Tailstock Considerations

For best results, the machine should be equipped with a heavy-duty live center. The live center will allow smooth, free rotation of the workpiece. If a power-operated tailstock (hydraulic or pneumatic) is used, it should include a means of throttling the actuating-mechanism to prevent a "hammer blow" effect when the workpiece face contacts the drive pins of the driver; otherwise, the pins could be damaged.

Center Hole Size for Proper Face Driver Function

While center hole diameter is not critical, it can adversely affect face driver operation if not taken into consideration in the selection of the proper center point for a given application.

In the case of an undersize center hole, the center point cannot retract enough to allow the pins to penetrate to the required depth. In this case, pins cannot engage the workpiece face and cutting cannot take place. Conversely, if the center hole is oversized, the center point cannot locate the part properly before the drive pins contact the face of the workpiece. As a result, the workpiece will be machined eccentrically with respect to other center hole. The correct size center hole allows centering and proper pin penetration to take place. For proper face driver function, check the center hole diameter of your workpiece to be sure it falls within the required limits for the center point being used.

Machining The Workpiece

Workpiece Hardness – Generally speaking there will be no problem with drive pin penetration at normal tailstock force if the workpiece hardness does not exceed **36 Rockwell "C."** Above 36 Rockwell "C", tailstock forces must be increased and the cutting section area reduced because of the increased torque encountered. For most turning operations, the practical upper limit of workpiece hardness for satisfactory use of face drivers is about **40-42 Rockwell "C."**

Since lower torques are involved in operations such as grinding or hobbing, it is often possible to achieve satisfactory pin penetration on workpieces having a hardness greater than 42 Rockwell "C"; however, we suggest you contact Riten for specific recommendations.

Cutting Recommendations – For proper face driver operation using only one tool, the tailstock force applied should be based on the cut requiring the most torque. Tailstock load capacity of each driver is listed in the chart below.

In turning applications involving lathes with a manually-operated tailstock, the initial tailstock force is reduced during the final pin penetration (which takes place when the cutting tool contacts the workpiece). As soon as the cut starts, the operator should retighten the tailstock to maintain the required force. On lathes equipped with a power-operated tailstock, the required tailstock force is automatically maintained.

When using multiple cutting tools, the tool slide feeding toward the headstock should be engaged first. This will firmly embed the drive pins in the workpiece. The distance from the driving face to the headstock will remain identical for all parts within ±0.002 when constant tailstock force is applied. The positioning or work does not depend on the diameter of the center hole because of the spring-loaded center point. Even when faces are uneven (i.e., sawed billets) the median position of the pins will remain constant from piece to piece.

With a mechanical tailstock, the average tightening with one hand exerts sufficient force to build up about 1,700 pounds of pressure. On a power-operated tailstock, force equals the area of the piston in square inches times the input pressure into the cylinder in pounds per square inch.

For longer tool life and best results we recommend you do not exceed the following tailstock force capacities for face drivers.

TAILSTOCK FORCE (LBS.)*

TOOL SERIES	OFFSET DRIVE PIN	CENTRAL DRIVE PIN	HALF WIDTH OFFSET DRIVE PIN	FULL WIDTH DRIVE PIN
40	680	N/A	720	800
41	680	N/A	720	800
42	700	N/A	750	980
43	1,000	N/A	1,250	1,460
44	1,800	N/A	2,140	2,490
45	2,100	N/A	2,480	2,990
46	2,780	N/A	3,000	3,350
47	3,300	N/A	3,490	4,200
48	3,500	N/A	4,250	4,490
49	3,700	N/A	4,500	5,000
60	420	420	420	420
61	800	940	940	940
62	1,140	2,000	2,250	4,500
63	1,710	2,630	3,250	6,500
64	2,050	3,160	3,900	7,800
66	3,650	4,960	6,250	12,500
68	4,560	6,200	7,500	15,000

* For tailstock force in excess of these values contact Riten.

Assembly Instructions — 60-68 Type

Drive Pins

To replace drive pins: Loosen cap retaining screw(s) and remove nose cap from body. Withdraw drive pin retainers and remove drive pins. When replacing drive pins, be certain the chisel point is oriented correctly for proper drive ratio (right- or left-hand).

Center Point

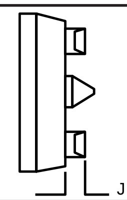
On all face drivers, the center point is secured by a retaining pin engaging the center point keyway. The center point is removed by taking the nose cap and extracting the retaining pin.

Tool Disassembly

To separate the carrier body from the shank assembly, remove the center point, screw plug and compression spring assembly. Remove inlet screw (when applicable). Hold the face driver in a horizontal position on a bench and insert a brass rod (slightly smaller in diameter than the center point) in the bore for the center point. The rod will bottom against drive shank, gentle tapping will separate the carrier body from the shank assembly.

Hydraulic Adjustment

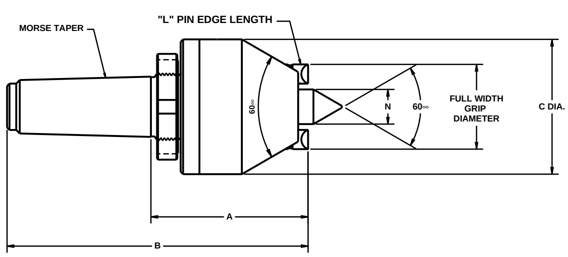
To add/change hydraulic oil, remove the inlet screw and washer which seal the hydraulic chamber. With the pistons and drive pins in full forward position, fill chamber to overflowing with SAE 50 hydraulic oil. Allow all air bubbles to be displaced. Replace the inlet screw. Hold the face driver in an arbor press with the drive pins against a flat plate. Displace excess oil from the chamber by compressing the drive pins to the appropriate dimension “J” (See chart). Tighten the inlet screw and washer to seal the chamber.



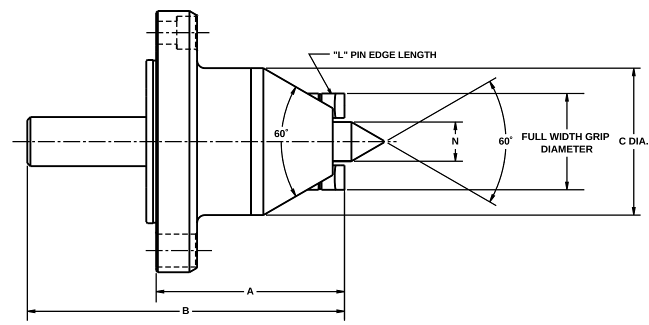
TOOL SERIES	J		TOOL SERIES	J
60	0.12		64	0.34
61	0.19		66	0.47
62	0.25		68	0.39
63	0.34			

Mechanical Design — Type 40 thru 49

Morse Taper Drivers

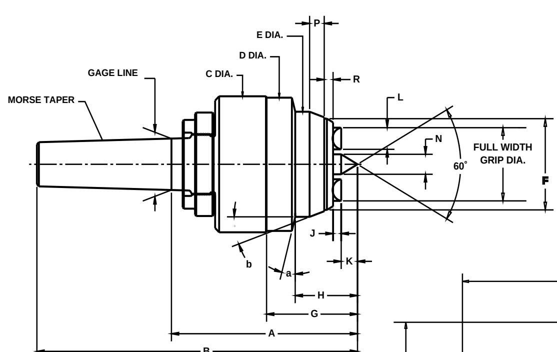


Flange Mount Drivers – Spindle Adapter Required

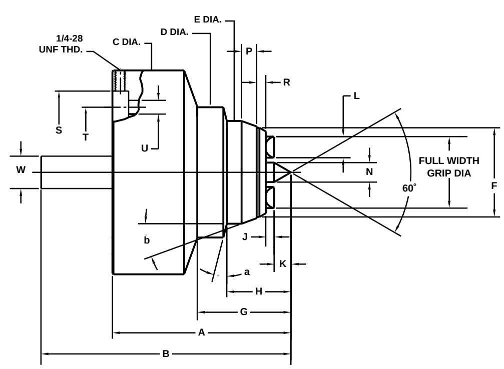


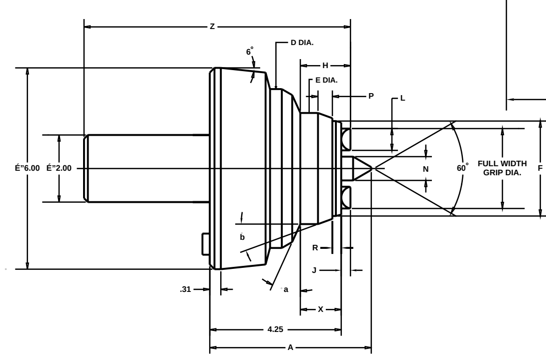
Hydraulic Design — Type 60 thru 68

Morse Taper Drivers



Chuck Mount Drivers





Flange Mount Drivers – Spindle Adapter Required

Dimensions for Type 40 thru 51 and 60 thru 68

TOOL SERIES	MORSE TAPER		40	41	42	43	44	45	46	47	48	49	60	61	62	63	64	66	68		
DIMENSIONS FOR MORSE TAPER DRIVERS	A	2																			
	A	3	3.43	3.43	3.15	3.15							4.38	4.38							
	A	4	3.43	3.43	3.15	3.15	3.15	3.15						4.40	4.38	4.47					
	A	5	3.43	3.43	3.15	3.15	3.15	3.15		4.13			4.51	4.51	4.56	5.81	5.81				
	A	6								4.13		5.35			4.65	5.90	5.90	6.90			
	B	2																			
	B	3	5.83	5.83	5.55	5.55							7.32	7.44							
	B	4	6.34	6.34	6.06	6.06	6.06	6.06					7.96	8.06	8.03						
	B	5	7.25	7.25	6.97	6.97	6.97	6.97		7.95			8.64	8.76	8.69	9.94	9.91				
	B	6								9.41		10.63			9.91	11.16	11.16	12.16			
	C	3	1.89	1.89	1.65	1.89							2.50	2.50							
	C	4	1.89	1.89	1.65	1.89	2.76	2.76					2.50	2.50	3.25		4.81	6.22			
	C	5	1.89	1.89	1.65	1.89	2.76	2.76		3.54			2.50	2.50	3.25	4.81	4.81	6.22			
	C	6								3.54		5.20				3.25	4.81	4.81	6.22		
COMMON DIMENSIONS FOR ALL MOUNTS	a												20°	20°	15°	25°	15°	15°	15°		
	b		60°	60°	60°	60°	60°	60°	60°	60°	60°	60°	20°	20°	15°	20°	20°	30°	30°		
	D												2.50	2.50	3.16	4.72	4.72	6.14	8.19		
	E												1.19	1.59	2.50	3.31	3.75	5.27	6.63		
	F												0.95	1.18	2.08	2.75	3.21	4.63	6.05		
	G												1.95	2.11	2.31	2.97	2.97	3.97	4.34		
	H												1.44	1.25	1.59	2.06	2.13	3.13	3.28		
	J												0.12	0.19	0.25	0.34	0.34	0.47	0.39		
	K												0.19	0.31	0.40	0.50	0.59	0.84	1.03		
	“L” PIN EDGE LENGTH	NO. OF PINS	3	3	3	3	6	6	6	6	6	6	4	4	5	5	6	8	10		
	“L” PIN EDGE LENGTH	FULL WIDTH	0.24	0.32	0.24	0.32	0.39	0.39	0.20	0.30	0.30	0.39	0.20	0.28	0.51	0.67	0.67	0.79	0.79		
	“L” PIN EDGE LENGTH	CENTRAL											0.08	0.11	0.21	0.27	0.27	0.32	0.32		
	“L” PIN EDGE LENGTH	OFFSET	0.06	0.06	0.06	0.06	0.20	0.20	0.20	0.20	0.20	0.20	0.06	0.08	0.12	0.18	0.18	0.24	0.24		
	“L” PIN EDGE LENGTH	HALF-OFFSET	0.12	0.16	0.12	0.16	0.30	0.30	0.20	0.39	0.39	0.49	0.10	0.14	0.26	0.33	0.33	0.39	0.39		
	N		0.87	0.87	0.24	0.32	0.55	0.71	0.55	0.94	1.10	1.38	0.35	0.20	0.47	0.71	0.79	1.18	1.57		
	P												0.28	0.38	0.58	0.50	0.48	0.44	0.34		
	R												0.22	0.09	0.16	0.28	0.20	0.16	0.16		
DIMENSIONS FOR CHUCK MOUNT DRIVERS	A												4.44	4.56	4.63	4.83	4.80				
	X												1.25	0.94	1.21	1.48	1.58				
	Z												8.24	8.36	8.43	8.63	8.60				
DIMENSIONS FOR FLANGE MOUNT DRIVERS	S												3.937	3.937	3.937	5.512	5.512	5.512	6.694		
	T												3.150	3.150	3.150	4.960	4.960	6.220	7.323		
	U	SIZE											0.332	0.332	0.332	0.332	0.332	0.413	0.422		
	U	NO.											6	6	6	8	8	8	8		
	W												1.25	1.25	0.78	1.00	1.00	1.97	2.22		
	A		4.528	4.528	4.528	4.528	4.528	4.528	4.528	4.528	4.528	4.528	4.76	4.76	4.37	5.31	5.31	6.41	6.59		
	B		5.348	5.348	5.348	5.038	4.998	5.108	6.098	7.668	7.668	7.708	5.89	6.01	6.06	8.16	8.16	11.22	11.25		
	C		1.89	1.89	1.65	1.89	2.76	2.76	3.15	3.54	3.94	5.20	5.00	5.00	4.94	6.28	6.28	7.06	8.25		

The nomogram on page 28 should be used to determine the specific tailstock force required for various machining conditions. The three basic factors which determine the tailstock force required for optimum holding power and maximum stock removal are: **maximum raw stock diameter, driving diameter for face driver and cutting section area.** (FPR x depth of cut).

How to Select Tools Using the Nomograms

1. Determine finished driving diameter of workpiece. Select face driver with a maximum driving diameter that is smaller than finished diameter of driving face.
2. Determine cutting section area for each cutting tool used.
3. Determine tailstock force for each tool separately. Add individual forces to center point spring load to arrive at total tailstock force required.

Nomogram for Cutting Section Area

Since the cutting section area must be known before tailstock force can be determined, Nomogram No. 1 on page 28 has been developed as an aid in arriving at this value. The nomogram is a graphic representation of the formula for cutting section area which is “feed per revolution” times “depth of cut.”

How to use Nomogram for Cutting Section Area

Place a straightedge from the proper point on “feed” scale to the desired depth of cut on “depth of cut” scale. Read figure at point where straightedge intersects “cutting section area” scale (center scale on nomogram). This figure, which represents the area of chip in square inches, is the torque-producing element working against the face driver and is used in Scale 4 of the tailstock nomogram to determine tailstock force (Nomogram No. 2 on page 28).

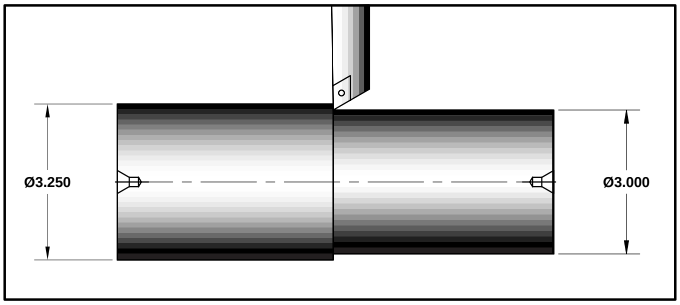
Nomogram for Tailstock Force

This nomogram is used to determine the tailstock force for **one** cutting tool. If more than one tool is involved, the tailstock force must be determined for **each** tool and the results added together to arrive at the **total tailstock force required**. To insure adequate torque-carrying capacity, these rules should be followed:

1. Ratio between maximum raw stock diameter and face driver driving diameter should not exceed 2 to 1; however, on small cutting areas, it may be possible to exceed this ratio.
2. This nomogram is based on cutting ferrous metals having a maximum hardness of 34 Rockwell C, with cutting tool travel **toward** headstock.
3. **If cutting tool travel is away from headstock, double the tailstock force.**
4. **If plunge cutting from cross slide, increase tailstock force by 50%.**
5. For cutting nonferrous materials, reduce tailstock force by one-third.

How to Use Tailstock Force Nomogram

1. Place straightedge from raw stock diameter (Scale 1) to driving diameter (Scale 2), determine pivot point on Scale 3.
2. Place straightedge from pivot point on Scale 3 through previously determined cutting section area (Scale 4). Read tailstock force at point where straightedge intersects Scale 5.
3. Make necessary adjustments in tailstock force to compensate for direction of cutting tool travel and material being cut.
4. If the tailstock force figure plots off scale on Scale 5, reduce feed and depth of cut accordingly and run through the selection procedure again on both nomograms. If this occurs, consult Riten for alternate solutions.
5. To the tailstock force, add center point spring load for the specific driver being used (see spring load section on each product type page) to obtain **total tailstock force** required.

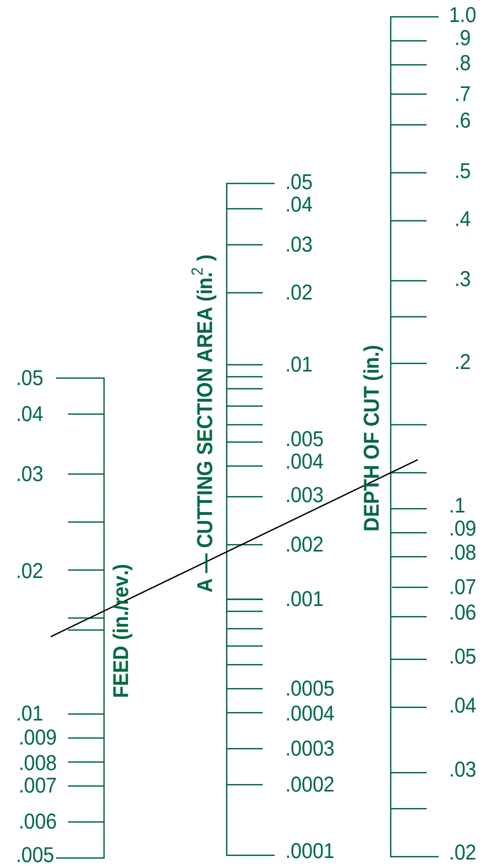


Example Exercise:

1. Select a face driver for a piece (part shown above) which is C1120 steel and is to be driven from 3.000" diameter face.
2. From tool selection chart on page 6, choose a face driver having the largest gripping diameter under 3.000". For this application, face driver selected should be Tool Series 64, with a 2.91" gripping diameter using full width pin.
3. Assume a feed of 0.016" and a 0.125" depth of cut.
4. Lay straightedge on cutting section nomogram across 0.016 on “feed” scale and 0.125" on “depth of cut” scale. On “cutting section area” scale, straightedge should intersect at 0.002".
5. Lay straightedge on 3.250" (raw stock diameter) on Scale 1 and 2.91" (driving diameter) on Scale 2.
6. Draw a line which intersects pivot Scale 3.
7. Lay straightedge on point of intersection on Scale 3 and at 0.002" cutting section area on Scale 4. Tailstock force required should read 400 pounds.
8. Since total tailstock force equals tailstock force plus spring load, see spring load section on each product type page and locate the spring load. For Type 64 the spring load is 100 lbs.
9. To arrive at total tailstock force for this cutting application, add 400 pounds (tailstock force) and 100 pounds (spring load) and you get 500 pounds total tailstock force.
10. If more than one tool is involved, the tailstock force for each must be determined separately, following the rules and direction previously outlined. Add up each tailstock force, and to this figure, add the spring load to arrive at the total tailstock force required.

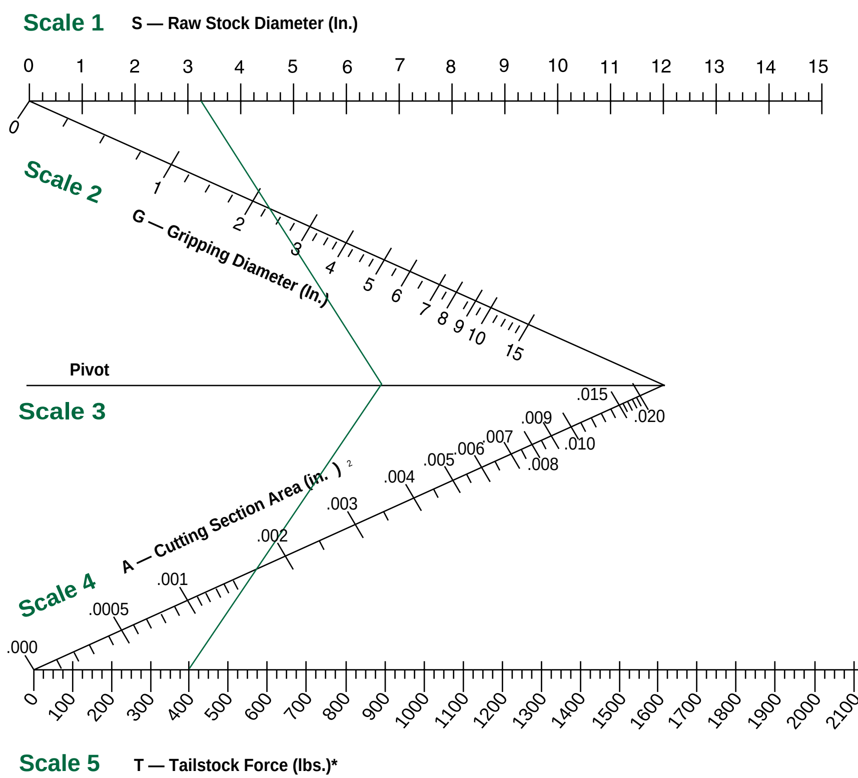
Nomograms

1. Cutting Section Area



2. Tailstock Force

*Tailstock Force = Area of Cylinder x Line Pressure
* Quick Change Series uses same chart




For longer tool life and best results we recommend that you do not exceed the following tailstock force capacities for face drivers.

TAILSTOCK FORCE (LBS.)*

TOOL SERIES	OFFSET DRIVE PIN	CENTRAL DRIVE PIN	HALF WIDTH OFFSET DRIVE PIN	FULL WIDTH DRIVE PIN
40	680	N/A	720	800
41	680	N/A	720	800
42	700	N/A	750	980
43	1000	N/A	1250	1460
44	1800	N/A	2140	2490
45	2100	N/A	2480	2990
46	2780	N/A	3000	3350
47	3300	N/A	3490	4200
48	3500	N/A	4250	4490
49	3700	N/A	4500	5000
60	420	420	420	420
61	800	940	940	940
62	1,140	2,000	2,250	4,500
63	1,710	2,630	3,250	6,500
64	2,050	3,160	3,900	7,800
66	3,650	4,960	6,250	12,500
68	4,560	6,200	7,500	15,000

*For tailstock force in excess of these values contact Riten.

Face Driver Care & Maintenance

Properly maintained, Riten Face Drivers and Live Centers are trouble free. However, like all precision tools they should not be abused. The drive pins, center points and carrier bodies in a face driver are machined to tight tolerance to help prevent contamination. The high-quality seals in both products resist coolant contamination.

Checking a Face Driver

The two types of compensating mediums in a facedriver are hydraulic and mechanical. Standard mechanical drivers should be inspected periodically for deterioration in the male and female spherical washers. Heavy-duty hydraulic face drivers should be inspected periodically for oil leakage. If the drive pins in a hydraulic face driver appear to bottom out or fail to move in concert, the driver is probably low on oil. To check for this, engage all of the pins against a square work-piece and measure the "J" dimension. Follow the hydraulic adjustment instructions on page 25.

Lubrication and Cleaning

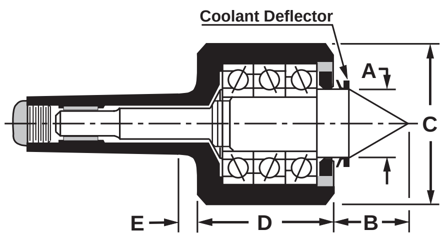
The center point and drive pins should be periodically removed and inspected. Cleaning the tools and coating them with a light oil or rust inhibitor will extend tool life.

Accessories

CNC Heavy Duty Live Centers for Face Driving

- Accuracy guaranteed to ± .0002.
- May be used in conjunction with face drivers.
- Large workpieces in CNC applications.
- Also available in Jarno, Brown & Sharpe, and Straight Shanks.
- Riten full service, repair and guarantee apply.

These CNC live centers are used to counter the high thrust in face driving applications. These centers are also used where workpieces may weigh several thousand pounds. Radial pressure, thrust and rigidity requirements demand centers with triple row bearing design to handle these loads.



MORSE TAPER – STANDARD POINT

MT	A	B	C	D	E	Max RPM	W.P. Weight	Order No.	UPC Number
3	1⅛	1½	2 13/16	3 3/16	½	5000	3000	15103*	662503-15103
4	1 21/32	1¾	3¾	3 27/32	½	4000	4800	15164*	662503-15164
5	1⅞	2¼	3¾	3 27/32	½	4000	8000	15165	662503-15165
5	2	2¼	4⅝	3 27/32	½	4000	14000	15105	662503-15105
6	2	2¼	4⅝	3 27/32	½	4000	14000	15106	662503-15106

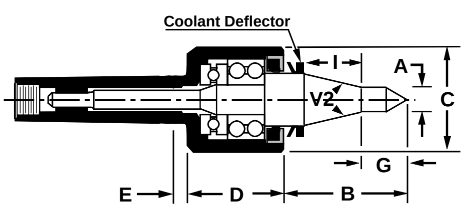
MORSE TAPER – TRACER POINT

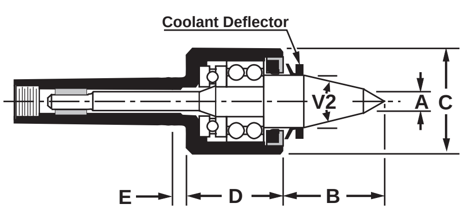
MT	A	B	C	D	E	V2	Max RPM	W.P. Weight	Order No.	UPC Number
3	½	2 1/16	2 13/16	3 3/16	½	30°	5000	1100	16103*	662503-16103
4	⅝	2 17/32	3¾	3 27/32	½	30°	4500	1800	16194*	662503-16194
5	⅝	2 25/32	3¾	3 27/32	½	30°	4000	3800	16195	662503-16195
5	15/16	3 9/32	4⅝	3 27/32	½	30°	4000	7100	16105	662503-16105
6	15/16	3 9/32	4⅝	3 27/32	½	30°	4000	7100	16106	662503-16106

* Stub spindle design on 3MT and 4MT.

Riten CNC High RPM Sprint Live Centers

- Accuracy guaranteed to ± .0001.
- Coolant Deflectors, no friction seal.
- Point configuration allows for tool clearance.
- Meets the rigid requirements of CNC turning.
- Points through-hardened to 61-63 Rc.
- Body heat-treated for additional strength.
- Riten full service, repair and guarantee apply.





Morse Taper - Long Point

MT	A	B	C	D	E	G	V2	I	RPM	Weight	Order No.	UPC Number
2	⅜	2	2⅛	2	⅜	¾	30°	1 19/32	6000	310	14102	662503-14102
3	⅜	2	2⅛	2	⅜	¾	30°	1 19/32	6000	310	14103	662503-14103
4	½	2½	2¾	2 5/16	⅜	15/16	30°	2¼	4000	1100	14104	662503-14104
5	⅝	2½	3⅛	2¾	⅜	-	30°	-	4000	2910	14105	662503-14105

Morse Taper - Tracer Point

MT	A	B	C	D	E	G	V2	I	RPM	Weight	Order No.	UPC Number
5	⅝	2 9/16	3⅛	2¾	⅜	-	30°	-	4000	2910	14905	662503-14905