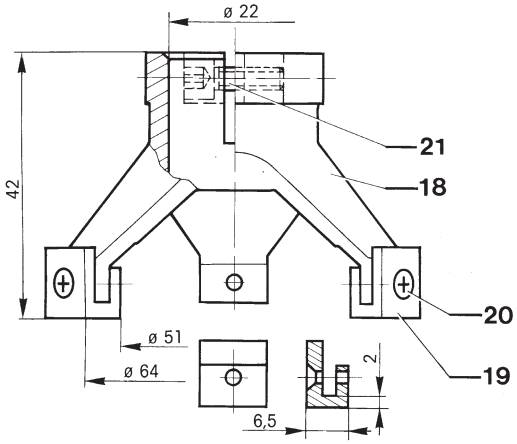




Drilling + Countersinking Application

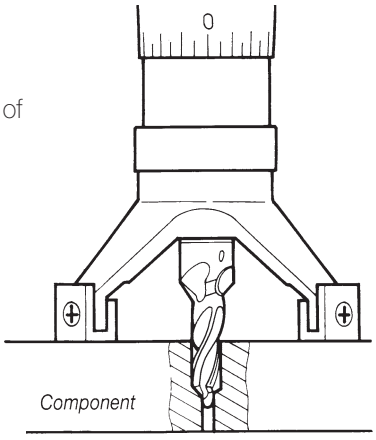
This mounting base is mostly used with aluminum templates of 2,5 mm thickness and with a tripod which ensures a better stability.

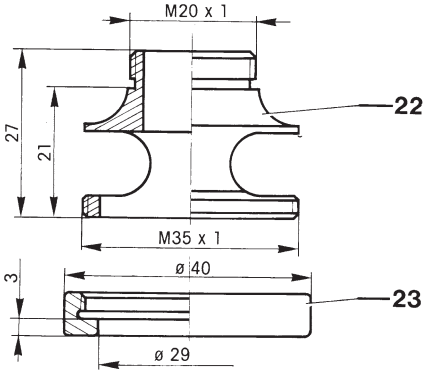


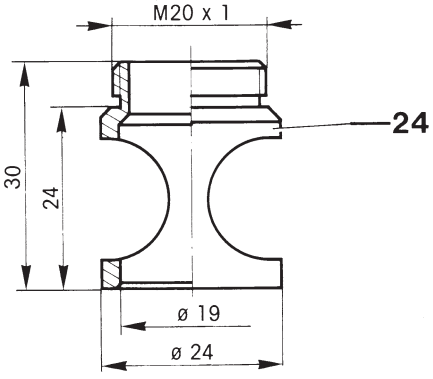


Reaming + Countersinking Application

This tripod is used for reaming + countersinking application. Positioning of the cutter with a pilot in the prehole.







Recoules™

RB 356 HPI 21 & RB 356 HPI 38

1/4” - 28 Inches

Bulk:

RB 356 HPI 21

Tool attachment:	**1/4” - 28 F**
Stroke:	**21 mm - .826”**
Body off:	**Ø 27 mm - 1.063” dia.**
Overall length:	**maxi: 136 mm - 5.354”**
	mini: 116 mm - 4.567”
Weight:	**300 g.**

RB 356 HPI 38

Tool attachment:	**1/4” - 28 F**
Stroke:	**38 mm - 1.500”**
Body off:	**Ø 27 mm - 1.063” dia.**
Overall length:	**maxi: 183 mm - 7.204”**
	mini: 168 mm - 6.614”
Weight:	**375 g.**

Advantages:

- **Mounted on three needle bearings, this high precision drill-cage ensures perfect concentricity.**
- **Removable adaptor with two possibilities of use:**
  A.-Chuck-clamping of the straight shank with three wrench flats,
  B.-Direct fitting on the spindle without using the drill chuck.
  This gives perfect concentricity and noticeably reduces the length and weight of the drill and tool assembly.
  Results are higher performance, improved machining and much less fatigue for the operator.
- **Cemented, hardened and ground chrome-nickel steel spindle mounted on three needle bearings and a ball thrust bearing. Body of specially treated chrome steel.**
- **Ground centring-cone of the cutter (120°) for perfect concentricity.**
- **Microstop depth adjustment: (1 scale division = .001”).**
- **Safety locking ensured by a locknut equipped with a seal. This patented feature allows an easy loosening of the locknut without damage to the drill-cage.**

For Use With Cutters of 1/4” - 28 Ground Thread

On request all our cutter attachments can be 1/4” - 28 thread.

Basic Drill-Cage

Drill Bush Mounting Base 90.815.120

Mounting Base Flat Bearing 90.815.125

Threaded Mounting Base 90.815.135

Mounting Base Flat Bearing 90.815.070

Tripod Fitted with Three Nylon Studs 90.815.165

Nylon Nose Piece Flat Bearing 90.825.175

Available on separate order:

Drill Bush

Spanner for Fitting of Drill Bushes 90.469.020

How to order a drill bush:

example: drill bush of 3,17 mm dia.

A. Basic Code: 10.110

+

B. Bush Dia in 100th of mm: 317

=

10.110.317
Code to indicate

RB 356 HPI 21

Basic Drill-Cage + Adaptor 90.815.120	Drill Bush Mounting Base 90.815.125	Mounting Base Flat Bearing 90.815.165	Tripod + 3 Nylon Studs 90.815.135	Threaded Mounting Base 90.825.175	Nylon Nose Piece 90.815.070	Mounting Base Flat Bearing			Microstop Drill-Cage Assembly Codification
•									10.040.050
•	•								10.040.150
•		•							10.040.250
•		•	•						10.040.260
•				•	•				10.040.455
•			•						10.040.555
•						•			10.040.650

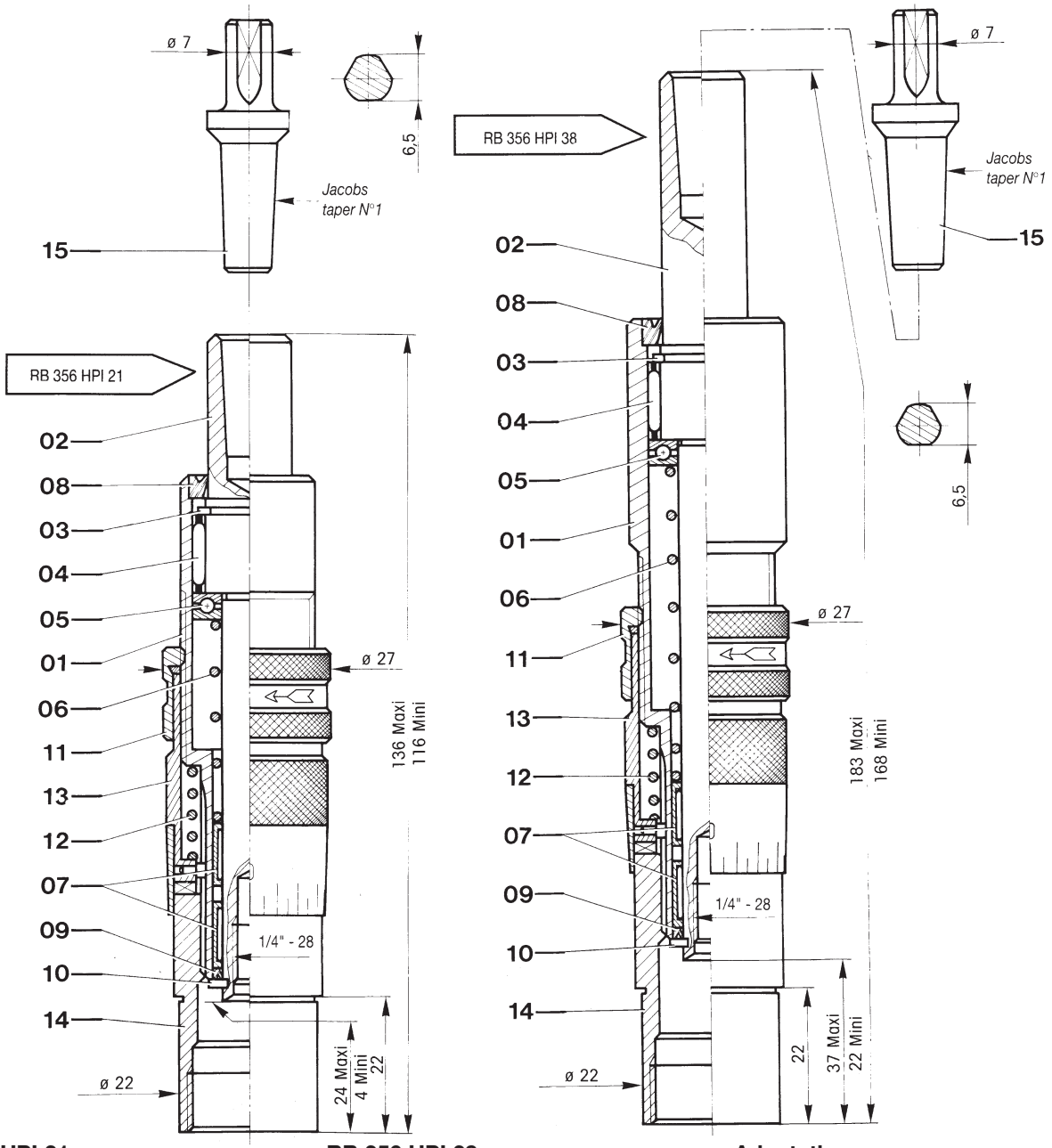
RB 356 HPI 38

Basic Drill-Cage + Adaptor 90.815.120	Drill Bush Mounting Base 90.815.125	Mounting Base Flat Bearing 90.815.165	Tripod + 3 Nylon Studs 90.815.135	Threaded Mounting Base 90.825.175	Nylon Nose Piece 90.815.070	Mounting Base Flat Bearing			Microstop Drill-Cage Assembly Codification
•									10.045.050
•	•								10.045.150
•		•							10.045.250
•		•	•						10.045.260
•				•	•				10.045.455
•			•						10.045.555
•						•			10.045.650

For spare parts, please indicate codification number.

Microstop Drill-Cage for Drilling, Reaming & Countersinking

RB 356 HPI 21 & RB 356 HPI 38 Inches



RB 356 HPI 21

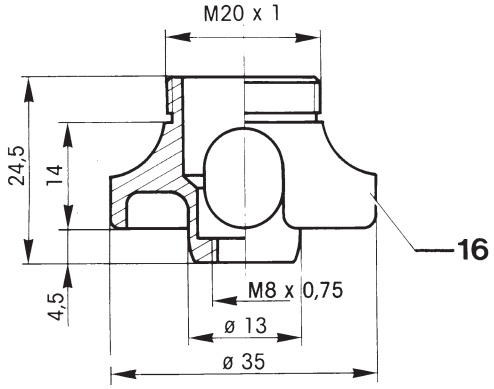
Code Reference	REP Index	NB QTY	Description
90.505.050	01	1	BODY
90.025.066	02	1	SPINDLE
93.605.050	03	1	CIRCLIPS
90.405.170	04	1	NEEDLE CAGE
90.280.035	05	1	BALL THRUST BEARING
93.430.070	06	1	SPRING
90.615.050	07	2	NEEDLE BUSHES
90.230.085	08	1	SEAL RING
90.230.045	09	1	SEAL RING
90.456.030	10	1	CIRCLIPS
90.495.035	11	1	LOCKNUT
93.430.035	12	1	SPRING
94.215.035	13	1	VERNIER ASSEMBLY
90.815.115	14	1	MOUNTING BASE
90.005.010	15	1	ADAPTOR

RB 356 HPI 38

Code Reference	REP Index	NB QTY	Description
90.505.045	01	1	BODY
90.025.070	02	1	SPINDLE
93.605.050	03	1	CIRCLIPS
90.405.170	04	1	NEEDLE CAGE
90.280.035	05	1	BALL THRUST BEARING
93.430.065	06	1	SPRING
90.615.050	07	2	NEEDLE BUSHES
90.230.085	08	1	SEAL RING
90.230.045	09	1	SEAL RING
90.456.030	10	1	CIRCLIPS
90.495.035	11	1	LOCKNUT
93.430.035	12	1	SPRING
94.215.035	13	1	VERNIER ASSEMBLY
90.815.065	14	1	MOUNTING BASE
90.005.010	15	1	ADAPTOR

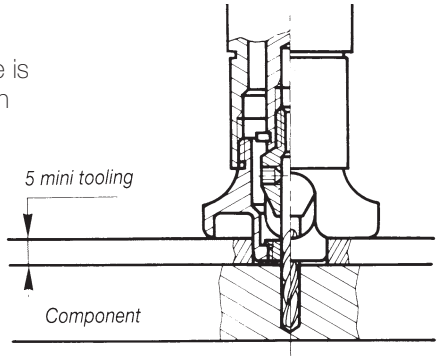
Adaptations

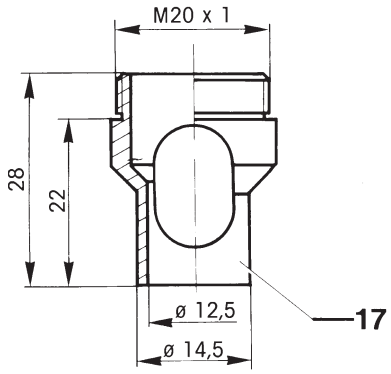
Code Reference	REP Index	NB QTY	Description
90.815.120	16	1	MOUNTING BASE
90.815.125	17	1	MOUNTING BASE
90.815.160	18	1	MOUNTING BASE
90.825.190	19	3	NYLON STUD
94.235.324	20	3	SCREW
94.232.085	21	1	SCREW
90.815.135	22	1	MOUNTING BASE
90.825.175	23	1	NYLON NOSE PIECE
90.815.070	24	1	MOUNTING BASE



Drilling Application

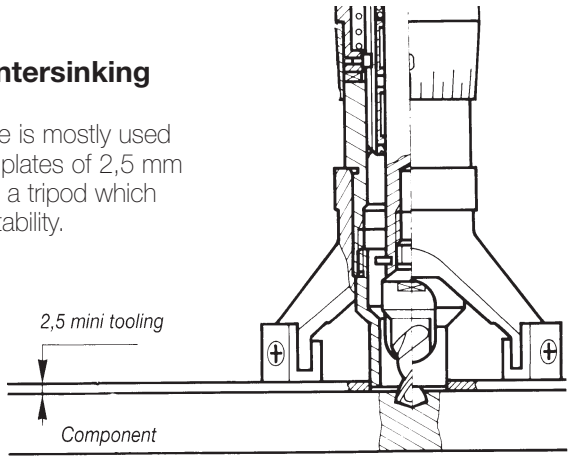
This drill bush mounting base is used with bushes codification number 10.110 + Ø.

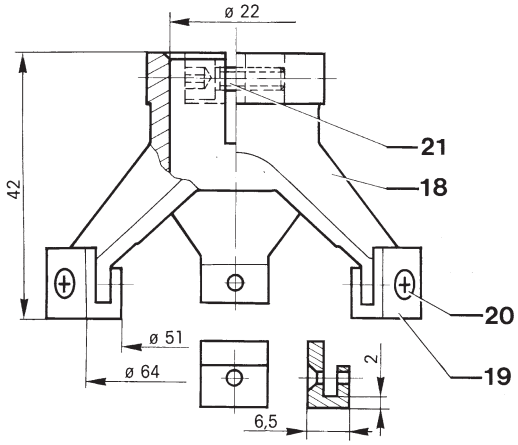




Drilling + Countersinking Application

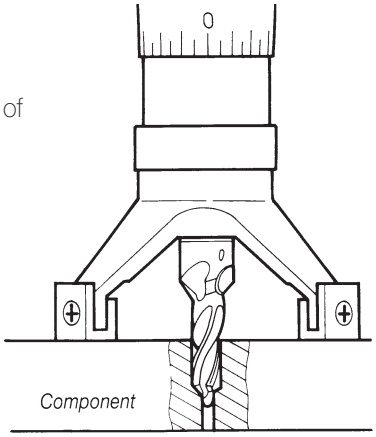
This mounting base is mostly used with aluminum templates of 2,5 mm thickness and with a tripod which ensures a better stability.

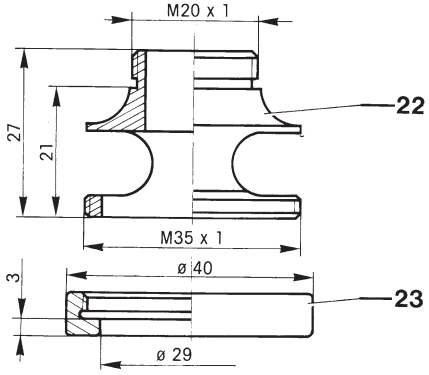


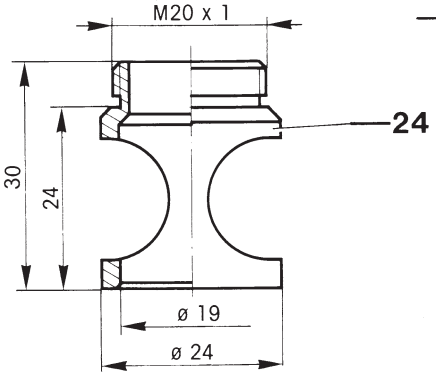


Reaming + Countersinking Application

This tripod is used for reaming + countersinking application. Positioning of the cutter with a pilot in the prehole.







Microstop Drill-Cage for Drilling, Reaming & Countersinking

RB 356 HP 58 Metric

Recoules™

RB 356 HP 58

M10 x 1 Metric

Special for Drill Countersinking Reamers and Taper-Lok Cutters

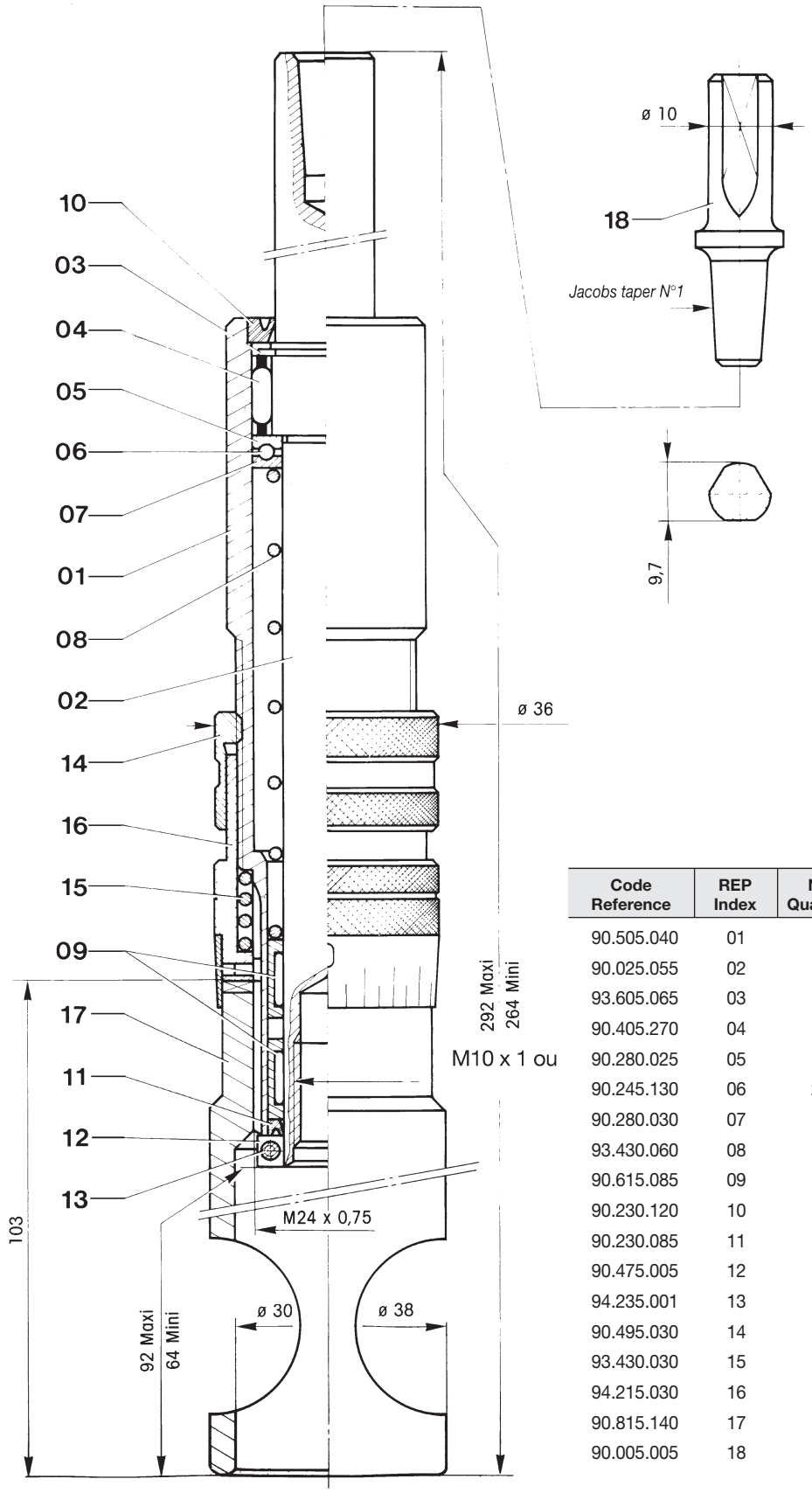
Bulk:

Tool attachment:-M10 x 1
Stroke:-58 mm - 2.283”
Body off:-Ø 38 mm - 1.5” dia
Overall length:-
maxi: 292 mm - 11.5”
mini: 264 mm - 10.4”
Weight:-970 g.

Code number:-10.050.000

Advantages:

- **Mounted on three needle bearings, this high precision drill-cage ensures perfect concentricity.**
- **It has been specially designed for drilling, reaming and countersinking operations.**
- **Removable adaptor with two possibilities of use:**
  A.-Chuck clamping of the straight shank with 3 wrench flats,
  B.-Direct fitting on the spindle without using the drill chuck.
  This gives perfect concentricity and noticeably reduces the length and weight of the drill-and-tool assembly.
  Results are higher performance, improved machining and much less fatigue for the operator.
- **Cemented, hardened and ground chrome-nickel steel spindle mounted on three needle bearings and a ball thrust bearing.**
- **Body of specially treated chrome steel fully ground throughout.**
- **Ground centring-cone of the cutter (120°) for perfect concentricity.**
- **Microstop depth adjustment: (1 scale division = .001”).**
- **Safety locking ensured by a locknut equipped with a seal.**
  This patented feature allows an easy loosening of the locknut without damage to the drill-cage.



Code Reference	REP Index	NB Quantity	Description
90.505.040	01	1	BODY
90.025.055	02	1	SPINDLE
93.605.065	03	1	CIRCLIPS
90.405.270	04	1	NEEDLE CAGE
90.280.025	05	1	BALL THRUST BEARING
90.245.130	06	23	BALL 2,5 MM DIA.
90.280.030	07	1	BALL THRUST BEARING
93.430.060	08	1	SPRING
90.615.085	09	2	NEEDLE BUSHES
90.230.120	10	1	SEAL RING
90.230.085	11	1	SEAL RING
90.475.005	12	1	COLLAR
94.235.001	13	1	SCREW
90.495.030	14	1	LOCKNUT
93.430.030	15	1	SPRING
94.215.030	16	1	VERNIER ASSEMBLY
90.815.140	17	1	MOUNTING BASE
90.005.005	18	1	ADAPTOR

For spare parts, please indicate codification number.

Recoules™

RB 356 HPI 58

7/16” - 20 F Inches

Special for Drill Countersinking Reamers and Taper-Lok Cutters

Bulk:

Tool attachment:-7/16” - 20 F
Stroke:-58 mm - 2.283”
Body off:-Ø 38 mm - 1.5” dia
Overall length:-
maxi: 292 mm - 11.5”
mini: 264 mm - 10.4”
Weight:-970 g.

Code number:-10.050.050

Advantages:

- **Mounted on three needle bearings, this high precision drill-cage ensures perfect concentricity.**
- **It has been specially designed for drilling, reaming and countersinking operations.**
- **Removable adaptor with two possibilities of use:**
  A.-Chuck clamping of the straight shank with 3 wrench flats,
  B.-Direct fitting on the spindle without using the drill chuck.
  This gives perfect concentricity and noticeably reduces the length and weight of the drill-and-tool assembly.
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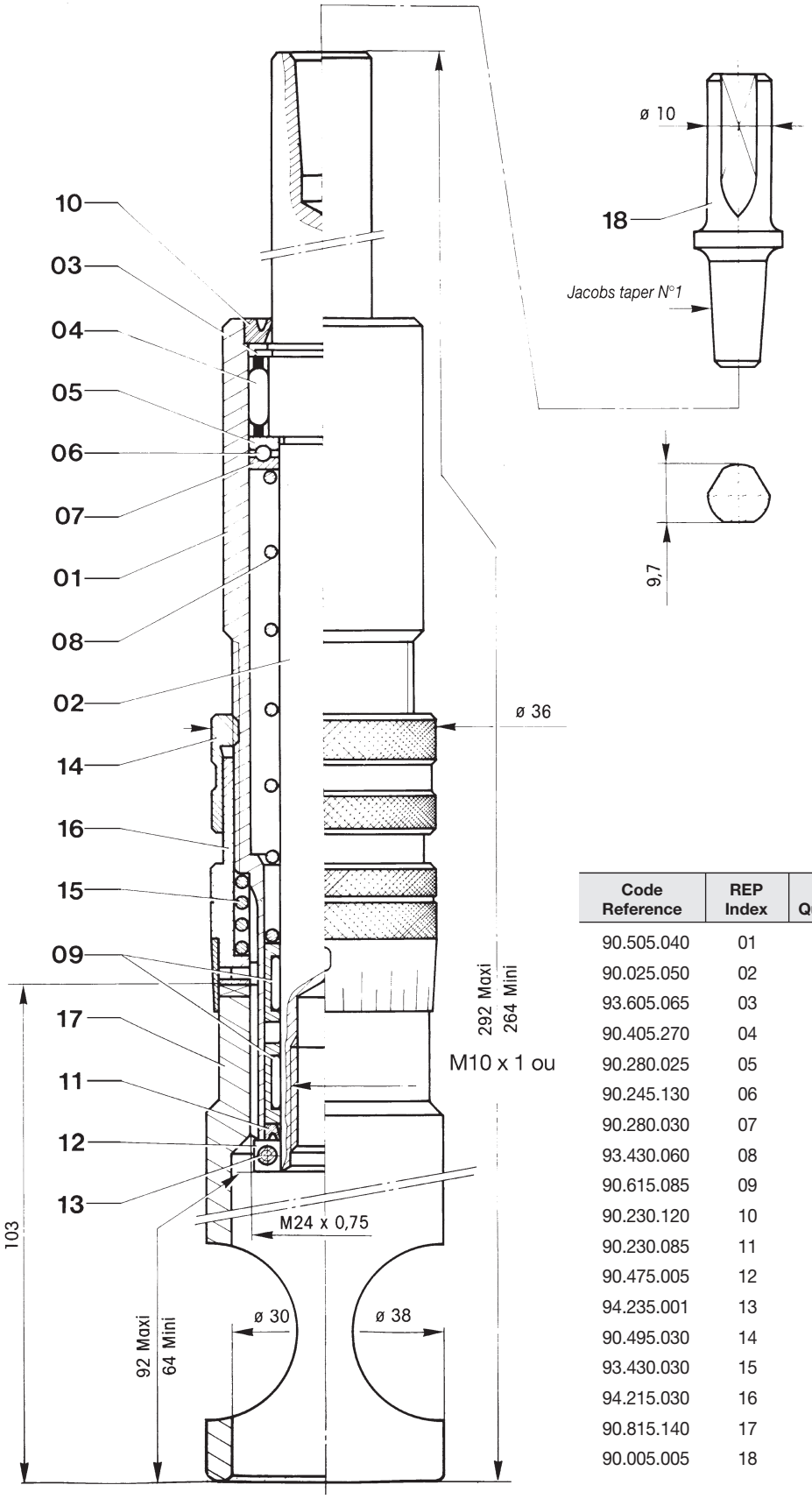

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For spare parts, please indicate codification number.

Recoules Quackenbush® Cleco® DOTCO® APEX®

Power Tools Sales & Service Centers

Please note that all locations may not service all products.
Please contact the nearest Apex Tool Group Sales & Service Center for the appropriate facility to handle your service requirements.

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