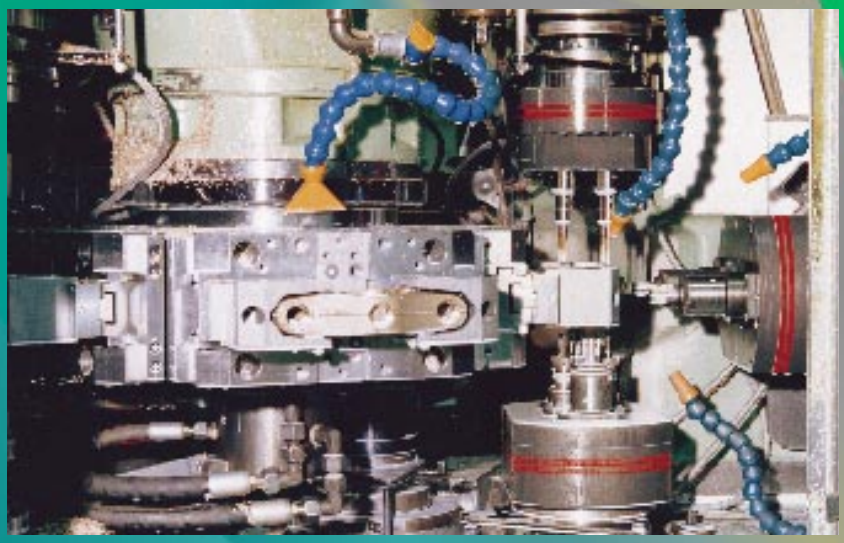
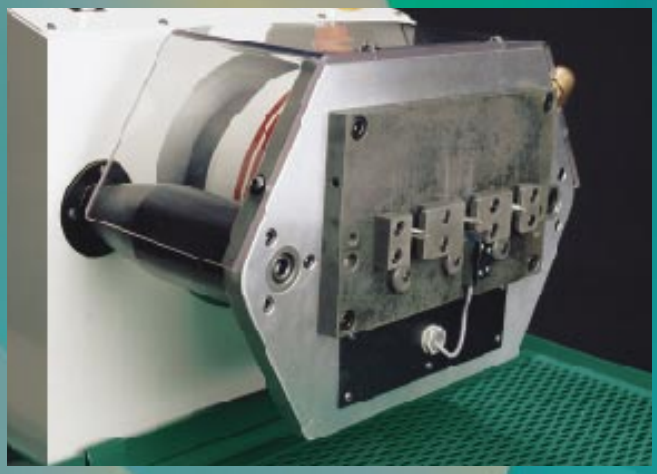
CENTRELINE

MULTI-SPINDLE DRILLING AND TAPPING HEADS

CENTINEL

APPLICATIONS

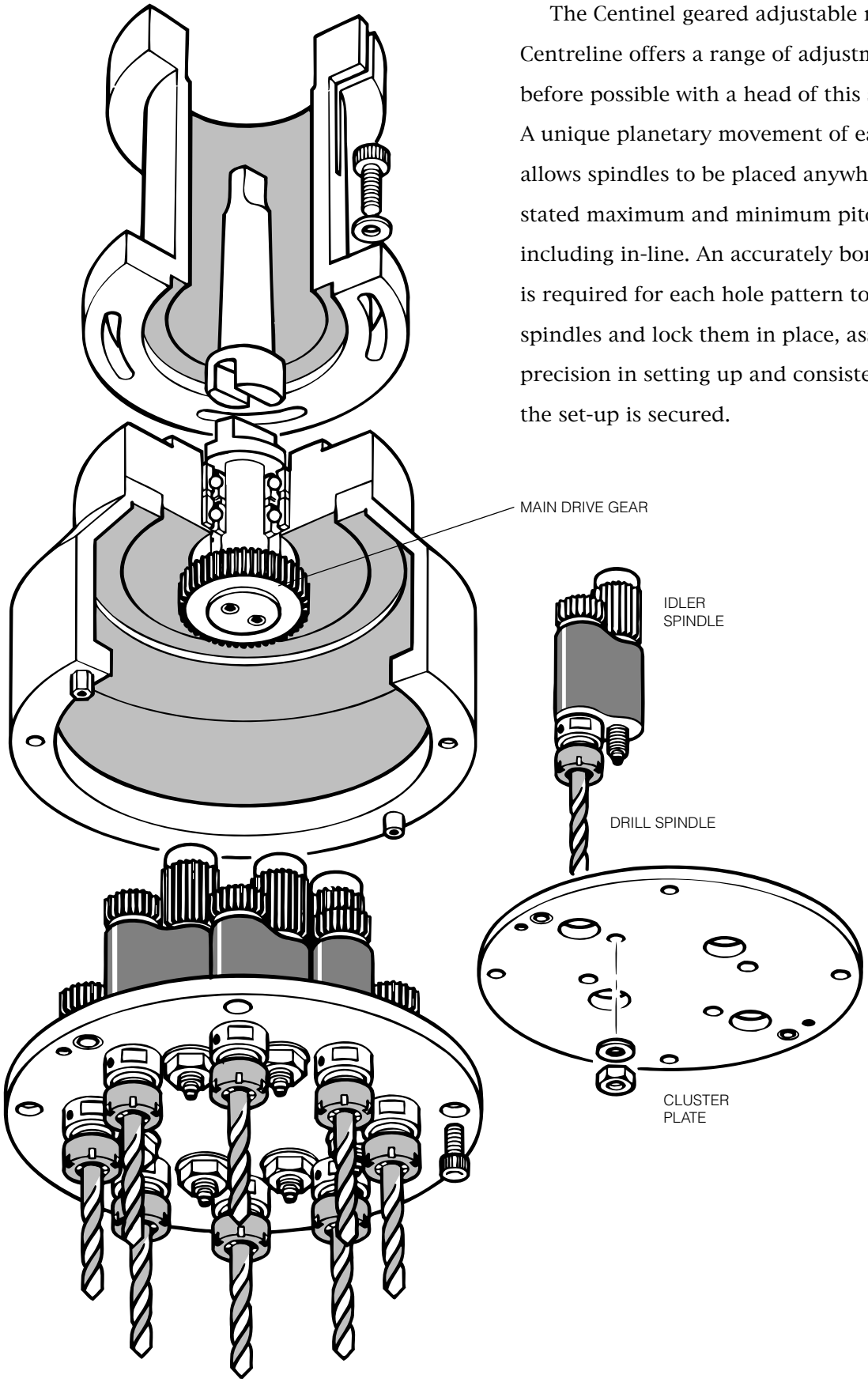




CONTENTS

THE CENTINEL SYSTEM

The Centinel geared adjustable multi-head from Centreline offers a range of adjustment never before possible with a head of this size and weight. A unique planetary movement of each spindle allows spindles to be placed anywhere within the stated maximum and minimum pitch circles, including in-line. An accurately bored cluster plate is required for each hole pattern to mount the spindles and lock them in place, assuring speed and precision in setting up and consistent accuracy once the set-up is secured.



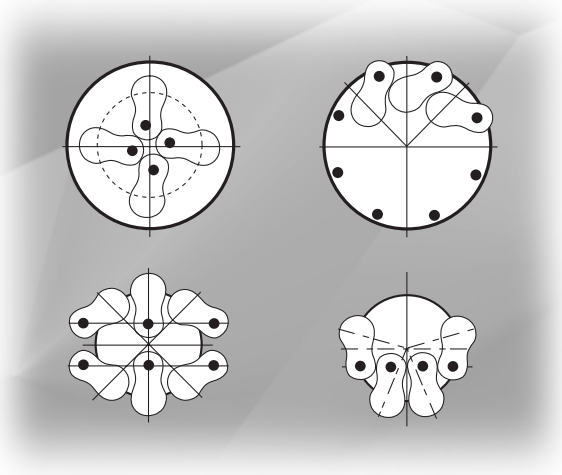
The Centinel's planetary adjustment is unique in multi-spindle heads, but the idea may be said to be universal as it parallels the movement of the moon around the earth and the earth around the sun. The cut-away diagram demonstrates how this idea is applied to the Centinel.

The drill spindle is able to rotate a full 360° around the axis of the idler spindle which is secured to the jig-bored cluster plate - moon around the earth. The complete spindle assembly can also rotate 360° around the main drive gear - earth around the sun. Thus the drill or tap can be positioned anywhere within the designated maximum and minimum pitch circles of the head, the appropriate cluster plate holding each hole pattern firmly in place.

Spindles can be removed or added as required and adjustment is quick and simple: for a new pattern, just bore a new cluster plate and re-assemble. Up to ten spindles can be mounted in this way, depending on the model.

Simple in concept and simple to use, but leading the field in multi-head design.

- fully adjustable head
- gear driven for reliability
- add or subtract spindles in minutes
- up to ten spindles on one head
- jig-bored positioning plate ensures fast & accurate set-ups
- adaptable for practically any machine - manual or Automatic Tool Change (ATC)
- position spindles ANYWHERE within the min & max PCD's of the unit

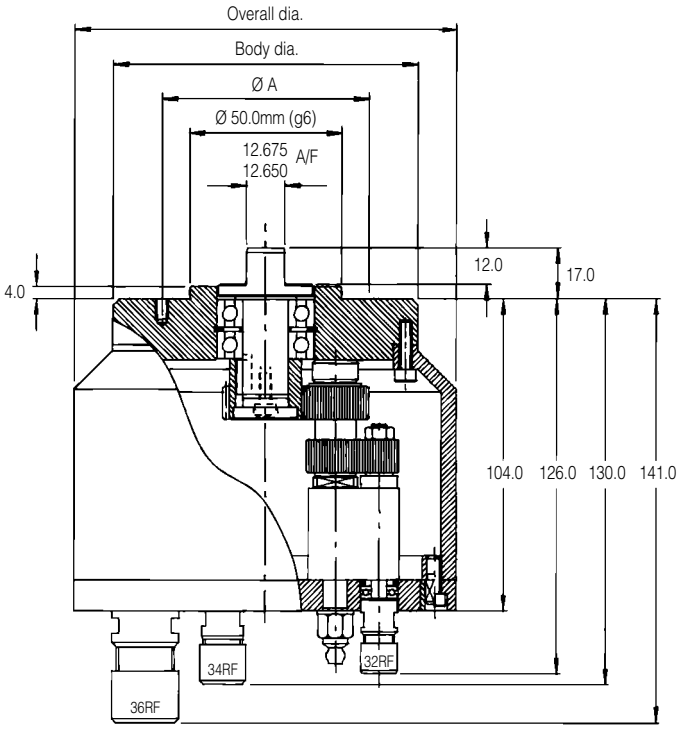


Examples of spindle configurations

30 RANGE

MAIN BODY ASSEMBLY

Dimensions (mm)				
Main Body Assembly	Overall dia.	Body dia.	A (8 holes equispaced)	Unit Weight (kg)
30 BC 21	100.0	90.0	Ø68.0mm (M4 x 8 d'p)	1.25
30 BC 24	100.0	90.0	Ø68.0mm (M4 x 8 d'p)	1.25
30 CD 30	125.0	100.0	Ø68.0mm (M4 x 8 d'p)	1.65
30 CD 36	125.0	100.0	Ø68.0mm (M4 x 8 d'p)	1.65
30 DE 42	150.0	125.0	Ø68.0mm (M4 x 8 d'p)	2.00

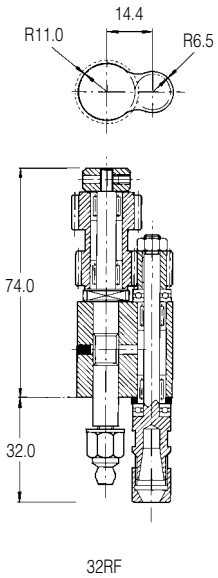


SPINDLE ASSEMBLY

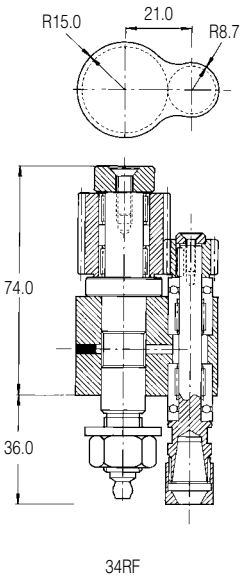
Spindles			
Spindle Assembly	Max. Tool dia.	Max. Speed r.p.m.	Unit Weight (kg)
32RF	5.0	6000	0.2
34RF	7.0	5000	0.3
36RF	10.0	5000	0.6

Minimum Centre Distances			
Spindle Assembly	32RF	34RF	36RF
32RF	13.0	15.2	18.5
34RF	15.2	17.4	20.7
36RF	18.5	20.7	24.0

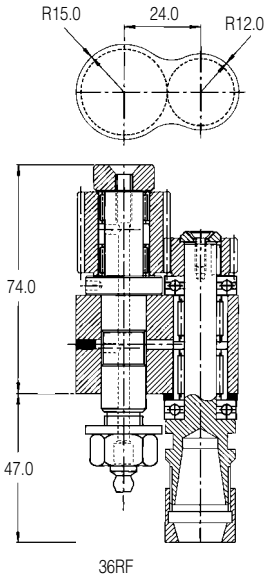
The 32, 34 and 36 spindle assemblies can be fitted to the same head. This is useful in overcoming possible close centre problems. A further advantage is the higher gear ratio of the smaller spindles, which helps if drilling large and small holes at the same time.



32RF



34RF



36RF

SPECIFICATIONS

Maximum and Minimum Pitch Circle Diameters with Spindles Equispaced

Main Body Assembly	Spindle Assembly	32RF							34RF							36RF							
	No. of Spindles	2	3	4	5	6	7	8	2	3	4	5	6	7	8	2	3	4	5	6	7	8	
30 BC 21	Max. P.C. Ø	65.0	65.0	65.0	65.0	65.0			60.6	60.6						54.0							fig.1
				38.8	52.2	58.4				40.6													fig.2
																							fig.3
			15.0																				fig.4
	Min. P.C. Ø	13.0							17.4							24.0							fig.5
		Head Ratio: 1.65:1							Head Ratio: 1.40:1							Head Ratio: 1.00: 1							
30 BC 24	Max. P.C. Ø	65.0	65.0	65.0	65.0	65.0																	fig.1
					52.2	59.4																	fig.2
																							fig.3
				18.4																			fig.4
	Min. P.C. Ø	15.2	15.2																				fig.5
		Head Ratio: 1.89:1																					
30 CD 30	Max. P.C. Ø	78.8	78.8	78.8	78.8	78.8			85.6	85.6	85.6	85.6				79.0	79.0	79.0					fig.1
					48.9	61.0					60.0	75.8					42.0	71.8					fig.2
					31.9																		fig.3
					22.3					20.1													fig.4
	Min. P.C. Ø	21.2	21.2	21.2					17.4							24.0							fig.5
		Head Ratio: 2.36:1							Head Ratio: 2.00:1							Head Ratio: 1.43: 1							
30 CD 36	Max. P.C. Ø	84.8	84.8	84.8	84.8	84.8			85.6	85.6	85.6	85.6				79.0	79.0	79.0					fig.1
						61.0						74.8						69.2					fig.2
						36.2																	fig.3
											24.6						27.7						fig.4
	Min. P.C. Ø	27.2	27.2	27.2	27.2	27.2			21.0	21.0						24.0							fig.5
		Head Ratio: 2.83:1							Head Ratio: 2.40:1							Head Ratio: 1.71: 1							
30 DE 42	Max. P.C. Ø	90.8	90.8	90.8	90.8	90.8			110.6	110.6	110.6	110.6	110.6			104.0	104.0	104.0	104.0	104.0			fig.1
												74.7	88.7					63.8	87.0	97.3			fig.2
												37.0											fig.3
												29.6					27.7						fig.4
	Min. P.C. Ø	33.2	33.2	33.2	33.2	33.2			27.0	27.0	27.0					24.0							fig.5
		Head Ratio: 3.30:1							Head Ratio: 2.80:1							Head Ratio: 2.00: 1							

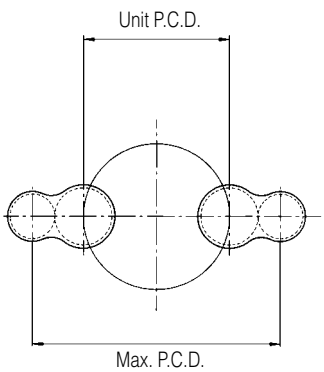


Fig.1

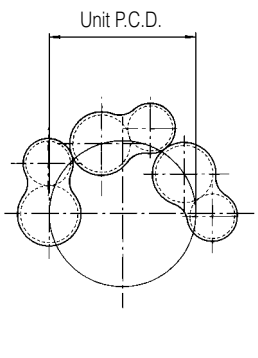


Fig.2

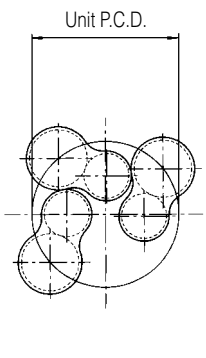


Fig.3

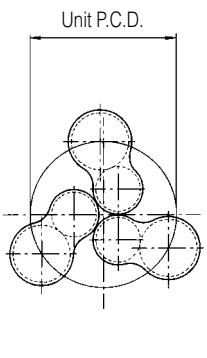


Fig.4

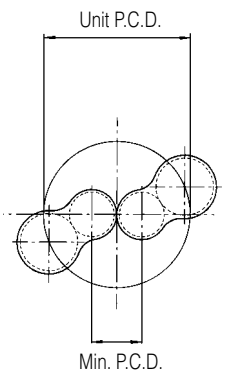
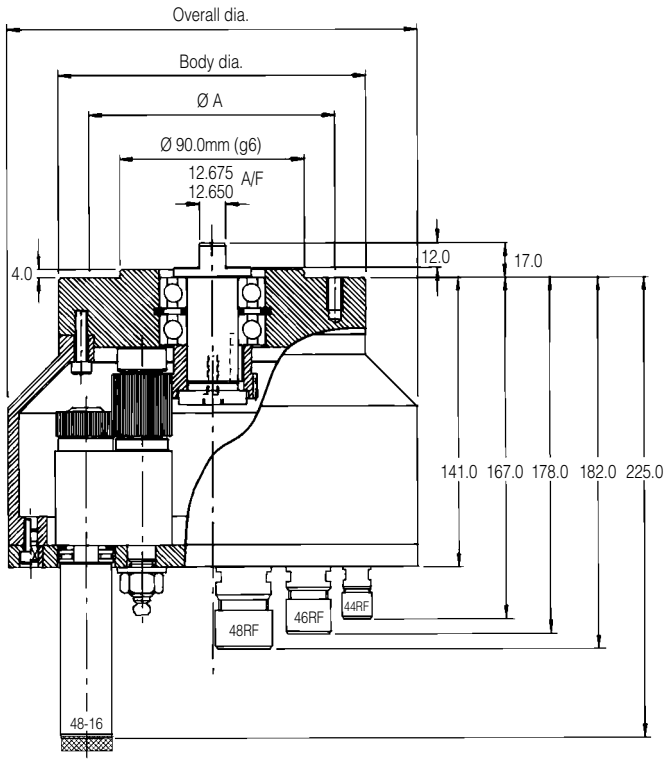


Fig.5

40 RANGE

MAIN BODY ASSEMBLY

Dimensions (mm)				
Main Body Assembly	Overall dia.	Body dia.	A (8 holes equispaced)	Unit Weight (kg)
40 DE 32	150.0	125.0	Ø110.0mm (M6 x 16 d'p)	3.80
40 EF 42	175.0	150.0	Ø120.0mm (M8 x 16 d'p)	5.50
40 EG 54	200.0	150.0	Ø120.0mm (M8 x 16 d'p)	6.00
40 FH 81	225.0	175.0	Ø120.0mm (M8 x 16 d'p)	7.20
40 HK XX	275.0	225.0	Ø120.0mm (M8 x 16 d'p)	9.90

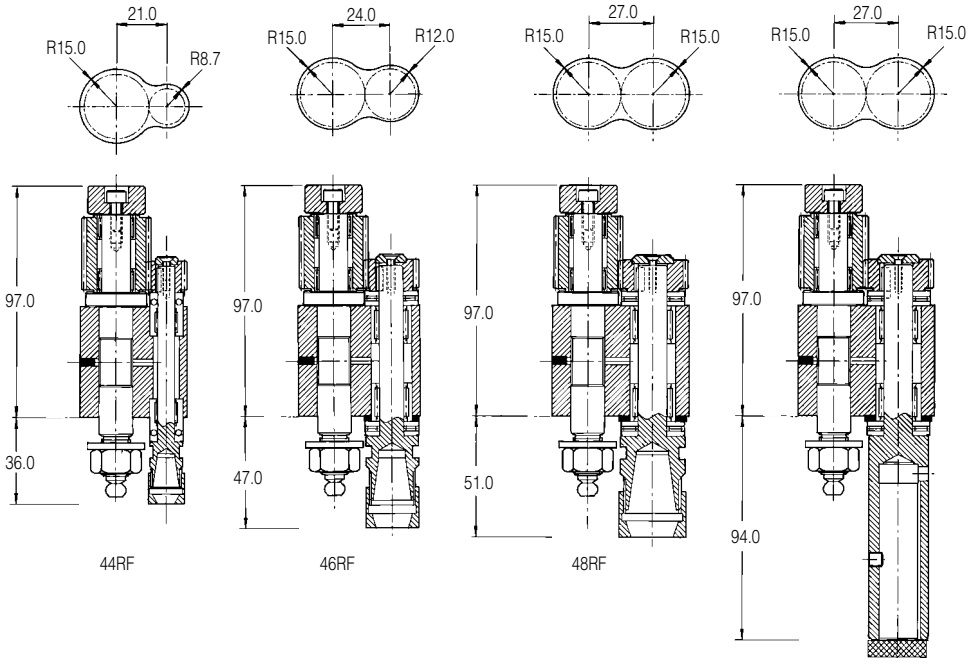


SPINDLE ASSEMBLY

Spindles			
Spindle Assembly	Max. Tool dia.	Max. Speed r.p.m.	Unit Weight (kg)
44RF	7.0	5000	0.5
46RF	10.0	5000	0.6
48RF/48-16	13.0	3500	1.1

Minimum Centre Distances			
Spindle Assembly	44RF	46RF	48RF/ 48-16
44RF	17.4	20.7	23.7
46RF	20.7	24.0	27.0
48RF/48-16	23.7	27.0	30.0

The 44, 46 and 48 spindle assemblies can be fitted to the same head. This is useful in overcoming possible close centre problems. A further advantage is the higher gear ratio of the smaller spindles, which helps if drilling large and small holes at the same time.



SPECIFICATIONS

Maximum and Minimum Pitch Circle Diameters with Spindles Equispaced

Main Body Assembly	Spindle Assembly	44RF							46RF							48RF / 48-16							
	No. of Spindles	2	3	4	5	6	7	8	2	3	4	5	6	7	8	2	3	4	5	6	7	8	
40 DE 32	Max. P.C. Ø	98.7	98.7	98.7	98.7				92.0	92.0	92.0	92.0				86.0	86.0	86.0					fig.1
				57.6	75.8						71.1	85.1						80.6					fig.2
				26.0																			fig.3
			19.9	24.4						27.7							55.0						fig.4
	Min. P.C. Ø	17.4							24.0							30.0							fig.5
		Head Ratio: 2.13:1							Head Ratio: 1.52:1							Head Ratio: 1.19: 1							
40 EF 42	Max. P.C. Ø	111.0	111.0	111.0	111.0	111.0			117.0	117.0	117.0	117.0	117.0			111.0	111.0	111.0	111.0	111.0			fig.1
						88.1					63.7	86.7	97.3					78.3	95.9	105.1			fig.2
											34.1												fig.3
					29.4					27.7	33.9						34.6						fig.4
	Min. P.C. Ø	27.0	27.0	27.0					24.0							30.0							fig.5
		Head Ratio: 2.80:1							Head Ratio: 2.00:1							Head Ratio: 1.56: 1							
40 EG 54	Max. P.C. Ø	123.0	123.0	123.0	123.0	123.0	123.0	123.0	129.0	129.0	129.0	129.0	129.0	129.0	129.0	132.0	132.0	132.0	132.0	132.0	132.0	132.0	fig.1
						89.6	100.6	107.0				84.0	101.2	110.0	115.4				97.0	112.0	117.8	122.6	fig.2
						51.2	45.4					47.2											fig.3
							40.1				33.9	40.8					34.6	42.4					fig.4
	Min. P.C. Ø	39.0	39.0	39.0	39.0	39.0			33.0	33.0						30.0							fig.5
		Head Ratio: 3.60:1							Head Ratio: 2.57:1							Head Ratio: 2.00: 1							
40 FH 81	Max. P.C. Ø	150.0	150.0	150.0	150.0	150.0	150.0	150.0	156.0	156.0	156.0	156.0	156.0	156.0	156.0	157.0	157.0	157.0	157.0	157.0	157.0	157.0	fig.1
								116.6						117.4	129.6					111.8	129.7	139.0	fig.2
								83.0						77.3	70.1					75.4			fig.3
															62.7					60.0			fig.4
	Min. P.C. Ø	66.0	66.0	66.0	66.0	66.0	66.0	66.0	60.0	60.0	60.0	60.0	60.0	60.0		54.0	54.0	54.0	54.0				fig.5
		Head Ratio: 5.40:1							Head Ratio: 3.86:1							Head Ratio: 3.00: 1							
40 HK XX	Max. P.C. Ø	194.0	194.0	194.0	194.0	194.0	194.0	194.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	206.0	206.0	206.0	206.0	206.0	206.0	206.0	fig.1
									Please refer to Centreline's Engineering Department for more information on this range														fig.2
																							fig.3
																							fig.4
	Min. P.C. Ø	92.0	92.0	92.0	92.0	92.0	92.0	92.0	86.0	86.0	86.0	86.0	86.0	86.0	86.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	fig.5

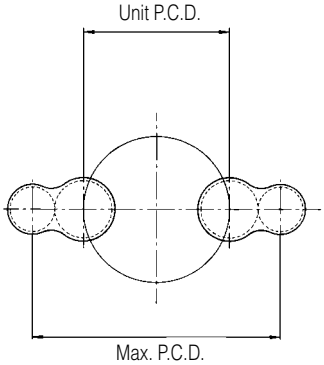


Fig.1

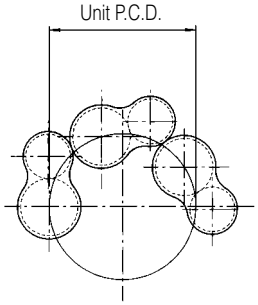


Fig.2

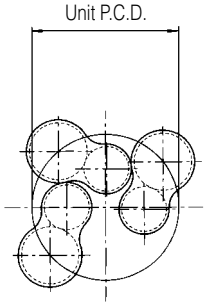


Fig.3

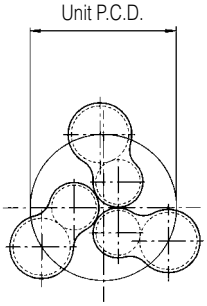


Fig.4

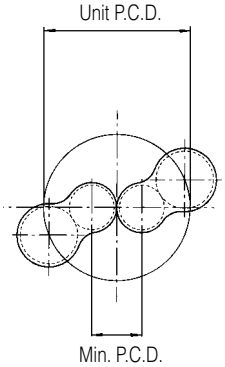
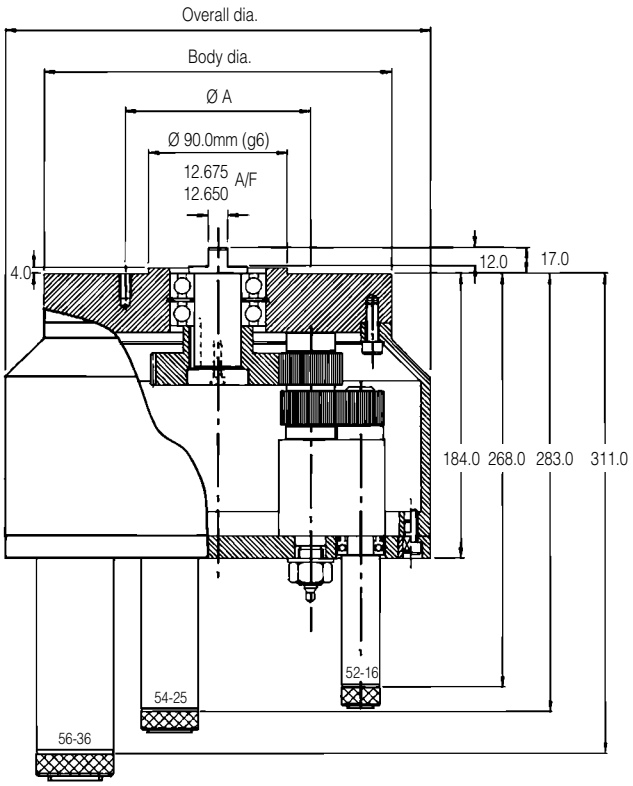


Fig.5

50 RANGE

MAIN BODY ASSEMBLY

Dimensions (mm)				
Main Body Assembly	Overall dia.	Body dia.	A (8 holes equispaced)	Unit Weight (kg)
50 FG 32	200.0	175.0	Ø120.0mm (M8 x 16 d'p)	7.90
50 HK 42	275.0	225.0	Ø120.0mm (M8 x 16 d'p)	11.80
50 LN XX	350.0	300.0	Ø120.0mm (M8 x 16 d'p)	13.00

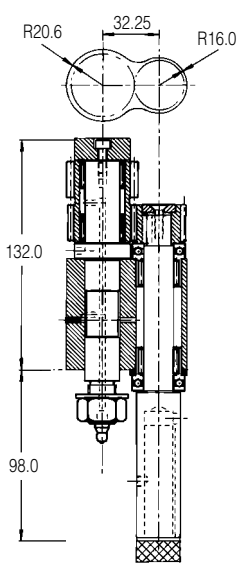


SPINDLE ASSEMBLY

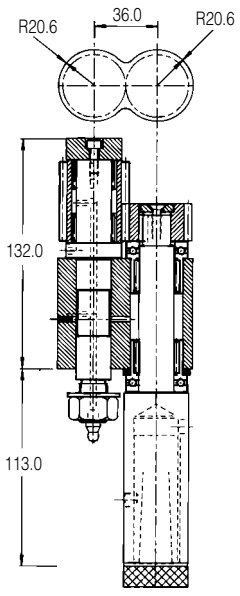
Spindles			
Spindle Assembly	Max. Tool dia.	Max. Speed r.p.m.	Unit Weight (kg)
52-16	14.00	3500	2.0
54-25	23.00	3500	2.6
56-36	31.75	2500	5.7

Minimum Centre Distances			
Spindle Assembly	52-16	54-25	56-36
52-16	32.0	36.4	45.8
54-25	36.4	41.2	50.6
56-36	45.8	50.6	60.0

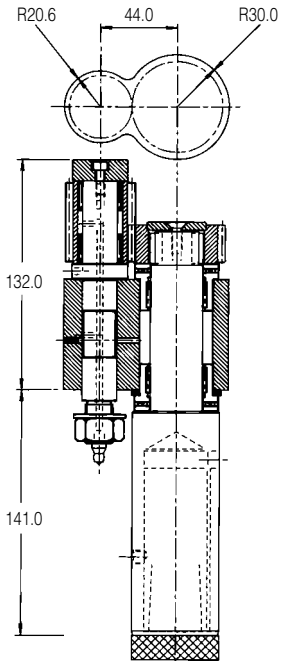
The 52, 54 and 56 spindle assemblies can be fitted to the same head. This is useful in overcoming possible close centre problems. A further advantage is the higher gear ratio of the smaller spindles, which helps if drilling large and small holes at the same time.



52-16
1MT



54-25
2MT



56-36
3MT

SPECIFICATIONS

Maximum and Minimum Pitch Circle Diameters with Spindles Equispaced

Main Body Assembly	Spindle Assembly	52-16							54-25							56-36							
	No. of Spindles	2	3	4	5	6	7	8	2	3	4	5	6	7	8	2	3	4	5	6	7	8	
50 FG 32	Max. P.C. Ø	128.0	128.0	128.0	128.0				118.8	118.8	118.8					100.0	100.0						fig.1
					116.7						101.6						88.2						fig.2
																							fig.3
			37.0	45.3						47.5													fig.4
	Min. P.C. Ø	35.5							41.2							60.0							fig.5
		Head Ratio: 2.25:1							Head Ratio: 1.78:1							Head Ratio: 1.23: 1							
50 HK 42	Max. P.C. Ø	184.5	184.5	184.5	184.5	184.5	184.5	184.5	192.0	192.0	192.0	192.0	192.0	192.0	192.0	175.0	175.0	175.0	175.0				fig.1
						137.6	149.4	162.0				128.4	152.4	164.9	172.7			126.7	160.1				fig.2
						70.5																	fig.3
						64.0					58.2						69.3						fig.4
	Min. P.C. Ø	55.5	55.5	55.5	55.5				48.0	48.0						60.0							fig.5
		Head Ratio: 2.95:1							Head Ratio: 2.33:1							Head Ratio: 1.61: 1							
50 LN XX	Max. P.C. Ø	264.5	264.5	264.5	264.5	264.5	264.5	264.5	268.0	268.0	268.0	268.0	268.0	268.0	268.0	248.0	248.0	248.0	248.0	248.0	248.0	248.0	fig.1
									Please refer to Centreline's Engineering Department for more information on this range														fig.2
																							fig.3
																							fig.4
	Min. P.C. Ø	83.5	83.5	83.5	83.5	83.5	83.5	83.5	80.0	80.0	80.0	80.0	80.0	80.0	80.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	fig.5

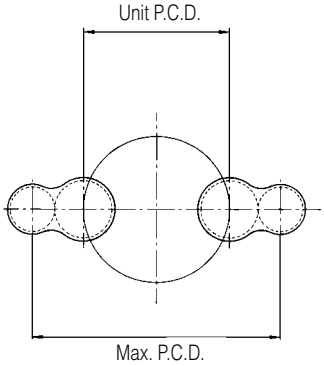


Fig.1

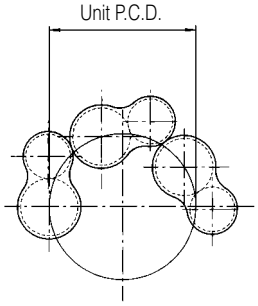


Fig.2

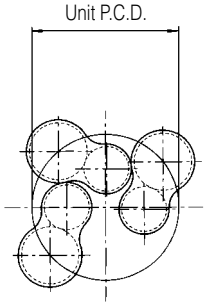


Fig.3

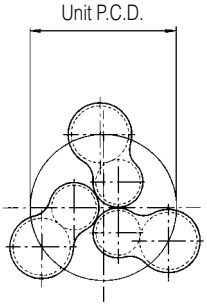


Fig.4

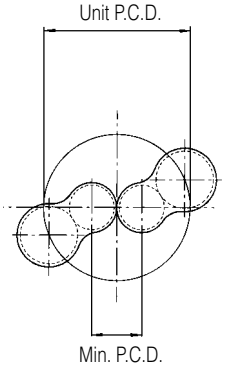


Fig.5

ALTERNATIVE SPECIFICATIONS

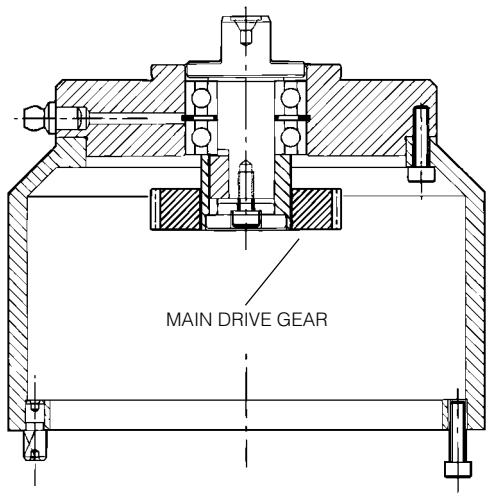
The Centreline Centinel multi-spindle drilling and tapping system has proved itself to be the most versatile adjustable gear-driven system available worldwide.

To demonstrate the outstanding flexibility of the system, the following pages show how Centreline's Engineering Department can easily and economically change the gear-driven components.

MAIN DRIVE GEARS

Standard main drive gears, as shown, have been selected to cover the maximum percentage of applications. However if required, alternative sizes can be specified and fitted.

The minimum and maximum size of gears that can be used with each body assembly are listed. The figures indicate the number of teeth on the gear.

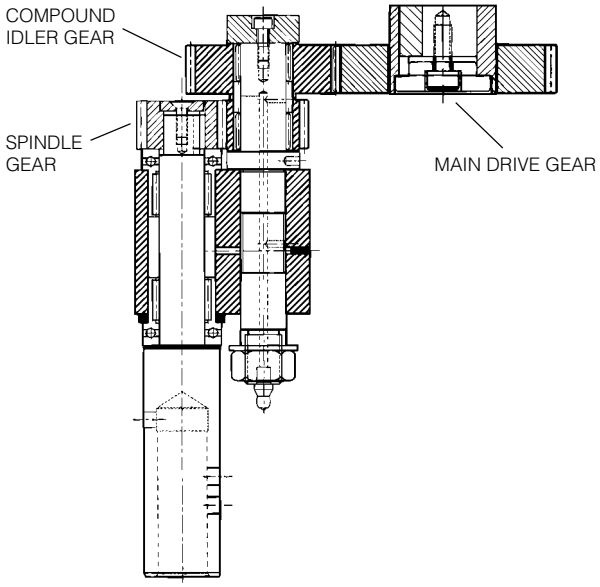


30 Range					
Body Assembly	Standard Gear	Min. Drive Gear	Max. Drive Gear	Max. Drive Gear (34/36RF Spindle)	Module
30 BC 21	21	21	31	21	1
30 BC 24	24	21	31	21	1
30 CD 30	30	26	48	37	1
30 CD 36	36	26	48	37	1
30 DE 42	42	26	73	62	1

40 Range				
Body Assembly	Standard Gear	Min. Drive Gear	Max. Drive Gear	Module
40 DE 32	32	30	38	1
40 EF 42	42	32	64	1
40 EG 54	54	32	64	1
40 FH 81	81	32	89	1

50 Range				
Body Assembly	Standard Gear	Min. Drive Gear	Max. Drive Gear	Module
50 FG 32	32	25	33	2
50 HK 42	42	25	56	2
50 LN XX	XX	25	To Suit	2

COMPOUND IDLER GEAR



Each spindle assembly consists of an idler gear and a spindle gear. The Centinel design is a two-level construction and the idler gear has normally the same number of teeth at each level. At the lower level it drives the spindle gear and at the higher level it is driven by the main drive gear.

If an alternative speed ratio is preferred, compound idler gears can be fitted to the spindle assemblies. The size of compound idler gears is only limited by the space available within the chosen main body assembly.

ALTERNATIVE GEAR RATIOS

The main drive gear (Sun) and the idler gear (Earth) can both be changed to give different gear ratios and working area covered.

Experience has taught us that 90% of machining operations can be achieved using the body and spindle combinations shown on the previous pages. However, there are some situations where these combinations are not suitable. There are many applications where it is desirable to have a gear ratio which is a whole number (e.g. 1:1, 2:1) and this is particularly relevant with multi-heads fitted to lead screw feed units.

Using alternative main drive gears and compound idler gears, the following combinations are available without additional cost.

30 RANGE ALTERNATIVE GEAR RATIOS

Maximum and Minimum Pitch Circle Diameters with Spindles Equispaced

Main Body Assembly	Spindle Assembly	32RF							
	No. of Spindles	2	3	4	5	6	7	8	
30 BC 28 (1)	Max. P.C. Ø	65.0	65.0	65.0	65.0	65.0			fig.1
					46.0	59.7			fig.2
					35.0	26.5			fig.3
					22.1	26.0			fig.4
	Min. P.C. Ø	21.2	21.2	21.2					fig.5
		Head Ratio: 2.00:1							
30 CD 28 (2)	Max. P.C. Ø	78.8	78.8	78.8	78.8	78.8			fig.1
					46.0	59.7			fig.2
					35.0	26.5			fig.3
					22.1	26.0			fig.4
	Min. P.C. Ø	21.2	21.2	21.2					fig.5
		Head Ratio: 2.00:1							
30 DE 28 (3)	Max. P.C. Ø	78.8	78.8	78.8	78.8	78.8			fig.1
					46.0	59.7			fig.2
					35.0	26.5			fig.3
					22.1	26.0			fig.4
	Min. P.C. Ø	21.2	21.2	21.2					fig.5
		Head Ratio: 2.00:1							

Main Body Assembly	Spindle Assembly	34RF							
	No. of Spindles	2	3	4	5	6	7	8	
30 DE 30 (4)	Max. P.C. Ø	99.0	99.0	99.0	99.0				fig.1
				59.7	75.7				fig.2
									fig.3
			20.1						fig.4
	Min. P.C. Ø	17.4							fig.5
		Head Ratio: 2.00:1							

Main Body Assembly	Spindle Assembly	36RF							
	No. of Spindles	2	3	4	5	6	7	8	
30 DE 28 (5)	Max. P.C. Ø	104.0	104.0						fig.1
									fig.2
									fig.3
									fig.4
	Min. P.C. Ø	24.0	27.7						fig.5
		Head Ratio: 1.00:1							
30 DE 42 (6)	Max. P.C. Ø	104.0	104.0	104.0	104.0	104.0			fig.1
				63.8	87.0	97.3			fig.2
									fig.3
			27.7						fig.4
	Min. P.C. Ø	24.0							fig.5
		Head Ratio: 2.00:1							

Use with the Following Spindles

(1) 32RF with 22/22 Compound Gear
(2) 32RF with 22/22 Compound Gear
(3) 32RF with 22/22 Compound Gear
(4) 34RF Standard
(5) 36RF with 36/27 Compound Gear
(6) 36RF Standard

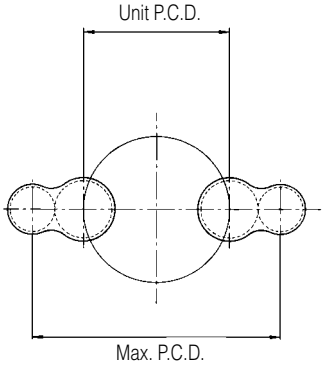


Fig.1

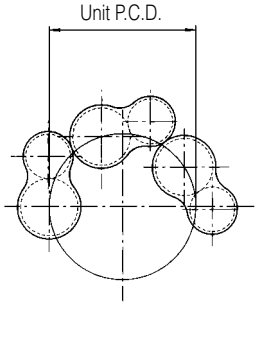


Fig.2

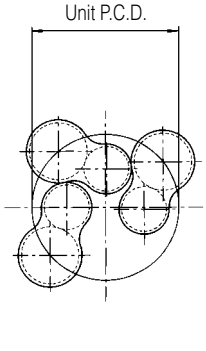


Fig.3

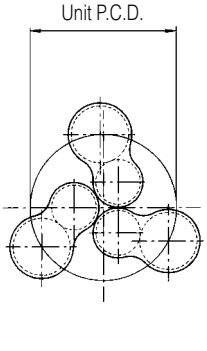


Fig.4

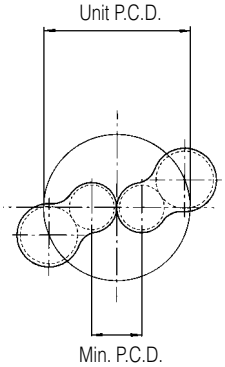


Fig.5

40 RANGE ALTERNATIVE GEAR RATIOS

Maximum and Minimum Pitch Circle Diameters with Spindles Equispaced

Main Body Assembly	Spindle Assembly	44RF							
	No. of Spindles	2	3	4	5	6	7	8	
40 DE 30 (1)	Max. P.C. Ø	98.6	98.6	98.6					fig.1
				60.0					fig.2
									fig.3
			20.1						fig.4
	Min. P.C. Ø	17.4							fig.5
		Head Ratio: 2.00:1							
40 EF 30 (2)	Max. P.C. Ø	123.6	123.6	123.6					fig.1
									fig.2
									fig.3
									fig.4
	Min. P.C. Ø	42.0	42.0	42.0					fig.5
		Head Ratio: 1.00:1							

Main Body Assembly	Spindle Assembly	46RF							
	No. of Spindles	2	3	4	5	6	7	8	
40 EF 35 (3)	Max. P.C. Ø	117.0	117.0	117.0					fig.1
									fig.2
									fig.3
				34.0					fig.4
	Min. P.C. Ø	32.0	32.0						fig.5
		Head Ratio: 1.00:1							
40 EF 42 (4)	Max. P.C. Ø	117.0	117.0	117.0	117.0	117.0			fig.1
				63.7	86.7	97.3			fig.2
				34.1					fig.3
			27.7	33.9					fig.4
	Min. P.C. Ø	24.0							fig.5
		Head Ratio: 2.00:1							
40 EG 35 (5)	Max. P.C. Ø	128.0	128.0	128.0					fig.1
									fig.2
									fig.3
				34.0					fig.4
	Min. P.C. Ø	32.0	32.0						fig.5
		Head Ratio: 1.00:1							
40 EG 42 (6)	Max. P.C. Ø	117.0	117.0	117.0	117.0	117.0			fig.1
				63.7	86.7	97.3			fig.2
				34.1					fig.3
			27.7	33.9					fig.4
	Min. P.C. Ø	24.0							fig.5
		Head Ratio: 2.00:1							
40 FH 42 (7)	Max. P.C. Ø	144.0	144.0	144.0	144.0				fig.1
									fig.2
									fig.3
									fig.4
	Min. P.C. Ø	48.0	48.0	48.0	48.0				fig.5
		Head Ratio: 1.00:1							
40 FH 56 (8)	Max. P.C. Ø	140.0	140.0	140.0	140.0	140.0	140.0		fig.1
						102.0	119.1		fig.2
						57.5			fig.3
						48.0			fig.4
	Min. P.C. Ø	44.0	44.0	44.0	44.0				fig.5
		Head Ratio: 2.00:1							

Main Body Assembly	Spindle Assembly	48RF/48-16							
	No. of Spindles	2	3	4	5	6	7	8	
40 EF 42 (9)	Max. P.C. Ø	111.0	111.0	111.0	111.0				fig.1
					96.5				fig.2
									fig.3
			34.7	42.5					fig.4
	Min. P.C. Ø	30.0							fig.5
		Head Ratio: 1.00:1							
40 EF 54 (10)	Max. P.C. Ø	135.0	135.0	135.0	135.0				fig.1
					96.5				fig.2
									fig.3
			34.7	42.5					fig.4
	Min. P.C. Ø	30.0							fig.5
		Head Ratio: 2.00:1							
40 EG 54 (11)	Max. P.C. Ø	132.0	132.0	132.0	132.0	132.0	132.0	132.0	fig.1
					96.5	112.0	117.8	122.6	fig.2
									fig.3
			34.7	42.5					fig.4
	Min. P.C. Ø	30.0							fig.5
		Head Ratio: 2.00:1							
40 FH 54 (12)	Max. P.C. Ø	157.0	157.0	157.0	157.0				fig.1
									fig.2
									fig.3
									fig.4
	Min. P.C. Ø	54.0	54.0	54.0	54.0				fig.5
		Head Ratio: 1.00:1							
40 FH 54 (13)	Max. P.C. Ø	135.0	135.0	135.0	135.0	135.0	135.0	135.0	fig.1
					96.5	113.3	119.4	124.6	fig.2
									fig.3
			34.7	42.5					fig.4
	Min. P.C. Ø	30.0							fig.5
		Head Ratio: 2.00:1							

Use with the Following Spindles

1. 44RF Standard
2. 44RF with 54/27 Compound Gear
3. 46RF with 45/27 Compound Gear
4. 46RF Standard
5. 46RF with 45/27 Compound Gear
6. 46RF Standard
7. 46RF with 54/27 Compound Gear
8. 46RF with 36/27 Compound Gear
9. 48RF/48-16 with 42/27 Compound Gear
10. 48RF/48-16 Standard
11. 48RF/48-16 Standard
12. 48RF/48-16 with 54/27 Compound Gear
13. 48RF/48-16 Standard

50 RANGE ALTERNATIVE GEAR RATIOS

Maximum and Minimum Pitch Circle Diameters with Spindles Equispaced

Main Body Assembly	Spindle Assembly	52-16							
	No. of Spindles	2	3	4	5	6	7	8	
50 HK 25 (1)	Max. P.C. Ø	178.5	178.5	178.5					fig.1
									fig.2
									fig.3
									fig.4
	Min. P.C. Ø	49.5	49.5	49.5					fig.5
		Head Ratio: 0.99:1							
50 HK 38 (2)	Max. P.C. Ø	188.5	188.5	188.5	188.5	188.5	188.5		fig.1
						137.3	154.6		fig.2
						77.7			fig.3
						64.0			fig.4
	Min. P.C. Ø	59.5	59.5	59.5	59.5				fig.5
		Head Ratio: 2.00:1							

Main Body Assembly	Spindle Assembly	54-25							
	No. of Spindles	2	3	4	5	6	7	8	
50 FG 25 (3)	Max. P.C. Ø	118.8	118.8	118.8					fig.1
				101.8					fig.2
									fig.3
			48.0						fig.4
	Min. P.C. Ø	41.2							fig.5
		Head Ratio: 1.00:1							
50 HK 32 (4)	Max. P.C. Ø	193.8	193.8	193.8	193.8	193.8			fig.1
					70.5	154.0			fig.2
									fig.3
				58.3					fig.4
	Min. P.C. Ø	56.0	56.0						fig.5
		Head Ratio: 1.00:1							
50 HK 36 (5)	Max. P.C. Ø	180.0	180.0	180.0	180.0	180.0	180.0	180.0	fig.1
				87.8	131.3	148.7	158.5	164.8	fig.2
				65.3					fig.3
			47.6	58.3					fig.4
	Min. P.C. Ø	41.2							fig.5
		Head Ratio: 2.00:1							

Main Body Assembly	Spindle Assembly	56-36							
	No. of Spindles	2	3	4	5	6	7	8	
50 FG 26 (6)	Max. P.C. Ø	100.0							fig.1
									fig.2
									fig.3
									fig.4
	Min. P.C. Ø	60.0							fig.5
		Head Ratio: 1.00:1							
50 HK 39 (7)	Max. P.C. Ø	175.0	175.0	175.0	175.0				fig.1
				108.9	160.9				fig.2
									fig.3
			69.3						fig.4
	Min. P.C. Ø	60.0							fig.5
		Head Ratio: 1.00:1							
50 HK 52 (8)	Max. P.C. Ø	175.0	175.0	175.0	175.0				fig.1
					159.9				fig.2
									fig.3
			69.3	84.8					fig.4
	Min. P.C. Ø	60.0							fig.5
		Head Ratio: 2.00:1							

Use with the Following Spindles

1. 52-16 with 32/24 Compound Gear
2. 52-16 with 24/24 Compound Gear
3. 54-25 with 25/18 Compound Gear
4. 54-25 with 32/18 Compound Gear
5. 54-25 Standard
6. 56-36 Standard
7. 56-36 with 27/18 Compound Gear
8. 56-36 Standard

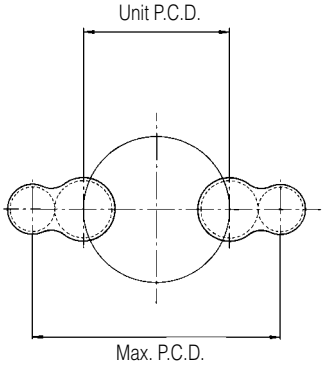


Fig.1

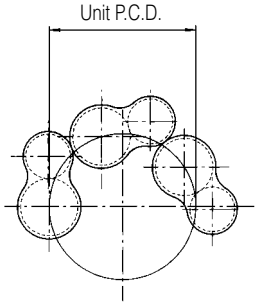


Fig.2

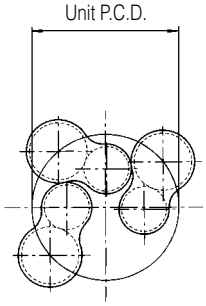


Fig.3

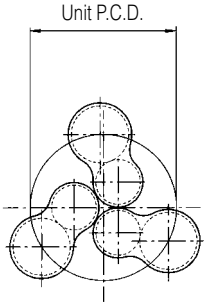


Fig.4

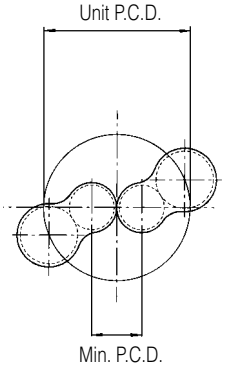


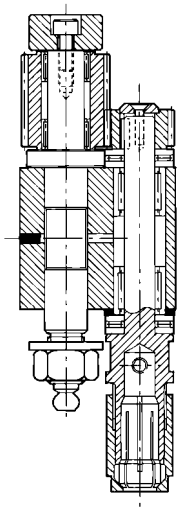
Fig.5

ALTERNATIVE SPINDLES

The basic spindle designs using Collets or Adjustable Adaptors are shown on pages 6, 7, 8, 9, 10 & 11 of this catalogue.

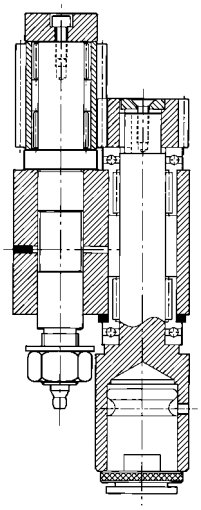
Many alternative spindles are available within the 'Centinel System' to suit special needs or national standards.

Double Angle Collets (Erickson)		
Spindle Assembly	Tool Capacity	All other dimensions as per spindle assembly
34DA	Ø6.3mm max.	34RF
36DA	Ø9.5mm max.	36RF
44DA	Ø6.3mm max.	44RF
46DA	Ø9.5mm max.	46RF
48DA	Ø14.0mm max.	48RF

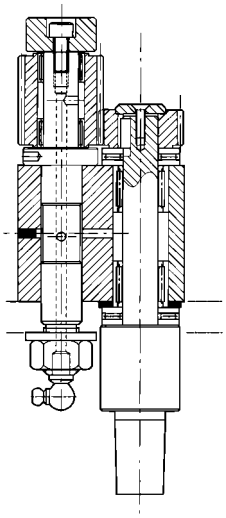


TQC Spindles (Tapping Quick Change)		
Spindle Assembly	Tool Capacity	All other dimensions as per spindle assembly
34TQC	M1 - M8	34RF
36TQC	M1 - M8	36RF
44TQC	M1 - M8	44RF
46TQC	M1 - M8	46RF
48TQC	M4 - M14	48RF
52TQC	M4 - M14	52-16
54TQC	M7 - M24	54-25

For use with Centreline 'Rapidtap' machine and lead screw feed units. For details of the tap chucks see pages 33, 34 & 35.



Stub Spindles		
Spindle Assembly	Tool Capacity	All other dimensions as per spindle assembly
46JT1 (Jacobs Taper)	Ø10.0mm max.	46RF
48JT6 (Jacobs Taper)	Ø13.0mm max.	48RF
46B10 ('B' Taper)	Ø10.0mm max.	46RF
48B18 ('B' Taper)	Ø13.0mm max.	48RF

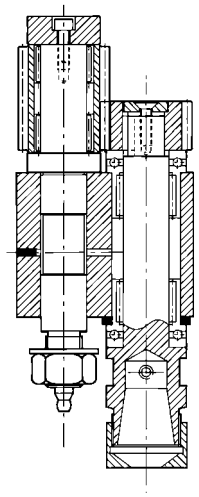


ALTERNATIVE SPINDLES

50 Range Collet Spindles

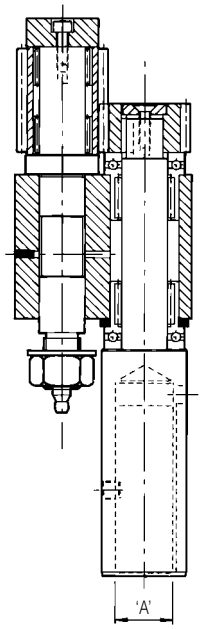
Spindle Assembly	Tool Capacity	Collet Size	All other dimensions as per spindle assembly
52RF	Ø16.0mm max.	ER25	52-16
54RF	Ø16.0mm max.	ER25	54-25
56RF	Ø20.0mm max.	ER32	56-36
56RF*	Ø26.0mm max.	ER40	56-36

* Centinel Plus only



Alternative Bore Spindles

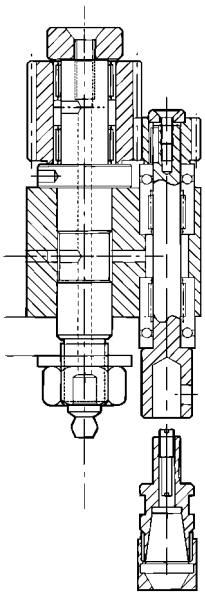
Spindle Assembly	Bore Diameter 'A'	All other dimensions as per spindle assembly
46-50	1/2"	46RF
46-12	12mm	46RF
54-20	20mm	54-25
54-22	22mm	54-25
54-26	26mm	54-25
54-28	28mm	54-25
56-35	35mm	56-36
52-58	5/8"	52-16
54-34	3/4"	54-25
54-78	7/8"	54-25
56-38	1 3/8"	56-36

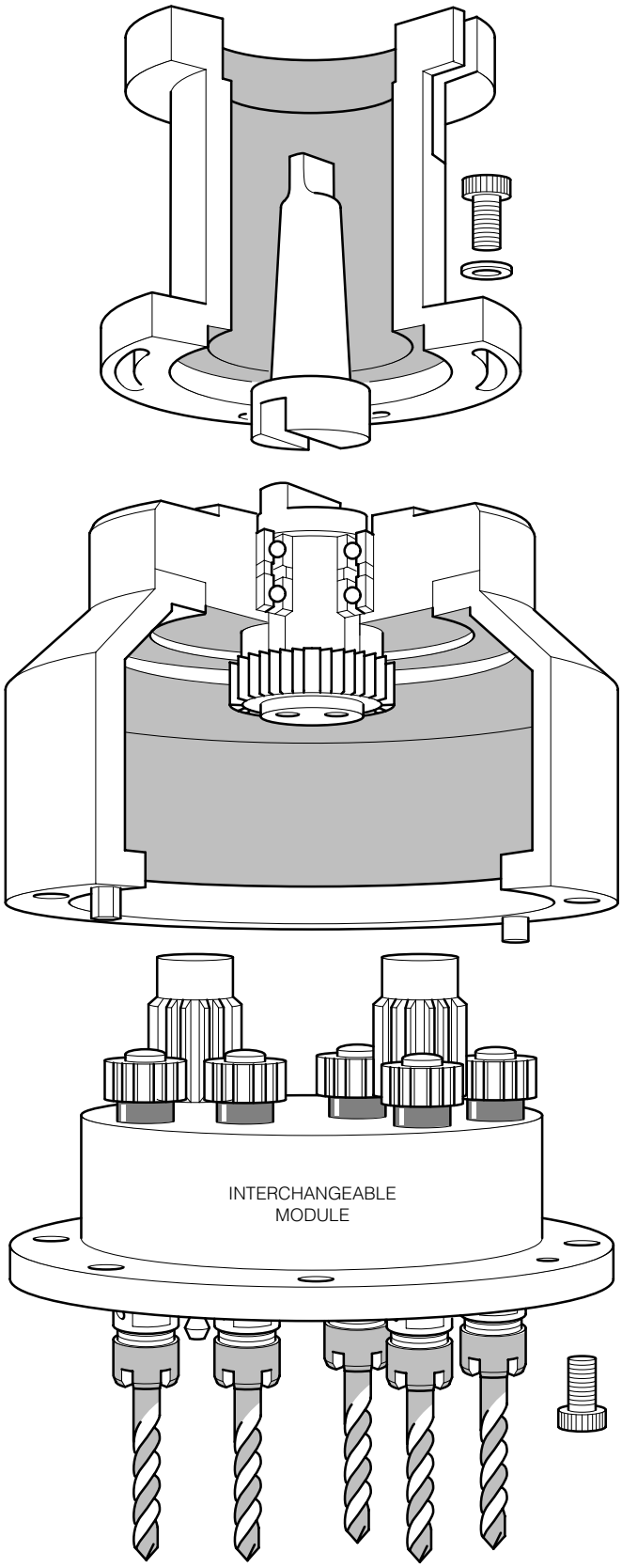


Interchangeable Adjustable Toolholders

Spindle Assembly	Tool Capacity	Collet Size	All other dimensions as per spindle assembly
32ATH	Ø5.0mm max	ER8	32RF
34ATH	Ø7.0mm max	ER11	34RF
36ATH	Ø10.0mm max	ER16	36RF
44ATH	Ø7.0mm max	ER11	44RF
46ATH	Ø10.0mm max	ER16	46RF
48ATH	Ø13.0mm max	ER20	48RF
54ATH	Ø16.0mm max	ER25	54-25
56ATH	Ø20.0mm max	ER32	56-36

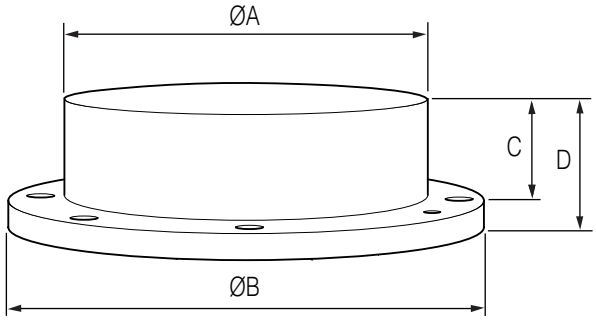
These toolholders enable the tools to be changed quickly and set to depth off the machine.





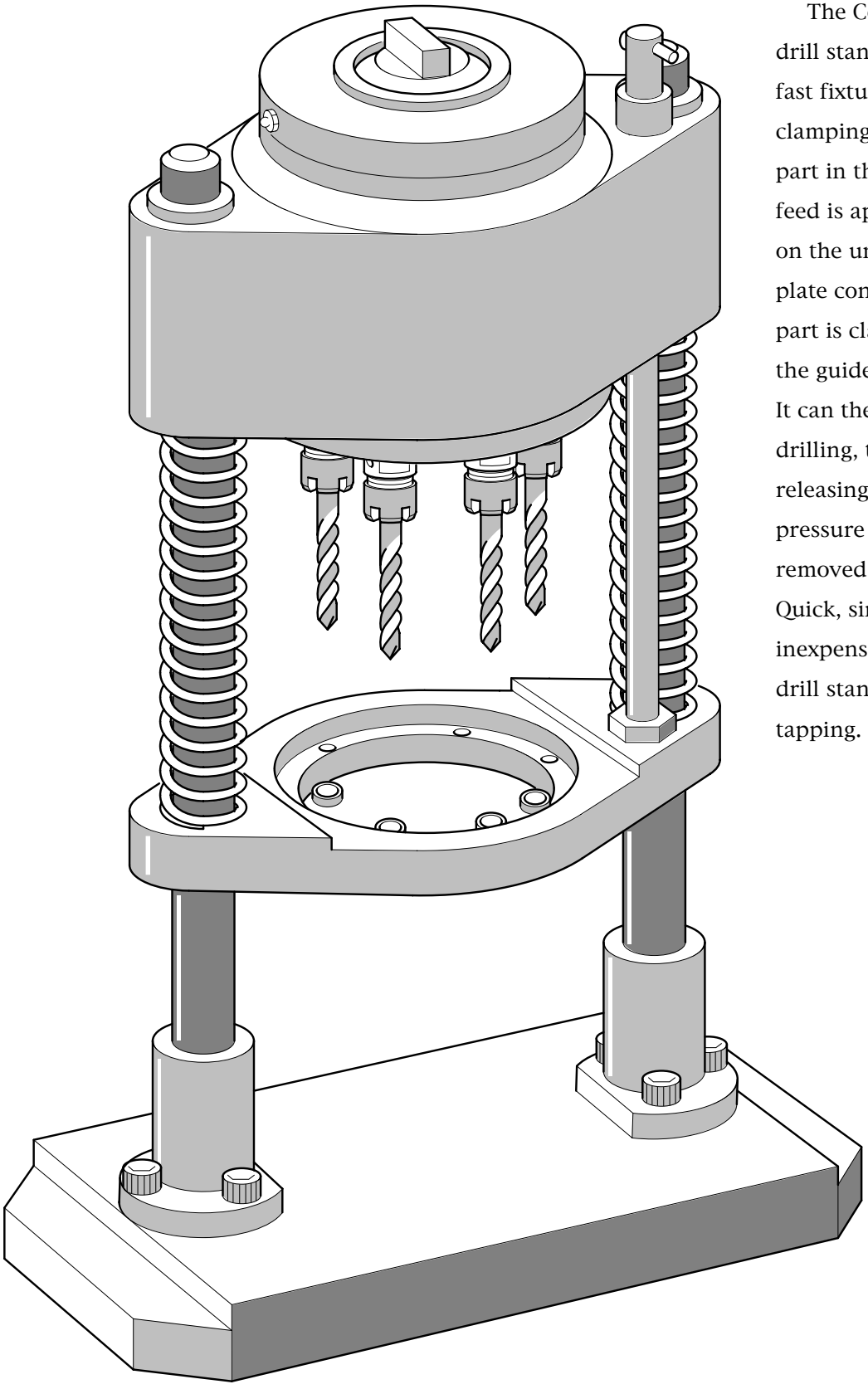
Building on the unique design of the standard Centinel, we now offer the CENTINEL PLUS which features a Fixed Centre Unit, utilising the standard components and incorporating an interchangeable module.

This design allows us to satisfy the requirements of even more machining applications, while at the same time retaining the interchangeability and cost-efficiency for which the Centinel is renowned.



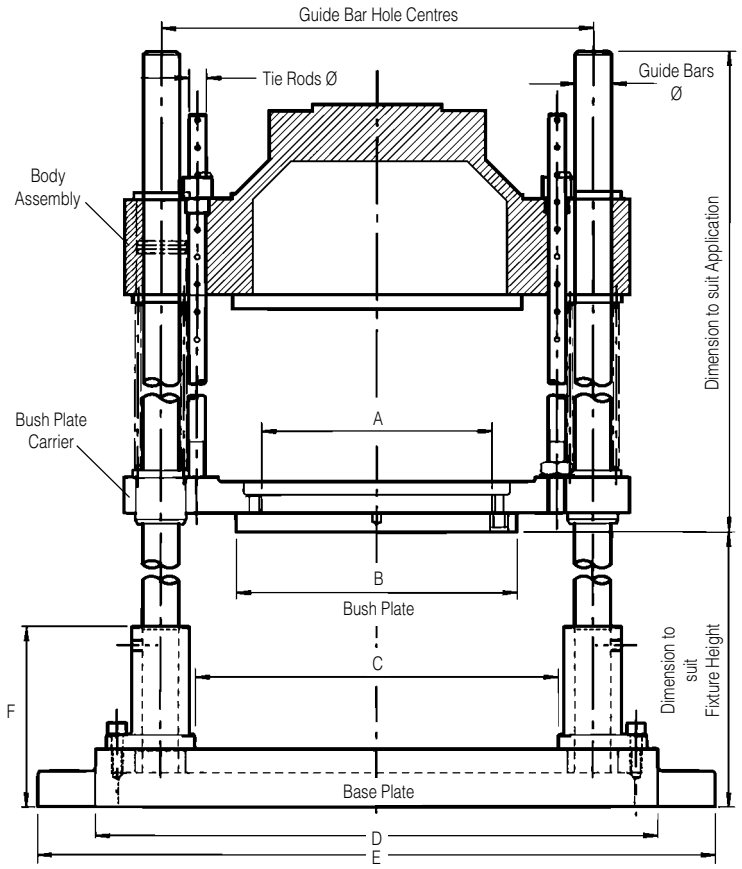
Unbored Interchangeable Modules				
Body Assembly	ØA	ØB	C	D
30 BC FCM	76.0	100.0	33.0	43.0
30 CD FCM	101.0	125.0	33.0	43.0
30 DE FCM	126.0	150.0	33.0	43.0
40 DE FCM	115.0	150.0	46.5	56.5
40 EF FCM	140.0	175.0	46.5	56.5
40 EG FCM	161.0	200.0	46.5	56.5
40 FH FCM	186.0	225.0	46.5	56.5
50 FG FCM	158.0	200.0	63.5	77.5
50 HK FCM	233.0	275.0	63.5	77.5
50 LN FCM	308.0	350.0	63.5	77.5

THE DRILL STAND



The Centreline self-clamping drill stand is the ideal tool for fast fixture loading and part clamping. After locating the part in the fixture, the machine feed is applied. The clamp pads on the underside of the bush plate contact the part and the part is clamped in position via the guide bar spring pressure. It can then be drilled. After drilling, the head retracts, releasing the clamping pressure and the part can be removed from the fixture. Quick, simple, easy to use and inexpensive, the Centreline drill stand can also be used for tapping.

DRILL STAND ASSEMBLY

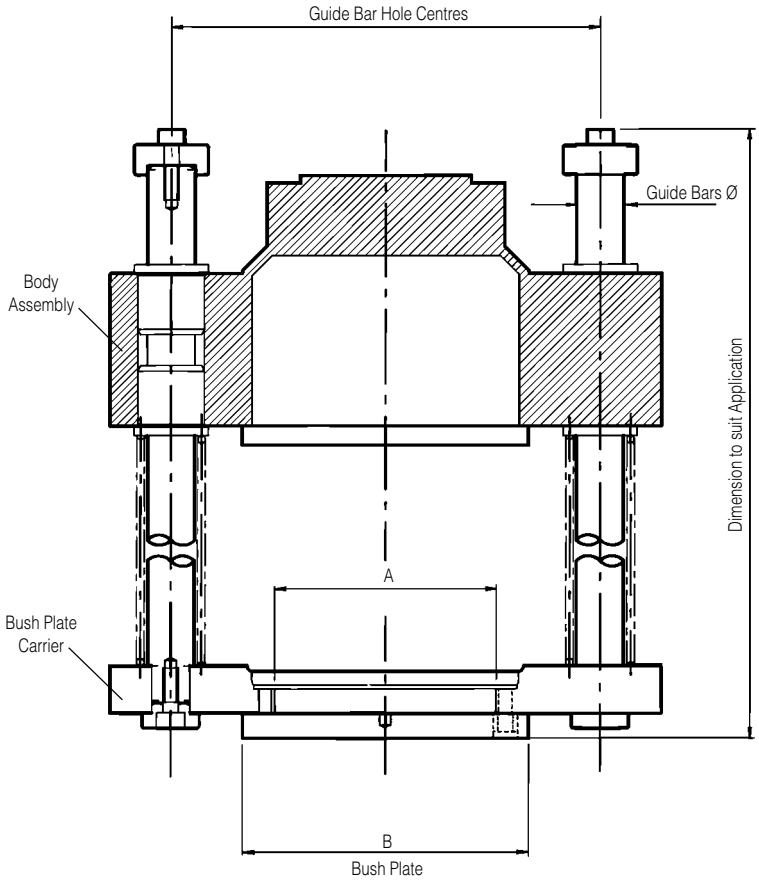


30 Range									
Main Body Assembly	Guide Bar Hole Centres	A	B	C	D	E	F	Tie Rod Ø	Guide Bar Ø
30 BC 21 DSA	150.0	78.0	112.0	114.0	240.0	320.0	125.0	8.0	20.0
30 BC 24 DSA	150.0	78.0	112.0	114.0	240.0	320.0	125.0	8.0	20.0
30 CD 30 DSA	175.0	103.0	137.0	139.0	265.0	345.0	125.0	8.0	20.0
30 CD 36 DSA	175.0	103.0	137.0	139.0	265.0	345.0	125.0	8.0	20.0
30 DE 42 DSA	200.0	116.0	150.0	152.0	290.0	370.0	125.0	8.0	20.0

40 Range									
Main Body Assembly	Guide Bar Hole Centres	A	B	C	D	E	F	Tie Rod Ø	Guide Bar Ø
40 DE 32 DSA	225.0	116.0	150.0	177.0	315.0	395.0	125.0	12.0	25.0
40 EF 42 DSA	225.0	116.0	150.0	177.0	315.0	395.0	125.0	12.0	25.0
40 EG 54 DSA	300.0	160.0	225.0	252.0	380.0	460.0	125.0	12.0	25.0
40 FH 81 DSA	300.0	160.0	225.0	252.0	380.0	460.0	125.0	12.0	25.0

50 Range									
Main Body Assembly	Guide Bar Hole Centres	A	B	C	D	E	F	Tie Rod Ø	Guide Bar Ø
50 FG 32 DSA	275.0	160.0	195.0	205.0	380.0	460.0	130.0	16.0	35.0
50 HK 42 DSA	350.0	220.0	255.0	280.0	457.0	533.0	140.0	16.0	35.0
50 LN XX DSA	500.0	295.0	330.0	430.0	625.0	725.0	150.0	16.0	35.0

FLOATING BUSH PLATE ASSEMBLY

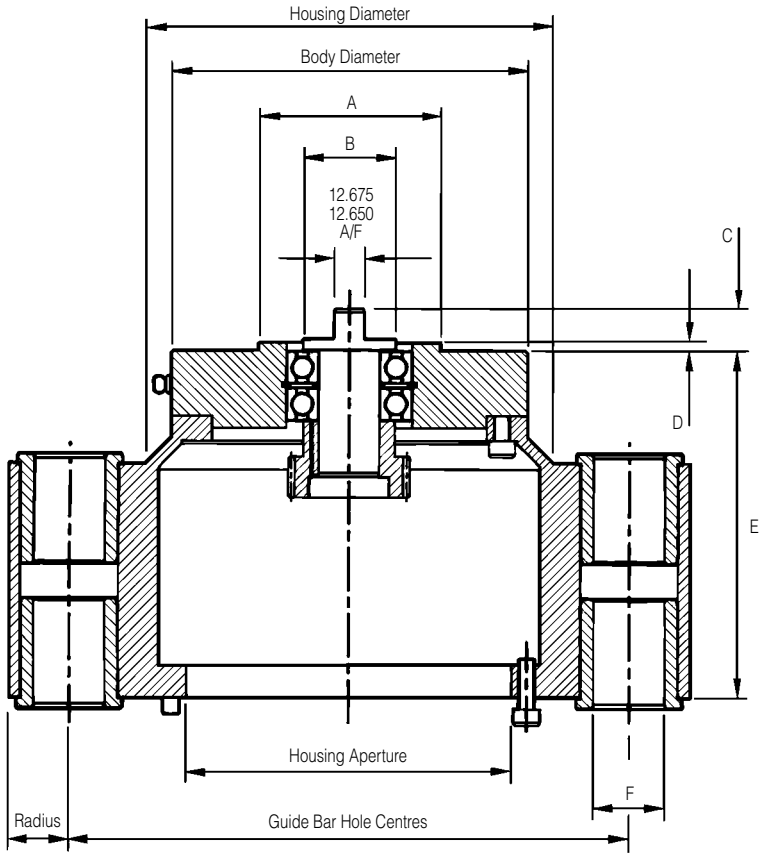


30 Range				
Main Body Assembly	Guide Bar Hole Centres	A	B	Guide Bar Ø
30 BC 21 FBPA	150.0	78.0	112.0	20.0
30 BC 24 FBPA	150.0	78.0	112.0	20.0
30 CD 30 FBPA	175.0	103.0	137.0	20.0
30 CD 36 FBPA	175.0	103.0	137.0	20.0
30 DE 42 FBPA	200.0	116.0	150.0	20.0

40 Range				
Main Body Assembly	Guide Bar Hole Centres	A	B	Guide Bar Ø
40 DE 32 FBPA	225.0	116.0	150.0	25.0
40 EF 42 FBPA	225.0	116.0	150.0	25.0
40 EG 54 FBPA	300.0	160.0	225.0	25.0
40 FH 81 FBPA	300.0	160.0	225.0	25.0

50 Range				
Main Body Assembly	Guide Bar Hole Centres	A	B	Guide Bar Ø
50 FG 32 FBPA	275.0	160.0	195.0	35.0
50 HK 42 FBPA	350.0	220.0	255.0	35.0
50 LN XX FBPA	500.0	295.0	330.0	35.0

MAIN BODY ASSEMBLY WITH GUIDE BAR BUSHES

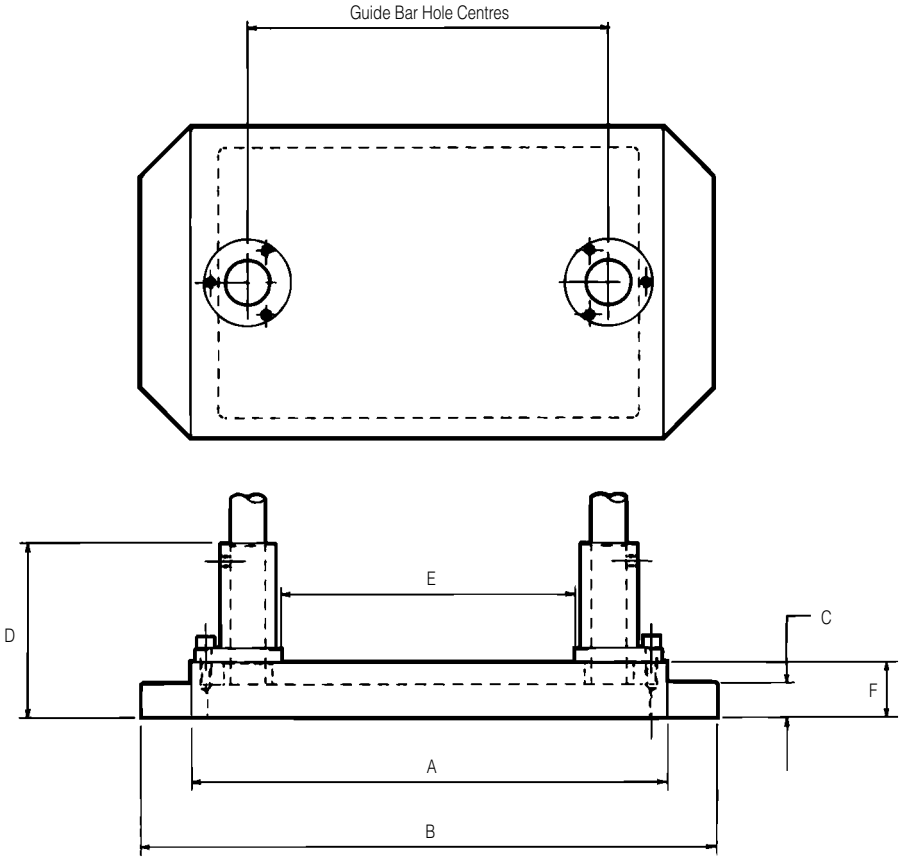


30 Range											
Main Body Assembly	Housing Diameter	Body Diameter	Guide Bar Centres	Housing Aperture	Radius	A	B	C	D	E	F
30BC 21 GB	100.0	90.0	150.0	78.0	22.5	50.0	31.0	17.0	4.0	94.0	20.0
30 BC 24 GB	100.0	90.0	150.0	78.0	22.5	50.0	31.0	17.0	4.0	94.0	20.0
30 CD 30 GB	125.0	100.0	175.0	103.0	25.0	50.0	31.0	17.0	4.0	94.0	20.0
30 CD 36 GB	125.0	100.0	175.0	103.0	25.0	50.0	31.0	17.0	4.0	94.0	20.0
30 DE 42 GB	150.0	125.0	200.0	128.0	27.5	50.0	31.0	17.0	4.0	94.0	20.0

40 Range											
Main Body Assembly	Housing Diameter	Body Diameter	Guide Bar Centres	Housing Aperture	Radius	A	B	C	D	E	F
40 DE 32 GB	150.0	125.0	225.0	116.0	32.0	90.0	38.0	17.0	4.0	131.0	25.0
40 EF 42 GB	175.0	150.0	225.0	141.0	32.0	90.0	38.0	17.0	4.0	131.0	25.0
40 EG 54 GB	200.0	150.0	300.0	162.0	25.5	90.0	38.0	17.0	4.0	131.0	25.0
40 FH 81 GB	225.0	175.0	300.0	187.0	25.5	90.0	38.0	17.0	4.0	131.0	25.0

50 Range											
Main Body Assembly	Housing Diameter	Body Diameter	Guide Bar Centres	Housing Aperture	Radius	A	B	C	D	E	F
50 FG 32 GB	200.0	175.0	275.0	160.0	30.0	90.0	38.0	17.0	4.0	170.0	35.0
50 HK 42 GB	275.0	225.0	350.0	235.0	35.0	90.0	38.0	17.0	4.0	170.0	35.0
50 LN XX GB	350.0	300.0	500.0	310.0	50.0	90.0	38.0	17.0	4.0	170.0	35.0

BASE PLATE ASSEMBLY



30 Range							
Main Body Assembly	Guide Bar Hole Centres	A	B	C	D	E	F
30 BC 21 BPA	150.0	240.0	320.0	25.0	125.0	102.0	40.0
30 BC 24 BPA	150.0	240.0	320.0	25.0	125.0	102.0	40.0
30 CD 30 BPA	175.0	265.0	345.0	25.0	125.0	127.0	40.0
30 CD 36 BPA	175.0	265.0	345.0	25.0	125.0	127.0	40.0
30 DE 42 BPA	200.0	290.0	370.0	25.0	125.0	152.0	40.0

40 Range							
Main Body Assembly	Guide Bar Hole Centres	A	B	C	D	E	F
40 DE 32 BPA	225.0	315.0	395.0	25.0	125.0	177.0	40.0
40 EF 42 BPA	225.0	315.0	395.0	25.0	125.0	177.0	40.0
40 EG 54 BPA	300.0	380.0	460.0	25.0	125.0	252.0	40.0
40 FH 81 BPA	300.0	380.0	460.0	25.0	125.0	252.0	40.0

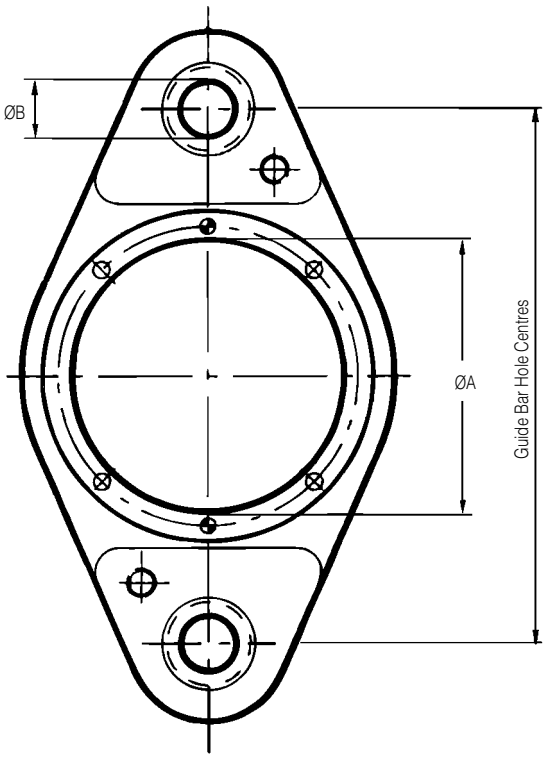
50 Range							
Main Body Assembly	Guide Bar Hole Centres	A	B	C	D	E	F
50 FG 32 BPA	275.0	380.0	460.0	25.0	130.0	175.0	40.0
50 HK 42 BPA	350.0	457.0	533.0	32.0	140.0	250.0	50.0
50 LN XX BPA	500.0	625.0	725.0	30.0	150.0	400.0	60.0

BUSH PLATE CARRIER

30 Range			
Main Body Assembly	Guide Bar Hole Centres	ØA	ØB
30 BC 21 BPC	150.0	78.0	20.0
30 BC 24 BPC	150.0	78.0	20.0
30 CD 30 BPC	175.0	103.0	20.0
30 CD 36 BPC	175.0	103.0	20.0
30 DE 42 BPC	200.0	116.0	20.0

40 Range			
Main Body Assembly	Guide Bar Hole Centres	ØA	ØB
40 DE 32 BPC	225.0	116.0	25.0
40 EF 42 BPC	225.0	140.0	25.0
40 EG 54 BPC	300.0	160.0	25.0
40 FH 81 BPC	300.0	175.0	25.0

50 Range			
Main Body Assembly	Guide Bar Hole Centres	ØA	ØB
50 FG 32 BPC	275.0	160.0	35.0
50 HK 42 BPC	350.0	220.0	35.0
50 LN XX BPC	500.0	295.0	35.0

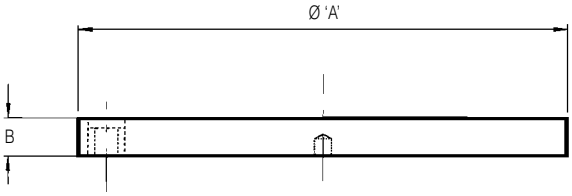


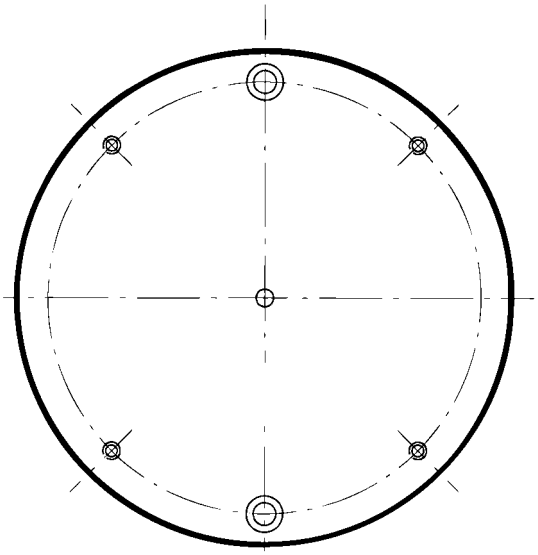
INTERCHANGEABLE BUSH PLATE

30 Range		
Main Body Assembly	Ø 'A'	B
30 BC 21 IBP	112.0	13.0
30 BC 24 IBP	112.0	13.0
30 CD 30 IBP	137.0	13.0
30 CD 36 IBP	137.0	13.0
30 DE 42 IBP	150.0	13.0

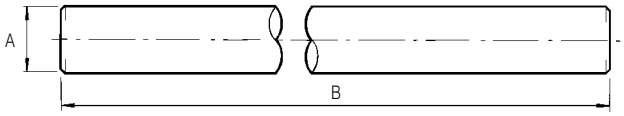
40 Range		
Main Body Assembly	Ø 'A'	B
40 DE 32 IBP	150.0	13.0
40 EF 42 IBP	170.0	13.0
40 EG 54 IBP	200.0	13.0
40 FH 81 IBP	225.0	13.0

50 Range		
Main Body Assembly	Ø 'A'	B
50 FG 32 IBP	150.0	13.0
50 HK 42 IBP	255.0	13.0
50 LN XX IBP	330.0	13.0





GUIDE BARS

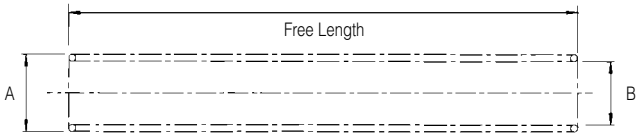


Part Number	Dia. 'A'	Length 'B'
GB200200	20	200
GB200225	20	225
GB200250	20	250
GB200275	20	275
GB200300	20	300
GB200325	20	325
GB200350	20	350
GB200375	20	375
GB200400	20	400

Part Number	Dia. 'A'	Length 'B'
GB250250	25	250
GB250300	25	300
GB250350	25	350
GB250400	25	400
GB250450	25	450
GB250500	25	500
GB250550	25	550
GB250600	25	600
GB250650	25	650
GB250700	25	700

Part Number	Dia. 'A'	Length 'B'
GB350300	35	300
GB350350	35	350
GB350400	35	400
GB350450	35	450
GB350500	35	500
GB350550	35	550
GB350600	35	600
GB350650	35	650
GB350700	35	700
GB350750	35	750
GB350800	35	800

COMPRESSION SPRINGS

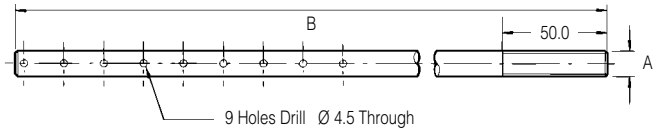


Part Number	Dia. 'A'	Dia. 'B'	Free Length
CS300050	28	22	50
CS300075	28	22	75
CS300100	28	22	100
CS300125	28	22	125
CS300150	28	22	150
CS300175	28	22	175
CS300200	28	22	200

Part Number	Dia. 'A'	Dia. 'B'	Free Length
CS400100	33	27	100
CS400125	33	27	125
CS400150	33	27	150
CS400175	33	27	175
CS400200	33	27	200
CS400225	33	27	225
CS400250	33	27	250
CS400275	33	27	275
CS400300	33	27	300

Part Number	Dia. 'A'	Dia. 'B'	Free Length
CS500150	47	37	150
CS500175	47	37	175
CS500200	47	37	200
CS500225	47	37	225
CS500250	47	37	250
CS500275	47	37	275
CS500300	47	37	300
CS500325	47	37	325

TIE RODS

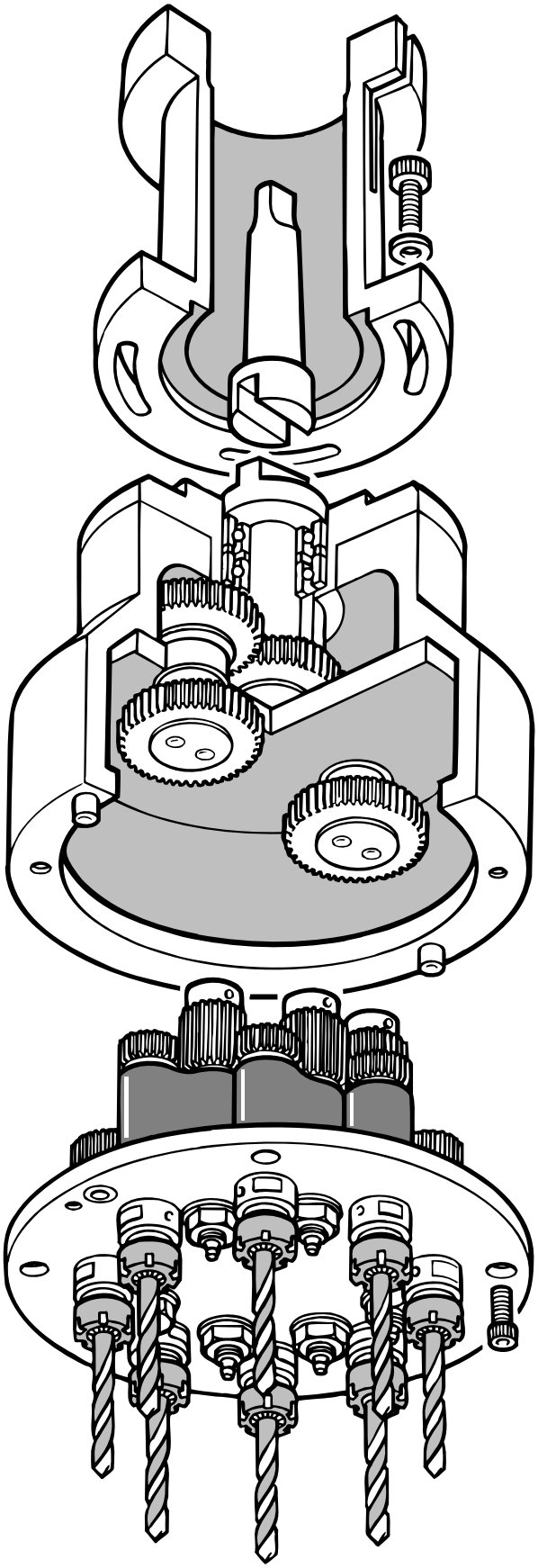


Part Number	Dia. 'A'	Length 'B'
TR080100	8	100
TR080125	8	125
TR080150	8	150
TR080175	8	175
TR080200	8	200
TR080225	8	225
TR080250	8	250
TR080275	8	275
TR080300	8	300

Part Number	Dia. 'A'	Length 'B'
TR120150	12	150
TR120200	12	200
TR120250	12	250
TR120300	12	300
TR120350	12	350
TR120400	12	400
TR120450	12	450
TR120500	12	500
TR120550	12	550
TR120600	12	600

Part Number	Dia. 'A'	Length 'B'
TR160200	16	200
TR160250	16	250
TR160300	16	300
TR160350	16	350
TR160400	16	400
TR160450	16	450
TR160500	16	500
TR160550	16	550
TR160600	16	600
TR160650	16	650
TR160700	16	700

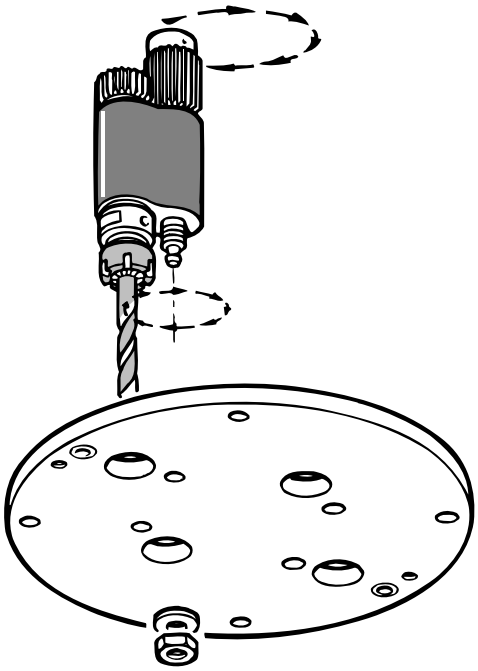
THE GALAXY HEAD



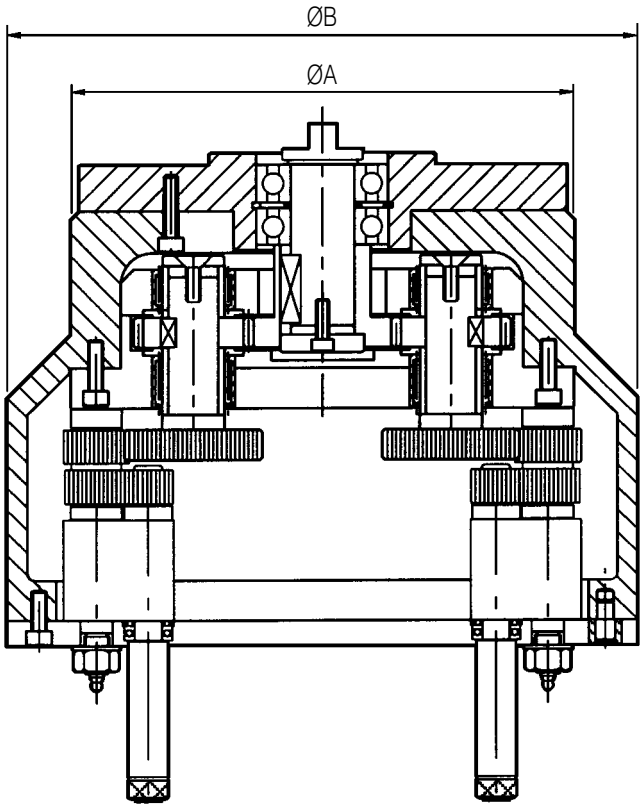
From the introduction to the Centinel system on page 4, you will understand the basic Centinel planetary movement: moon around the earth, and earth around the sun.

Centreline has now extended the range to a multi-spindle system which incorporates multiple main drive (sun) gears. This is the GALAXY HEAD with 2, 3 or 4 main drive gears to which standard spindle assemblies can be mounted. This 'universe' configuration greatly extends the versatility of the Centinel without any loss of rigidity.

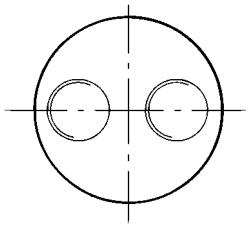
The GALAXY concept can also be used in conjunction with the Centinel Plus System on page 19, incorporating the interchangeable module.



GALAXY MAIN BODY ASSEMBLY

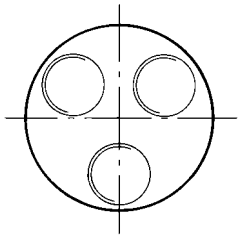


40 Range			
Main Body Assembly	ØA	ØB	Output
40 GJ 2	200.0	250.0	2
40 GJ 3	200.0	250.0	3
40 GJ 4	200.0	250.0	4

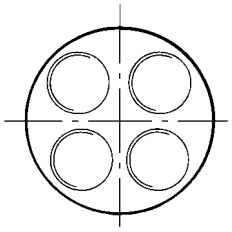


Main Body Assembly	ØA	ØB	Output
40 HK 2	225.0	275.0	2
40 HK 3	225.0	275.0	3
40 HK 4	225.0	275.0	4

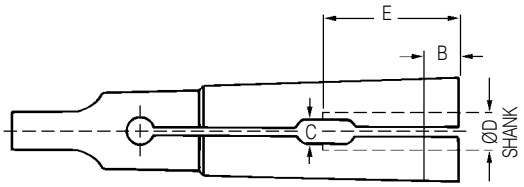
50 Range			
Main Body Assembly	ØA	ØB	Output
50 GJ 2	200.0	250.0	2
50 GJ 3	200.0	250.0	3
50 GJ 4	200.0	250.0	4



Main Body Assembly	ØA	ØB	Output
50 HK 2	225.0	275.0	2
50 HK 3	225.0	275.0	3
50 HK 4	225.0	275.0	4



Main Body Assembly	ØA	ØB	Output
50 LN 2	300.0	350.0	2
50 LN 3	300.0	350.0	3
50 LN 4	300.0	350.0	4



DRILL DRIVERS

The simple way to turn an inexpensive straight shank drill into a taper shank drill, able to be used with Morse taper adjustable adaptors.

1 Morse Taper - B = 4.80

Part No.	D	C	E
X55087	3.15 1/8"	-	15.9
X55144	3.20		
X55032	3.25		
X55146	3.30		
X55147	3.35		
X55148	3.40		
X55033	3.45		
X55150	3.50		
X55088	3.55 9/64"		
X55154	3.70		
X55036	3.75		
X55037	3.80		
X55039	3.90	2.29	19
X55089	3.95 5/32"	2.39	
X55040	4.00		
X55042	4.10		
X55043	4.20		
X55044	4.30		
X55090	4.35 11/64"		
X55045	4.40		
X55046	4.50		
X55048	4.60		
X55049	4.70		
X55091	4.75 3/16"		
X55050	4.80		
X55051	4.85		
X55052	4.90		
X55053	5.00		
X55055	5.10		
X55092	13/64"		
X55056	5.20	3.00	22.2
X55058	5.30	3.10	
X55059	5.40		
X55186	5.50		
X55093	7/32"		
X55060	5.60		
X55188	5.70		
X55061	5.80		
X55094	15/64"		

Part No.	D	C	E
X55192	6.00		
X55193	6.10		
X55194	6.20	3.00	
X55196	6.30	3.10	22.2
X55066	1/4"		
X55197	6.40		
X55198	6.50		
X55199	6.60		
X55200	6.70		
X55095	17/64" 6.75		
X55202	6.80		
X55070	6.90		
X55204	7.00		
X55096	9/32"	4.01	25.4
X55206	7.20	4.11	
X55208	7.30		
X55209	7.40		
X55074	7.50		
X55097	19/64"		
X55212	7.70		
X55213	7.75		
X55214	7.80		
X55215	7.90		
X55098	5/16"		
X55076	8.00		
X55217	8.10		
X55077	8.20		
X55219	8.25		
X55220	8.30		
X55099	21/64"		
X55221	8.40		
X55222	8.50		
X55079	8.60		
X55224	8.70	5.05	28.6
X55100	11/32" 8.75	5.15	
X55226	8.80		
X55227	8.90		
X55228	9.00		
X55101	23/64"		
X55230	9.20		
X55232	9.30		
X55233	9.40		
X55102	9.50 3/8"		

2 Morse Taper - B = 6.35

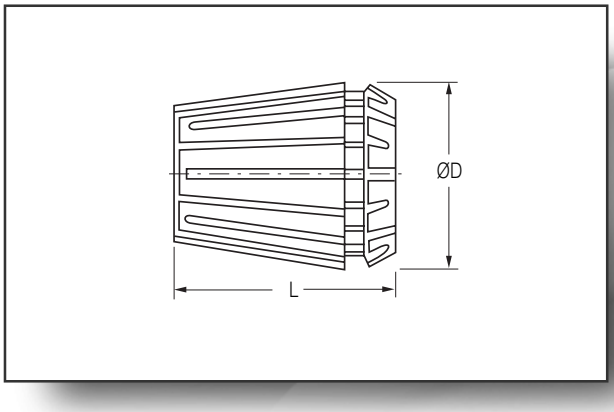
Part No.	D	C	E
X56042	4.85		
X56044	5.00		
X56088	13/64"		
X56047	5.20		
X56049	5.30	3.00	22.2
X56185	5.50	3.10	
X56089	7/32"		
X56090	15/64"		
X56191	6.00		
X56192	6.10		
X56195	6.30		
X56057	1/4"		
X56197	6.50		
X56198	6.60		
X56091	17/64" 6.75		
X56201	6.80		
X56203	7.00	4.01	25.4
X56092	9/32"	4.11	
X56093	19/64"		
X56213	7.80		
X56214	7.90		
X56094	5/16"		
X56067	8.00		
X56216	8.10		
X56095	21/64"		
X56221	8.50		
X56070	8.60		
X56223	8.70		
X56096	11/32" 8.75	5.05 5.15	28.6
X56225	8.80		
X56227	9.00		
X56097	23/64"		
X56231	9.30		
X56232	9.40		
X56098	9.50 3/8"		
X56074	9.60		
X56235	9.70	6.07	31.8
X56075	9.80	6.17	

Part No.	D	C	E
X56099	9.90 25/64"		
X56239	10.00		
X56076	10.10		
X56241	10.20		
X56100	10.30 13/32"		
X56078	10.50		
X56246	10.60		
X56101	10.70 27/64"	6.07	31.8
X56249	10.80	6.17	
X56251	11.00		
X56102	11.10 7/16"		
X56253	11.20		
X56256	11.40		
X56103	11.50 29/64"		
X56261	11.80		
X56104	11.90 15/32"		
X56263	12.00		
X56264	12.10		
X56105	12.30 31/64"		
X56269	12.50		
X56106	12.70 1/2"	7.54	33.3
X56273	12.80	7.69	
X56275	13.00		
X56107	33/64" 13.10		
X56108	17/32" 13.50		
X56109	35/64" 13.90		
X56287	14.00		
X56110	9/16"		

Unless otherwise stated, all dimensions are in millimetres.

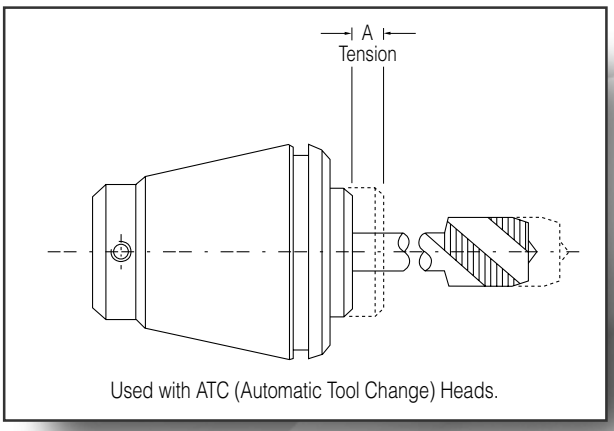
COLLETS

Part Number	Clamping Range	In Increments Of	ØD	L
ER8	0.5 - 5	0.5	8.5	13.5
ER11	0.5 - 7	0.5	11.5	18.0
ER16	0.5 - 10	1.0	17.0	27.5
ER20	1 - 13	1.0	21.0	31.5
ER25	1 - 16	1.0	26.0	34.0
ER32	2 - 20	1.0	33.0	40.0
ER40	3 -26	1.0	41.0	46.0



TENSION TAPPING COLLETS

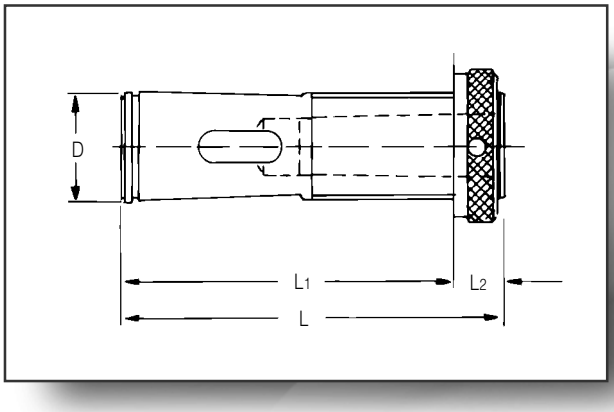
Part Number	Collet Size	Tap Shank Size	A
XT116200	ER16	2.0	7
XT116224		2.24	
XT116250		2.5	
XT116280		2.8	
XT116315		3.15	
XT116355		3.55	
XT116400		4.0	
XT116450		4.5	
XT116500		5.0	
XT116550		5.5	
XT120250	ER20	2.5	7
XT120280		2.8	
XT120315		3.15	
XT120355		3.55	
XT120400		4.0	
XT120450		4.5	
XT120500		5.0	
XT120560		5.6	
XT120630		6.3	
XT120700		7.0	



Used with ATC (Automatic Tool Change) Heads.

ADJUSTABLE ADAPTORS

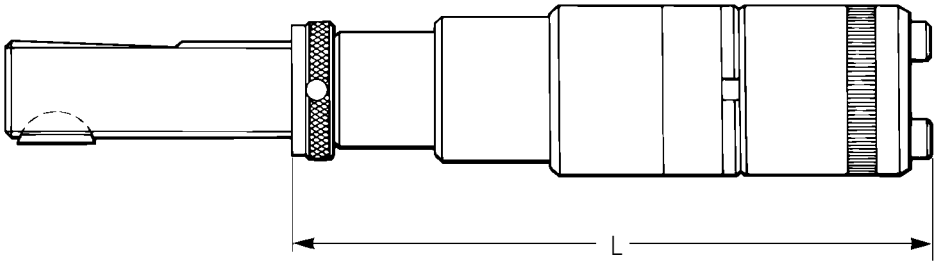
Diameter D	Morse Taper	L	L1	L2	Adjustment	Standard Assembly
16 x 1.5 Tpz	1	85	73	12	28	X117402
20 x 2 Tpz	1	88	76	12	28	X117403
25 x 2 Tpz	1	95	83	12	30	X136192
	2					X136193
28 x 2 Tpz	1	95	83	12	30	X117404
	2					X117405
36 x 2 Tpz	1	118	104	14	36	X136176
	2					X117406
	3					X117407



Unless otherwise stated, all dimensions are in millimetres.

TAP HOLDERS

Automotive Shank, Parallel Float, with Compression and Tension



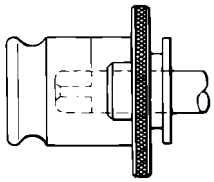
Dimensions - mm

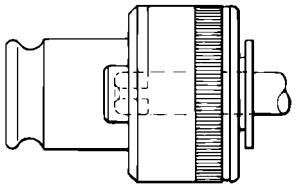
Holder Size	Tap Range	Max. Dia. of Holder	Radial Float	Compression	Tension	L	Shank - Trapezoidal			
							16 x 1.5	20 x 2	28 x 2	36 x 2
0	M1 - M8	23	0.25	20	10	138	X400211	X400212		
				15	15	133	X400221	X400222		
				0	30	118	X400121	X400122		
1	M4 - M14	35	0.50	30	10	163	X410231	X410232	X410234	
				20	20	153	X410241	X410242	X410244	
				0	40	133	X410131	X410132	X410134	
2	M7 - M24	50	1.00	30	10	196		X420232	X420234	
						198				X420235
				20	20	186		X420242	X420244	
						188				X420245
				0	40	166		X420132	X420134	
						168				X420135
3	M14 - M36	72	1.50	30	10	252			X430234	
						254				X430235
				20	20	242			X430244	
						244				X430245
				0	40	222			X430134	
						224				X430135

Dimensions - inches

Holder Size	Tap Range	Max. Dia. of Holder	Radial Float	Compression	Tension	L	Shank - National ACME Threads			
							1/2 x16	5/8 x 16	7/8 x 12	1 3/8 x 12
0	1/16 to 7/16	0.874	0.010	0.787	0.394	5.393	X401210	X401211		
				0.591	0.591	5.196	X401220	X401221		
				0.000	1.181	4.606	X401120	X401121		
1	3/16 to 9/16	1.379	0.020	1.181	0.394	6.377		X411231	X411233	
				0.787	0.787	5.984		X411241	X411243	
				0.000	1.575	5.196		X411131	X411133	
2	5/16 to 1	1.969	0.040	1.181	0.394	7.677			X421233	X421236
				0.787	0.787	7.283			X421243	X421246
				0.000	1.575	6.496			X421133	X421136
3	9/16 to 1 3/8	2.835	0.060	1.181	0.394	9.881				X431236
						9.881				
				0.787	0.787	9.488				X431246
						9.488				
				0.000	1.575	8.700				X431136
						8.700				

TAP CHUCKS: ISO STANDARD





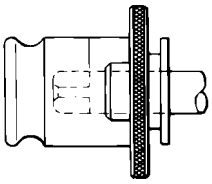
ISO Standard Taps, Positive Drive (PD)

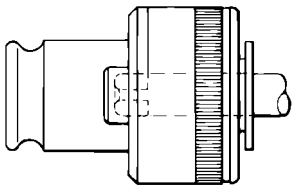
Chuck Size	Tap Size	Shank Ø (mm)	Square A/F (mm)	PD
0	M1 - M2 10, 9, BA	2.50	2.00	X600000
	M2.2 - M2.5 8, 7, 6, BA	2.80	2.24	X600001
	M3 4-5 UNC/UNF . 5BA	3.15	2.50	X600002
	M3.5 6 UNC/UNF . 4BA	3.55	2.80	X600003
	M4	4.00	3.15	X600004
	M4.5 8 UNC/UNF . 3BA	4.50	3.55	X600005
	M5 10 UNC/UNF . 2BA	5.00	4.00	X600006
	12 UNC/UNF . 1BA	5.60	4.50	X600007
	M6 1/4 UNC/UNF . 0BA	6.30	5.00	X600008
	M7	7.10	5.60	X600009
	M8, M11 5/16 - 7/16 UNC/UNF	8.00	6.30	X600010
1	M4	4.00	3.15	X610004
	M4.5 8 UNC/UNF . 3BA	4.50	3.55	X610005
	M5 10 UNC/UNF . 2BA	5.00	4.00	X610006
	12 UNC/UNF . 1BA	5.60	4.50	X610007
	M6 1/4 UNC/UNF . 0BA	6.30	5.00	X610008
	M7	7.10	5.60	X610009
	M8, M11 5/16 - 7/16 UNC/UNF	8.00	6.30	X610010
	M9, M12 1/2 UNC/UNF	9.00	7.10	X610011
	M10 3/8 UNC/UNF	10.00	8.00	X610012
	M14 9/16 UNC/UNF	11.20	9.00	X610013
2	M7	7.10	5.60	X620009
	M8, M11 5/16 - 7/16 UNC/UNF	8.00	6.30	X620010
	M9, M12 1/2 UNC/UNF	9.00	7.10	X620011
	M10 3/8 UNC/UNF	10.00	8.00	X620012
	M14 9/16 UNC/UNF	11.20	9.00	X620013
	M16 5/8 UNC/UNF	12.50	10.00	X620014
	M18, M20 3/4 UNC/UNF	14.00	11.20	X620015
	M22 7/8 UNC/UNF	16.00	12.50	X620016
	M24 1" UNC/UNF	18.00	14.00	X620017
3	M14 9/16 UNC/UNF	11.20	9.00	X630013
	M16 5/8 UNC/UNF	12.50	10.00	X630014
	M18, M20 3/4 UNC/UNF	14.00	11.20	X630015
	M22 7/8 UNC/UNF	16.00	12.50	X630016
	M24 1" UNC/UNF	18.00	14.00	X630017
	M27, M30 1 1/8 UNC/UNF	20.00	16.00	X630018
	M33 1.1/4 UNC/UNF	22.40	18.00	X630019
	M36 1.3/8 UNC/UNF	25.00	20.00	X630020
	M39, M42 1.1/2 UNC/UNF	28.00	22.40	X630021

ISO Standard Taps, Slipping Clutch Drive (SCD)

Chuck Size	Tap Size	Shank Ø (mm)	Square A/F (mm)	SCD
0	M1 - M2 0-1 UNC	2.50	2.00	X602000
	M2.2 - M2.5 2-3 UNC	2.80	2.24	X602001
	M3 4-5 UNC	3.15	2.50	X602002
	M3.5 6 UNC	3.55	2.80	X602003
	M4	4.00	3.15	X602004
	M4.5 8 UNC	4.50	3.55	X602005
	M5 10 UNC	5.00	4.00	X602006
	12 UNC	5.60	4.50	X602007
	M6 1/4 UNC/UNF	6.30	5.00	X602008
	M7	7.10	5.60	X602009
	M8 5/16 UNC/BSW	8.00	6.30	X602010
1	M4	4.00	3.15	X612004
	M4.5 8 UNC	4.50	3.55	X612005
	M5 10 UNC	5.00	4.00	X612006
	12 UNC	5.60	4.50	X612007
	M6 1/4 UNC/BSW	6.30	5.00	X612008
	M7	7.10	5.60	X612009
	M8, M11 5/16 UNC/BSW	8.00	6.30	X612010
	M9	9.00	7.10	X612011
	M10 3/8 UNC/BSW	10.00	8.00	X612012
	M11 7/16 UNC/BSW	8.00	6.30	X612050
	M12 1/2 UNC/BSW	9.00	7.10	X612051
	M14 9/16 UNC/BSW	11.20	9.00	X612013
2	M7	7.10	5.60	X622009
	M8 5/16 UNC/BSW	8.00	6.30	X622010
	M9	9.00	7.10	X622011
	M10 3/8 UNC/BSW	10.00	8.00	X622012
	M11 7/16 UNC/BSW	8.00	6.30	X622050
	M12 1/2 UNC/BSW	9.00	7.10	X622051
	M14 9/16 UNC/BSW	11.20	9.00	X622013
	M16 5/8 UNC/BSW	12.50	10.00	X622014
	M18	14.00	11.20	X622015
	M20 3/4 UNC/BSW	14.00	11.20	X622052
	M22 7/8 UNC/BSW	16.00	12.50	X622016
	M24 1" UNC/BSW	18.00	14.00	X622017
3	M14 9/16 UNC/BSW	11.20	9.00	X632013
	M16 5/8 UNC/BSW	12.50	10.00	X632014
	M18	14.00	11.20	X632015
	M20 3/4 UNC/BSW	14.00	11.20	X632052
	M22 7/8 UNC/BSW	16.00	12.50	X632016
	M24 1" UNC/BSW	18.00	14.00	X632017
	M27	20.00	16.00	X632018
	M30 1.1/8 UNC/BSW	20.00	16.00	X632053
	M33 1.1/4 UNC/BSW	22.40	18.00	X632019
	M36 1.3/8 UNC/BSW	25.00	20.00	X632020
	M39 1.1/2 UNC/BSW	28.00	22.40	X632021
	M42	28.00	22.40	X632054

TAP CHUCKS: DIN STANDARD





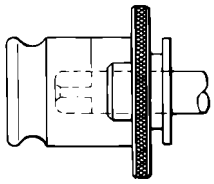
DIN Standard Taps, Positive Drive (PD)

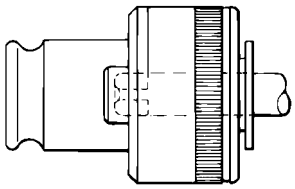
Chuck Size	Tap Size	Shank Ø (mm)	Square A/F (mm)	PD
0	M1 - M1.8, M3 - M3.5	2.50	2.10	X600100
	M2 - M2.6, M4	2.80	2.10	X600101
	M3, M5	3.50	2.70	X600102
	M3.5	4.00	3.00	X600103
	M4, M6	4.50	3.40	X600104
	M7	5.50	4.30	X600105
	M5, M6, M7, M8	6.00	4.90	X600106
	M10	7.00	5.50	X600107
	M8	8.00	6.20	X600108
1	M3, M5	3.50	2.70	X610102
	M3.5	4.00	3.00	X610103
	M4, M6	4.50	3.40	X610104
	M7	5.50	4.30	X610105
	M5, M6, M7, M8	6.00	4.90	X610106
	M10	7.00	5.50	X610107
	M8	8.00	6.20	X610110
	M12	9.00	7.00	X610111
	M10	10.00	8.00	X610112
	M14	11.00	9.00	X610111
2	M10	7.00	5.50	X620107
	M8	8.00	6.20	X620010
	M12	9.00	7.00	X620011
	M10	10.00	8.00	X620012
	M14	11.00	9.00	X620011
	M16	12.00	9.00	X620012
	M18	14.00	11.00	X620015
	M20	16.00	12.00	X620014
	M22, M24	18.00	14.50	X620015
3	M14	11.00	9.00	X630111
	M16	12.00	9.00	X630112
	M18	14.00	11.00	X630115
	M20	16.00	12.00	X630114
	M22, M24	18.00	14.50	X630115
	M27	20.00	16.00	X630118
	M30	22.00	18.00	X630117
	M33	25.00	20.00	X630120
	M36	28.00	22.00	X630121

DIN Standard Taps, Slipping Clutch Drive (SCD)

Chuck Size	Tap Size	Shank Ø (mm)	Square A/F (mm)	SCD
0	M1 - M1.8	2.50	2.10	X602100
	M3	2.50	2.10	X602150
	M3.5	2.50	2.10	X602151
	M2, M2.2	2.80	2.10	X602101
	M2.5	2.80	2.10	X602152
	M4	2.80	2.10	X602153
	M3	3.50	2.70	X602102
	M5	3.50	2.70	X602154
	M3.5	4.00	3.00	X602103
	M4	4.50	3.40	X602104
	M6	4.50	3.40	X602155
	M7	5.50	4.30	X602105
	M5	6.00	4.90	X602106
	M6	6.00	4.90	X602156
	M8	6.00	4.90	X602157
	M10	7.00	5.50	X602107
1	M3	3.50	2.70	X612102
	M5	3.50	2.70	X612154
	M3.5	4.00	3.00	X612103
	M4	4.50	3.40	X612104
	M6	4.50	3.40	X612155
	M5	6.00	4.90	X612106
	M6	6.00	4.90	X612156
	M7	5.50	4.30	X612105
	M8	6.00	4.90	X612157
	M10	7.00	5.50	X612107
	M8	8.00	6.20	X612110
	M12	9.00	7.00	X612151
	M10	10.00	8.00	X612012
2	M10	7.00	5.50	X622107
	M8	8.00	6.20	X622010
	M12	9.00	7.00	X622051
	M10	10.00	8.00	X622012
	M14	11.00	9.00	X622111
	M16	12.00	9.00	X622112
	M18	14.00	11.00	X622015
	M20	16.00	12.00	X622114
3	M14	11.00	9.00	X632111
	M16	12.00	9.00	X632112
	M18	14.00	11.00	X632015
	M20	16.00	12.00	X632114
	M22	18.00	14.50	X632115
	M24	18.00	14.50	X632158
	M27	20.00	16.00	X632018
	M30	22.00	18.00	X632117
	M33	25.00	20.00	X632118
	M36	28.00	22.00	X632119

TAP CHUCKS: AMERICAN STANDARD





American Standard Taps, Positive Drive (PD)

Chuck Size	Tap Size	Shank Ø (ins)	Square A/F (ins)	PD
0	0 - 6	.141	.110	X600300
	8	.168	.131	X600301
	10	.194	.152	X600302
	12	.220	.165	X600303
	14, 1/4	.255	.191	X600304
	5/16	.318	.238	X600305
1	0 - 6	.141	.110	X610300
	8	.168	.131	X610301
	10	.194	.152	X610302
	12	.220	.165	X610303
	14, 1/4	.255	.191	X610304
	5/16	.318	.238	X610305
	7/16	.323	.242	X610306
	1/2	.367	.275	X610307
	3/8	.381	.286	X610308
	9/16	.429	.322	X610309
2	5/16	.318	.238	X620305
	7/16	.323	.242	X620306
	1/2	.367	.275	X620307
	3/8	.381	.286	X620308
	9/16	.429	.322	X620309
	5/8	.480	.360	X620310
	11/16	.542	.406	X620318
	3/4	.590	.442	X620311
	13/16	.652	.489	X620319
	7/8	.697	.523	X620312
3	5/8	.480	.360	X630310
	11/16	.542	.460	X630318
	3/4	.590	.442	X630311
	13/16	.652	.489	X630319
	7/8	.697	.523	X630312
	15/16	.760	.570	X630320
	1	.800	.600	X630313
	1 1/8	.896	.672	X630314
	1 1/4	1.021	.766	X630315
	1 3/8	1.108	.831	X630316

American Standard Taps, Slipping Clutch Drive (SCD)

Chuck Size	Tap Size	Shank Ø (ins)	Square A/F (ins)	SCD
0	0 - 6	.141	.110	X602300
	8	.168	.131	X602301
	10	.194	.152	X602302
	12	.220	.165	X602303
	12, 1/4	.255	.191	X602304
	5/16	.318	.238	X602305
1	0 - 6	.141	.110	X612300
	8	.168	.131	X612301
	10	.194	.152	X612302
	12	.220	.165	X612303
	12, 1/4	.255	.191	X612304
	5/16	.318	.238	X612305
	7/16	.323	.242	X612306
	1/2	.367	.275	X612307
	3/8	.381	.286	X612308
	9/16	.429	.322	X612309
2	5/16	.318	.238	X622305
	7/16	.323	.242	X622306
	1/2	.367	.275	X622307
	3/8	.381	.286	X622308
	9/16	.429	.322	X622309
	5/8	.480	.360	X622310
	11/16	.542	.406	X622318
	3/4	.590	.442	X622311
	13/16	.652	.489	X622319
	7/8	.697	.523	X622312
3	5/8	.480	.360	X632310
	11/16	.542	.460	X632318
	3/4	.590	.442	X632311
	13/16	.652	.489	X632319
	7/8	.697	.523	X632312
	15/16	.760	.570	X632320
	1	.800	.600	X632313
	1 1/8	.896	.672	X632314
	1 1/4	1.021	.766	X632315
	1 3/8	1.108	.831	X632316

TAPPING DATA

UNF Screw Thread Data

Thread Size	Clearance Drill Diameter (mm)	Cutting Tap Drill Diameter (mm)	Forming Tap Drill Diameter (mm)
No 0 UNF 80	1.60	1.25	1.40
No 1 UNF 72	1.95	1.55	1.70
No 2 UNF 64	2.30	1.90	2.00
No 3 UNF 56	2.65	2.15	2.30
No 4 UNF 48	2.95	2.40	2.60
No 5 UNF 44	3.30	2.70	2.90
No 6 UNF 40	3.60	2.95	3.20
No 8 UNF 36	4.30	3.50	3.80
No 10 UNF 32	4.90	4.10	4.50
No 12 UNF 28	5.60	4.70	5.10
1/4 UNF 28	6.50	5.50	5.90
5/16 UNF 24	8.10	6.90	7.50
3/8 UNF 24	9.70	8.50	9.00
7/16 UNF 20	11.30	9.90	10.50
1/2 UNF 20	13.00	11.50	12.20
9/16 UNF 18	14.50	12.90	-
5/8 UNF 18	16.25	14.50	-
3/4 UNF 16	19.25	17.50	-
7/8 UNF 14	22.50	20.40	-
1 UNF 12	25.75	23.25	-
1 1/8 UNF 12	29.00	26.50	-
1 1/4 UNF 12	32.00	29.50	-
1 3/8 UNF 12	35.50	32.75	-
1 1/2 UNF 12	38.50	36.00	-

UNC Screw Thread Data

Thread Size	Clearance Drill Diameter (mm)	Cutting Tap Drill Diameter (mm)	Forming Tap Drill Diameter (mm)
No 1 UNC 64	1.95	1.55	1.65
No 2 UNC 56	2.30	1.85	1.95
No 3 UNC 48	2.65	2.10	2.25
No 4 UNC 40	2.95	2.35	2.55
No 5 UNC 40	3.30	2.65	2.85
No 6 UNC 32	3.60	2.85	3.10
No 8 UNC 32	4.30	3.50	3.80
No 10 UNC 24	4.90	3.90	4.30
No 12 UNC 24	5.60	4.50	5.00
1/4 UNC 20	6.50	5.10	5.80
5/16 UNC 18	8.10	6.60	7.30
3/8 UNC 16	9.70	8.00	8.80
7/16 UNC 14	11.30	9.40	10.46
1/2 UNC 13	13.00	10.80	11.90
9/16 UNC 12	14.50	12.20	-
5/8 UNC 11	16.25	13.50	-
3/4 UNC 10	19.25	16.50	-
7/8 UNC 9	22.50	19.50	-
1 UNC 8	25.75	22.25	-
1 1/8 UNC 7	29.00	25.00	-
1 1/4 UNC 7	32.00	28.00	-

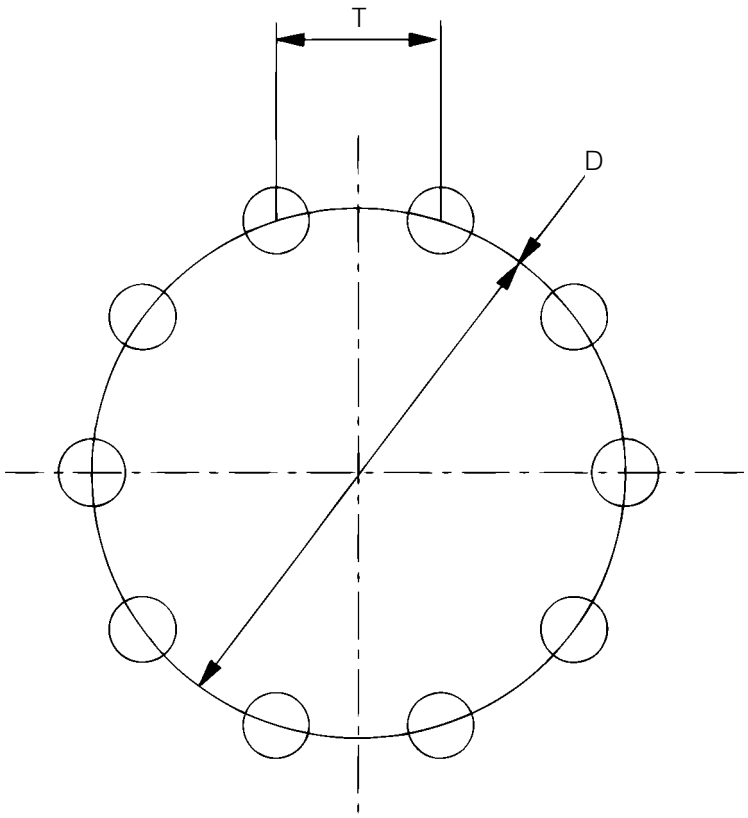
Metric Fine Screw Thread Data

Thread Size	Clearance Drill Diameter (mm)	Cutting Tap Drill Diameter (mm)	Forming Tap Drill Diameter (mm)
M3 x 0.35	3.10	2.65	-
M4 x 0.50	4.10	3.50	-
M5 x 0.50	5.10	4.50	-
M6 x 0.75	6.10	5.20	-
M7 x 0.75	7.20	6.20	-
M8 x 1.00	8.20	7.00	-
M10 x 1.25	10.20	8.80	-
M12 x 1.25	12.20	10.80	-
M14 x 1.50	14.25	12.50	-
M16 x 1.50	16.25	14.50	-
M18 x 1.50	18.25	16.50	-
M20 x 1.50	20.25	18.50	-
M22 x 1.50	22.25	20.50	-
M24 x 2.00	24.25	22.00	-
M27 x 2.00	27.25	25.00	-
M30 x 2.00	30.50	28.00	-

Metric Coarse Screw Thread Data

Thread Size	Clearance Drill Diameter (mm)	Cutting Tap Drill Diameter (mm)	Forming Tap Drill Diameter (mm)
M1 x 0.25	1.05	0.75	-
M1.1 x 0.25	1.15	0.85	-
M1.2 x 0.25	1.25	0.95	-
M1.4 x 0.30	1.45	1.10	-
M1.6 x 0.35	1.65	1.25	1.45
M1.8 x 0.35	1.85	1.45	1.65
M2 x 0.40	2.05	1.60	1.80
M2.2 x 0.45	2.25	1.75	2.00
M2.5 x 0.45	2.60	2.05	2.30
M3 x 0.50	3.10	2.50	2.80
M3.5 x 0.60	3.60	2.90	3.20
M4 x 0.70	4.10	3.30	3.70
M4.5 x 0.75	4.60	3.70	4.10
M5 x 0.80	5.10	4.20	4.60
M6 x 1.00	6.10	5.00	5.60
M7 x 1.00	7.20	6.00	6.50
M8 x 1.25	8.20	6.80	7.40
M9 x 1.25	9.20	7.80	8.36
M10 x 1.50	10.20	8.50	9.30
M11 x 1.50	11.20	9.50	-
M12 x 1.75	12.20	10.20	11.20
M14 x 2.00	14.25	12.00	13.00
M16 x 2.00	16.25	14.00	15.00
M18 x 2.50	18.25	15.50	16.80
M20 x 2.50	20.25	17.50	18.80
M22 x 2.50	22.25	19.50	-
M24 x 3.00	24.25	21.00	-
M27 x 3.00	27.25	24.00	-

PITCH CIRCLE CHORDAL DISTANCE CALCULATION



To obtain the chordal distance T the following formula is used:

$$T = D \times C$$

where: D = diameter of the pitch circle
C = constant as given in tables

Number of Holes	Constant 'C'
3	0.86603
4	0.70711
5	0.58779
6	0.50000
7	0.43388
8	0.38268
9	0.34202

Number of Holes	Constant 'C'
10	0.30902
11	0.28173
12	0.25882
13	0.23932
14	0.22252
15	0.20791
16	0.19509

Number of Holes	Constant 'C'
17	0.18375
18	0.17365
19	0.16459
20	0.15643
21	0.14904
22	0.14231
23	0.13617

Number of Holes	Constant 'C'
24	0.13053
25	0.12533
26	0.12054
27	0.11609
28	0.11196
29	0.10812
30	0.10453

POWER CHART

HP required for Drilling Low Carbon Steel
Peripheral drill speed of 60 feet per minute

Drill sizes and Feed Rates in inches

Drill Size	Feed/ Rev	Number of Spindles											
		1	2	3	4	5	6	7	8	9	10	11	12
1/8	0.002	0.050	0.100	0.150	0.200	0.250	0.300	0.350	0.400	0.450	0.500	0.550	0.600
3/32	0.003	0.082	0.164	0.246	0.328	0.410	0.492	0.574	0.656	0.738	0.820	0.902	0.984
3/16	0.004	0.121	0.242	0.363	0.484	0.605	0.726	0.847	0.968	1.089	1.210	1.331	1.452
7/32	0.005	0.167	0.334	0.501	0.668	0.835	1.002	1.169	1.336	1.503	1.670	1.837	2.004
1/4	0.005	0.190	0.380	0.570	0.760	0.950	1.140	1.330	1.520	1.710	1.900	2.090	2.280
9/32	0.006	0.247	0.494	0.741	0.988	1.235	1.482	1.729	1.976	2.223	2.470	2.717	2.964
5/16	0.006	0.275	0.550	0.825	1.100	1.375	1.650	1.925	2.200	2.475	2.750	3.025	3.300
3/8	0.007	0.374	0.748	1.122	1.496	1.870	2.244	2.618	2.992	3.366	3.740	4.114	4.488
7/16	0.007	0.437	0.874	1.311	1.748	2.185	2.622	3.059	3.496	3.933	4.370	4.807	5.244
1/2	0.008	0.556	1.112	1.668	2.224	2.780	3.336	3.892	4.448	5.004	5.560	6.116	6.672
9/16	0.008	0.627	1.254	1.881	2.508	3.135	3.762	4.389	5.016	5.643	6.270	6.897	7.524
5/8	0.009	0.770	1.540	2.310	3.080	3.850	4.620	5.390	6.160	6.930	7.700	8.470	9.240
11/16	0.009	0.847	1.694	2.541	3.388	4.235	5.082	5.929	6.776	7.623	8.470	9.317	10.164
3/4	0.010	1.013	2.026	3.039	4.052	5.065	6.078	7.091	8.104	9.117	10.130	11.143	12.156
13/16	0.011	1.193	2.386	3.579	4.772	5.965	7.158	8.351	9.544	10.737	11.930	13.123	14.316
7/8	0.011	1.284	2.568	3.852	5.136	6.420	7.704	8.988	10.272	11.556	12.840	14.124	15.408
15/16	0.012	1.484	2.968	4.452	5.936	7.420	8.904	10.388	11.872	13.356	14.840	16.324	17.808
1	0.012	1.583	3.166	4.749	6.332	7.915	9.498	11.081	12.664	14.247	15.830	17.413	18.996

For light alloy multiply the above figures by 0.4 For cast iron multiply the above figures by 0.8 For Stainless Steel multiply the above figures by 2

KW required for Drilling Low Carbon Steel
Peripheral drill speed of 18 metres per minute

Drill sizes and Feed Rates in mm

Drill Size	Feed/ Rev	Number of Spindles											
		1	2	3	4	5	6	7	8	9	10	11	12
3	0.050	0.036	0.072	0.108	0.144	0.180	0.216	0.252	0.288	0.324	0.360	0.396	0.432
4	0.075	0.061	0.122	0.183	0.244	0.305	0.366	0.427	0.488	0.549	0.610	0.671	0.732
5	0.100	0.095	0.190	0.285	0.380	0.475	0.570	0.665	0.760	0.855	0.950	1.045	1.140
6	0.125	0.134	0.268	0.402	0.536	0.670	0.804	0.938	1.072	1.206	1.340	1.474	1.608
7	0.125	0.157	0.314	0.471	0.628	0.785	0.942	1.099	1.256	1.413	1.570	1.727	1.884
8	0.150	0.207	0.414	0.621	0.828	1.035	1.242	1.449	1.656	1.863	2.070	2.277	2.484
9	0.150	0.230	0.460	0.690	0.920	1.150	1.380	1.610	1.840	2.070	2.300	2.530	2.760
10	0.175	0.293	0.586	0.879	1.172	1.465	1.758	2.051	2.344	2.637	2.930	3.223	3.516
12	0.175	0.350	0.700	1.050	1.400	1.750	2.100	2.450	2.800	3.150	3.500	3.850	4.200
14	0.200	0.458	0.916	1.374	1.832	2.290	2.748	3.206	3.664	4.122	4.580	5.038	5.496
16	0.200	0.524	1.048	1.572	2.096	2.620	3.144	3.668	4.192	4.716	5.240	5.764	6.288
18	0.225	0.651	1.302	1.953	2.604	3.255	3.906	4.557	5.208	5.859	6.510	7.161	7.812
20	0.250	0.791	1.582	2.373	3.164	3.955	4.746	5.537	6.328	7.119	7.910	8.701	9.492
22	0.275	0.949	1.898	2.847	3.796	4.745	5.694	6.643	7.592	8.541	9.490	10.439	11.388
24	0.300	1.114	2.228	3.342	4.456	5.570	6.684	7.798	8.912	10.026	11.140	12.254	13.368

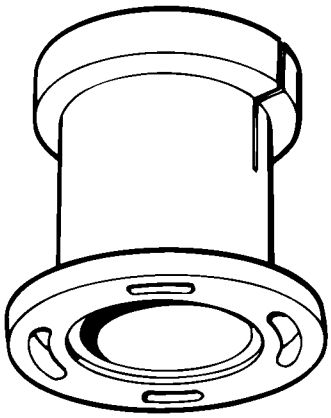
For light alloy multiply the above figures by 0.4 For cast iron multiply the above figures by 0.8 For Stainless Steel multiply the above figures by 2
To convert to Horse Power multiply the above figures by 1.34

MACHINE ADAPTIONS

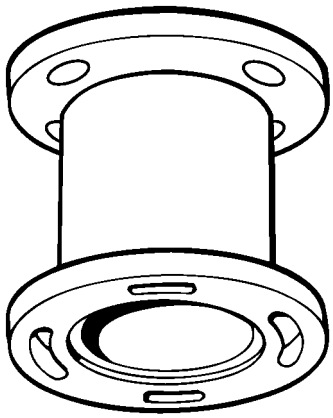
Centreline Multi-Spindle Heads can be fitted to almost all types of machines from simple drill presses to CNC machining centres with automatic tool change (ATC).

If a quill clamp and driver are required please help us by providing all information possible on your machine including make, model and serial number (see pages 40 & 41).

QUILL CLAMPS

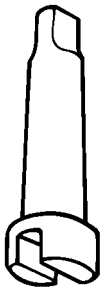


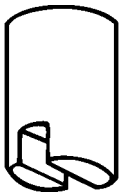
Quill Clamp A

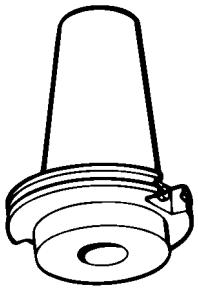


Quill Clamp B

DRIVERS







Morse Tapers	
Size	Part No.
1MT	CL1MT
2MT	CL2MT
3MT	CL3MT
4MT	CL4MT
5MT	CL5MT
6MT	CL6MT

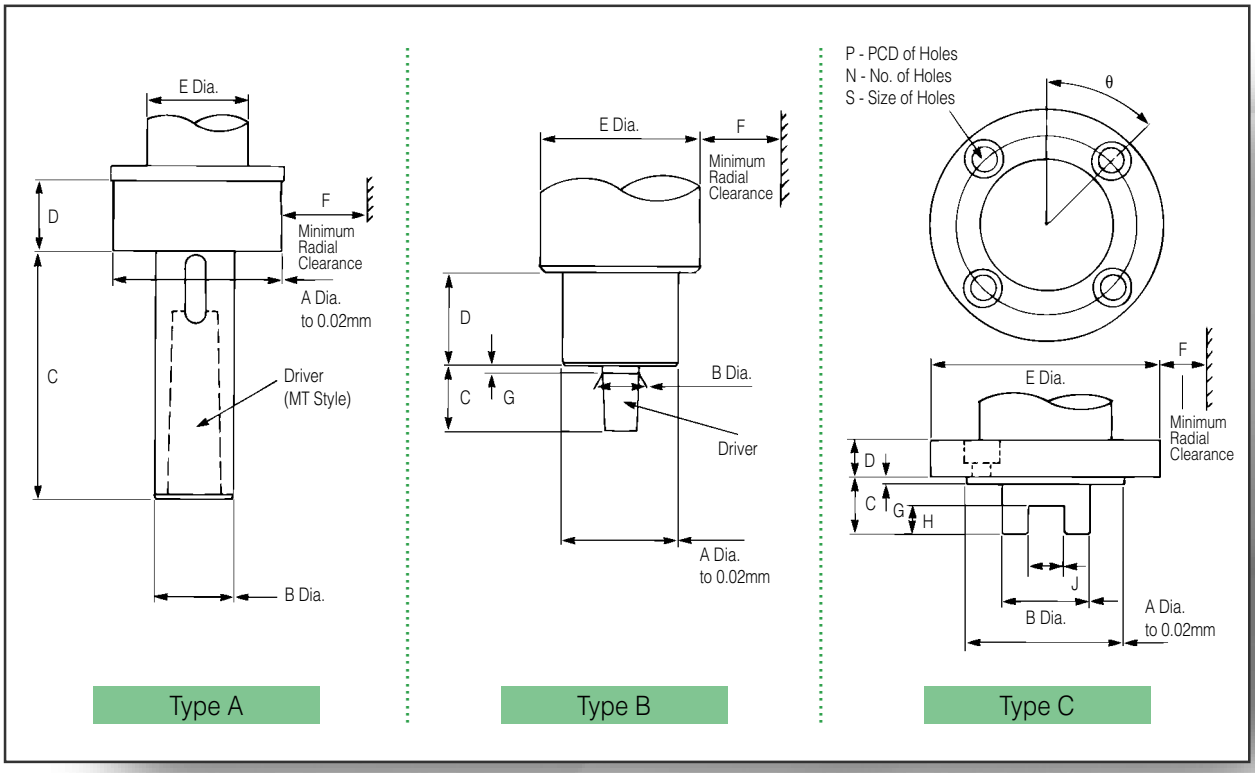
Jacobs Tapers	
Size	Part No.
1JT	CL1JT
2JT	CL2JT
3JT	CL3JT
6JT	CL4JT
33JT	CL5JT

Stub Tapers	
Size	Part No.
B10	CLB10
B12	CLB12
B16	CLB16
B18	CLB18
B22	CLB22

International Tapers	
Size	Part No.
ISO 30	CL30IS
ISO 35	CL35IS
ISO 40	CL40IS
ISO 45	CL45IS
ISO 50	CL50IS

DRILLING MACHINE SPINDLE DETAILS

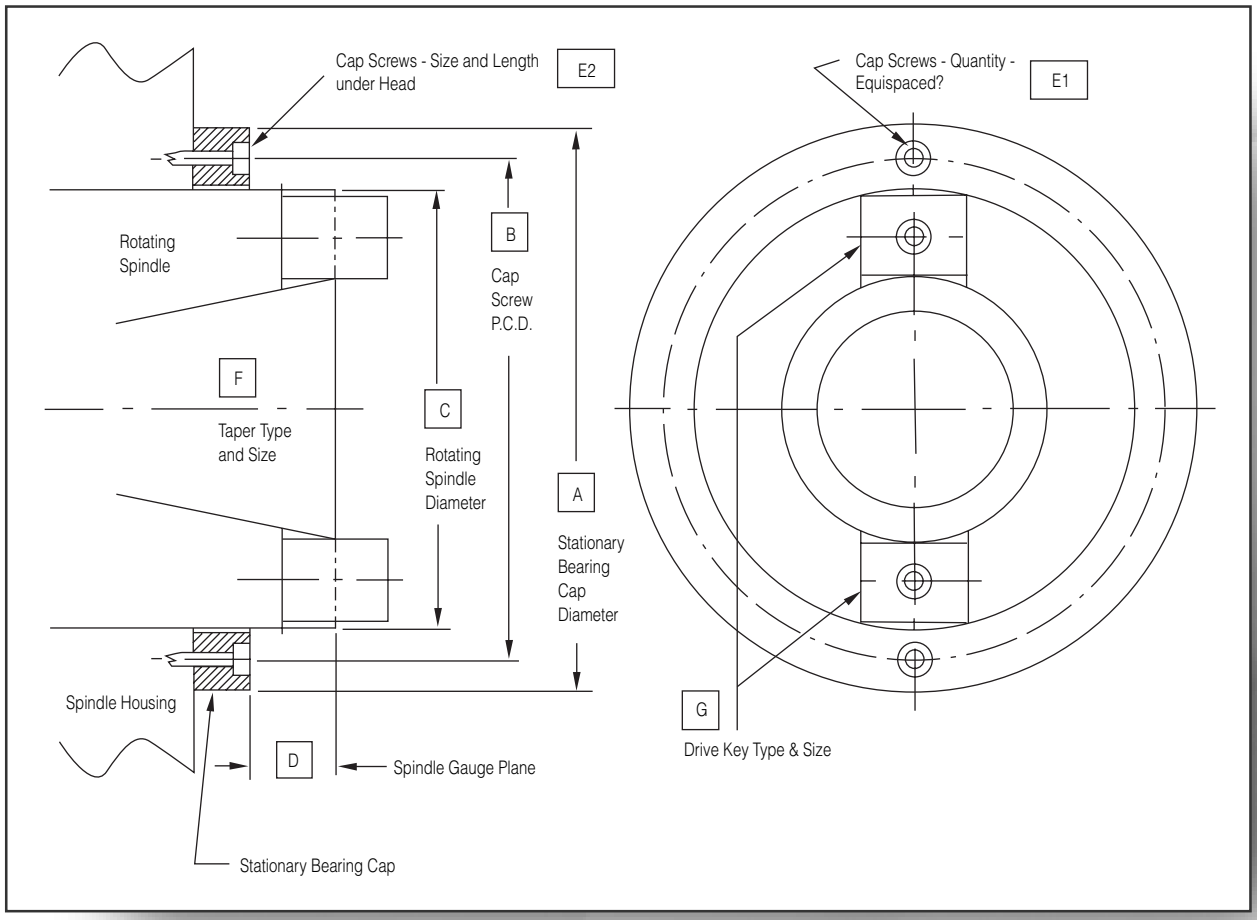
Typical Drilling Machine Spindle Configurations



Information required when ordering

Machine	
Model	
Serial number	
Quill Type	
Driver Part No.(from previous page)	
A	
B	
C	
D	
E	
F	
G	
H	
J (slot)	
N	
P	
S	
θ	

ATC MACHINE SPINDLE NOSE DETAILS



Information required when ordering		
Machine: Make		
Model		
Bearing Cap Diameter (Stationary)	A	
Cap Screw Pitch Circle Diameter	B	
Spindle Diameter (Rotating)	C	
Spindle Gauge Plane to Bearing Cap Distance	D	
Cap Screws - Quantity - Equispaced?	E1	
Cap Screws - Size & Length under Head	E2	
Taper Type and Size (BT / ANSI / DIN / HSK)	F	
Drive Key Type and Size	G	
Any Existing Tapped Mounting Holes Available?		If Yes Please Provide Sketch

AUTOMATIC TOOL CHANGE (ATC) MULTI-HEADS

Centreline has been designing and manufacturing automatic tool change multi-spindle heads almost from the inception of automatic tool changers and can claim some of the largest installations worldwide. All the multi-spindle head designs featured in this catalogue can be used with automatic tool changers, providing that the machine's ATC capability is suitable.

To determine the suitability of your machine's ATC, we need to know the maximum size of tool that can be used. This is normally derived from the following ATC specifications:

Adjacent pockets empty	mm
Adjacent pockets full	mm
Maximum tool length	mm
Maximum tool weight	kg

If you supply us with the above information, together with your workpiece details, hole pattern required, hole sizes and material to be machined, Centreline's Engineering Department will very quickly advise you whether we can meet your needs.

It is always worthwhile consulting Centreline about what you wish to achieve with ATC tooling. We have a long history of working with companies worldwide and our experience enables us to engineer cost-effective solutions for individual applications.

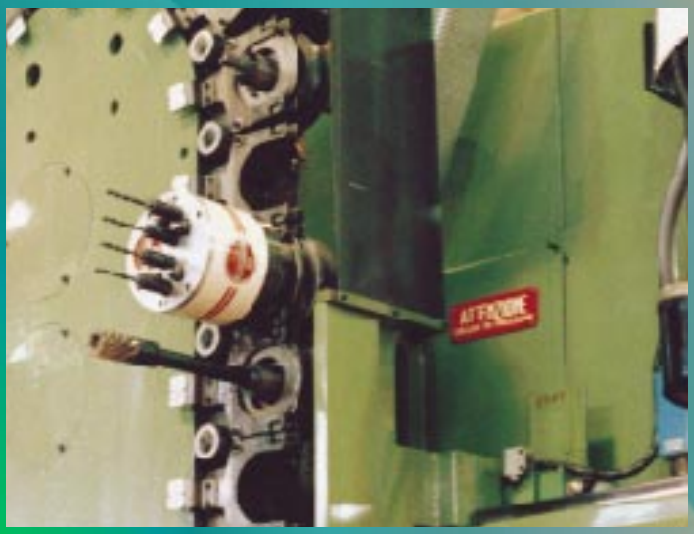
As an example: consider the problem of a machine with a stroke of 1000mm and a component to be drilled at 1030mm centres. There are 3 solutions:

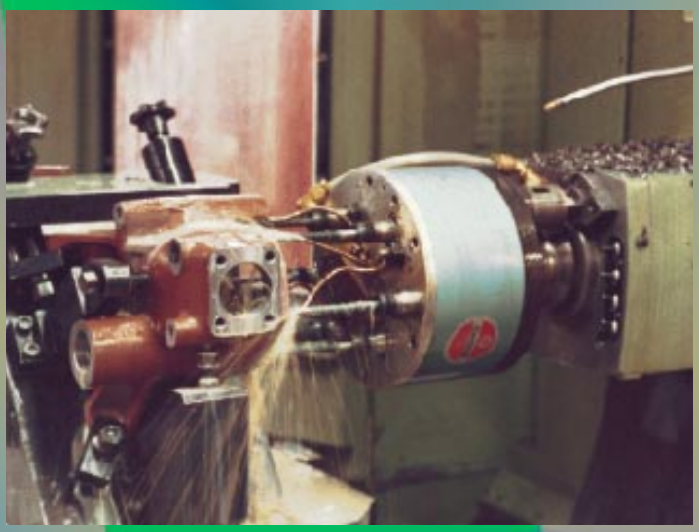
- You can always drill and reset the part.
- You can buy a larger machine.
- To save both time and money, there is the Centreline solution - a single spindle ATC head with the spindle offset 30mm.

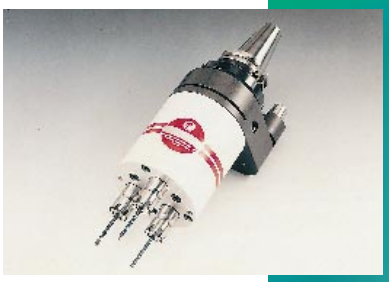
We are brimming with simple and inexpensive ideas for utilising our range of multi-heads, angle heads, speed increasers and rotary coolant adaptors to increase the profitability of your machining centre.

What was not possible yesterday, may be possible today and will be a Centreline standard tomorrow.

AUTOMATIC TOOL CHANGE



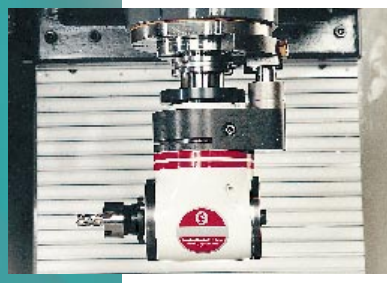




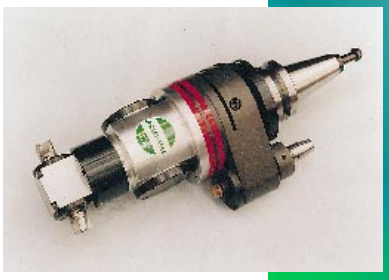
Centinel multi-spindle drilling and tapping heads

Speed Increaser for manual or automatic tool change

Angle machining heads
0 - 90 degrees

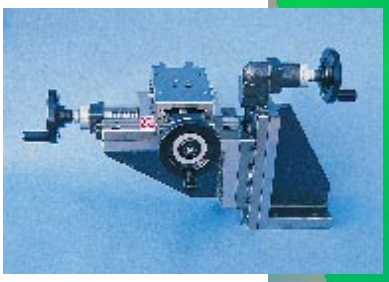


Right angle machining heads



Custom double sided right angle head

Rotary coolant adaptor



Econoslides - 100mm to 400mm widths and 100mm to 1200mm lengths, plus specials

Rapidtap - high speed multi-spindle tapping machine

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