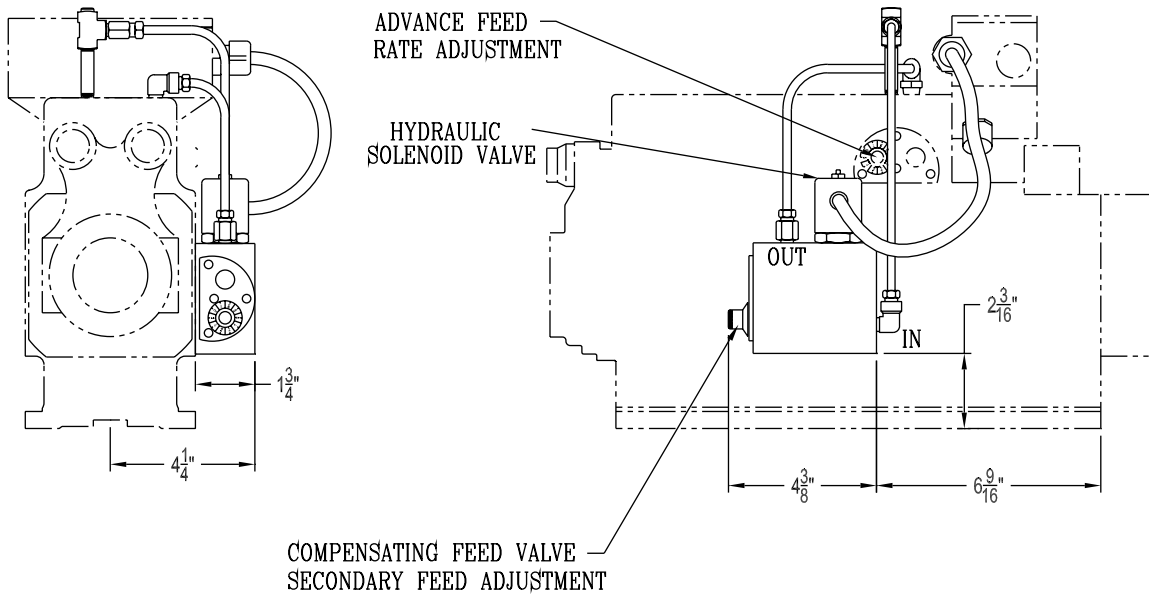
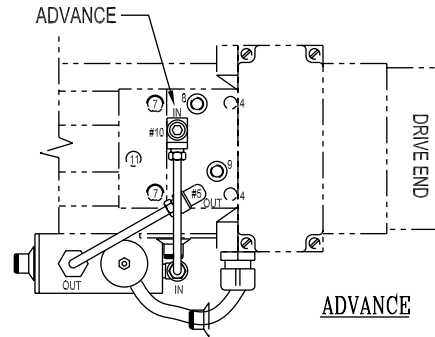
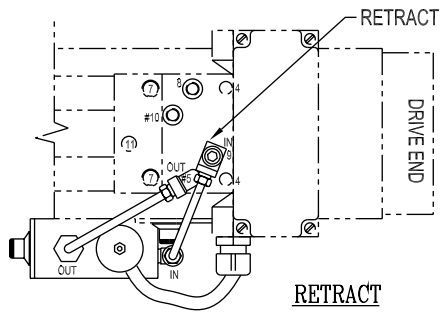


Specials – Feed Control Valves See note below for location in the Specification Code

V1 – Dual Feed Manifold



V2 – Skip Feed Cam Bar (Not Shown)

Please specify rapid distance, skip distance and depth. Contact Haise Machines for more information.

Note: Location in the Specification Code

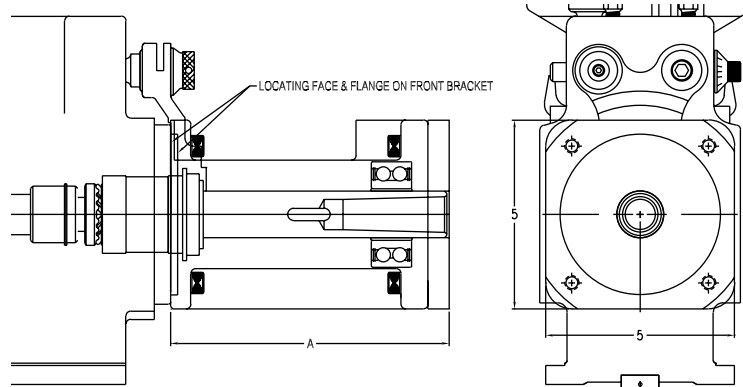
Model	Spindle	Drive	Belt/Pulley	Motor	Belt Housing	Special
X X XX	XX	X	X	XX	XX	_____

Specials (Continued)

See note on page 46 for location in the Specification Code

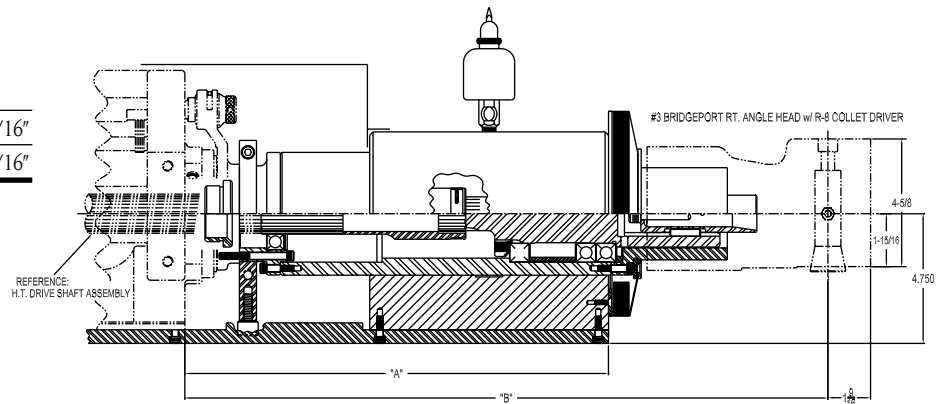
Spindle Support Assembly

Catalog No.	Stroke	"A"
SA1	4"	7-3/8"
SA2	6"	8-13/16"



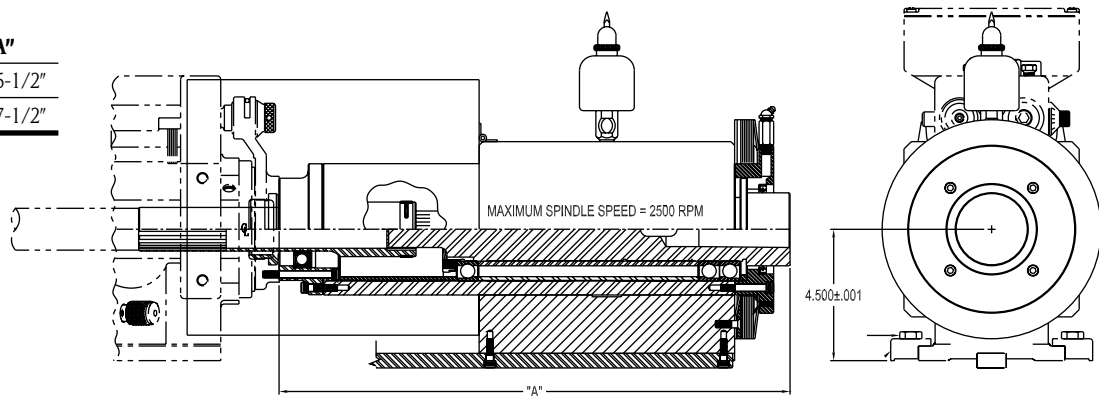
Right Angle Milling Attachment

Catalog No.	Stroke	"A"	"B"
SA3	4"	15-1/2"	23-9/16"
SA4	6"	17-1/2"	25-9/16"



Heavy Duty Boring Adaption With Roller Bearings

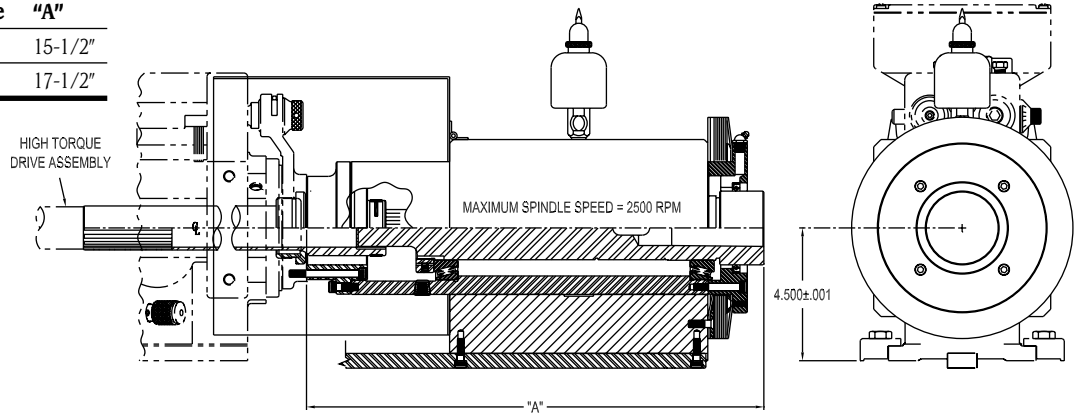
Catalog No.	Stroke	"A"
SA5	4"	15-1/2"
SA6	6"	17-1/2"



Specials (Continued) See note on page 49 for location in the Specification Code

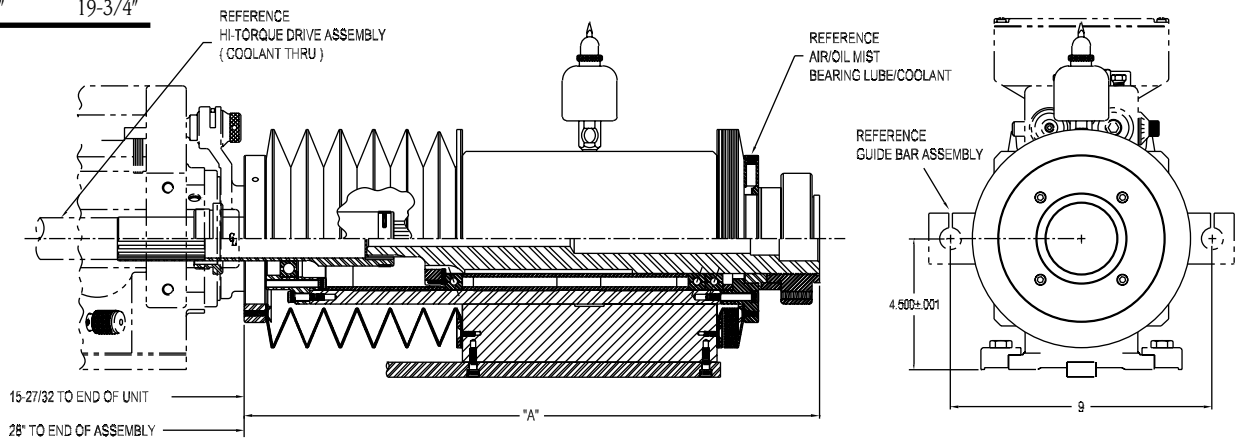
Heavy Duty Milling Adaption With Tapered Bearings

Catalog No.	Stroke	"A"
SA7	4"	15-1/2"
SA8	6"	17-1/2"



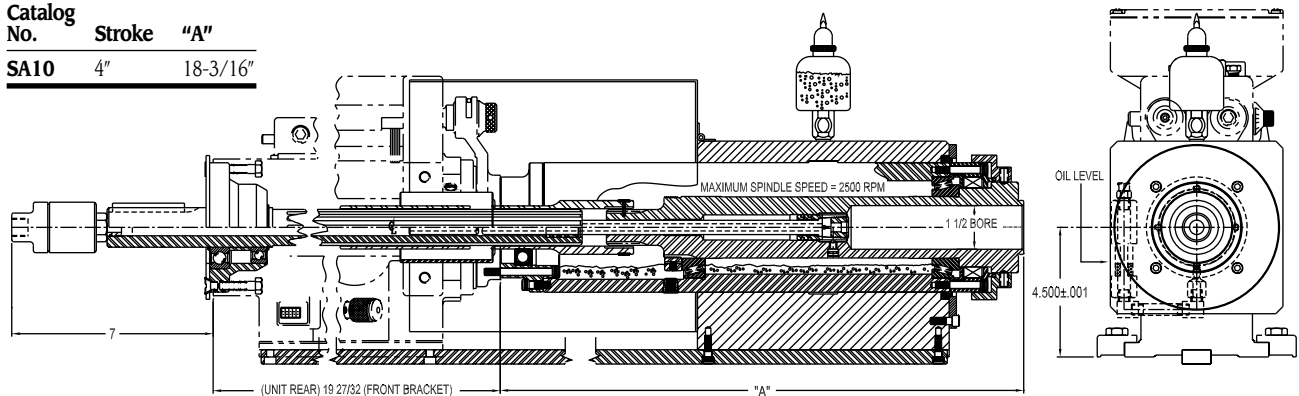
4" Stroke High Speed Boring Spindle

Catalog No.	Stroke	"A"
SA9	4"	19-3/4"



Heavy Duty Milling Adaption With Tapered Bearings and Thru Coolant

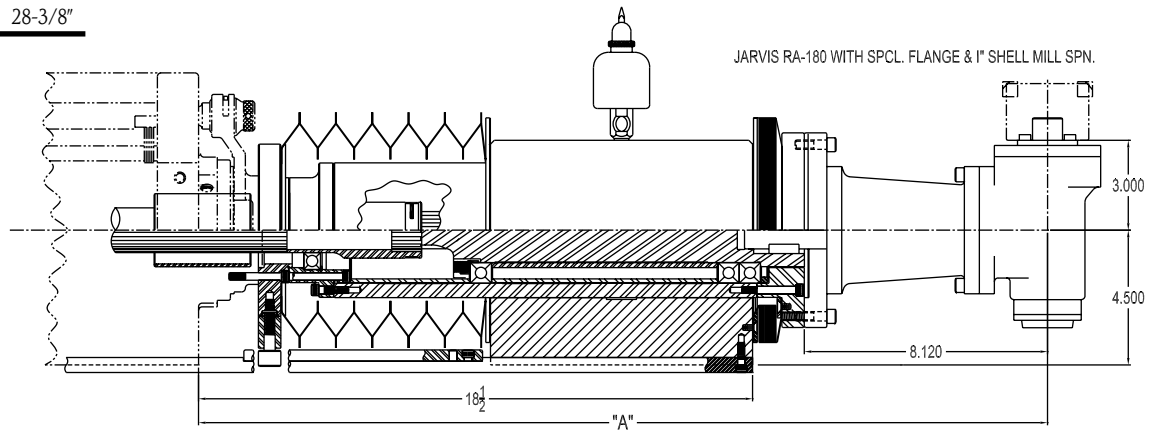
Catalog No.	Stroke	"A"
SA10	4"	18-3/16"



Specials (Continued)

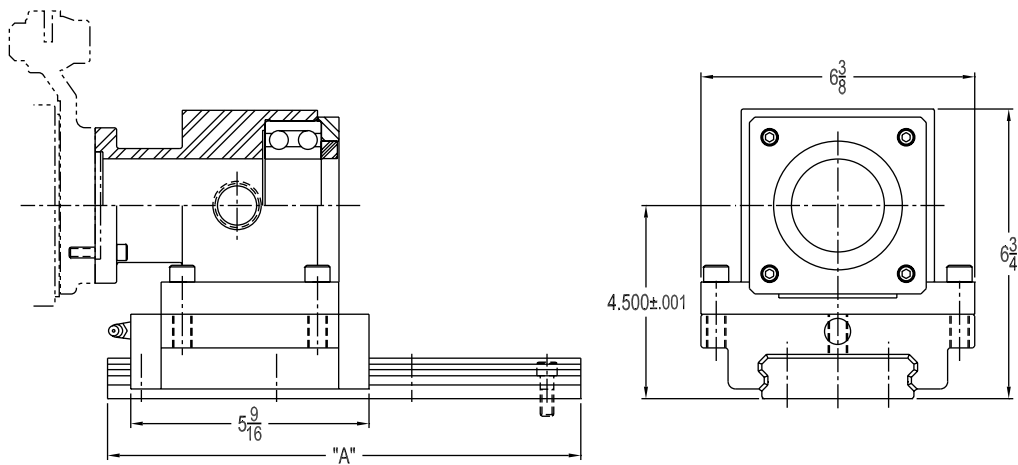
Heavy Duty Right Angle Milling Head

Catalog No.	Stroke	"A"
SA11	6"	28-3/8"



Support Quill and THK Slide Assembly

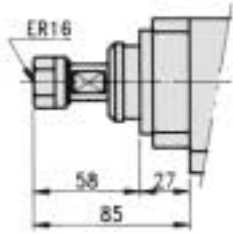
Catalog No.	Stroke	"A"
SA12	4"	11-1/32"
SA13	6"	14-3/16"



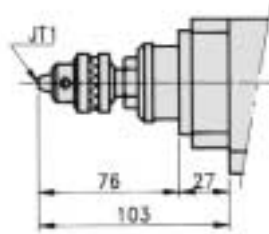
Note: Location in the Specification Code

Model	Spindle	Drive	Belt/Pulley	Motor	Belt Housing	Special
XX XX	XX	X	X	XX	XX	<u> </u>

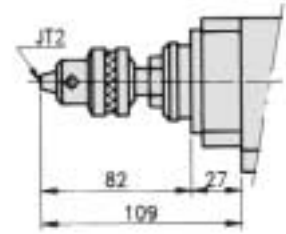
FD3-55



FD3-55-ER16

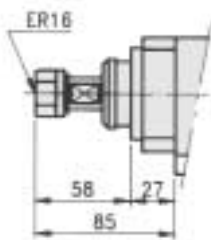


FD3-55-JT1

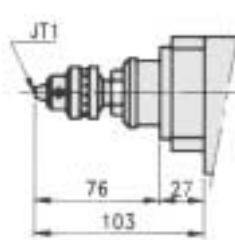


FD3-55-JT2

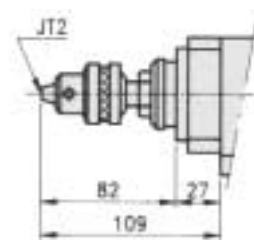
FD3-80



FD3-80-ER16

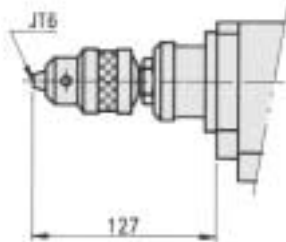


FD3-80-JT1

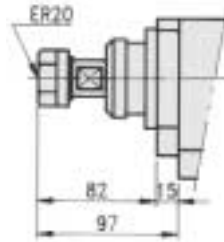


FD3-80-JT2

FD55-80

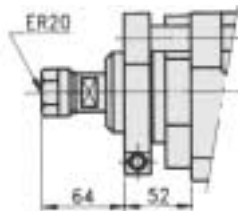


FD55-80-JT6

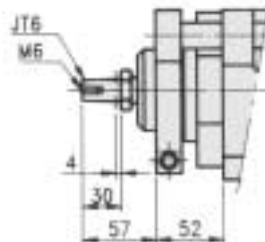


FD55-80-ER20

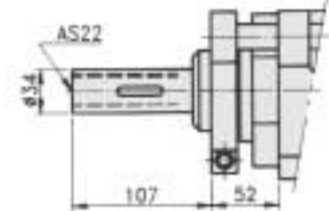
FD56-100



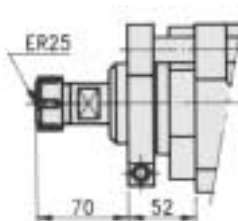
FD56-100-ER20



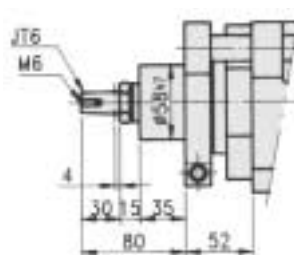
FD56-100-JT6



FD56-100-AS22



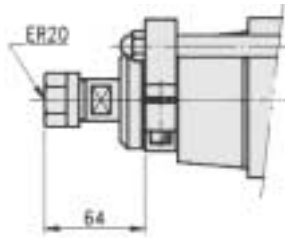
FD56-100-ER25



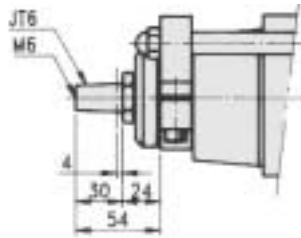
FD56-100-JT6 Multi

SPINDLE OPTIONS FOR METRIC UNITS

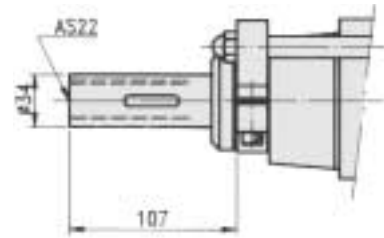
FD6-130/FTD63 (DRILLING)



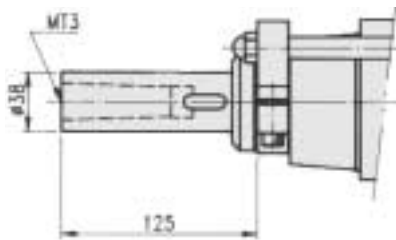
**FD6-130-ER20
FTD63-ER20**



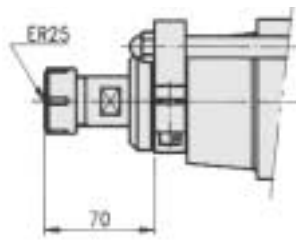
**FD6-130-JT6
FTD63-JT6**



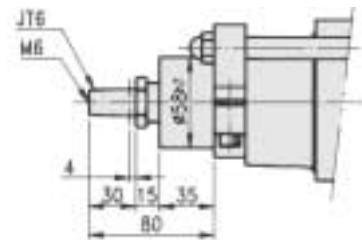
**FD6-130-AS22
FTD63-AS22**



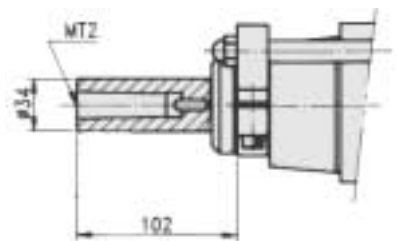
**FD6-130-MT3
FTD63-MT3**



**FD6-130-ER25
FTD63-ER25**

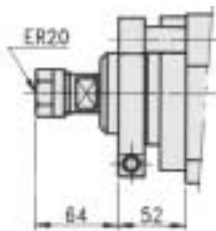


**FD6-130-JT6 Multi
FTD63-JT6 Multi**

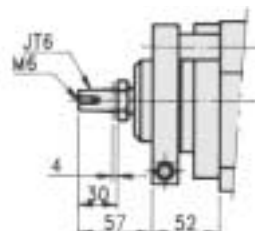


**FD6-130-MT2
FTD63-MT2**

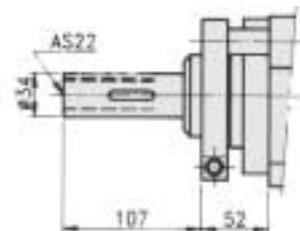
FD62-100



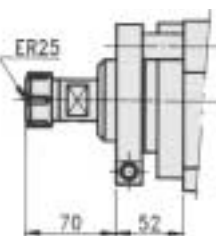
FD62-100-ER20



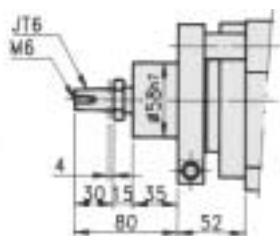
FD62-100-JT6



FD62-100-AS22



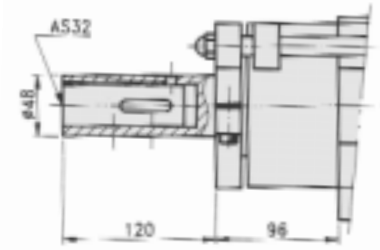
FD62-100-ER25



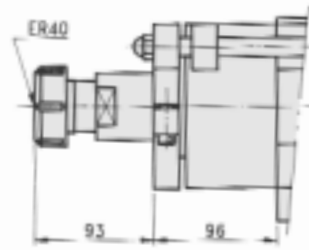
FD62-100-JT6 Multi

SPINDLE OPTIONS FOR METRIC UNITS

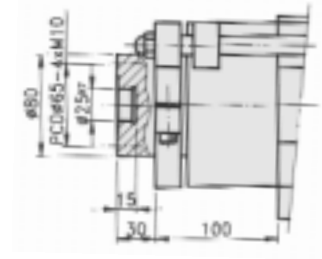
FD7-150



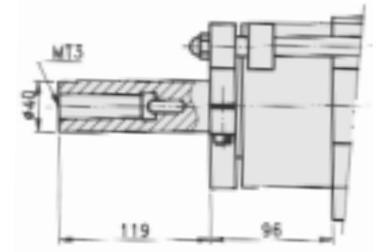
FD7-150-AS32



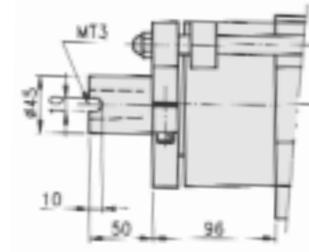
FD7-150-ER40



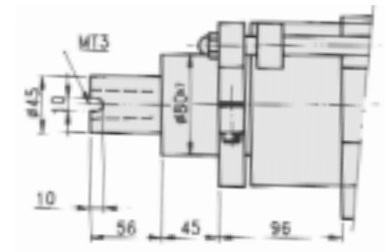
FD7-150-FB30



FD7-150-MT3A

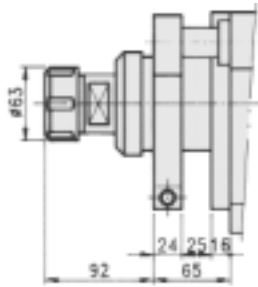


FD7-150-MT3B

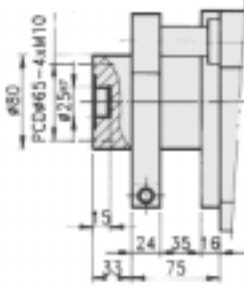


FD7-150-MT3B Multi

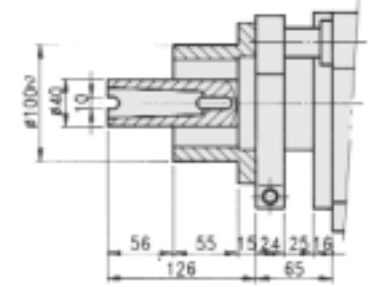
FD75-100



FD75-100-ER40

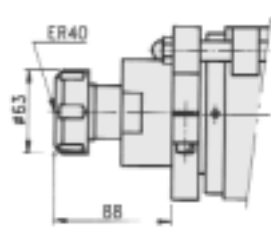


FD75-100-FB30

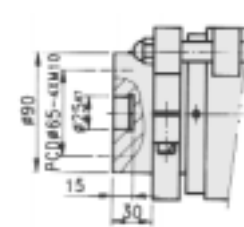


FD75-100-MT3A Multi

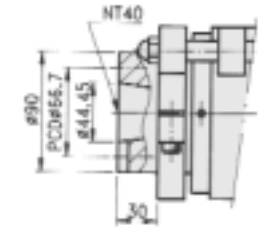
FD8-150



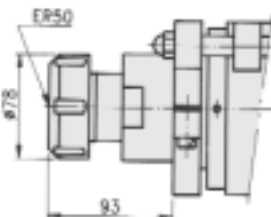
FD8-150-ER40



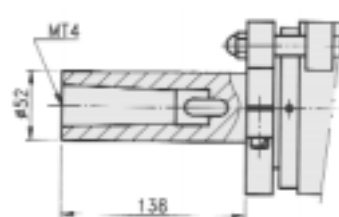
FD8-150-FB30



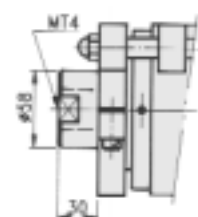
FD8-150-NT40



FD8-150-ER50

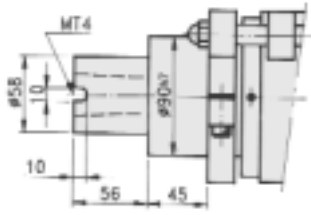


FD8-150-MT4A



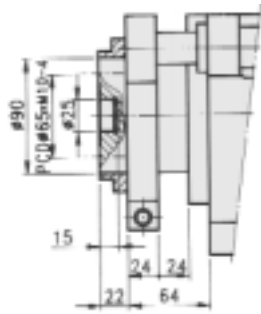
FD8-150-MT4B

SPINDLE OPTIONS FOR METRIC UNITS

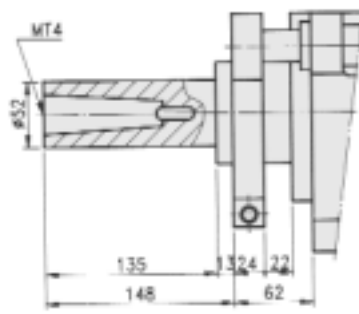


FD8-150-MT4B Multi

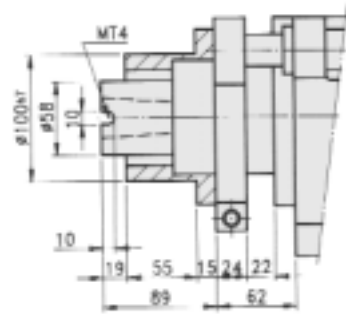
FD85-100



FD85-100-FB30

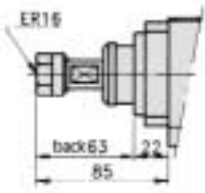


FD85-100-MT4A

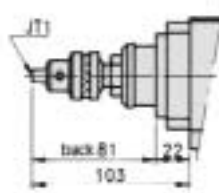


FD85-100-MT4B Multi

F2N-60

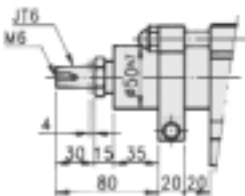


F2N-60-ER16

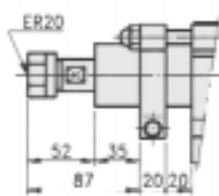


F2N-60-JT1

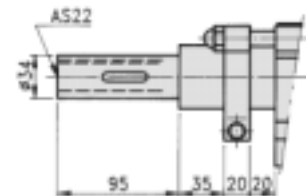
F6N-60



F6N-60-JT6

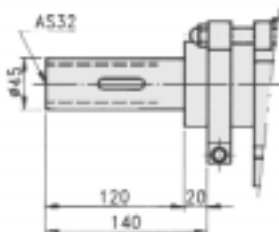


F6N-60-ER20

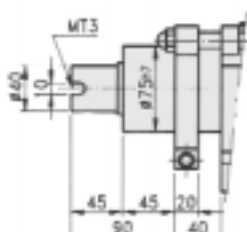


F6N-60-AS22

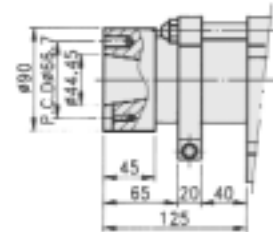
F7N-80



F7N-80-AS32

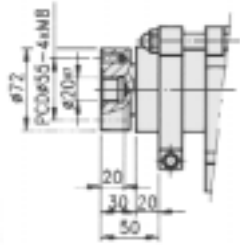


F7N-80-MT3B Multi



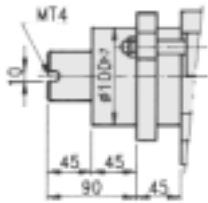
F7N-80-NT40

SPINDLE OPTIONS FOR METRIC UNITS

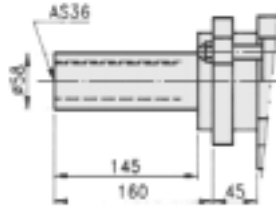


F7N-80-FB20

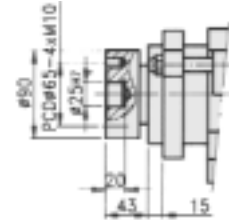
F8N-90



F8N-90-MT4B Multi

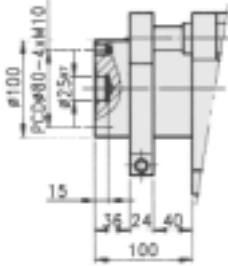


F8N-90-AS36



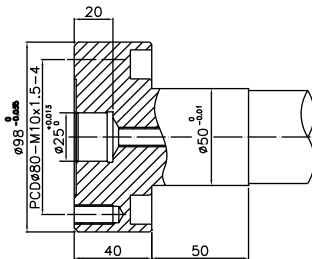
F8N-90-FB30

F85N-90



F85N-90-FB30

FTD9



FTD9-FB45

Job Requirements

Please use the worksheets on pages 56–57 when requesting a quote or placing an order for any of the power feed units listed.

To also assist us in providing you with the best product(s) for your needs, please complete the following information as accurately as possible.

Applications _____

Material _____

List operations to be done by units _____ Unit orientation (vert. or hor.) _____

Tooling used _____

Note any special conditions _____

Date quote required by: _____

Component/Machine delivery required by: _____

Expected order date _____

Approx. investment \$ _____

Number of units _____

Customer Information

Customer Name _____

Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Phone _____ Fax _____

Email _____

For Example Only

1. Application

- A. Drill D_c 3/8" "
- B. Material K_c (1020STL) = 290,000 See page 59
- C. Tooling
- 1) Speed V_c 150 SFM (Reference Tool Company or page 58)
- 2) Feed f_n .009 ipr
- D. Stroke $>$ 3-7/8" "

2. Parameters

- A. Thrust F_r 230 ($F_r = .235 \times D_c \times K_c \times f_n$)
- B. Torque M_c 367 ($M_c = .375 \times D_c \times K_c \times f_n$)
- C. HP P_c 1.11 ($P_c = D_c \times K_c \times f_n \times V_c / 132,000$)
- D. RPM N 1528 ($N = SFM \times 3.82 / D_c$)

3. Power feed unit selection

When using standard unit, choose power source (air or hydraulic), spindle nose and RPM.
Example: Assuming that we choose the shortest stroke unit that will work.

Power Source	Model	Thrust	Torque	HP	RPM
Pneumatic	FD56-100	345#	550 in-lb	2	1528
Hydraulic	FD62-100	3000#		2	1528

Work Area

1. Application

- A. Drill D_c _____
- B. Material K_c _____
- C. Tooling
- 1) Speed V_c _____
- 2) Feed f_n _____
- D. Stroke $>$ _____

2. Parameters

- A. Thrust F_r _____
- B. Torque M_c _____
- C. HP P_c _____
- D. RPM N _____

3. Results

Product Selection Work Area

Pneumatic Drilling Units

- ___ **Model FD3-55** Spindle Options – Pg. 50
 ___ ER16 ___ JT1 ___ JT2
- ___ **Model FD3-80** Spindle Options – Pg. 50
 ___ ER16 ___ JT1 ___ JT2
- ___ **Model FD55-80** Spindle Options – Pg. 50
 ___ ER20 ___ JT6
- ___ **Model FD56-100** Spindle Options – Pg. 50
 ___ ER20 ___ JT6 ___ AS22 ___ ER25 ___ JT6Multi

Hydraulic Drilling Units

- ___ **Model FD6-130** Spindle Options – Pg. 51
 ___ ER20 ___ JT6 ___ AS22 ___ MT3 ___ ER25 ___ JT6 Multi ___ MT2
- ___ **Model FD62-100** Spindle Options – Pg. 51
 ___ ER20 ___ JT6 ___ AS22 ___ ER25 ___ JT6 Multi
- ___ **Model FD7-150** Spindle Options – Pg. 52
 ___ AS32 ___ ER40 ___ FB30 ___ MT3A ___ MT3B ___ MT3B Multi
- ___ **Model FD75-100** Spindle Options – Pg. 52
 ___ ER40 ___ FB30 ___ MT3A Multi
- ___ **Model FD8-150** Spindle Options – Pg. 52-53
 ___ ER40 ___ FB30 ___ NT40 ___ ER50 ___ MT4A
 ___ MT4B ___ MT4B Multi
- ___ **Model FD85-100** Spindle Options – Pg. 53
 ___ FB30 ___ MT4A ___ MT4B Multi

Tapping Units

- ___ **Model F2N-60** Spindle Options – Pg. 53
 ___ ER16 ___ JT1
- ___ **Model F6N-60** Spindle Options – Pg. 53
 ___ ER20 ___ JT6 ___ AS22
- ___ **Model F7N-80** Spindle Options – Pg. 53-54
 ___ AS32 ___ MT3B Multi ___ NT40
 ___ FB20
- ___ **Model F8N-90** Spindle Options – Pg. 54
 ___ MT4B Multi ___ AS36 ___ FB30
- ___ **Model F85N-90** Spindle Options – Pg. 54
 ___ FB30

Drilling-Tapping Units

- ___ **Model FTD63-120/80** Spindle Options – Pg. 51
 ___ ER20 ___ JT6* ___ AS22 ___ MT3
 ___ ER25 ___ JT6 Multi ___ MT2
- ___ **Model FTD9-150/90** Spindle Options – Pg. 54
 ___ Drilling Spindle – Flange Only FB45
 ___ Tapping Spindle – Flange Only FB45

For Example Only

1. Application

- A. Drill D_c 3/8" "
- B. Material K_c (1020S7L) = 290,000 See page 59
- C. Tooling
- 1) Speed V_c 150 SFM (Reference Tool Company or page 58)
- 2) Feed f_n .009 ipr
- D. Stroke $>$ 3-7/8" "

2. Parameters

- A. Thrust F_r 230 ($F_r = .235 \times D_c \times K_c \times f_n$)
- B. Torque M_c 367 ($M_c = .375 \times D_c \times K_c \times f_n$)
- C. HP P_c 1.11 ($P_c = D_c \times K_c \times f_n \times V_c / 132,000$)
- D. RPM N 1528 ($N = SFM \times 3.82 / D_c$)

3. Power feed unit selection

When using standard unit, choose power source (air or hydraulic), spindle nose and RPM.

Example: Assuming that we choose the shortest stroke unit that will work.

Power Source	Model	Thrust	HP	RPM
Air Hydraulic	2427	475#	2	3800
Hydraulic	6415	680#		
Servo Hydraulic	6629	2750#		

For Example Only (3 Shown)

Specifying a Unit – If using a taylor made unit for your needs.

A. Choose Power Source

- | | | |
|---------------|-----------|-----------------|
| Air Hydraulic | Hydraulic | Hydraulic Servo |
| 2427 | 6415 | 6629 |

B. Choose Spindle (NOTE: Standard spindles for these units have 600 #/in torque capacity.

- | | | |
|----------|--------------|---------------------------|
| - AK | - BJ | - SP |
| #2 Morse | 1-3/8" AA GQ | 1-3/8" AA Coolant Through |

C. Choose Drive (NOTE: A high torque, low RPM situation has not occurred, no gear reduction required. On 6629 unit, coolant through was chosen. Please choose a coolant through drive for this application. (If using belt/pulley, choose -A inline)

- | | | |
|--------|----|-----------------|
| -A | -A | -C |
| Inline | | Coolant Through |

D. Choose Belt & Pulley from chart, using 5-step 3V pulley, 2.3 HP @ 1500 RPM is available using 1200 RPM motor.

- | | | |
|---------------|----------------|-----------------|
| -A | -G1530 | -H |
| 5-step pulley | Single sheaves | Timing belt 1:1 |

E. Choose Motor

- | | | |
|----------|----------|-----------|
| -M | -Q | -JJ |
| 2HP 1200 | 3HP 1800 | 30A Servo |

F. Choose a Belt Housing

- | | | |
|-----|-----|-----|
| -A1 | -C1 | -B1 |
|-----|-----|-----|

G. Choose Special Options

H. Model Numbers Are Specified

- 2427 - AK - A - A - M - A1
 6415 - BJ - A - G1530 - Q - C1 - Spindle Support
 6629 - SP - C - H - JJ - B1 (Coolant Through)

Work Area

1. Application

- A. Drill D_c _____
- B. Material K_c _____
- C. Tooling
- 1) Speed V_c _____
- 2) Feed f_n _____
- D. Stroke $>$ _____

2. Parameters

- A. Thrust F_r _____
- B. Torque M_c _____
- C. HP P_c _____
- D. RPM N _____

3. Results

Work Area

Specify a Unit

A. Choose Power Source

B. Choose Spindle (pgs. 36-37)

C. Choose Drive (pgs. 38-39)

D. Choose Belt & Pulley (pgs. 40-41)

E. Choose Motor (pgs. 42-44)

F. Choose Belt Housing (pg. 45)

G. Choose Special Options (pgs. 46-49)

H. Model Numbers Are Specified

Model Spindle Drive Belt/Pulley Motor Belt Housing Special

Drilling Speeds/Feeds

Materials	Examples	Hardness	Carbide 118° PT		Carbide Tin 140° PT		Carbide Str. Plate 120° PT		HSCO Tin 130° PT		HSS 118	
			SFM	FC	SFM	FC	SFM	FC	SFM	FC	SFM	FC
Low & Non-Alloy Steels	1010, 12L14	≤ 16 Rc	-	-	330	12	-	-	200	12	105	8
Steel & Cast Steel	1045, 8620	17 - 32 Rc	-	-	280	10	-	-	185	12	90	8
Steels 4140, 4340	33 - 40 Rc	-	-	235	8	-	120	8	40	40	5	5
Steels 4620, 5140	41 - 65 Rc	-	-	160	4	-	55	5	15	16	4	4
Hardened & Maraging Steels	300M	45 - 63 Rc	-	-	100	3	-	-	-	-	-	-
Hardened Steels	-	55 - 65 Rc	-	-	-	-	-	-	-	-	-	-
Tool Steel, Unalloyed	1086, W1	≤ 32 Rc	-	-	245	9	-	-	130	12	45	6
Tool Steel, Low Alloyed	52100, L2	≤ 32 Rc	-	-	235	10	-	-	130	10	45	6
Tool Steel, High Alloyed	A2, D2, H13	≤ 32 Rc	-	-	200	10	-	-	90	10	30	6
Stainless, Martensitic	400 Series	≤ 34 Rc	-	-	210	10	-	-	110	8	25	7
Stainless, Sulphered	300 Series	≤ 24 Rc	-	-	200	6	-	-	80	7	15	4
Stainless, Austenitic	300 Series, PH's	≤ 28 Rc	-	-	-	-	-	-	55	5	10	3
Manganese Armor Plate	A 128(A)	-	-	-	-	-	-	-	-	-	-	-
Super Alloys - Ni & Co Based	Inc., Hast. Nim	< 27 Rc	-	-	-	-	-	-	55	4	15	1
Super Alloys - Ni & Co Based	Inc., Hast. Nim	27 - 38 Rc	25	3	-	-	-	-	-	-	5	3
Super Alloys - Ni & Co Based	Inc., Hast. Nim	> 38 Rc	-	-	-	-	-	-	-	-	-	-
Cast Iron	A48-20B, 40B	< 225 HB	185	8	315	16	410	12	200	16	90	10
Cast Iron	A48-45B to 60	225 - 270 HB	150	8	260	16	330	12	160	16	70	10
Nodule & Ductile Iron	GGG-40 to 60	< 150 HB	150	8	260	16	330	12	160	16	70	10
Nodule & Ductile Iron	CG Iron	≤ 260 HB	115	6	210	16	-	-	125	12	50	9
Malleable Iron	ASTM A502	≤ 350 HB	150	8	260	16	330	12	160	16	70	10
Chilled Cast Iron	-	400 - 600 HB	-	-	-	-	-	-	-	-	-	-
Pure Copper	101	≤ 75 HB	425	7	560	7	-	-	315	12	160	10
Cu - Ni - Zn Alloys	CuNi10Zn42Pb	≤ 180 HB	295	9	395	10	-	-	245	12	100	9
Brass - Short Chipping	Ms58	≤ 150 HB	360	12	525	16	690	16	360	12	200	10
Brass - Long Chipping	51000	≤ 150 HB	360	9	525	12	-	-	260	12	125	9
Bronze, Soft	CDA 65500	< 100 HB	330	9	490	12	-	-	260	12	115	9
Bronze, Special	Ampco 8 - 16	≤ 200 HB	200	8	260	12	-	-	160	12	85	7
Bronze, Special	Ampco 20	200 - 300 HB	80	3	165	5	-	-	125	7	54	5
Bronze, Special	Ampco 20 - 26	> 300 HB	80	3	-	-	-	-	-	-	-	-
Al & Al Alloys Wrought	6061, 7075	< 140 HB	725	10	820	16	1315	16	360	16	220	12
Al Alloys ≤ 10% Si	355, 360	≤ 180 HB	560	10	655	16	855	16	210	12	140	12
Al Alloys 10 - 14% Si	385, 413	≤ 180 HB	490	10	590	16	790	16	160	12	100	10
Al Alloys > 14% Si	A390, 393	≤ 180 HB	330	9	460	12	655	16	-	-	-	-
Ti & Ti Alloys	4900, 4902, 492	≤ 24 Rc	80	3	130	5	-	-	-	-	-	-
Ti Alloys	6AL 4V	< 24 Rc	55	2	105	4	-	-	-	-	-	-
Zinc Alloys	Zamak	< 80 HB	490	9	655	16	-	-	360	16	220	12
Thermoplastics	Plexiglas	-	130	12	-	-	-	-	150	12	125	12

Feed Curve Conversion

Feed Curve	.060" 1.5MM	.160" 4.0MM	.250" 6.3MM	.315" 8.0MM	.400" 10.0MM	.625" 16.0MM
16	.002"	.006"	.010"	.012"	.014"	.019"
12	.0018"	.005"	.008"	.010"	.011"	.015"
10	.0015"	.004"	.006"	.0075"	.009"	.012"
9	.0013"	.0035"	.0055"	.007"	.008"	.011"
8	.0012"	.003"	.005"	.006"	.007"	.010"
7	.0011"	.0027"	.0045"	.0055"	.006"	.009"
6	.001"	.0025"	.004"	.005"	.0055"	.0075"
5	.0007"	.002"	.003"	.004"	.004"	.006"
4	.0006"	.0015"	.0025"	.003"	.0035"	.005"
3	.0004"	.001"	.002"	.0025"	.003"	.0035"
2	.0002"	.0008"	.001"	.0013"	.0015"	.0025"

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Specific Cutting Force k_c for $f_z = .016$ for Different Materials

CMC No.	Material		HB	Specific Cutting Force, $k_{c.016}$ * lbs/in. ²
01.1	Unalloyed Steel	C = 0.15%	125	290,000
01.2		C = 0.35%	150	304,500
01.3		C = 0.60%	200	316,100
02.1	Low Alloy Steel	Non-Hardened	180	304,500
02.2		Hardened and Tempered	275	402,400
02.2		Hardened and Tempered	300	402,300
02.2		Hardened and Tempered	350	402,300
03.1	High Alloy Steel	Annealed	200	362,500
03.2		Hardened	325	543,100
05.11	Stainless Steel	Martensitic/Ferritic	200	330,500
05.21		Austenitic	175	355,200
06.1	Steel Castings	Unalloyed	180	261,000
06.2		Low Alloyed	200	304,500
06.3		High Alloyed	225	362,500
04	Hard Steel	Hardened Steel	55 HRC	681,500
06.33		Manganese Steel 12%	250	522,000
07.1	Malleable Cast Iron	Ferritic	130	137,700
07.2		Pearlitic	230	159,500
08.1	Grey Cast Iron	Low Tensile Strength	180	159,500
08.2		High Tensile Strength	260	203,000
09.1	Nodular Cast Iron	Ferritic	160	152,200
09.2		Pearlitic	250	253,700
10	Chilled Cast Iron		400	398,700
20.11	Heat Resistant Alloys	Fe-base, Annealed	200	435,000
20.12		Fe-base, Aged	280	442,200
20.21, 20.31		Ni- or Co-Base, Annealed	250	520,000
20.22, 20.32		Ni- or Co-Base, Aged	350	540,000
20.24, 20.33		Ni- or Co-Base, Cast	320	536,500
30.11	Aluminum Alloys	Non Heat Treatable	60	72,500
30.12		Heat Treatable	100	116,000
30.21	Aluminum Alloys, Cast	Non Heat Treatable	75	108,100
30.22		Heat Treatable	90	130,500
33.1	Copper and Copper Alloys	Lead Alloys, Pb > 1%	110	101,500
33.2		Brass, Red Brass	90	101,500
33.3		Bronze and Leadfree Copper Including Electrolytic Copper	100	253,150

*The $k_{c.0.4}$ -values are valid for: $f_z = .016$ inch/z, $K_r = 90^\circ$, $\lambda_{sh} = +6^\circ$



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