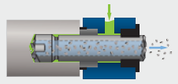
BTA DURABLE TOOLING GUIDE

UNISIG

DEEP HOLE DRILLING SYSTEMS

Choose your tooling type and drilling diameters to determine the durable tooling required for your machine. Tool and drill tube sizes are the basis for the entire durable tooling system.

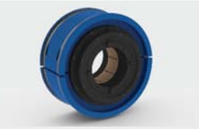
BTA Overview of Tools and Machines



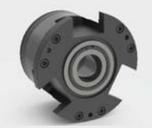
Drill Tubes

Drill Tube Driver System

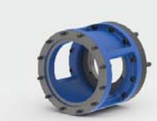
Vibration Dampener Assembly



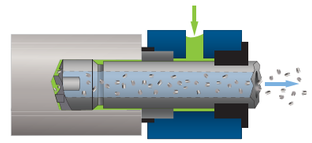
Pressure Head Assembly



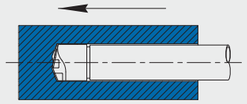
UNISIG Machine Models and Additional Accessories



BTA style deep hole drilling is characterized by external coolant delivery, and internal chip exhaust, allowing drilling or machining to be performed precisely, cleanly, and accurately to large diameters.

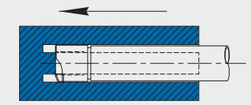


The following tooling processes utilize an external coolant/internal chip exhaust sytem, and can be performed on BTA deep hole drilling machines. Each process has a similar function, but is designed to achieve specific hole characteristics to extreme tolerances.



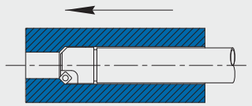
BTA Drilling

A standard BTA drill uses a pattern of multiple inserts to cut deep, round holes into a solid piece of metal., with external coolant delivery, and clean internal chip removal.



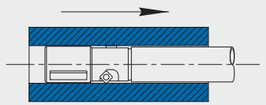
Trepanning

Trepanning is capable of drilling the same diameter hole with less power than with a BTA tool. The process is performed on blank metal and leaves a solid, often re-usable core in the middle of the tube.



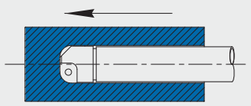
Counterboring

Counterboring enlarges an existing hole that is drilled or cast, and is efficient as a second pass to achieve a larger diameter with the same power. It can be setup with an emphasis on straightness or concentricity.



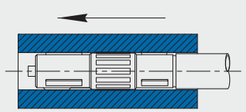
Pull Boring

Pull boring results in extreme straightness tolerances, as the boring bar is in tension rather than compression, providing superior control. Accessories such as a lantern chuck help optimize a machine for easy pull boring.



Bottom Forming

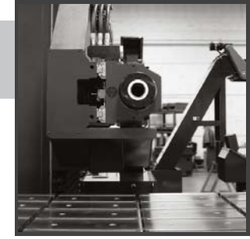
This form tooling operation finishes the base of a hole with a specific form or profile, based on the part drawing. Tools such as radius, step, or flat bottom forms are guided with wear pads along the finished hole diameter.



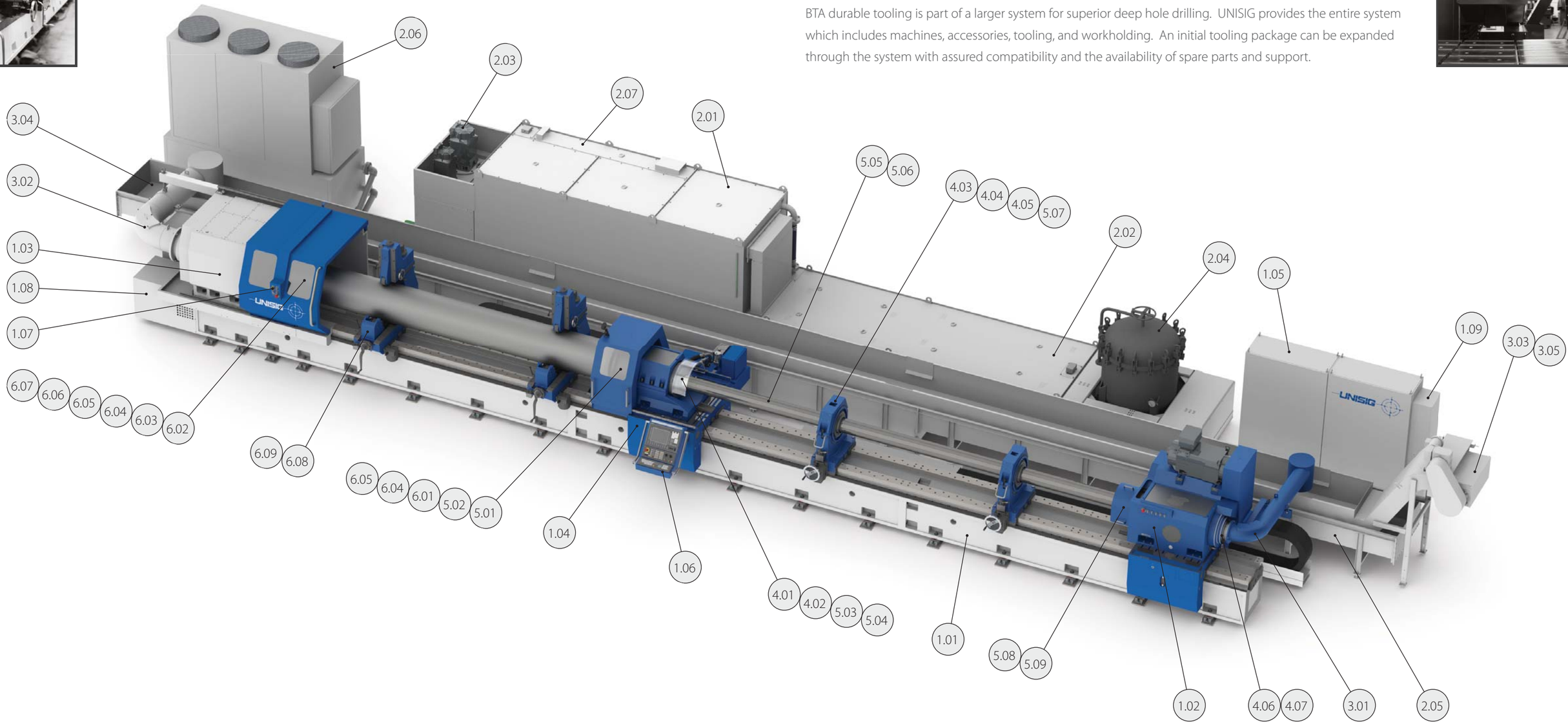
Skiving and Roller Burnishing

This tool performs two operations in one pass: skiving cuts the inside surface to very round tolerances, and rollers cold-work the top layer of the material. This achieves mirror-surface finishes, often required in hydraulic applications.

BTA Machine Identification



BTA durable tooling is part of a larger system for superior deep hole drilling. UNISIG provides the entire system which includes machines, accessories, tooling, and workholding. An initial tooling package can be expanded through the system with assured compatibility and the availability of spare parts and support.



Machine and Options		Coolant System		Chip Removal		Accessories		Tooling		Workholding	
1.01	Machine Base	2.01	Filtered Coolant Reservoir	3.01	Chip Discharge, Rear	4.01	Pressure Head	5.01	Master Bushing System	6.01	Pressure Head Chuck
1.02	Tool Headstock	2.02	Unfiltered Coolant Reservoir	3.02	Chip Discharge, Forward	4.02	Pressure Head Mounting Reducer	5.02	Drill Bushings	6.02	Workpiece Chuck, Manual
1.03	Workpiece Headstock	2.03	High Pressure Coolant Pumps	3.03	Chip Conveyor	4.03	Vibration Dampener Carriage	5.03	Packing Gland	6.03	Workpiece Chuck, Automatic
1.04	Pressure Head Carriage	2.04	Coolant Filter System	3.04	Chip Baskets	4.04	Vibration Dampener Cartridge	5.04	Packing Gland Mounting Reducer	6.04	Offset Jaw Sets
1.05	Electrical Cabinet	2.05	Coolant Return Trough	3.05	Chip Crusher/Wringer	4.05	Vibration Dampener Mounting Reducer	5.05	Drill Tube	6.05	Clamping Cones
1.06	Operators Interface	2.06	Coolant Refrigerant Chiller			4.06	Rotary Union and Hydraulic Circuit for Skiving	5.06	Thread Adapter	6.06	Breakthrough Seal
1.07	Remote Operators Interface	2.07	Coolant Oil-Water Heat Exchanger			4.07	Servo Driven Actuator for Bottle Boring Tools	5.07	Vibration Dampener Collet	6.07	Lantern For Pull Boring
1.08	Hydraulic Power Unit							5.08	Tube Clamp Spindle Adapter	6.08	Workpiece Steady Rest, Manual
1.09	Electrical Cabinet Air Conditioner							5.09	Tube Clamp Insert and Seal	6.09	Workpiece Steady Rest, Automatic

When machines are quoted, tooling packages are recommended and included. Required tooling to drill is based on various factors such as drill depth, drill diameter, and range of diameters to be drilled.

UNISIG Deep Hole Drilling Systems | www.unisig.com | sales@unisig.com | PH 262.252.3802 | FX 262.252.4075

Drill Tube Size Chart

BTA drill tubes thread onto the tool head to connect it to the machine spindle. Each tube size is standardized, and engineered for a small range of hole diameters. The quantity and sizes of drill tubes determine the necessary durable tooling for the rest of the machine.

Find a drill tube size based on tube specifications or drilled hole diameter.

Tube OD (mm)	Tube ID (mm)	BTA Tube Size	Drilled Hole Diameter (mm)	Drilled Hole Diameter (Inch)
11	7	794	12.6 - 13.6	0.496 - 0.535
12	8	795	13.6 - 14.6	0.536 - 0.575
13	9	796	14.6 - 15.6	0.576 - 0.614
14	9	797	15.6 - 16.7	0.615 - 0.657
15	10	798	16.7 - 17.7	0.658 - 0.696
16	11	799	17.7 - 18.9	0.697 - 0.744
17	12	800	18.9 - 20.0	0.745 - 0.787
18	12	801	20.0 - 21.8	0.788 - 0.858
20	13	802	21.8 - 24.1	0.859 - 0.948
22	14	803	24.1 - 26.4	0.949 - 1.039
24	16	804	26.4 - 28.7	1.040 - 1.129
26	17	805	28.7 - 31.0	1.130 - 1.220
28	19	806	31.0 - 33.3	1.221 - 1.311
30	20	807	33.3 - 36.2	1.312 - 1.425
33	23	808	36.2 - 39.6	1.426 - 1.559
36	26	809	39.6 - 43.0	1.560 - 1.692
39	28	810	43.0 - 47.0	1.693 - 1.850
43	31	811	47.0 - 51.7	1.851 - 2.035
47	35	812	51.7 - 56.2	2.036 - 2.212
51	39	813	56.2 - 65.0	2.213 - 2.559
56	43	813E	60.6 - 65.0	2.386 - 2.559
56	43	814	65.0 - 67.0	2.559 - 2.637
62	48	815	67.0 - 73.0	2.638 - 2.873
68	53	816	73.0 - 80.0	2.874 - 3.149
75	59	817	80.0 - 87.0	3.150 - 3.424
82	66	818	87.0 - 100.0	3.425 - 3.936
94	78	819	100.0 - 112.0	3.937 - 4.408
106	88	820	112.0 - 124.0	4.409 - 4.881
118	94	821	124.0 - 136.0	4.882 - 5.353
130	104	822	136.0 - 148.0	5.354 - 5.826
142	116	823	148.0 - 160.0	5.827 - 6.298
154	128	824	160.0 - 171.9	6.299 - 6.767
166	140	825	172.0 - 183.9	6.772 - 7.240
178	145	826	184.0 - 195.9	7.244 - 7.712
190	154	827	196.0 - 207.9	7.717 - 8.185
202	166	828	208.0 - 219.9	8.189 - 8.657
214	178	829	220.0 - 231.9	8.661 - 9.130
226	190	830	232.0 - 243.9	9.134 - 9.602
238	202	831	244.0 - 255.9	9.606 - 10.075
250	214	832	256.0 - 267.9	10.079 - 10.547
262	226	833	268.0 - 279.9	10.551 - 11.020
274	238	834	280.0 - 291.9	11.024 - 11.492
286	250	835	292.0 - 303.9	11.496 - 11.964
298	262	836	304.0 - 315.9	11.968 - 12.436
310	274	837	316.0 - 327.9	12.440 - 12.909
322	286	838	328.0 - 339.99	12.913 - 13.385
334	298	839	340.0 - 351.99	13.386 - 13.858
346	310	840	352.0 - 363.99	13.858 - 14.330
358	322	841	364.0 - 375.99	14.331 - 14.803
370	334	842	376.0 - 387.99	14.803 - 15.275
382	346	843	388.0 - 399.99	15.276 - 15.748
394	358	844	400.0 - 411.99	15.748 - 16.220
406	370	845	412.0 - 423.99	16.220 - 16.693
418	382	846	424.0 - 435.99	16.693 - 17.165
430	394	847	436.0 - 447.99	17.165 - 17.637
442	406	848	448.0 - 459.99	17.638 - 18.110
454	418	849	460.0 - 471.99	18.110 - 18.582
466	430	850	472.0 - 483.99	18.583 - 19.055
478	442	851	484.0 - 495.99	19.055 - 19.527
490	454	852	496.0 - 507.99	19.528 - 20.000

Information and specifications on larger size BTA drill tubes available upon request.

Threaded Starts and Flange Connections

Standardized start patterns on BTA drill tubes allow easy installation and interchangeability of tooling and accessories. These thread and flange starts are engineered to maintain a secure and solid connection during drilling.

4-Start Thread Connection

4-start thread standards are common in many BTA deep hole drilling setups, and are often used for performance advantages such as resistance to "sticking" during the drilling cycle, and easier to break loose after drilling. 4-start threads also make it possible to use larger thread leads on thinner-walled tools by using a reduced thread depth.

1-Start Thread Connection

1-start, or single start thread standards are common in many BTA drilling setups, as well as with alternate methods such as skiving and roller burnishing. A 1-start threaded tool installs easily onto the drill tube, and reduces the length of the overall setup.

Flange Connection

Flange starts are standard on larger tooling setups, and feature a four bolt connection with drive keys. Flange starts provide a sturdy connection for large diameter drilling at high torques. Using a flange start eliminates the need for large, expensive internal and external threads, reduces the length of the overall setup, and allows for easy tool installation and changes.

Drill Tube Thread Adapters

Drill tube adapters are designed to expand the range of capabilities of existing tooling and machines. Adapters allow drill tubes to utilize larger drill sizes, to mount heads with different connection types, and to protect expensive drill tubes from potential damage.

Drill Tube Adapters

Drill tube adapters allow non-matching tooling heads and drill tubes to connect when the sizes or connection types aren't alike. Each adapter has two ends with typical start patterns or mounts, to increase capacity of tooling setups. There are two general types of adapters.

Size Adapters

Size adapters are engineered to allow a drill tube to use a wider range of drill diameters on a single tube size. These adapters are commonly used for operations that require a BTA drilled hole, followed by a counterbore. Size adapters are most effective when drilling low strength, short chipping materials.

Type Adapters

Connection type adapters are used when the tool and drill tube both have internal, or both external threads, or non-matching connections. This allows a drill tube and tooling setup to accept a variety of drill heads from different manufacturers, and also to protect the drill tube from damage.

Drill Tube Adapter Advantages

- Utilize one drill tube and durable tooling set between drilling and counterboring applications
- Reduce the number of drill tubes required when drilling low strength materials
- Adapt between different sizes, or thread or connection types
- Protect against potential drill tube damage by using adapters as a perishable part.

Drill Tube Adapter Cautions

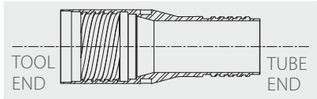
- Torque capacity is reduced due to the use of a smaller than standard thread size
- Increased chance of chip plug-up
- Decreased rigidity across entire system

Thread Adapter Size Chart

Adapters are carefully engineered to utilize additional sizes and start types of drill heads while maintaining reasonable productivity and rigidity.

Adapter Part Number Configuration

T	1	0	1	3	.	0	X	X	X	.	X	X	X	X



TOOLING SERIES OF THREAD ADAPTERS

ADAPTER TYPE
0- STANDARD

ADAPTER COMBINATION
0- FEMALE TOOL END - MALE TUBE END
1- FEMALE TOOL END - FEMALE TUBE END
2- MALE TOOL END - MALE TUBE END
3- MALE TOOL END - FLANGE TUBE END
4- FEMALE TOOL END - FLANGE TUBE END

TOOL CONNECTION TYPE
0- FLANGE TYPE
1- SINGLE START THREAD
4- 4-START THREAD

TUBE CONNECTION SIZE
0- FLANGE TYPE
1- SINGLE START THREAD
4- 4-START THREAD

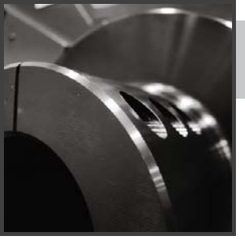
TOOL CONNECTION SIZE
XX- LAST 2 DIGITS OF TUBE SIZE

TUBE CONNECTION TYPE
XX- LAST 2 DIGITS OF TUBE SIZE

● Direct Fit; Type Adapters
○ Size or Type Adapters

OD (mm)	Tube Size	800	801	802	803	804	805	806	807	808	809	810	811	812	813	813E	814	815	816	817	818	819	820	821	822	823	824	825	826	827
	OD (mm)	17	18	20	22	24	26	28	30	33	36	39	43	47	51	56	56	62	68	75	82	94	106	118	130	142	154	166	178	190
17	800	●																												
18	801		●																											
20	802			●																										
22	803				●																									
24	804					●																								
26	805						●																							
28	806							●																						
30	807								●																					
33	808									●	○																			
36	809										●	○																		
39	810											●	○																	
43	811												●	○	○															
47	812													●	○	○														
51	813														●	○	○													
56	813E															●	○	○												
56	814																●	○	○											
62	815																	●	○	○										
68	816																		●	○	○									
75	817																			●	○	○								
82	818																				●	○	○							
94	819																					●	○	○						
106	820																						●	○	○					
118	821																							●	○	○				
130	822																								●	○	○			
142	823																									●	○	○		
154	824																										●	○	○	
166	825																											●	○	○
178	826																												●	○
190	827																													●

Other size or type adapter combinations may be possible. An engineering review is required. Contact UNISIG.



Driver System Overview

Drill tube drivers connect BTA drill tubes to the machine spindle, securing the tool to the machine and transmitting drilling power. These precision components are manufactured from heat treated alloy steel with tapered connections ground to ISO, ASME, or DIN standards.

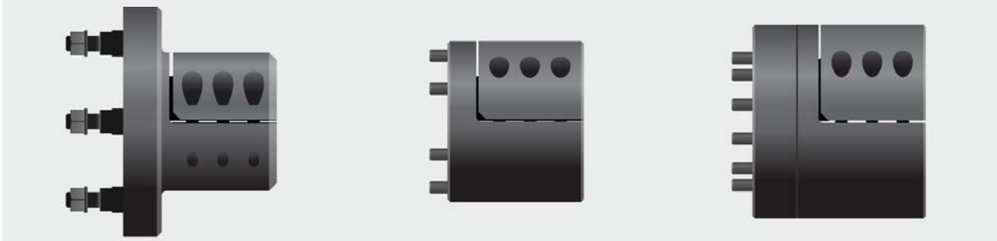
Driver System

BTA DRIVER ASSEMBLY

SPINDLE ADAPTER FLANGE AND REDUCER

SPLIT CLAMP REDUCER AND SEAL KIT

Driver Mounting Types



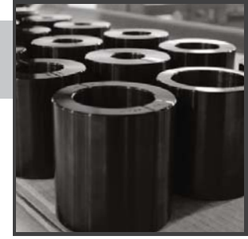
BAYONET MOUNT

DIRECT MOUNT

ADAPTER MOUNT

Spindle Nose		Drill Tube Driver System										
Type/Size	Size	68 mm	94 mm	106 mm	118 mm	142 mm	166 mm	190 mm	238 mm	310 mm	394 mm	490 mm
ISO/ASME	A2-6	Direct Fit	Direct Fit	Adapter Mount								
ISO/ASME	A2-8	Direct Fit	Direct Fit	Direct Fit	Direct Fit	Adapter Mount	Adapter Mount					
DIN 55027	SIZE 8	Bayonet Clamp	Bayonet Clamp	Bayonet Clamp	Bayonet Clamp	Bayonet Clamp	Bayonet Clamp					
ISO/ASME	A2-11			Direct Fit	Direct Fit	Direct Fit	Direct Fit	Adapter Mount	Adapter Mount			
DIN 55027	SIZE 11			Bayonet Clamp	Bayonet Clamp	Bayonet Clamp	Bayonet Clamp	Bayonet Clamp	Bayonet Clamp			
ISO/ASME	A2-15			Direct Fit	Direct Fit	Direct Fit	Direct Fit	Direct Fit	Direct Fit	Adapter Mount		
DIN 55027	SIZE 15			Bayonet Clamp	Bayonet Clamp	Bayonet Clamp	Bayonet Clamp	Bayonet Clamp	Bayonet Clamp	Bayonet Clamp		
ISO/ASME	A2-20				Direct Fit	Direct Fit	Direct Fit	Direct Fit	Direct Fit	Direct Fit	Adapter Mount	Adapter Mount
DIN 55027	SIZE 20				Bayonet Clamp	Bayonet Clamp	Bayonet Clamp	Bayonet Clamp	Bayonet Clamp	Bayonet Clamp	Bayonet Clamp	Bayonet Clamp

Split Clamp and Seal Ring Size Chart



Various nominal sizes are available to match each machine's capacity. Split clamp reducers and tube seals allow a wide range of tools to be used with a specific size flange adapter. The nominal diameter of the flange adapter is a direct fit for the largest drill tube in its range.

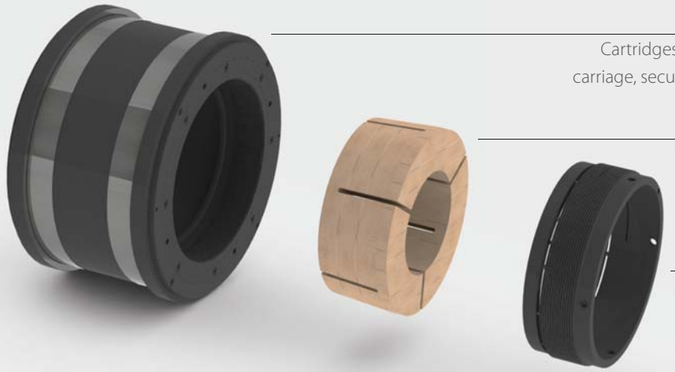
● Standard ○ Limited application

Drill Tube		Split Clamp Reducer and Seal Set										
OD (mm)	Tube Size	68 mm	94 mm	106 mm	118 mm	142 mm	166 mm	190 mm	238 mm	310 mm	394 mm	490 mm
11	794	○	○									
12	795	○	○									
13	796	○	○									
14	797	●	○									
15	798	●	○									
16	799	●	○									
17	800	●	●	○	○							
18	801	●	●	○	○							
20	802	●	●	○	○							
22	803	●	●	●	○							
24	804	●	●	●	●							
26	805	●	●	●	●							
28	806	●	●	●	●	○						
30	807	●	●	●	●	○						
33	808	●	●	●	●	○	○					
36	809	●	●	●	●	○	○					
39	810	●	●	●	●	○	○	○				
43	811	●	●	●	●	●	○	○				
47	812	●	●	●	●	●	○	○				
51	813	●	●	●	●	●	○	○				
56	814	●	●	●	●	●	○	○				
62	815	●	●	●	●	●	○	○				
68	816	Direct Fit	●	●	●	●	●	○	○			
75	817		●	●	●	●	●	○	○			
82	818		●	●	●	●	●	○	○			
94	819		Direct Fit	●	●	●	●	●	○			
106	820			Direct Fit	●	●	●	●	○			
118	821				Direct Fit	●	●	●	●			
130	822					●	●	●	●	○		
142	823					Direct Fit	●	●	●	○		
154	824						●	●	●	○		
166	825						Direct Fit	●	●	○		
178	826							●	●	○		
190	827							Direct Fit	●	●	○	
202	828								●	●	○	
214	829								●	●	○	
226	830								●	●	○	
238	831								Direct Fit	●	●	
250	832									●	●	○
262	833									●	●	○
274	834									●	●	○
286	835									●	●	○
298	836									●	●	○
310	837									Direct Fit	●	●
322	838										●	●
334	839										●	●
346	840										●	●
358	841										●	●
370	842										●	●
382	843										●	●
394	844										Direct Fit	●
406	845											●
418	846											●
430	847											●
442	848											●
454	849											●
466	850											●
478	851											●
490	852											Direct Fit

Vibration Dampener Assemblies and Types

Drill tube vibration dampeners support the drill tube during the drilling process. Heat treated components and precision bearings make up an assembly that guides rotating drill tubes for superior hole finish and dependable tool life. Vibration dampeners are available as standard, or mechanical for micro-adjustment during drilling.

Standard Vibration Dampeners



Standard Vibration Dampener Cartridge

Cartridges come in a few standard sizes and fit inside the cast iron carriage, securing it to the machine bed for precision rotation cutting.

Tapered Vibration Dampener Collet

Tapered collets are made from a specialized dampening material that contacts the drill tube, allowing rotation without damaging the surface.

Tensioning Locknut

Locknuts securely hold the assembly together and adjust tension, to hold the tube securely during the rotating drill process.

Standard Vibration Dampeners

Vibration dampeners are required on mid-length to extremely long drill tubes to support the tube and reduce vibrations while drilling. Standard vibration dampener systems have a tapered collet with locknuts on each end, which adjust to increase or decrease clamping forces on the tube during setup. The standard assembly is durable and cost effective for most BTA deep hole drilling machines.

Mechanical Vibration Dampeners

Mechanical Vibration Dampener Cartridge

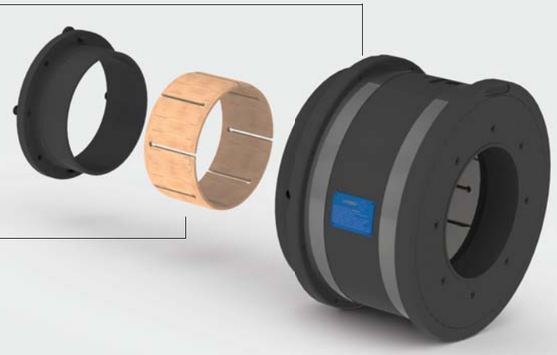
Mechanical vibration dampeners have either a mechanical or hydraulic mechanism for micro-adjustments during the drilling cycle.

Collet Retainer

Retainers hold the vibration dampener collet into the cartridge to prevent a cylindrical collet from slipping during drilling.

Cylindrical Vibration Dampener Collet

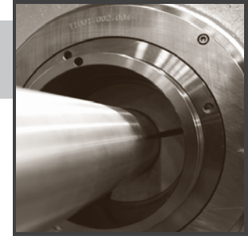
Cylindrical collets take advantage of internal tapering for secure installation, and are made of the same specialized material as the tapered collets for smooth rotation during drilling.



Mechanical Vibration Dampeners

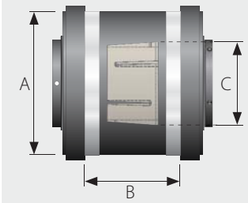
Mechanical vibration dampeners are an optional upgrade that allow clamping pressure adjustment and release during the drilling operation. This is possible with either a locknut mechanism or an internal hydraulic piston. Hydraulic systems are supplied with a hand pump to control pressure, and a power unit is available as an option. Mechanical vibration dampeners accept cylindrical collets, and have a tapered mechanism as an internal component, saving costs of perishable tooling over the life of the machine.

Vibration Dampener Reducers and Specifications

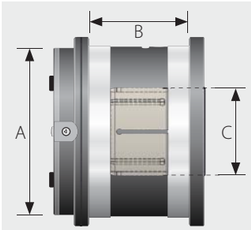


Vibration dampener mounting reducers allow cartridge assemblies to fit in the machine-mounted carriage, increasing the size range of the tooling set. Each system is engineered to fit together with a range of standard sizes, allowing easy management of the system while maintaining accuracy.

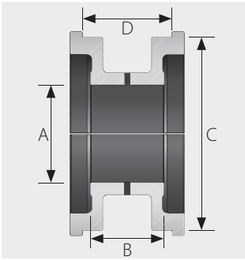
Standard Vibration Dampener Cartridge - Tapered Collet						
Cartridge OD (A)	135 mm	180 mm	280 mm	355 mm	490 mm	650 mm
Mounting Width (B)	54 mm	135 mm	165 mm	165 mm	200 mm	200 mm
Collet Gauge Line (C)	83 mm	93 mm	163 mm	252 mm	372 mm	532 mm



Mechanical Vibration Dampener Cartridge - Cylindrical Collet					
Hydraulic Actuation	•	•	•	•	•
Locknut Actuation	•	•			
Cartridge OD (A)	230 mm	280 mm	355 mm	490 mm	650 mm
Mounting Width (B)	135 mm	165 mm	165 mm	200 mm	200 mm
Collet OD (C)	104 mm	145 mm	205 mm	330 mm	490 mm

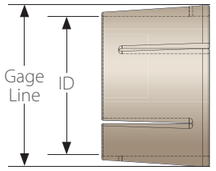


Vibration Dampener Mounting Reducer								
Inside Diameter (A)	180 mm	180 mm	280 mm	280 mm	355 mm	280 mm	355 mm	490 mm
Cartridge Mounting Width (B)	135 mm	135 mm	165 mm	165 mm	165 mm	165 mm	165 mm	200 mm
Reducer OD (C)	280 mm	355 mm	355 mm	490 mm	490 mm	650 mm	650 mm	650 mm
Reducer Mounting Width (D)	165 mm	165 mm	165 mm	200 mm	200 mm	200 mm	200 mm	200 mm



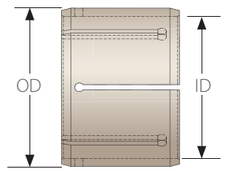
Vibration Dampener Collets - Tapered

Vibration dampener collets are made out of a special material which contacts the drill tube without damage. Tapered collets are designed for use with standard vibration dampeners.



Drill Tube		Dampener Collet by Gage Line					
		● Standard ○ Limited application					
OD (mm)	Tube Size	83 mm	93 mm	163 mm	252 mm	372 mm	532 mm
11	794	○	○				
12	795	○	○				
13	796	○	○				
14	797	○	○				
15	798	○	○				
16	799	○	○				
17	800	●	●				
18	801	●	●				
20	802	●	●				
22	803	●	●				
24	804	●	●				
26	805	●	●				
28	806	●	●				
30	807	●	●				
33	808	●	●	○			
36	809	●	●	○			
39	810	●	●	○			
43	811	●	●	●			
47	812	●	●	●			
51	813	●	●	●			
56	814	●	●	●			
62	815	●	●	●			
68	816	●	●	●			
75	817			●			
82	818			●			
94	819			●			
106	820			●			
118	821			●			
130	822			●			
142	823			●	●		
154	824				●		
166	825				●		
178	826				●		
190	827				●		
202	828				●		
214	829				●		
226	830				●	●	
238	831					●	
250	832					●	
262	833					●	
274	834					●	
286	835					●	
298	836					●	
310	837					●	
322	838					●	
334	839					●	
346	840					●	●
358	841						●
370	842						●
382	843						●
394	844						●
406	845						●
418	846						●
430	847						●
442	848						●
454	849						●
466	850						●
478	851						●
490	852						●

Vibration Dampener Collets - Cylindrical



Mechanical vibration dampeners use cylindrical collets, and are designed to compress the drill tube with permanent internal parts. Cylindrical collets are easy to install and are more cost-effective.

Drill Tube		Dampener Collet by Gage Line				
		● Standard				
OD (mm)	Tube Size	104 mm	145 mm	205 mm	330 mm	490 mm
11	794					
12	795					
13	796					
14	797					
15	798					
16	799					
17	800	●				
18	801	●				
20	802	●				
22	803	●				
24	804	●				
26	805	●				
28	806	●				
30	807	●				
33	808	●				
36	809	●				
39	810	●				
43	811	●	●			
47	812	●	●			
51	813	●	●			
56	814	●	●			
62	815	●	●			
68	816	●	●			
75	817	●	●			
82	818	●	●			
94	819	●	●			
106	820		●			
118	821		●	●		
130	822		●	●		
142	823			●		
154	824			●		
166	825			●		
178	826			●		
190	827			●	●	
202	828				●	
214	829				●	
226	830				●	
238	831				●	
250	832				●	
262	833				●	
274	834				●	
286	835				●	
298	836				●	
310	837				●	●
322	838					●
334	839					●
346	840					●
358	841					●
370	842					●
382	843					●
394	844					●
406	845					●
418	846					●
430	847					●
442	848					●
454	849					●
466	850					●
478	851					
490	852					

Rotating Pressure Head System

UNISIG high performance pressure head systems introduce fluid to the drill and align bushings to the workpiece when starting a hole, to allow a very high level of productivity during the drilling process. Several components make up the system, and all contribute to productive and accurate drilling.

Rotating Group - Rotating spindle components combined with engineered, balanced mechanical seals allow a wide operating range. In addition to providing a rotating seal for cutting fluid introduction, UNISIG pressure heads are designed to support the weight of a workpiece and guide the tool through a bushing as it enters the workpiece.

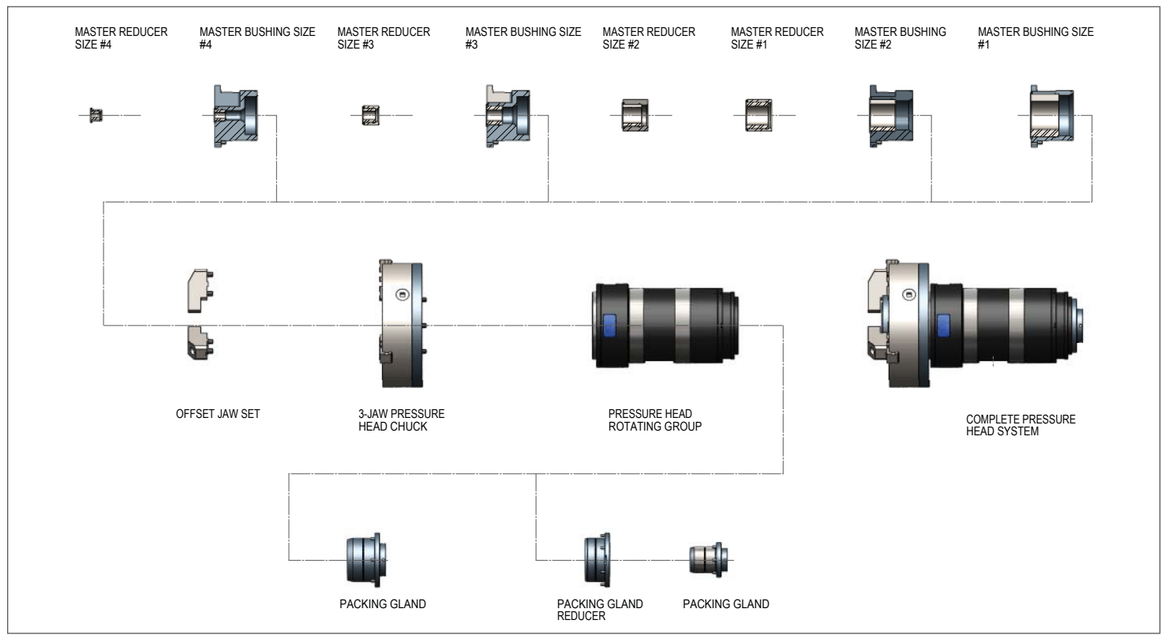
Packing Glands - Sealing and guiding components that adapt the pressure head to a specific drill tube size.

Pressure Head Chucks - Mounted directly to the rotating group to locate and support the workpiece. Pressure head chucks are specially prepared with a precision center bore and retention system. Chucks allow drilling of saw cut workpieces without end preparation, and rapid changeover between all types of parts without a need for custom tooling.

Workholding Cones - Mounted to the rotating group to locate and support the workpiece. Very accurate location is possible when a workpiece has been specially prepared for use with cones.

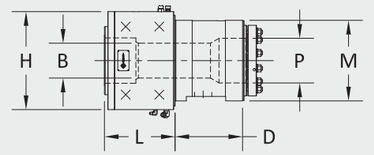
Master Bushings - Multiple step master bushings provide a durable mounting point for drill bushing inserts. Bushing seals are integral to the master for increased flexibility.

Drill Bushing Inserts - Heat treated and precision ground components that guide the BTA drill head as it enters the workpiece. The perishable bushing insert can be produced at the lowest cost when used in conjunction with a well designed master system.

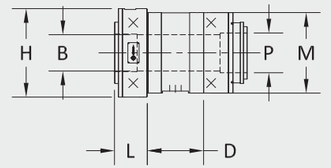


Pressure Head Models, Dimensions, and Ratings

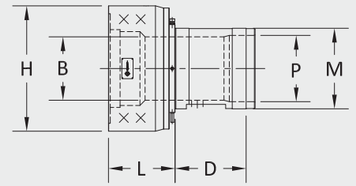
A variety of pressure heads are designed for various advantages during drilling. Machines that have different hole sizes, speed, and power requirements are optimized with the appropriate pressure head for efficient drilling.



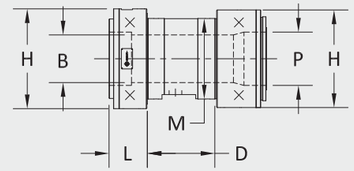
TYPE 1
HIGH SPEED



TYPE 3
HIGH LOAD



TYPE 2
LARGE BORE



TYPE 4
HIGH LOAD

Type 1: Designed with a stationary outer housing and rotating inner spindle shaft, as well as specialized bearings and seals that favor high speed, pressure, and precision applications. Maximum drill capacity for a given mounting diameter is smaller for Type 1 compared to other types.

Type 2: Designed to maximize drill diameter for a given mounting diameter, by using a rotating outer housing and stationary center shaft. A large outer fluid seal and bearing set require a lower maximum pressure and speed compared to other types.

Type 3: Spread bearing and balanced fluid seal construction make these the most durable of all pressure heads. A fixed outer housing and rotating center spindle shaft are maintained while maximizing the mounting diameter. Speed and drill diameters are moderate and efficient.

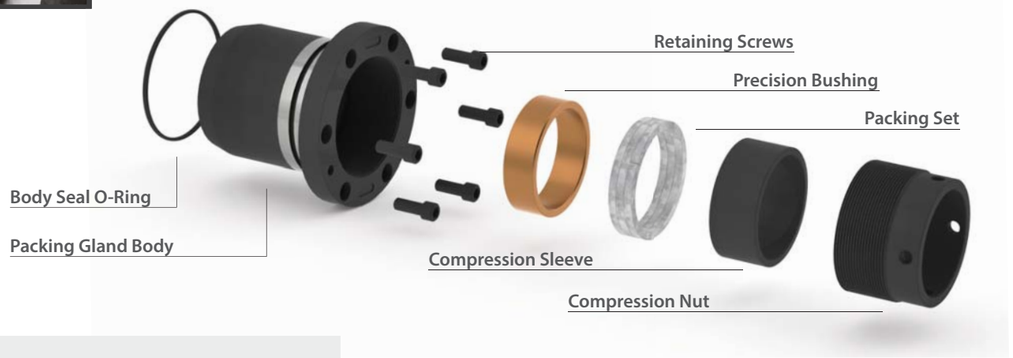
Type 4: The internal construction is the same as a Type 3 pressure head but with a larger bearing set for a given mounting diameter. This allows for a larger drill capacity than a Type 3 but requires slightly slower speed operation and a dual flange shaped outer housing design. This shape may not fit in all machine configurations.

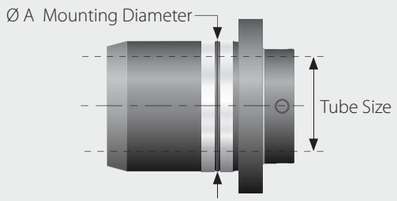
Model Code	Type	Mounting Diameter (M)	Maximum Tool Size in Body (B)	Rated Maximum Speed	Rated Fluid Pressure	Packing Gland Mounting Bore (P)	Standard Chuck Size
M180-B108	1	180 mm 7.09 in	105 mm 4.13 in	2000 rpm	80 bar 1160 psi	120 mm 4.72 in	320 mm 12.60 in
M180-B114	2	180 mm 7.09 in	111 mm 4.37 in	1500 rpm	25 bar 363 psi	120 mm 4.72 in	320 mm 12.60 in
M230-B141	1	230 mm 9.06 in	138 mm 5.43 in	1800 rpm	70 bar 1015 psi	160 mm 6.30 in	400 mm 15.75 in
M230-B174	2	230 mm 9.06 in	171 mm 6.73 in	1000 rpm	22 bar 319 psi	200 mm 7.87 in	500 mm 19.69 in
M230-B113	3	230 mm 9.06 in	110 mm 4.33 in	900 rpm	70 bar 1015 psi	120 mm 4.72 in	320 mm 12.60 in
M230-B141	4	230 mm 9.06 in	138 mm 5.43 in	900 rpm	70 bar 1015 psi	160 mm 6.30 in	400 mm 15.75 in
M300-B154	1	300 mm 11.81 in	151 mm 5.94 in	1500 rpm	70 bar 1015 psi	175 mm 6.89 in	500 mm 19.69 in
M300-B230	2	300 mm 11.81 in	227 mm 8.94 in	800 rpm	18 bar 261 psi	235 mm 9.25 in	630 mm 24.80 in
M300-B160	3	300 mm 11.81 in	157 mm 6.18 in	800 rpm	70 bar 1015 psi	175 mm 6.89 in	500 mm 19.69 in
M355-B154	1	355 mm 13.98 in	151 mm 5.94 in	1500 rpm	70 bar 1015 psi	200 mm 7.87 in	500 mm 19.69 in
M355-B279	2	355 mm 13.98 in	276 mm 10.87 in	600 rpm	15 bar 218 psi	290 mm 11.42 in	700 mm 27.56 in
M355-B196	3	355 mm 13.98 in	193 mm 7.60 in	600 rpm	70 bar 1015 psi	200 mm 7.87 in	630 mm 24.80 in
M355-B210	4	355 mm 13.98 in	207 mm 8.15 in	600 rpm	40 bar 580 psi	235 mm 9.25 in	630 mm 24.80 in
M450-B340	2	450 mm 17.72 in	337 mm 13.27 in	500 rpm	15 bar 218 psi	365 mm 14.37 in	700 mm 27.56 in
M450-B210	3	450 mm 17.72 in	207 mm 8.15 in	600 rpm	40 bar 580 psi	235 mm 9.25 in	630 mm 24.80 in
M450-B260	4	450 mm 17.72 in	257 mm 10.12 in	500 rpm	35 bar 508 psi	290 mm 11.42 in	700 mm 27.56 in
M530-B440	2	530 mm 20.87 in	437 mm 17.20 in	300 rpm	15 bar 218 psi	445 mm 17.52 in	800 mm 31.50 in
M530-B307	3	530 mm 20.87 in	304 mm 11.97 in	500 rpm	35 bar 508 psi	365 mm 14.37 in	700 mm 27.56 in
M650-B550	2	650 mm 25.59 in	547 mm 21.54 in	200 rpm	10 bar 145 psi	560 mm 22.05 in	1000 mm 39.37 in
M650-B403	3	650 mm 25.59 in	400 mm 15.75 in	400 rpm	20 bar 290 psi	445 mm 17.52 in	800 mm 31.50 in
M800-B655	2	800 mm 31.50 in	650 mm 25.59 in	150 rpm	5 bar 73 psi	560 mm 22.05 in	NA NA
M800-B600	3	800 mm 31.50 in	597 mm 23.50 in	200 rpm	10 bar 145 psi	560 mm 22.05 in	1000 mm 39.37 in

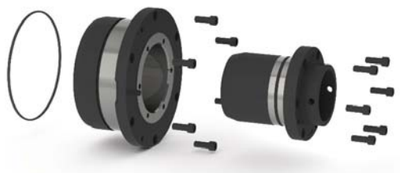
Dimensions H, L, and D vary by design. Maximum drill size may be further limited by chuck or clamping cone selected. Contact UNISIG for details.

Packing Gland Standard Size Chart (inch)

Packing glands are precision assemblies that accurately guide drill tubes into the workpiece, contain cutting fluid within the pressure head, and allow controlled flow of the fluid to the cutting tool.



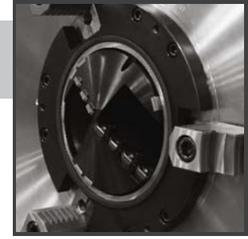




Packing gland reducers are available, contact UNISIG.

Drill Tube		Mounting Diameter				
OD (mm)	Tube Size	3.5 in	4.50 in	6.25 in	7.75 in	11.5 in
17	800	•				
18	801	•				
20	802	•				
22	803	•				
24	804	•				
26	805	•				
28	806	•				
30	807	•				
33	808	•				
36	809	•				
39	810	•				
43	811	•	•			
47	812		•			
51	813		•			
56	814		•			
62	815		•			
68	816		•			
75	817			•		
82	818			•		
94	819			•		
106	820			•		
118	821			•	•	
130	822				•	
142	823				•	
154	824				•	
166	825					•
178	826					•
190	827					•
202	828					•
214	829					•
226	830					•
238	831					•

Packing Gland Standard Size Chart (mm)

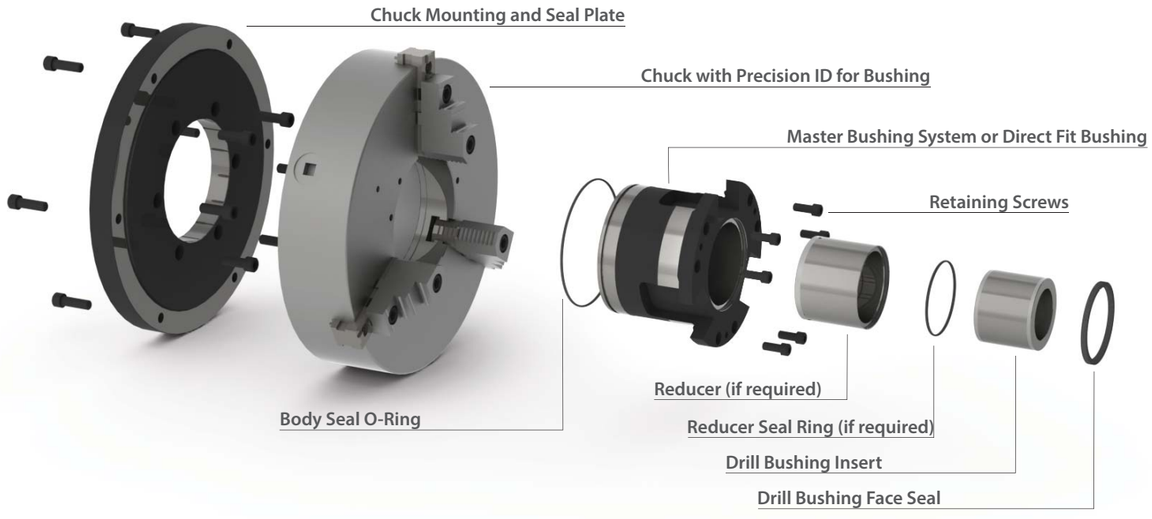


Packing glands are engineered and precision manufactured in a large range of standard sizes. In some cases, a reducer may be preferred to increase ranges of specific sizes of packing glands. These are available upon request.

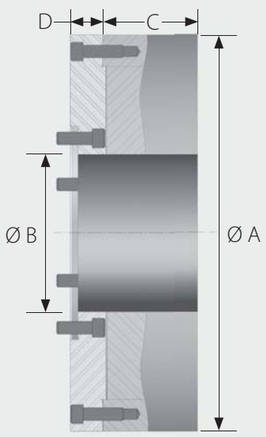
Drill Tube		Mounting Diameter										
OD (mm)	Tube Size	85 mm	105 mm	120 mm	160 mm	175 mm	200 mm	235 mm	290 mm	300 mm	365 mm	445 mm	560 mm
11	794	•											
12	795	•											
13	796	•											
14	797	•											
15	798	•											
16	799	•											
17	800	•	•	•									
18	801	•	•	•									
20	802	•	•	•									
22	803	•	•	•									
24	804	•	•	•									
26	805	•	•	•									
28	806	•	•	•									
30	807	•	•	•									
33	808	•	•	•									
36	809	•	•	•									
39	810	•	•	•									
43	811	•	•	•									
47	812		•	•									
51	813		•	•									
56	814		•	•									
62	815		•	•									
68	816		•	•									
75	817		•	•	•	•							
82	818		•	•	•	•							
94	819			•	•	•							
106	820				•	•							
118	821				•	•	•	•					
130	822					•	•	•					
142	823					•	•	•					
154	824						•	•					
166	825							•	•				
178	826							•	•				
190	827							•	•				
202	828								•	•			
214	829								•	•			
226	830								•	•			
238	831								•	•			
250	832									•	•		
262	833										•		
274	834										•		
286	835										•		
298	836										•		
310	837										•		
322	838											•	
334	839											•	
346	840											•	
358	841											•	
370	842											•	
382	843											•	
394	844												•
406	845												•
418	846												•
430	847												•
442	848												•
454	849												•
466	850												•
478	851												•
490	852												•

Pressure Head Chucks and Master Bushing System

Pressure head chucks mount directly to the rotating group to locate and support the workpiece. Chucks are specially prepared with a precision center bore and retention system. These chucks allow secure holding of saw-cut workpieces, and rapid changeover between all types of parts without custom tooling.



Direct Fit Bushings for Largest Tool Size



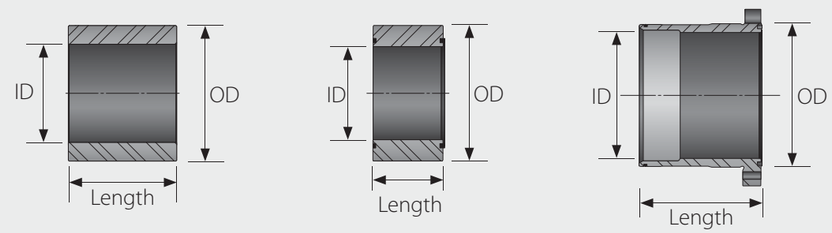
Standard 3-Jaw Scroll Chucks												
Size (A)			Master Bushing Bore (B)			Maximum Drill Bushing I.D.			Direct Fit			
320	mm	12.60 in	125	mm	4.92 in	92	mm	3.63 in	105	mm	4.13 in	
400	mm	15.75 in	150	mm	5.91 in	114	mm	4.50 in	130	mm	5.12 in	
500	mm	19.69 in	202	mm	7.95 in	159	mm	6.25 in	182	mm	7.17 in	
630	mm	24.80 in	253	mm	9.96 in	203	mm	8.00 in	233	mm	9.17 in	
700	mm	27.56 in	330	mm	12.99 in	292	mm	11.50 in	310	mm	12.20 in	
800	mm	31.50 in	420	mm	16.54 in	360	mm	14.17 in	400	mm	15.75 in	
1000	mm	39.37 in	575	mm	22.64 in	510	mm	20.08 in	555	mm	21.85 in	

*4-JAW SCROLL AND 4-JAW INDEPENDENT CHUCKS AVAILABLE UPON REQUEST

UNISIG selects premium chuck manufacturers for each machine, and customizes each to fit the machine and application. Chucks are made from high quality forged steel, and are commonly available in both 3-jaw geared scroll and 4-jaw independent styles.

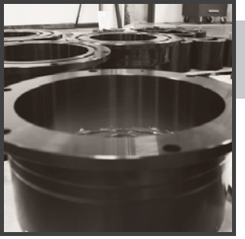
Each chuck is custom bored and ground to fit the maximum sized bushing; mounting holes are drilled to match as well. Sealing adapter plates locate and attach the chuck to the pressure head, and prevent coolant leakage.

Metric Drill Bushing System



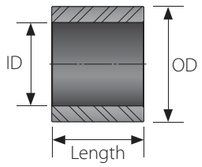
Master Bushing OD	Master Bushing Mounting Diameter - Bushing Size (OD) ● DIRECT MOUNT ○ REDUCER CUP REQUIRED														
	35 mm	48 mm	62 mm	78 mm	95 mm	110 mm	130 mm	175 mm	225 mm	265 mm	310 mm	325 mm	390 mm	435 mm	530 mm
125 mm	○	●	○	●	○	●									
150 mm	○	●	○	●	○	○	●								
202 mm	○	●	○	●	○	○	●	●							
253 mm			○	●	○	○	●	●	●						
330 mm									●	●	●				
420 mm										●		●	●		
575 mm												●		●	●

Outside Diameter		Length	Inside Diameter		
Nominal (mm)	Tolerance	+/- 0.010	Min (mm)	Max (mm)	Tolerance
26.00	n6	28.000	15.00	18.00	G6
30.00	n6	36.000	18.00	22.00	G6
35.00	n6	36.000	15.75	26.20	G6
42.00	n6	45.000	26.00	30.00	G6
48.00	n6	45.000	25.40	38.00	G6
55.00	n6	56.000	35.00	42.00	G6
62.00	n6	56.000	34.90	50.00	G6
70.00	n6	56.000	48.00	55.00	G6
78.00	n6	67.000	48.00	65.00	G6
85.00	n6	67.000	63.00	70.00	G6
95.00	n6	78.000	63.00	82.00	G6
105.00	n6	78.000	78.00	85.00	G6
110.00	n6	78.000	78.00	97.00	G6
115.00	n6	89.000	85.00	95.00	G6
125.00	n6	89.000	95.00	105.00	G6
130.00	n6	100.000	92.00	117.00	G6
175.00	n6	100.000	114.00	162.00	G6
225.00	n6	115.000	152.00	206.00	G6
265.00	n6	115.000	195.00	247.00	G6
310.00	n6	115.000	232.00	292.00	G6
325.00	n6	125.000	243.75	305.00	G6
390.00	n6	125.000	292.50	370.00	G6
435.00	n6	150.000	326.25	415.00	G6
530.00	n6	150.000	397.50	510.00	G6

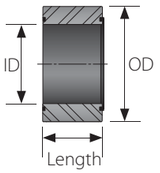


Inch Drill Bushing System

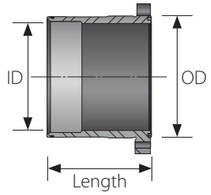
STANDARD BUSHING



INTEGRAL SEAL BUSHING



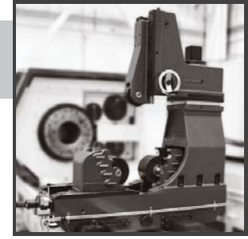
DIRECT FIT BUSHING



Master Bushing OD	Master Bushing Mounting Diameter - Bushing Size (OD) ● DIRECT MOUNT ○ REDUCER CUP REQUIRED									
	1.375 in	1.75 in	2.25 in	3.00 in	3.50 in	4.25 in	5.00 in	6.50 in	6.75 in	8.75 in
125 mm	○	●	○	●	○	●				
150mm	○	●	○	●	○	○	●			
202 mm	○	●	○	●	○	○	●		●	
253 mm			○	●	○	○	●	●		●
330 mm										●
420 mm										
575 mm										

Outside Diameter			Length (in)	Inside Diameter		
Nominal (in)	Tolerance (in)		+/- 0.010	Min (in)	Max (in)	Tolerance
1.0000	+.0018	+.0015	1.000	0.5000	0.7656	G6
1.1250	+.0020	+.0017	1.000	0.7656	0.8438	G6
1.2500	+.0020	+.0017	1.000	0.8594	0.9375	G6
1.3750	+.0022	+.0018	1.375	0.6250	1.03125	G6
1.5000	+.0021	+.0018	1.500	1.0156	1.1250	G6
1.7500	+.0023	+.0019	1.750	1.0000	1.3906	G6
2.2500	+.0025	+.0021	2.000	1.3750	1.7656	G6
2.3750	+.0025	+.0021	2.000	1.5000	2.0000	G6
2.5000	+.0025	+.0021	2.000	1.5000	2.1250	G6
2.7500	+.0025	+.0021	2.000	1.5000	2.3750	G6
3.0000	+.0028	+.0023	2.500	1.7500	2.5000	G6
3.2500	+.0028	+.0023	3.000	2.2500	2.7500	G6
3.3750	+.0028	+.0023	3.000	2.2500	2.8750	G6
3.5000	+.0028	+.0023	3.000	2.5000	3.0000	G6
3.7500	+.0028	+.0023	3.000	2.5000	3.3125	G6
4.0000	+.0028	+.0023	3.500	2.7500	3.3750	G6
4.2500	+.0030	+.0025	3.500	3.0000	3.6250	G6
4.5000	+.0030	+.0025	4.000	3.0000	3.7500	G6
4.5000	+.0030	+.0025	4.000	3.3750	3.8750	G6
4.7500	+.0030	+.0025	4.000	3.3750	4.1250	G6
5.000	+.0030	+.0025	4.000	3.6250	4.5000	G6
5.2500	+.0030	+.0025	4.000	3.9375	4.7500	G6
5.5000	+.0030	+.0025	4.000	4.1250	5.0000	G6
5.7500	+.0030	+.0025	4.000	4.3125	5.2500	G6
6.0000	+.0032	+.0027	4.000	4.5000	5.5000	G6
6.2500	+.0032	+.0027	4.000	4.6875	5.7500	G6
6.5000	+.0032	+.0027	4.500	4.5000	6.0000	G6
6.7500	+.0032	+.0027	4.500	4.5000	6.2500	G6
7.000	+.0032	+.0027	4.500	5.2500	6.5000	G6
7.2500	+.0032	+.0027	4.500	5.4375	6.7500	G6
7.5000	+.0032	+.0027	4.500	6.0000	7.0000	G6
7.7500	+.0032	+.0027	4.500	5.8125	7.2500	G6
8.0000	+.0032	+.0027	4.500	6.0000	7.5000	G6
8.2500	+.0032	+.0027	4.500	6.1875	7.7500	G6
8.5000	+.0032	+.0027	4.500	6.3750	8.0000	G6
8.7500	+.0032	+.0027	4.500	7.2500	8.0000	G6

UNISIG Machine Series and Additional Accessories



BTA durable tooling has optimum performance on a UNISIG deep hole drilling machine. Machines are capable of the highest precision standards across a wide range of diameters, depths, and tolerance requirements. Machines and tooling are engineered together for a complete, integrated system with hassle-free setup and operation.

B-Series Ballscrew Feed

On center drilling up to 6m deep

B-Series machines drill on-center holes in round workpieces, and can handle long workpieces with large drilling diameters.

B-Series Rack and Pinion Drive

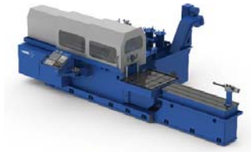
On center drilling up to 30m deep

Longer B-Series machines utilize rack and pinion drive to maintain straightness and accuracy at more extreme on-center drilling depths.

S-Series Machines

Skiving and burnishing for hydraulics

S-Series machines are optimized for efficient, accurate, and clean skiving and burnishing, resulting in extremely round holes and mirror-surface finishes.



USK Knee Type Machines

Off center drilling of all workpieces

USK machines are versatile, and can handle a range of drilling diameters, drilling depths, workpieces, and materials, and utilize BTA, gun drilling, or both.

USC Column Type Machines

Off center drilling of heavy workpieces

USC column machines drill precise holes in non-round workpieces up to 50 tons. Accurate drilling is achieved by a sturdy machine with a compact footprint.

USC-TS Tube Sheet Machines

Column machines for tube sheets

USC-TS machines are capable of handling thousands of heat exchanger holes quickly and accurately, allowing tube sheets to be completed with efficiency.

USC-M 7-Axis Machines

Drilling, milling, and tapping center

USC-M drilling centers have capabilities advantageous to mold shops. Machines allow multiple operations to be performed on all workpiece sides, with one setup.

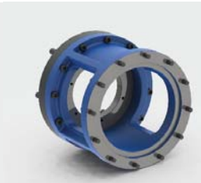
UNI Production Machines

Specialized production drilling

UNI machines achieve precise, production drilling, typically for the automotive industry. UNI machines are often paired with automation for high-volume efficiency.

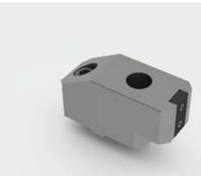
Breakthrough Seal System

For holes that are drilled entirely through the workpiece, a breakthrough seal system prevents leakage of oil and chips at the end of the part, and provides a clean return path for the fluid and chips.



Lantern Chuck

Lantern chucks allow access to the tool and drill tube for installation and alignment of a pull boring tool, without requiring a special pilot hole in the part.



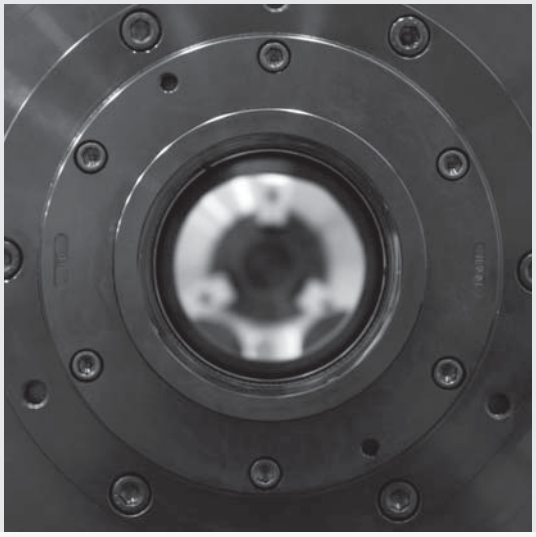
Offset Jaws

Offset chuck jaws allow a range of drill bushings and workpiece wall thicknesses without the need for custom jaws or tooling.

Workpiece Support and Clamping

Support accessories are adjustable for workpieces of longer lengths, and outside diameters. These provide stability during setup and maintain accuracy during drilling.

For information or a quote on UNISIG machines or accessories, please visit www.unisig.com


Request your durable tooling quote or more information
through our global headquarters or our European division.

UNISIG Deep Hole Drilling Systems

GLOBAL HEADQUARTERS | ENGINEERING AND MANUFACTURING

N58W14630 Shawn Circle
Menomonee Falls, WI 53051 USA
☎ +1-262-252-3802 🖷 +1-262-252-4075
www.unisig.com

UNISIG GmbH Tiefbohrsysteme

EUROPEAN SALES AND SERVICE HEADQUARTERS

Heuweg 3, 72574 Bad Urach, Germany
☎ +49 (0) 7125 9687590
🖷 +49 (0) 7125 9687599
www.unisig.de

Version: JUL-17-US-02