Right Angle Positive Feed Tools
ADVANCED DRILLING EQUIPMENT
Our positive feed drill motors are available in both in-line and right angle configurations (please also see the in-line tool section). The right angle tools are rapidly growing in popularity due to their compact size, light weight and ease of operation.

In-line drills have a limited stroke, but with a right angle drill a deeper stroke can be achieved by simply applying a longer spindle and nosepiece. In addition, the fixtures do not have to be as robust with a right angle drill, which represents a significant cost savings. The tools themselves weigh less and in use are closer to the fixture, resulting in less deflection of the fixture. Right angle tools have also been shown to reduce operator fatigue.

In general, positive feed drills are used for the larger holes and heavier structures in the aircraft industry such as the spars and the ribs, primarily in landing gear, wing and fuselage joins.

Positive feed drills produce a hole in a predictable and constant time. With each revolution of the spindle, the cutter travels a precise distance, i.e., one-thousandth of an inch or three-thousandths of an inch depending on the settings. This is true whether the tool is drilling air or drilling a tough alloy. The benefit is that burrs caused by surging of the cutter on the exit side of the cycle are virtually eliminated.

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.

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

**How Positive Feed Right Angle Drills Operate**

The fixed rate of spindle advancement (feed) for each rotation of the drill spindle in right angle tools is accomplished by differential gearing. The spindle of a right angle drill has external left-hand threads and four drive grooves that run the length of the spindle. The spindle fits into and through two gears: the spindle drive gear and the spindle feed gear.

The spindle drive gear has internal male splines that engage the drive grooves on the spindle. When the air motor is turned on, the spindle drive gear rotates, turning the spindle.

The spindle feed gear is threaded internally to match the external thread of the spindle, and its function is to
advance or retract the spindle. When this gear rotates faster than the spindle, the spindle will feed. When it stops, the spindle will retract. The desired feed rate is obtained by the differential gear ratio between the spindle drive and spindle feed gears.

At the completion of the drilling cycle, the feed stop collar contacts the feed engagement lever, lifting the differential feed gear and locking it in a stationary position. With the spindle continuing to rotate in a forward direction and the spindle feed gear held stationary, the spindle automatically retracts. This action occurs approximately three times faster than the advancement cycle. Depending on the positive feed model selected, the tool is shut down either manually or automatically.

**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 tool 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.

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

<table>
<thead>
<tr>
<th>Drill Bushing Tip Series</th>
<th>A</th>
<th>B</th>
<th>Tool Nose Thread (I.D.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>21000</td>
<td>.312</td>
<td>.625</td>
<td>3/4–16</td>
</tr>
<tr>
<td>22000</td>
<td>.609</td>
<td>.922</td>
<td>1–14</td>
</tr>
<tr>
<td>23000</td>
<td>.734</td>
<td>1.047</td>
<td>1 1/4–12</td>
</tr>
<tr>
<td>24000</td>
<td>.859</td>
<td>1.172</td>
<td>1 1/2–12</td>
</tr>
<tr>
<td>25000</td>
<td>None</td>
<td>1.562</td>
<td>2–16</td>
</tr>
</tbody>
</table>
Right Angle Tools

QUACKENBUSHTM

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 direction 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

<table>
<thead>
<tr>
<th>Model</th>
<th>Motor Configuration</th>
<th>HP</th>
<th>Max. Stroke</th>
<th>Weight</th>
<th>Max. Length</th>
<th>Spindle Speeds</th>
<th>Feed Per Revolution</th>
<th>Inlet</th>
<th>Min. Hose</th>
</tr>
</thead>
<tbody>
<tr>
<td>932QR</td>
<td>Right Angle</td>
<td>0.9</td>
<td>No Limit</td>
<td>5.8</td>
<td>2.2</td>
<td>13.92 354</td>
<td>450, 800, 4500</td>
<td>.0005, .001, .002, .003, .004, .006</td>
<td>.013, .03, .05, .07, .10, .15</td>
</tr>
<tr>
<td>932QR</td>
<td>Right Angle</td>
<td>1.3</td>
<td>No Limit</td>
<td>5.8</td>
<td>2.2</td>
<td>13.92 354</td>
<td>1300, 1600, 2000, 3200</td>
<td>.0005, .001, .002, .003, .004, .006</td>
<td>.013, .03, .05, .07, .10, .15</td>
</tr>
<tr>
<td>942QR</td>
<td>Right Angle</td>
<td>0.9</td>
<td>No Limit</td>
<td>5.8</td>
<td>2.2</td>
<td>13.92 354</td>
<td>450, 800, 4500</td>
<td>.0005, .001, .002, .003, .004, .006</td>
<td>.013, .03, .05, .07, .10, .15</td>
</tr>
<tr>
<td>942QR</td>
<td>Right Angle</td>
<td>1.3</td>
<td>No Limit</td>
<td>5.8</td>
<td>2.2</td>
<td>13.92 354</td>
<td>1300, 1600, 2000, 3200</td>
<td>.0005, .001, .002, .003, .004, .006</td>
<td>.013, .03, .05, .07, .10, .15</td>
</tr>
</tbody>
</table>

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.
### Right Angle Tools

**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: 450 RPM, 1300 RPM
    - 1.3 Nominal HP: 800 RPM, 1600 RPM, 4500 RPM, 2000 RPM, 3200 RPM
- **Feed Rate**
  - 05 = .0005 IPR
  - 10 = .001 IPR
  - 20 = .002 IPR
  - 30 = .003 IPR
  - 40 = .004 IPR
  - 60 = .006 IPR
- **Motor Stop**
  - MS = Motor Stop 932QR
  - DS = Depth Sensing 942QR

**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**


## Quackenbush 932QR & 942QR Tool Noses & Spindle Assemblies

- When ordering a tool, specify one nose and spindle assembly from chart below.
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- 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

<table>
<thead>
<tr>
<th>bushing thread</th>
<th>length x</th>
<th>part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>.75 - 16 un lh</td>
<td>3.0&quot;</td>
<td>614905</td>
</tr>
<tr>
<td>.75 - 16 un lh</td>
<td>4.0&quot;</td>
<td>614824</td>
</tr>
<tr>
<td>1&quot; -14 un lh</td>
<td>3.0&quot;</td>
<td>624812</td>
</tr>
<tr>
<td>1&quot; -14 un lh</td>
<td>4.75&quot;</td>
<td>614814</td>
</tr>
</tbody>
</table>

### Fluid Spindle Assemblies

<table>
<thead>
<tr>
<th>stroke</th>
<th>cutter end</th>
<th>part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.25&quot;</td>
<td>.375&quot; - 24</td>
<td>22005592</td>
</tr>
<tr>
<td>2.25&quot;</td>
<td>.375&quot; - 24</td>
<td>22005592</td>
</tr>
<tr>
<td>3.00&quot;</td>
<td>.375&quot; - 24</td>
<td>22005594</td>
</tr>
</tbody>
</table>

### Adapter Kits

<table>
<thead>
<tr>
<th>description</th>
<th>part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>convert inline tool to right angle</td>
<td>92050932</td>
</tr>
<tr>
<td>convert right angle tool to inline</td>
<td>92050952</td>
</tr>
</tbody>
</table>
15QDA-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 accommodate 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 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.
- 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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Motor Configuration</th>
<th>Maximum Stroke</th>
<th>Weight</th>
<th>Maximum Length</th>
<th>Spindle Speeds</th>
<th>Feed Per Revolution</th>
<th>Inlet</th>
<th>Minimum Hose Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>15QD-RAB-SU-RS</td>
<td>Right Angle</td>
<td>No Limit</td>
<td>5</td>
<td>2.27</td>
<td>13 3/8, 34</td>
<td>165, 265, 335, 465, 660, 1000, 1650</td>
<td>.0005, .001, .002, .003, .006</td>
<td>.375” NPT</td>
</tr>
</tbody>
</table>

EXTRA EQUIPMENT:
- Tool Noses, Spindles.
- Rated tool performance at 90 PSI measured at tool inlet with motor running.
- When selecting speeds and feeds, see page I-5.
- Mist lubricator – 631889
- SEE PAGES I-11–I-13 FOR SAFETY PRECAUTIONS.
- SEE PAGE 2-22 – 2-25 FOR TOOLING ACCESSORIES.

WHEN ORDERING TOOL:
- Tool nose and spindle must be specified. Other tool noses and spindles are available at extra charge – see page 2-26.
Right Angle Tools

SPINDLES (Select One)

<table>
<thead>
<tr>
<th>Spindle Type</th>
<th>Length</th>
<th>Max. Stroke</th>
<th>Thread Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid</td>
<td>4&quot;</td>
<td>1.12&quot;</td>
<td>.25&quot;-28 Internal Thread</td>
<td>623266</td>
</tr>
<tr>
<td></td>
<td>(101mm)</td>
<td>(29mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid</td>
<td>4&quot;</td>
<td>1.12&quot;</td>
<td>.375&quot;-24 Internal Thread with Counterbore</td>
<td>615915</td>
</tr>
<tr>
<td></td>
<td>(101mm)</td>
<td>(29mm)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fluid Swivel (631256) used with Oil Hole Spindles, and selection of Fluid Chucks. (See page 2-28)

Fluid Chucks used with .375 -24 Internal Thread Spindles.

Other Noses and Spindles are available as required (see page 2-24).

Nose Indexer (631249). New design 641244.

Order Tool Nose Adapter (614722) to attach S125 & S300 Tool Noses (1.75" O.D.) and accessories. (See page 2-26)

Order Tool Nose Adapter (614973) to attach S150 & S275 Tool Noses (2" O.D.) and accessories (See page 2-26)

Order Chuck Adapter (619136) when utilizing 3-jaw chuck with .375 -24 Internal Thread Spindles.
15QDA-RAB-SU-RS-RF Series Back Spotfacer

Stroke:
- Min. - .375" (9.5mm)
- Max. - Unlimited

- 15 series motor develops 1.0 nominal horsepower.
- Right angle tool designed for close quarter operation.
- Stroke is adjustable by positioning the stop collar.
- Spindle continues to rotate in forward direction on return stroke.
- 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.
- Spindle guard protects operator.

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 1-5.
SEE PAGES I-11–I-13 FOR SAFETY PRECAUTIONS.
SEE PAGE 2-22 – 2-25 FOR TOOLING ACCESSORIES.

<table>
<thead>
<tr>
<th>Model</th>
<th>Motor Configuration</th>
<th>Maximum Stroke</th>
<th>Weight</th>
<th>Maximum Length</th>
<th>Spindle Speeds</th>
<th>Feed Per Revolution</th>
<th>Inlet</th>
<th>Minimum Hose Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>15QDA-RAB-SU-RS-RF</td>
<td>Right Angle</td>
<td>No Limit</td>
<td>5</td>
<td>13.75</td>
<td>160, 265, 335, 465, 660, 1000, 1650</td>
<td>.0005, .001, .002, .003</td>
<td>.375&quot; NPT</td>
<td></td>
</tr>
</tbody>
</table>

15QDA-RAB-SU-RS-RF Right Angle
STANDARD EQUIPMENT
Specify nose and spindle when ordering.

ALUMINUM TOOL NOSE

<table>
<thead>
<tr>
<th>Length</th>
<th>Thread</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.875 in. (175mm)</td>
<td>.75 - 16LH</td>
<td>619954</td>
</tr>
<tr>
<td>7.125 in. (181mm)</td>
<td>1 - 14LH</td>
<td>619955</td>
</tr>
<tr>
<td>7.125 in. (181mm)</td>
<td>1.25 - 12LH</td>
<td>619953</td>
</tr>
</tbody>
</table>

SPINDLE

THREAD: .5-22 R.H. Thread
INTERNAL THREAD: .375 - 24 with Counterbore
MAX. STROKE: 3.626" (92MM)
PART NO: 624146-7
140QGDA-RA-SU-MS Series

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

Stroke:
- Min. – .3125" (8mm)
- Max. – Unlimited

- 140 series motor develops 1.4 nominal horsepower.
- Single push-button starts motor and engages drill feed mechanism.
- Stroke is adjustable by positioning the stop collar.
- 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.
- 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.
- Emergency push-button stops motor and disengages drill feed mechanism.

<table>
<thead>
<tr>
<th>Model</th>
<th>Motor Configuration</th>
<th>Maximum Stroke</th>
<th>Weight</th>
<th>Maximum Length</th>
<th>Spindle Speeds</th>
<th>Feed Per Revolution</th>
<th>Inlet</th>
<th>Minimum Hose Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>140QGDA-RA-SU-MS</td>
<td>Right Angle</td>
<td>No Limit</td>
<td>10.75</td>
<td>4.88</td>
<td>95, 150, 200, 260, 380, 580, 1000</td>
<td>.0005, .001, .002, .003, .006</td>
<td>.375&quot; NPT</td>
<td>.5&quot;</td>
</tr>
<tr>
<td>140QDA-RA-SU-MS</td>
<td>Right Angle</td>
<td>No Limit</td>
<td>10.75</td>
<td>4.88</td>
<td>1,400</td>
<td>.0005, .001, .002, .003, .006</td>
<td>.375&quot; NPT</td>
<td>.5&quot;</td>
</tr>
</tbody>
</table>

EXTRA EQUIPMENT:
Noses and spindles must be specified when ordering.
Rated tool performance at 90 PSI measured at tool inlet with motor running.
When selecting speeds and feeds, see page 1-5.
SEE PAGES I-11-I-13 FOR SAFETY PRECAUTIONS.
SEE PAGE 2-22 – 2-25 FOR TOOLING ACCESSORIES.

WHEN ORDERING TOOL:
Tool nose and spindle must be specified. Standard tool noses, spindle guard and spindle are provided when ordered with tool. Select one tool nose and one spindle. Other tool noses and spindles are available at extra charge – see page 2-26.
**Right Angle Tools**

**SPINDLES (Select One)**

<table>
<thead>
<tr>
<th>Spindle Type</th>
<th>Length</th>
<th>Max. Stroke</th>
<th>Thread Description</th>
<th>Spindle Part No.</th>
<th>Spindle Guard No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid</td>
<td>6&quot;</td>
<td>2.75&quot;</td>
<td>.375&quot;-24 Internal Thread</td>
<td>615747</td>
<td>624342</td>
</tr>
<tr>
<td></td>
<td>(152mm)</td>
<td>(70mm)</td>
<td>with Counterbore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil Hole</td>
<td>6&quot;</td>
<td>2.75&quot;</td>
<td>.375&quot;-24 Internal Thread</td>
<td>623812</td>
<td>624332</td>
</tr>
<tr>
<td></td>
<td>(152mm)</td>
<td>(70mm)</td>
<td>with Counterbore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**STANDARD SMALL SPINDLES**

- 6" (152mm) with Counterbore

**STEEL TOOL NOSES (Select One)**

<table>
<thead>
<tr>
<th>Dia.</th>
<th>Length</th>
<th>&quot;C&quot; Thread</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1875&quot; (30mm)</td>
<td>5&quot; (127mm)</td>
<td>.75&quot;-16 L.H.</td>
<td>614919</td>
</tr>
</tbody>
</table>

**STANDARD TOOL NOSES**

<table>
<thead>
<tr>
<th>Dia.</th>
<th>Length</th>
<th>&quot;C&quot; Thread</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1875&quot; (30mm)</td>
<td>5&quot; (127mm)</td>
<td>.75&quot;-16 L.H.</td>
</tr>
</tbody>
</table>

**Fluid Swivel (631256)** used with Oil Hole Spindles, and selection of Fluid Chucks. (See page 2-25)

**Fluid Chucks used with .375 -24 Internal Thread Spindles.**

**Other Noses and Spindles are available as required (see pg. 2-26).**

**Nose Indexer (631864).** New design 641267.

- Order Tool Nose Adapter (629222) to attach S125 & S300 Tool Noses (1.75" O.D.) and accessories. (See page 2-24)
- Order Tool Nose Adapter (629224) to attach S150 & S275 Tool Noses (2" O. D.) and accessories (See page 2-24)
- Order Chuck Adapter (619136) when utilizing 3-jaw chuck with .375 -24 Internal Thread Spindles.
Right Angle Tools

904QR

Capacity (Diameter):
- Aluminum – .80” (20mm)
- Titanium – .63” (16mm)

- Very lightweight and compact
- Powerful 1.6 HP Motor yet compact
- Only .80 from centerline to side of Angle Head
- For straight hole applications

- Easy to setup and operate
- Automatic Retract
- Standard Quackenbush motor

- Variety of speeds, and feed rates
- All control valves in one module
- Thru-spindle cutter lubrication

- Bayonet or Taperlock Fixturing
- Concentric Collet - see page 6-8
- Handle for convenient handling

- Options:
  - Nosepiece Indexer - easy to operate to orient clamp up
  - Precision Depth Control - contact Factory
  - Telescoping Spindle for limited access areas
  - Concentric collet

<table>
<thead>
<tr>
<th>Model</th>
<th>Spindle Speed</th>
<th>Feed Rate (rev)</th>
<th>Stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>in.</td>
<td>mm</td>
<td>in.</td>
</tr>
<tr>
<td>904QR</td>
<td>175, 350</td>
<td>.001</td>
<td>0.025</td>
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<td></td>
<td>525, 700</td>
<td>.002</td>
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<td>1100, 1500</td>
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<td>0.075</td>
</tr>
<tr>
<td></td>
<td>1750</td>
<td>.004</td>
<td>0.100</td>
</tr>
</tbody>
</table>

Spindle Termination
- 3/8" Geared Chuck
- 5/16" - 24 Int’l Thread, 120 Taper
- 3/8" - 24 Int’l Thread, 120 Taper
- 7/16" - 20 Int’l Thread, 120 Taper

Note: All threaded spindles provide for thru-the-spindle cutter lubrication.

Nosepiece Termination

Bayonet Nosepieces - pages 6-6
- None, M28 x 150 LH Internal Nosepiece Thread
- Bayonet Nosepiece Code.
- Specify Shank Diameter & Cutter Guide Diameter.
- Example: 20 mm Shank Diameter
  12.57 Cutter Guide Diameter

Note: Use threaded spindle terminations for Nosepieces P.

Taperlock Nosepieces - pages 2-20
- 22000 Taperlock (1.000-14 LH)
- 23000 Taperlock (1.250-12 LH)
- 24000 Taperlock (1.500-12 LH)
- None, 1.000-20 LH Ext’l Mounting Thread
- None, 1.562-20-14 LH Int’l Mounting Thread
- None, 1.825-18 LH Ext’l Mounting Thread

<table>
<thead>
<tr>
<th>Bayonet Nosepiece Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
</tr>
<tr>
<td>44</td>
</tr>
<tr>
<td>59</td>
</tr>
<tr>
<td>64</td>
</tr>
<tr>
<td>69</td>
</tr>
<tr>
<td>74</td>
</tr>
</tbody>
</table>

Taperlock Nosepiece Length
- See page 2-22: Select nosepiece length appropriate to Taperlock Series.
Right Angle Tools

SPECIFICATIONS:
- Air Inlet = 3/8" BSP
- Power = 1.2 KW (1.6 HP)
- Depth Repeatability = 0.025 mm (.001 inch) with Depth Sensing Nosepiece
- Weight = 5.9 Kg (13.2 lb) with typical spindle and nosepiece
- Spindle Offset = 20 mm (0.80 Inch)
- Air Consumption = 1550 L/Min (55 CFM)
- Noise = 80 dBa

Bayonet Nosepiece

Concentric Collet
See page 6-8 for 20904 with Concentric Collet and Depth Sensing.

Taperlock Nosepieces
Quackerbush Nosepieces are provided to utilize Taperlock Bushing Tips. Taperlock Series must be specified for details, see pages 1-3 and 2-20.

Setup
1. Install cutter; verify cutter guide bushings are correct size.
2. Adjust stroke by removing spindle guard, rotating End Stop and tighten Lock Screws.
3. Adjust Drill Point Lubricator to give desired flow rate.
4. (Option) Depress Indexer Lever and rotate Nosepiece to give optimum orientation.

Operation
1. Set Nosepiece into fixture and rotate to lock.
2. Push Slide Valve forward: motor starts, spindle rotates but does not advance.
3. Push Feed Button - spindle/cutter moves at fixed feed rate.
4. At end of stroke, spindle/cutter automatically returns to start position and motor stops.
5. Pull Slide Valve rearward - motor stops.

At all times Verify that Guards are in place and secure. Operators must understand and follow Safety Practices - See Pages I-11.
158QGD-15RAB-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 accommodate 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 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.
- 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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Motor Configuration</th>
<th>Maximum Stroke</th>
<th>Weight</th>
<th>Maximum Length</th>
<th>Spindle Speeds</th>
<th>Feed Per Revolution</th>
<th>Inlet</th>
<th>Minimum Hose Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>158QGD-15RAB-SU-RS</td>
<td>Right Angle</td>
<td>No Limit</td>
<td>9.25</td>
<td>16 / 16</td>
<td>550, 1000, 2000, 3000</td>
<td>.0005, .001, .002, .003</td>
<td>.375&quot; NPT</td>
<td>.5&quot;</td>
</tr>
</tbody>
</table>

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 I-5.
SEE PAGES I-11–I-13 FOR SAFETY PRECAUTIONS.
SEE PAGE 2-20 – 2-23 FOR TOOLING ACCESSORIES.

WHEN ORDERING TOOL:
Select one tool nose and one spindle. Other tool noses and spindles are available at extra charge — see page 2-24.
Order Tool Nose Adapter (614722) to attach S125 & S300 Tool Noses (1.75" O.D.) and accessories. (See page 2-26)

Order Tool Nose Adapter (614973) to attach S150 & S275 Tool Noses (2" O.D.) and accessories. (See page 2-26)

Order Chuck Adapter (619136) when utilizing 3-jaw chuck with .375 -24 Internal Thread Spindles.

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. (See page 2-25)

Other Noses and Spindles are available as required. (See page 2-26)

Nose Indexer (631249). New design 641244.
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

- 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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Motor Configuration</th>
<th>Maximum Stroke</th>
<th>Weight</th>
<th>Spindle Speeds</th>
<th>Feed Per Revolution</th>
<th>Inlet</th>
<th>Minimum Hose Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>158QGDA-RAD-SU-RS</td>
<td>Right Angle</td>
<td>No Limit</td>
<td>12.5</td>
<td>47, 56, 70, 94, 110, 120, 140, 185, 194, 230, 288, 380, 388, 460, 485, 570, 760, 950</td>
<td>.0005, .001, .002, .0035, .0055, .0075</td>
<td>.375&quot; NPT</td>
<td>.5&quot;</td>
</tr>
<tr>
<td>158QGDAV-RAD-SU-RS</td>
<td>Right Angle</td>
<td>No Limit</td>
<td>12.5</td>
<td>47/120, 92/230, 194/485, 380/950</td>
<td>.0005, .001, .002, .0035, .0055, .0075</td>
<td>.375&quot; NPT</td>
<td>.5&quot;</td>
</tr>
</tbody>
</table>

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 I-5. Mist lubricator (631298-7) may be ordered. SEE PAGES I-11–I-13 FOR SAFETY PRECAUTIONS. SEE PAGE 2-22 – 2-25 FOR TOOLING ACCESSORIES.

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 – see page 2-26.
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 (see page 2-25).

Other Noses and Spindles are available on request (see page 2-26).

Nose Indexers
1.5625 -20 (381326)
2.25 -20 (381327) Use with 615705 nose adapter.
New Design for 2.25-20: 641260

When ordering: Specify either 1¾"-20 or 2½"-20 NOSE THREAD ATTACHMENT

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 (see page 2-25).
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.

**Model** | **Motor Configuration** | **Maximum Stroke** | **Weight** | **Length** | **Spindle Speeds** | **Feed Per Revolution** | **Inlet** | **Minimum Hose Size**
--- | --- | --- | --- | --- | --- | --- | --- | ---
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 I-5.

SEE PAGES I-11–I-13 FOR SAFETY PRECAUTIONS.
SEE PAGE 2-22 – 2-25 FOR TOOLING ACCESSORIES.

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.
**STANDARD TOOL NOSE**

- 2½"-20 UN L.H. THREAD (FOR ATTACHMENT TO TOOL)
- 2"-16 UN L.H. THREAD (FOR DRILL BUSHING)

**STANDARD SPINDLE**

- 12.5 L.H.

**STEEL TOOL NOSES (Select One)**

<table>
<thead>
<tr>
<th>Length “A”</th>
<th>Thread</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>S400 SERIES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.5&quot; (241mm)</td>
<td>.75&quot; - 16 L.H.</td>
<td>621235</td>
</tr>
<tr>
<td>9.5&quot; (241mm)</td>
<td>1&quot; - 14 L.H.</td>
<td>621236</td>
</tr>
<tr>
<td>9.5&quot; (241mm)</td>
<td>1.25&quot; - 12 L.H.</td>
<td>621237</td>
</tr>
<tr>
<td>9.5&quot; (241mm)</td>
<td>1.5&quot; - 12 L.H.</td>
<td>621238</td>
</tr>
<tr>
<td>9.375&quot; (238mm)</td>
<td>2&quot; - 16 L.H.</td>
<td>614751</td>
</tr>
<tr>
<td>S600 SERIES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.5&quot; (282mm)</td>
<td>1&quot; - 14 L.H.</td>
<td>621244</td>
</tr>
<tr>
<td>11.5&quot; (282mm)</td>
<td>1.25&quot; - 12 L.H.</td>
<td>621245</td>
</tr>
<tr>
<td>11.5&quot; (282mm)</td>
<td>1.5&quot; - 12 L.H.</td>
<td>621246</td>
</tr>
<tr>
<td>11.375&quot; (279mm)</td>
<td>2&quot; - 16 L.H.</td>
<td>614757</td>
</tr>
</tbody>
</table>

**SPINDLES (Select One)**

<table>
<thead>
<tr>
<th>Spindle Type</th>
<th>Length “B”</th>
<th>Max. Stroke</th>
<th>Thread Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil Hole</td>
<td>9&quot; (229mm)</td>
<td>4&quot; (103mm)</td>
<td>.5625&quot;-18 Internal Thread with Counterbore and 118° Angle</td>
<td>382599</td>
</tr>
<tr>
<td>Oil Hole</td>
<td>9&quot; (229mm)</td>
<td>4&quot; (103mm)</td>
<td>.625&quot;-18 Internal Thread with Counterbore and 118° Angle</td>
<td>382346</td>
</tr>
<tr>
<td>Solid</td>
<td>9&quot; (229mm)</td>
<td>4&quot; (103mm)</td>
<td>No. 2 Short Morse Taper with Side Knock-Out</td>
<td>382628</td>
</tr>
</tbody>
</table>

- 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. (See page 2-26)
- 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. (See page 2-24)
- Fluid Swivels used with oil hole spindles and selection of Fluid Chucks. (See page 2-25)
- Other Noses & Spindles are available at extra charge. (See pg. 2-26)
The Quackenbush Depth Control or Countersink Attachment is a high quality, precision attachment for the 230 Series Positive Feed Drill which is used to precisely control the depth of drilled and reamed, straight or tapered holes on both flat or contoured surfaces. The attachment is also used for precision countersink operations. This attachment has been proven on the most demanding hole preparation jobs in the aircraft industry, and has earned the reputation for producing exceptionally high quality holes with precise depth accuracy, roundness and a high level of finish.

How the depth and dwell attachment operates

**Start**

Threaded to the end of the Depth and Dwell Attachment is a DRILL BUSHING which is used to secure the unit to the tooling fixture. A tubular SENSING SLEEVE is piloted by and slides axially inside the DRILL BUSHING. The SENSING SLEEVE surrounds and pilots the CUTTER and the SPINDLE. It is SPRING biased to engage the WORKPIECE and seat against it. The primary function of the SENSING SLEEVE is to provide a positive, definite stopping surface that is a precise repeatable distance from the workpiece.

**Finish**

Attached to SPINDLE is a patented micrometer type, ADJUSTABLE ROTATING STOP with a self-contained anti-friction bearing designed to engage the SENSING SLEEVE when the CUTTER has achieved the desired depth.

Once the pre-determined depth has been reached, the advancement of the CUTTER is stopped by the engagement of the ADJUSTABLE STOP on the SPINDLE contacting the SENSING SLEEVE. This allows the CUTTER to dwell (continue rotation without further feed) and produce the desired hole characteristics.

The Model 230 Right Angle Drill (furnished under separate order) features automatic thrust activated retract, torque overload shear pin, and automatic motor stop after retract.

When mounted on the Model 230 Right Angle Positive Feed Drill, the common SPINDLE extends through and is driven by the right angle drill head.

Spindles (up to 15" long) will be hollow for coolant flow. A fluid inducer (Part No. 381213) may be purchased for the remote end of the spindle. Rear spindle guards must be used on all applications.

NOTE: Models designed for 1.186 maximum diameter cutters are common. Larger units for 1.750 maximum diameter cutters are available. Shortened models are available for short strokes in confined work areas.
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")
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 ______________ B ______________ C ______________ D ______________ E ______________
   - External Thread
   - or
   - Internal Thread
   - 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.

FOR OTHER CUTTER STYLES, FURNISH CUTTER DRAWING
230QGDA-RAD-GD Gun Drill Series

Capacity:
Aluminum – .75" (19.1mm)

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

- 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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Motor Configuration</th>
<th>Maximum Stroke</th>
<th>Weight*</th>
<th>Maximum Length</th>
<th>Spindle Speeds</th>
<th>Feed Per Revolution</th>
<th>Inlet</th>
<th>Minimum Hose Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>230QGDA-RAD-GD</td>
<td>Right Angle</td>
<td>No Limit</td>
<td>13.25</td>
<td>5.95</td>
<td>1500, 1850, 2100</td>
<td>.0005, .001</td>
<td>.5&quot; NPT</td>
<td>.5&quot;</td>
</tr>
</tbody>
</table>

*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 I-5. Mist lubricator (831298) may be ordered.

SEE PAGES I-11–I-13 FOR SAFETY PRECAUTIONS.
SEE PAGE 2-22 – 2-25 FOR TOOLING ACCESSORIES.
SPINDLES (Select One)

<table>
<thead>
<tr>
<th>Spindle Type</th>
<th>Length &quot;B&quot;</th>
<th>Max. Stroke</th>
<th>Thread Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil Hole</td>
<td>9.25&quot;</td>
<td>4.5&quot;</td>
<td>.625&quot;-18 Internal Thread with Counterbore and 118° Angle</td>
<td>615964</td>
</tr>
<tr>
<td></td>
<td>(235mm)</td>
<td>(114mm)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other Noses and Spindles are available at extra charge. (See page 2-26)
Accessories for the No. 15 and 140 Series Right Angle Drills

<table>
<thead>
<tr>
<th>Thread Dim</th>
<th>Part No.</th>
<th>Dim. A</th>
<th>Thread Dim</th>
<th>Part No.</th>
<th>Dim. A</th>
</tr>
</thead>
<tbody>
<tr>
<td>.75 - 16 L.H.</td>
<td>619143</td>
<td>5.3125 in (135mm)</td>
<td>1&quot; - 14 L.H.</td>
<td>619142</td>
<td>5.4375 in (138mm)</td>
</tr>
<tr>
<td>1.25&quot; - 12 L.H.</td>
<td>619271</td>
<td>5.4375 in (138mm)</td>
<td>5.3125 in (135mm)</td>
<td>619333</td>
<td>5.4375 in (138mm)</td>
</tr>
<tr>
<td>1.5&quot; - 12 L.H.</td>
<td>619274</td>
<td>5.4375 in (138mm)</td>
<td>6.9375 in (176mm)</td>
<td>619297</td>
<td>6.9375 in (176mm)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thread Dim</th>
<th>Part No.</th>
<th>Dim. A</th>
</tr>
</thead>
<tbody>
<tr>
<td>.75 - 16 L.H.</td>
<td>619143</td>
<td>5.3125 in (135mm)</td>
</tr>
<tr>
<td>1&quot; - 14 L.H.</td>
<td>619142</td>
<td>5.4375 in (138mm)</td>
</tr>
<tr>
<td>1.25&quot; - 12 L.H.</td>
<td>619271</td>
<td>5.4375 in (138mm)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Bore</th>
<th>Part No.</th>
<th>Dim. A</th>
</tr>
</thead>
<tbody>
<tr>
<td>.25&quot;</td>
<td>621389</td>
<td>6.875 in (175mm)</td>
</tr>
<tr>
<td>.375&quot;</td>
<td>621390</td>
<td>7.125 in (181mm)</td>
</tr>
<tr>
<td>.500&quot;</td>
<td>621391</td>
<td>7.125 in (181mm)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Bushing Thread</th>
<th>S150 Series</th>
<th>S275 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>.75 - 16 L.H.</td>
<td>5.625 in (143mm)</td>
<td>619662</td>
</tr>
<tr>
<td>1&quot; - 14 L.H.</td>
<td>5.875 in (149mm)</td>
<td>619683</td>
</tr>
<tr>
<td>1.25&quot; - 12 L.H.</td>
<td>5.875 in (149mm)</td>
<td>619704</td>
</tr>
<tr>
<td>1.5&quot; - 12 L.H.</td>
<td>6.875 in (175mm)</td>
<td>617802</td>
</tr>
</tbody>
</table>
## Accessories for the No. 158 and 230GD Series Right Angle Drills

### Bushing S150 Series

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>.75&quot; - 16 L.H.</td>
<td>619662</td>
<td>6.875 in. (175mm)</td>
<td>619954</td>
</tr>
<tr>
<td>1&quot; - 14 L.H.</td>
<td>619683</td>
<td>7.125 in. (181mm)</td>
<td>619955</td>
</tr>
<tr>
<td>1.25&quot; - 12 L.H.</td>
<td>619704</td>
<td>7.125 in. (181mm)</td>
<td>619953</td>
</tr>
<tr>
<td>1.5&quot; - 12 L.H.</td>
<td>–</td>
<td>7.125 in. (181mm)</td>
<td>615627</td>
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### Bushing S275 Series

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<tbody>
<tr>
<td>5.625 in. (143mm)</td>
<td>619662</td>
<td>6.875 in. (175mm)</td>
<td>619954</td>
</tr>
<tr>
<td>5.875 in. (149mm)</td>
<td>619683</td>
<td>7.125 in. (181mm)</td>
<td>619955</td>
</tr>
<tr>
<td>5.875 in. (149mm)</td>
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<td>7.125 in. (181mm)</td>
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<tr>
<td>6.875 in. (175mm)</td>
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<td>7.125 in. (181mm)</td>
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### Bushing S400 Series

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<tbody>
<tr>
<td>1&quot; - 14 L.H.</td>
<td>621236</td>
<td>11.5 in. (292mm)</td>
<td>621244</td>
</tr>
<tr>
<td>1.25&quot; - 12 L.H.</td>
<td>621237</td>
<td>11.5 in. (292mm)</td>
<td>621245</td>
</tr>
<tr>
<td>1.5&quot; - 12 L.H.</td>
<td>621238</td>
<td>11.5 in. (292mm)</td>
<td>621246</td>
</tr>
<tr>
<td>2&quot; - 16 L.H.</td>
<td>614751</td>
<td>11.375 in. (289mm)</td>
<td>614757</td>
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### Bushing S600 Series

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<tr>
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</thead>
<tbody>
<tr>
<td>9.5 in. (241mm)</td>
<td>621236</td>
<td>11.5 in. (292mm)</td>
<td>621244</td>
</tr>
<tr>
<td>9.5 in. (241mm)</td>
<td>621237</td>
<td>11.5 in. (292mm)</td>
<td>621245</td>
</tr>
<tr>
<td>9.5 in. (241mm)</td>
<td>621238</td>
<td>11.5 in. (292mm)</td>
<td>621246</td>
</tr>
<tr>
<td>9.375 in. (238mm)</td>
<td>614751</td>
<td>11.375 in. (289mm)</td>
<td>614757</td>
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</table>

### Bushing S700 Series

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<tbody>
<tr>
<td>1&quot; - 14 L.H.</td>
<td>621228</td>
<td>13.5625 in. (344mm)</td>
<td>614749</td>
</tr>
<tr>
<td>1.25&quot; - 12 L.H.</td>
<td>621229</td>
<td>13.5625 in. (344mm)</td>
<td>614749</td>
</tr>
<tr>
<td>1.5&quot; - 12 L.H.</td>
<td>621230</td>
<td>13.5625 in. (344mm)</td>
<td>614749</td>
</tr>
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<td>2&quot; - 16 L.H.</td>
<td>614749</td>
<td>13.4375 in. (341mm)</td>
<td>614749</td>
</tr>
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</table>
Accessories for the No. 230 B & RA Series Right Angle Drills

<table>
<thead>
<tr>
<th>Bushing Thread</th>
<th>S400 Series</th>
<th>S600 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot; - 14 L.H.</td>
<td>9.5 in.</td>
<td>661236</td>
</tr>
<tr>
<td></td>
<td>(241mm)</td>
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<tr>
<td>1.25&quot; - 12 L.H.</td>
<td>9.5 in.</td>
<td>621237</td>
</tr>
<tr>
<td></td>
<td>(241mm)</td>
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<tr>
<td>1.5&quot; - 12 L.H.</td>
<td>9.5 in.</td>
<td>621238</td>
</tr>
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<td>(241mm)</td>
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<tr>
<td>2&quot; - 16 L.H.</td>
<td>9.375 in.</td>
<td>614751</td>
</tr>
<tr>
<td></td>
<td>(238mm)</td>
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</table>
### Fluid Chucks

<table>
<thead>
<tr>
<th>Quackenbush Drill</th>
<th>Bore Dia.</th>
<th>Side Feed</th>
<th>End Feed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>X</strong></td>
<td><strong>Y</strong></td>
</tr>
<tr>
<td>S-125, S-300</td>
<td>.250</td>
<td>1.510</td>
<td>2.031</td>
</tr>
<tr>
<td>S-265</td>
<td>.375</td>
<td>1.510</td>
<td>2.031</td>
</tr>
<tr>
<td>S-150, S-275</td>
<td>.500</td>
<td>1.510</td>
<td>2.031</td>
</tr>
<tr>
<td>S-400, S600</td>
<td>.500</td>
<td>1.510</td>
<td>2.406</td>
</tr>
<tr>
<td>S-400, S600</td>
<td>.750</td>
<td>1.510</td>
<td>2.406</td>
</tr>
<tr>
<td>S-400, S600</td>
<td>1.000</td>
<td>1.510</td>
<td>2.406</td>
</tr>
<tr>
<td>S-700, S750</td>
<td>1.000</td>
<td>1.510</td>
<td>2.406</td>
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</tbody>
</table>

*Stroke length. Note: Dimensions X & Y are reference.

### Swivels

<table>
<thead>
<tr>
<th>Quackenbush Drill</th>
<th>Model</th>
<th>Part No.</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 QDA-RA-SU</td>
<td>ALL MODELS</td>
<td>631256</td>
<td>.4375</td>
<td>1.5</td>
<td>.7813</td>
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<tr>
<td>158QDA-RA-SU</td>
<td>18 TPI SPINDLES</td>
<td>621448</td>
<td>.625</td>
<td>1.5</td>
<td>.8125</td>
</tr>
<tr>
<td>230QDA-RA-SU-MS</td>
<td>12.5 TPI SPINDLES</td>
<td>381213</td>
<td>1.5625</td>
<td>1.75</td>
<td>.5</td>
</tr>
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</table>

**NOTE:** Thread size for fluid line for all chucks and swivels is .125-27 NPT.
Nose Indexers for the 15, 158 & 230 Series Right Angle Drills

These new indexers eliminate the need to relocate lock screws on the fixtures, or shim nose pieces in order to orientate the tool to fit the application. An indexer aids in applying a right angle tool in confined spaces, and on applications where multiple tools are used in close proximity. The tool is orientated to the desired position by depressing a spring loaded lever, which allows the nose to rotate and lock without changing the position of the tool.

As an accessory for a new 15 series right angle tool, use part number 641244. To retrofit a previously purchased tool use part number 641245. Either indexer adds approximately 1 3/8” of length to the tool.

158 right angle tool indexer is part number 641260. This is the same basic indexer used with the 230 series except for the thread adapter (632684) and the retainer block (632691). The 632684 adapter allows the indexer to be attached directly to the 1 9/16-20 internal threads in the head of the tool. Therefore, if the tool has a 614228 adapter for the 2 1/4-20 nose threads, simply remove the 614228 adapter before installing the indexer. The 641260 indexer adds approximately 2 3/8” of length.

There are two adapters for the 230 series because the 230 series comes with either the 1 9/16-20 or the 2 1/4-20 nose attachment threads. Use indexer 641261 for a tool with the 1 9/16-20 internal threads in the tool. The 641261 indexer adds approximately 2” of length. Use indexer 641262 for a tool with the 2 1/4-20 external threads. The 641262 indexer adds approximately 2 1/4” of length.

The indexers are basically the same except the 641262 requires the 632685 thread adapter and the 632693 retainer block. Both indexers are designed to accommodate noses with either the 1 9/16-20 or 2 1/4-20 attachment threads.

<table>
<thead>
<tr>
<th>Quackenbush Drill</th>
<th>Model</th>
<th>Part No.</th>
<th>Length</th>
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</thead>
<tbody>
<tr>
<td>15QDA-RAB-SU-RS</td>
<td>New</td>
<td>641244</td>
<td>1 3/8&quot;</td>
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<tr>
<td>15QDA-RAB-SU-RS</td>
<td>Retrofit</td>
<td>641245</td>
<td>2 3/8&quot;</td>
</tr>
<tr>
<td>158QGDA-RAD-SU-RS</td>
<td>1 9/16-20</td>
<td>641261</td>
<td>2”</td>
</tr>
<tr>
<td>230QGDA-RA-SU-MS</td>
<td>2 1/4-20</td>
<td>641262</td>
<td>2 1/4”</td>
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### Lubricators

<table>
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<tr>
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<td>631887</td>
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<td>631883</td>
<td>631882</td>
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<td>631879</td>
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<td>120SC</td>
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<td>641100</td>
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<td>180SC</td>
<td>641109</td>
<td>641081</td>
<td>641100</td>
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<td>15QDA</td>
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<td>NEW #</td>
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<td>641047</td>
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<td>158QGDA-15RAB</td>
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### 932QR/942QR Micropumps/Counters

<table>
<thead>
<tr>
<th>Tool Model</th>
<th>Description</th>
<th>Part Number</th>
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<tbody>
<tr>
<td>932QR/942QR</td>
<td>Micro-Pump with manual counter</td>
<td>22007057</td>
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<tr>
<td>932QR/942QR</td>
<td>Micro-Pump without counter</td>
<td>22007067</td>
</tr>
<tr>
<td>932QR/942QR</td>
<td>Manual Counter</td>
<td>22008167</td>
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</table>
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 158QGDA-RA
   - (.5625" flange width for 230QGDA-RA-MS)
   - 1" for 230QGDA-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.

How to order Tool Noses for Right Angle Tools

INFORMATION REQUIRED TO ORDER TOOL NOSES:

1. **TOOL SERIES**
   - □ 15QDA-RA (1"-20 Nose Thread)
   - □ 158QGDA-RA (1.5625"-20 OR 2.25"-20 Nose Thread)
   - □ 230QGDA-RA-MS (1.5625"-20 OR 2.25"-20 Nose Thread)
   - □ 230QGDA-RA-GD (1.5625"-20 OR 2.25"-20 Nose Thread)

2. **DIAMETER**
   - Standard Sizes - 1.1875" OD
     - 15QDA-RA - 1.5625", 2" and 2.375" OD
     - 230QGDA-RA-MS - 1.5625", 2" and 2.375" OD
     - 230QGDA-RA-GD - 1.5625", 2" and 2.375" OD

3. **OVERALL LENGTH**
4. **DRILL BUSHING SERIES**

   **NOTE:** Drawings for special tool noses must be provided when ordering.