

ANGLE HEADS



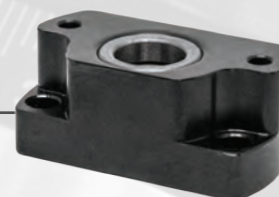
DAV 30

DESIGN

The Compact design, along with mentioned specifications, allows for high performance speeds, and long tool life.

STOP BLOCK

with case hardened bushing and gasket



Case hardened and ground shank and shaft

Positioning pin with automatic release

Modular antirotation group

Standard 150Psi (10 bar) coolant through the pin

Graduated retaining ring

OUTPUT

- ER collet (standard)
- Weldon
- Shell mill holder
- Special

Treated steel head body with 360° position and internal air pressure, maximum rigidity and corrosion resistant. Minimum thermal expansion

Precision/lapped surface for accurate alignment

BEARINGS

Angular contact preloaded ball bearings of precision class ABEC 9



GEARS

Gleason ground spiral bevel gears maximum performance and minimum vibration



Angle Heads

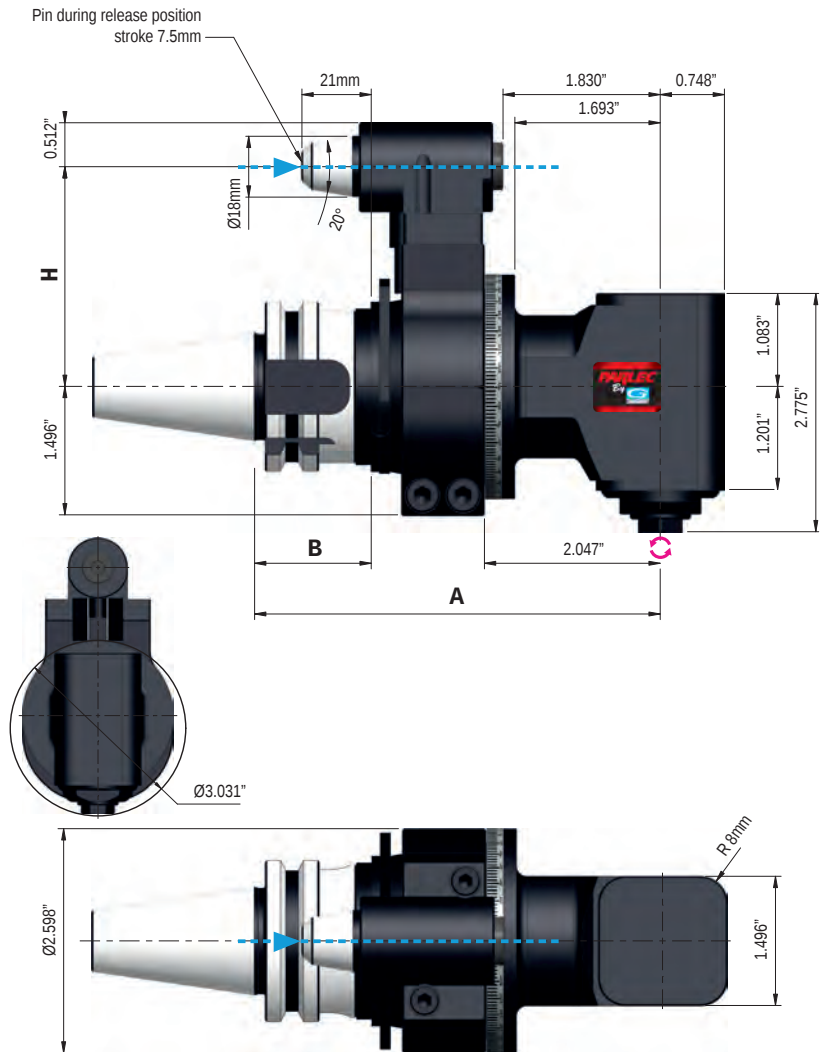
One Head for Many Machines - Interchangeable drive tapers



One Machine with Many Heads - System reduces cost



FL90-7

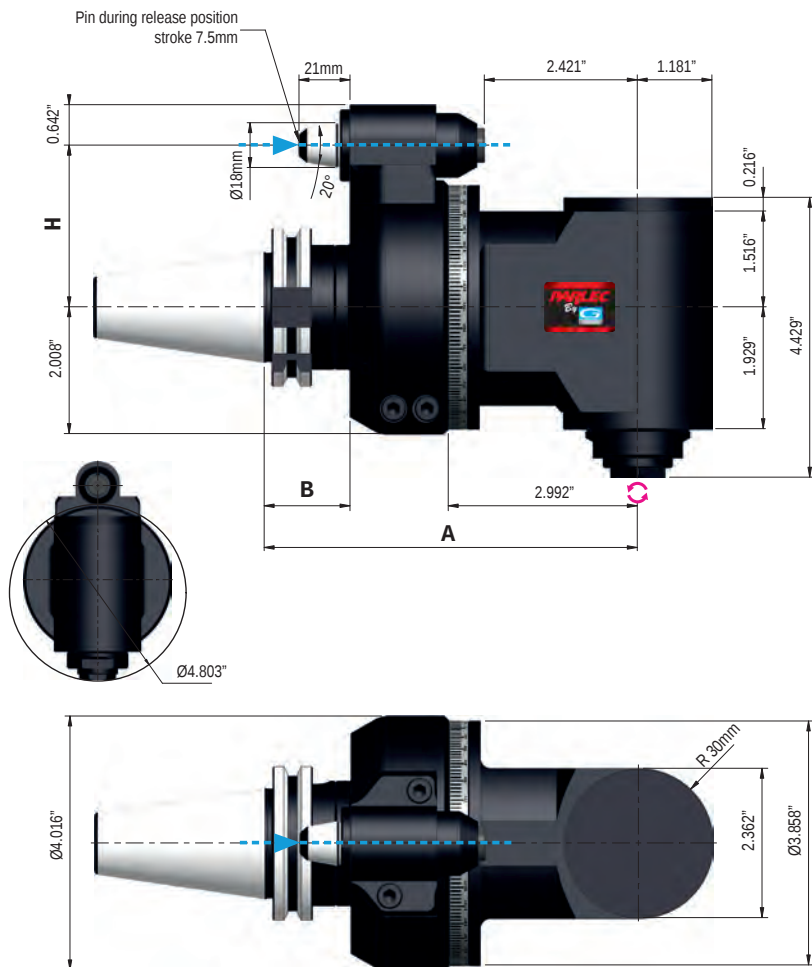


Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER11	1/4"	1:1	8,000	27 ft/lbs	44 in/lbs	Through Positioning Pin	Opposite Spindle	Light

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	4.72"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	5.3 lbs
BT 40	4.72"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	5.3 lbs
CAT 50	4.72"	1.378"	3.15" (80)	4.33" (110)	9.3 lbs
HSK63A	5.08"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	5.3 lbs
HSK100A	5.08"	1.811"	3.15" (80)	4.33" (110)	9.3 lbs

* Other spindle connections available: BT30, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76-93.

FL90-13

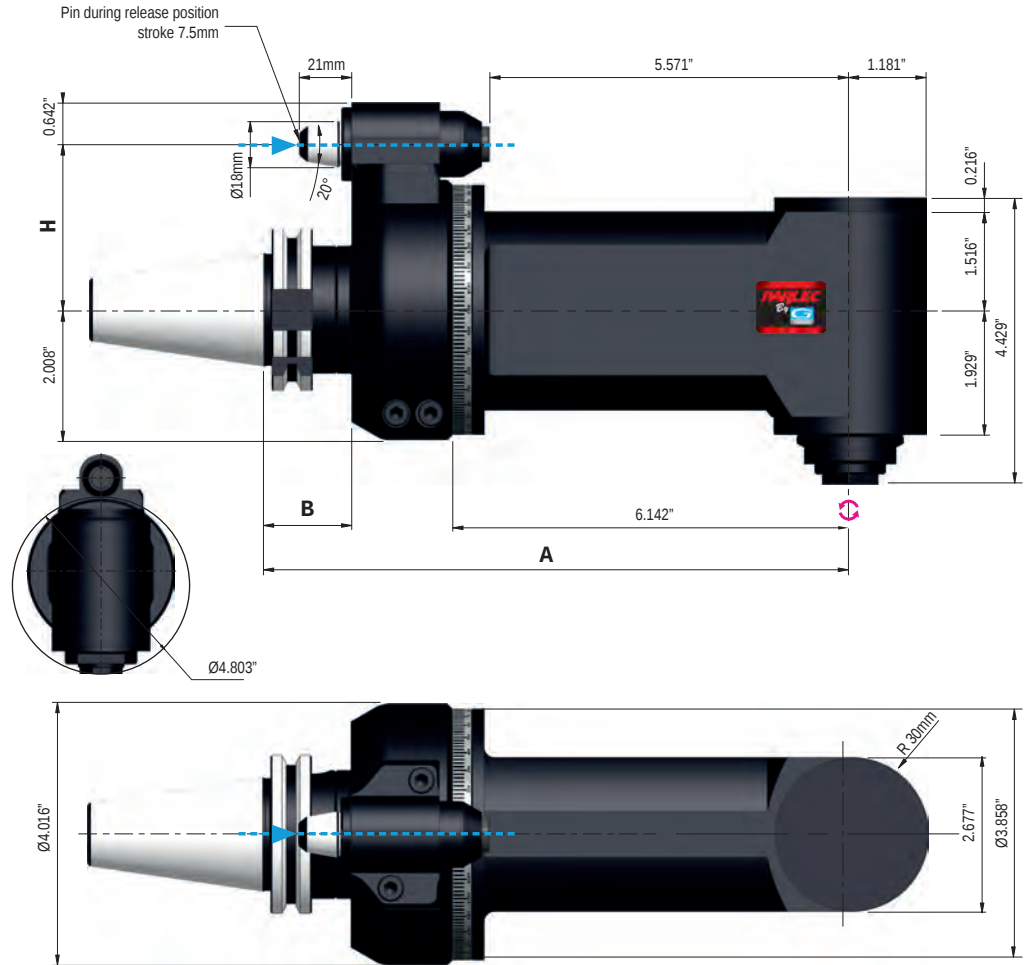


Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delviery	Tool Rotation Direction	Series
ER20	1/2"	1 : 1	6,000	126 ft/lbs	177 in/lbs	Through Positioning Pin	Opposite Spindle	Light

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	5.91"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	11.0 lbs
BT 40	5.91"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	11.0 lbs
CAT 50	5.91"	1.378"	3.15" (80)	4.33" (110)	16.5 lbs
HSK63A	6.26"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	11.0 lbs
HSK100A	6.26"	1.811"	3.15" (80)	4.33" (110)	16.5 lbs

*Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76–93.

FL90-13L



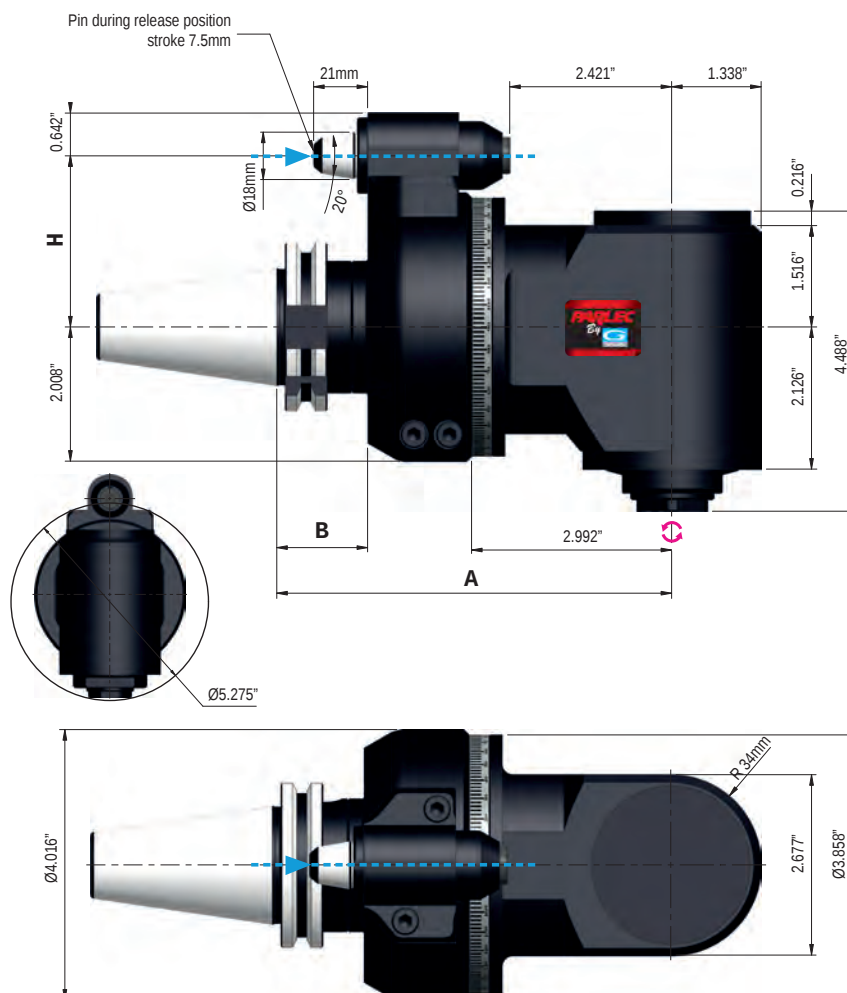
Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER20	1/2"	1:1	6,000	126 ft/lbs	177 in/lbs	Through Positioning Pin	Opposite Spindle	Light

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	9.06"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	12.6 lbs
BT 40	9.06"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	12.6 lbs
CAT 50	9.06"	1.378"	3.15" (80)	4.33" (110)	17.6 lbs
HSK63A	9.41"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	12.6 lbs
HSK100A	9.41"	1.811"	3.15" (80)	4.33" (110)	17.6 lbs

* Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76-93.

Angle Heads

FL90-16

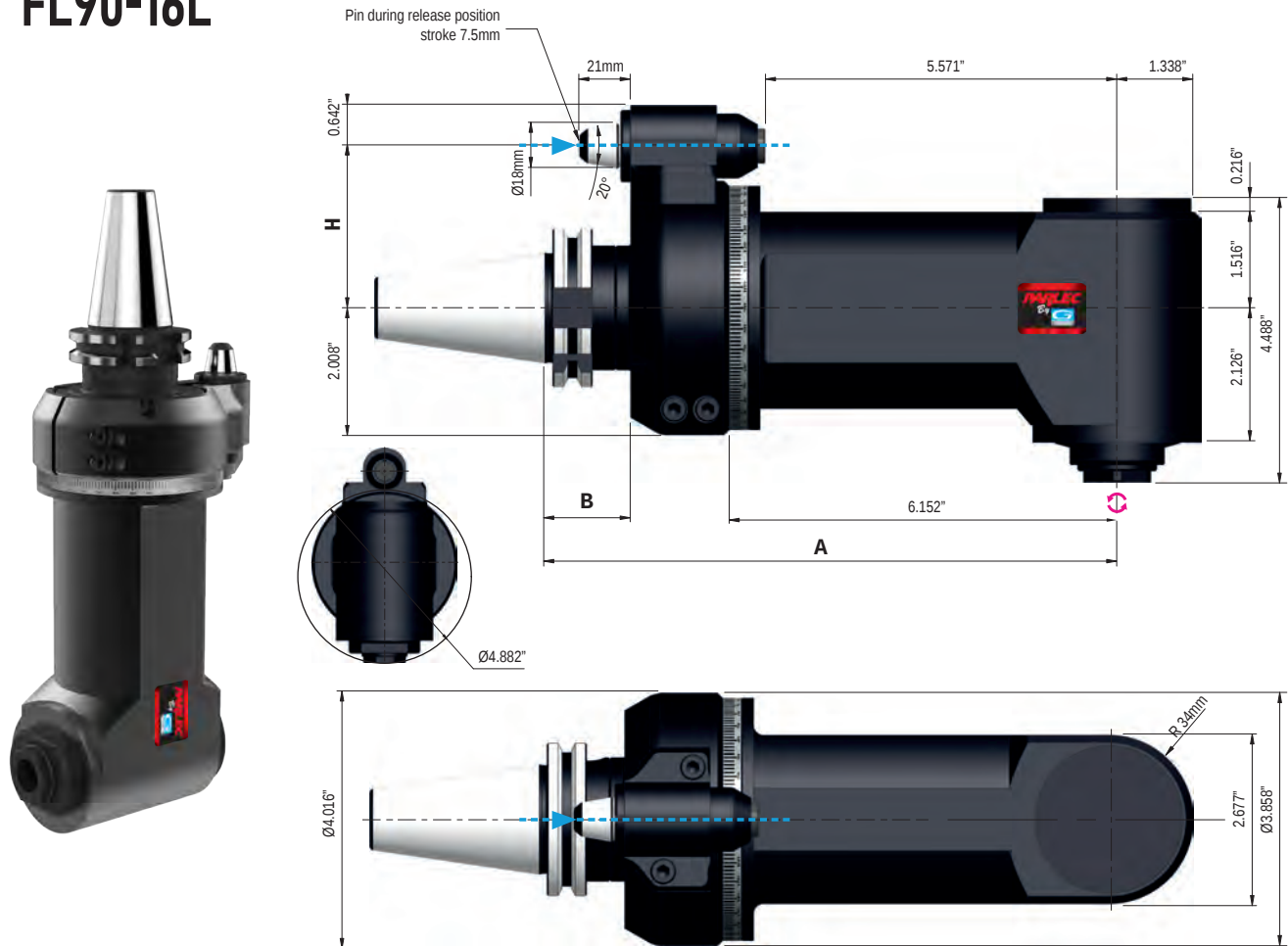


Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER25	5/8"	1 : 1	4,000	191 ft/lbs	230 in/lbs	Through Positioning Pin	Opposite Spindle	Light

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	5.91"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	11.0 lbs
BT 40	5.91"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	11.0 lbs
CAT 50	5.91"	1.378"	3.15" (80)	4.33" (110)	16.5 lbs
HSK63A	6.26"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	11.0 lbs
HSK100A	6.26"	1.811"	3.15" (80)	4.33" (110)	16.5 lbs

* Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76–93.

FL90-16L



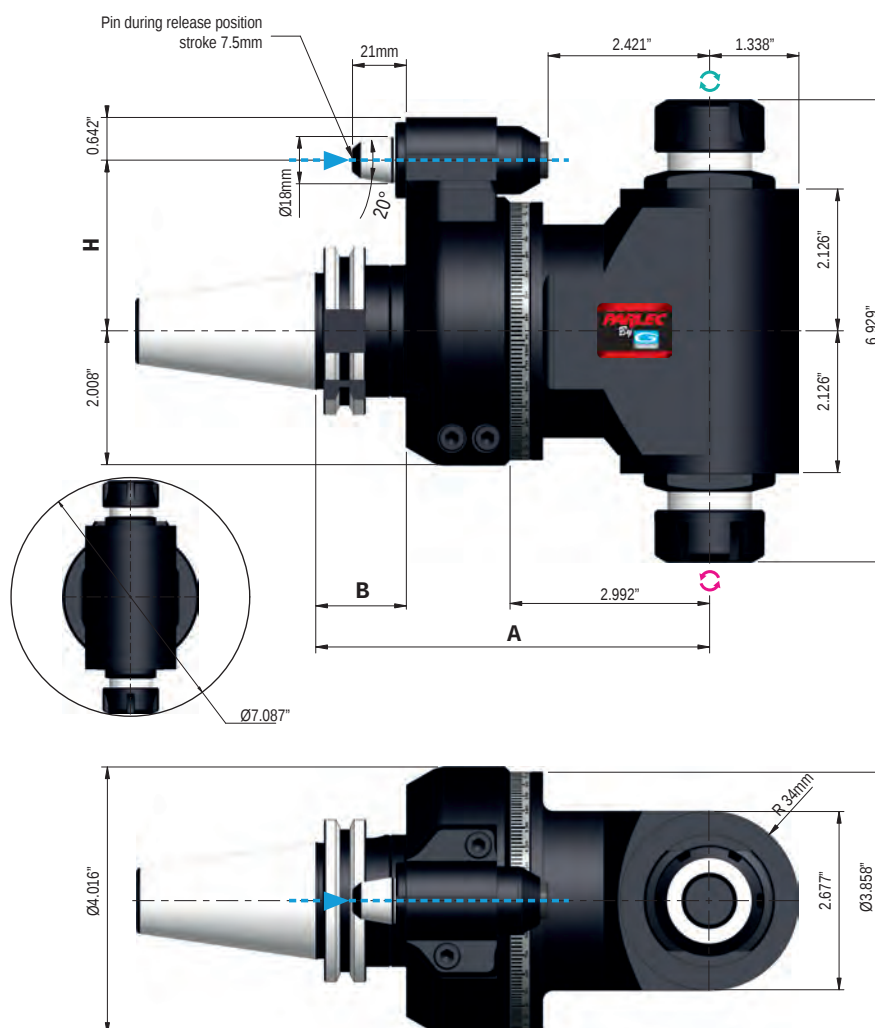
Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER25	5/8"	1:1	4,000	191 ft/lbs	230 in/lbs	Through Positioning Pin	Opposite Spindle	Light

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	9.06"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	14.5 lbs
BT 40	9.06"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	14.5 lbs
CAT 50	9.06"	1.378"	3.15" (80)	4.33" (110)	18.7 lbs
HSK63A	9.41"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	14.5 lbs
HSK100A	9.41"	1.811"	3.15" (80)	4.33" (110)	18.7 lbs

* Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76-93.

Angle Heads

FL90-16D

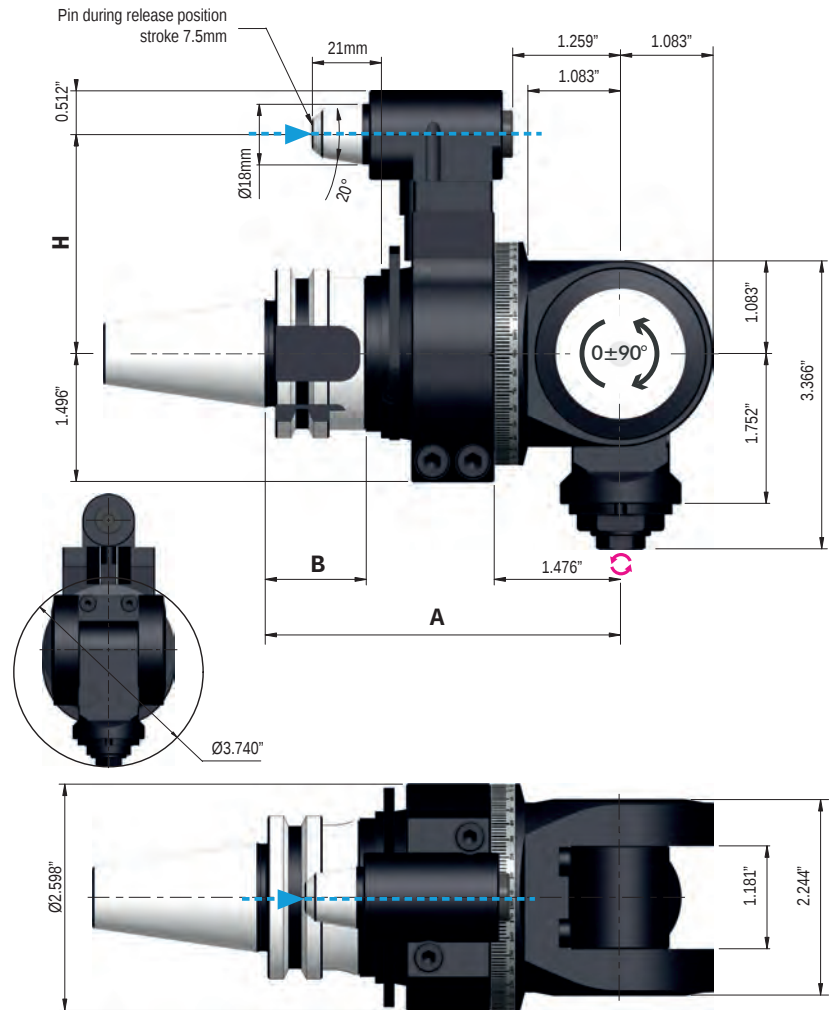


Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER25	5/8"	1 : 1	4,000	191 ft/lbs	230 in/lbs	Through Positioning Pin	One side same/ Opposite Spindle	Light

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	5.91"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	14.3 lbs
BT 40	5.91"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	14.3 lbs
CAT 50	5.91"	1.378"	3.15" (80)	4.33" (110)	18.7 lbs
HSK63A	6.26"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	14.3 lbs
HSK100A	6.26"	1.811"	3.15" (80)	4.33" (110)	18.7 lbs

* Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76–93.

FLU-7



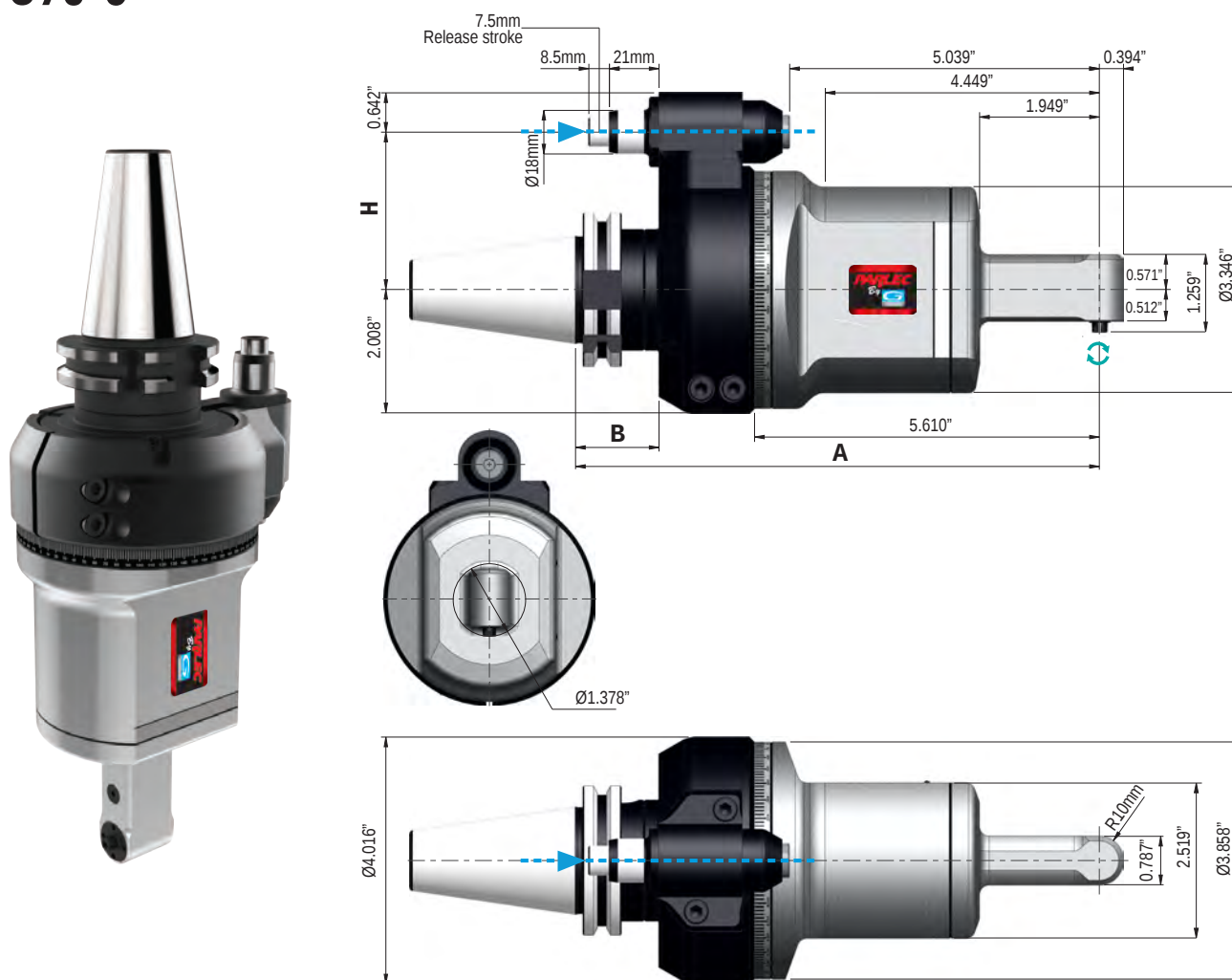
Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER11	1/4"	1:1	8,000	18.5 ft/lb	44 in/lbs	Through Positioning Pin	Opposite Spindle	Light, Adjustable

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	4.15"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	4.4 lbs
BT 40	4.15"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	4.4 lbs
HSK63A	4.50"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	4.4 lbs

* Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76-93.

Angle Heads

FS90-3

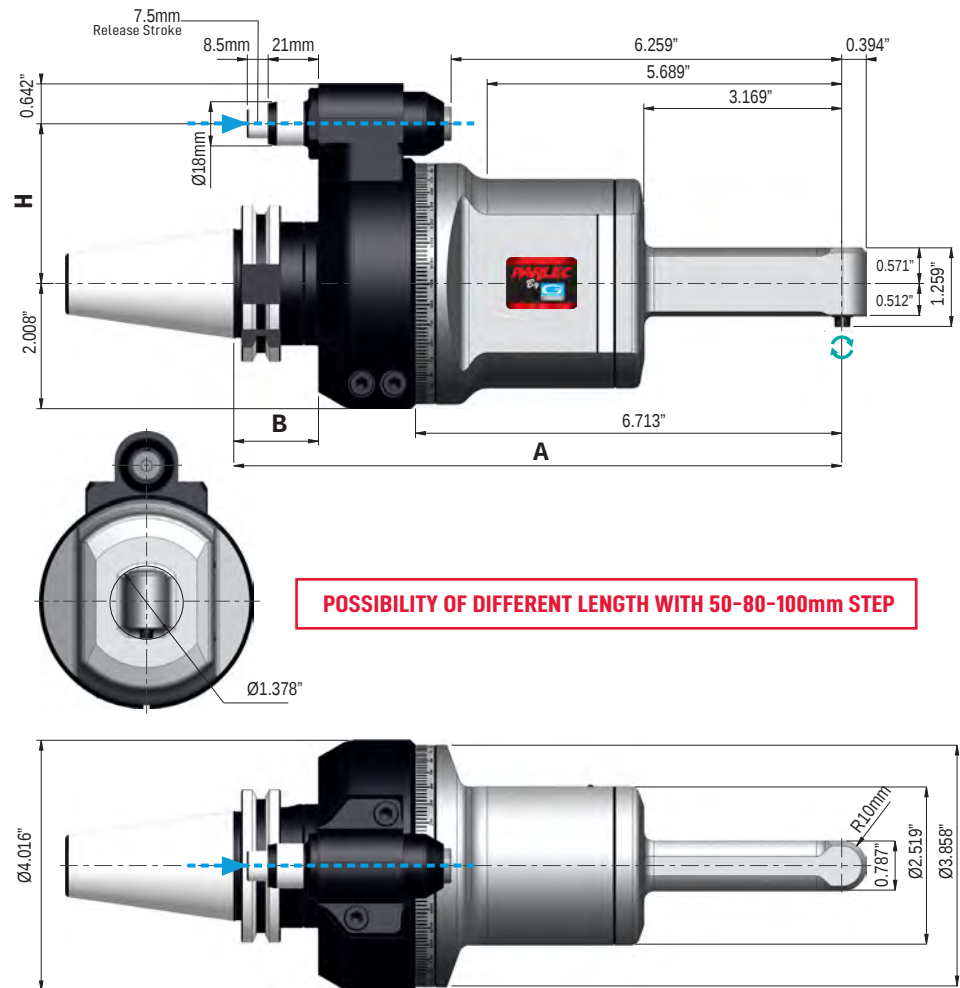


Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
6023E	3 mm	1 : 1.2308	8,000	16 ft/lbs	18 in/lbs	Through Positioning Pin	Same as Spindle	Slim

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	8.52"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	12.1 lbs
BT 40	8.52"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	12.1 lbs
CAT 50	8.52"	1.378"	3.15" (80)	4.33" (110)	16.5 lbs
HSK63A	8.88"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	12.1 lbs
HSK100A	8.88"	1.811"	3.15" (80)	4.33" (110)	16.5 lbs

* Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76–93.

FS90-3L

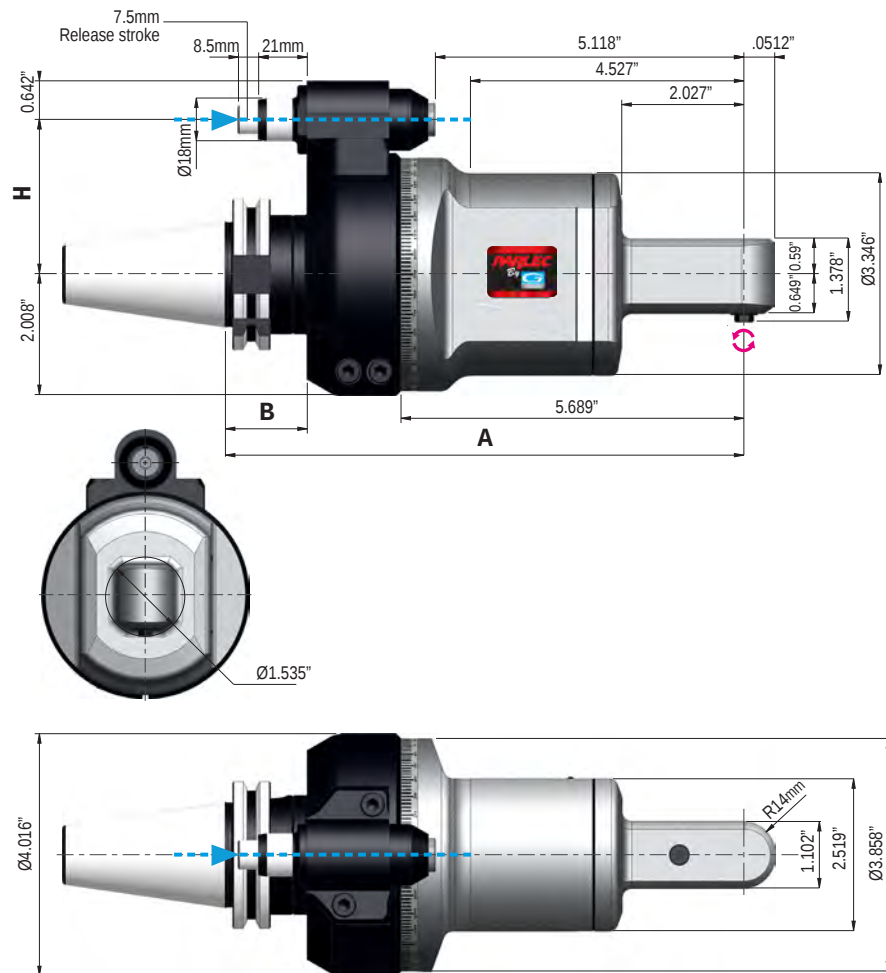


Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
6023E	3 mm	1 : 1.2308	8,000	16 ft/lbs	18 in/lbs	Through Positioning Pin	Same as Spindle	Slim, Extended

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	9.74"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	14.1 lbs
BT 40	9.74"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	14.1 lbs
CAT 50	9.74"	1.378"	3.15" (80)	4.33" (110)	19.0 lbs
HSK63A	10.6"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	14.1 lbs
HSK100A	10.6"	1.811"	3.15" (80)	4.33" (110)	19.0 lbs

* Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76-93.

FS90-4



Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	8.60"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	12.1 lbs
BT 40	8.60"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	12.1 lbs
CAT 50	8.60"	1.378"	3.15" (80)	4.33" (110)	16.5 lbs
HSK63A	8.95"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	12.1 lbs
HSK100A	8.95"	1.811"	3.15" (80)	4.33" (110)	16.5 lbs

204

PARLEC
Mamuvahlu Bhattar

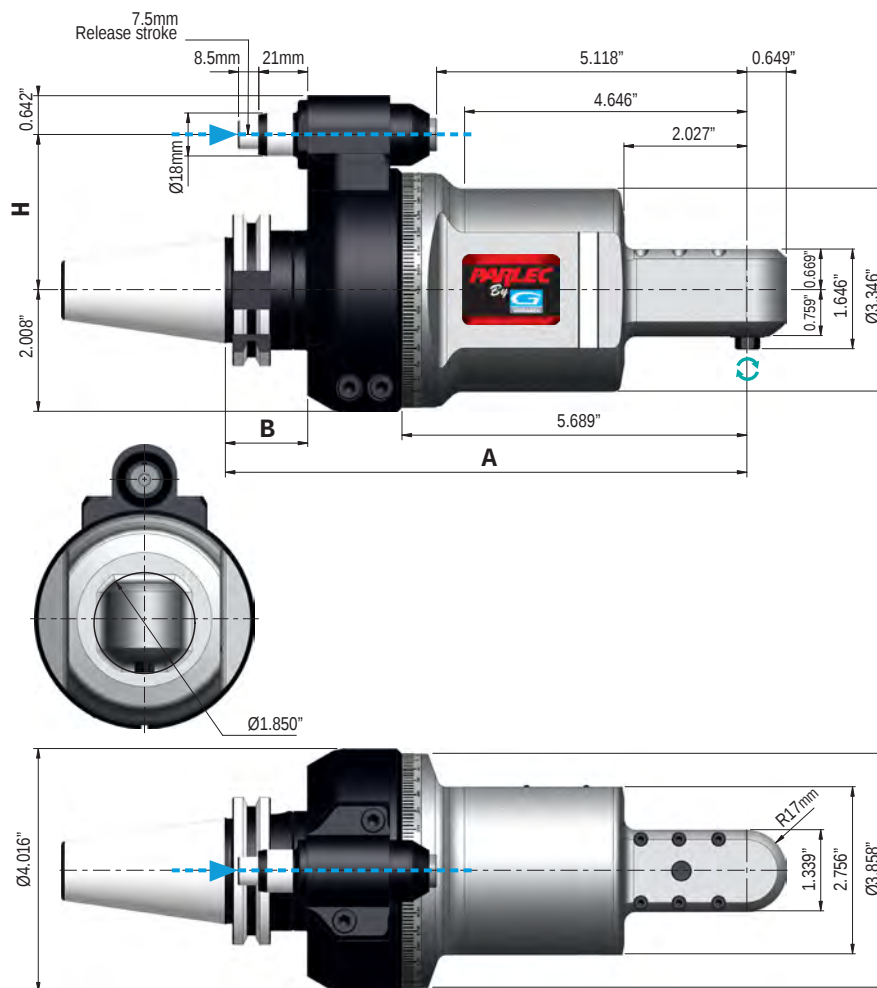


Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	10.12"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	14.9 lbs
BT 40	10.12"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	14.9 lbs
CAT 50	10.12"	1.378"	3.15" (80)	4.33" (110)	19.8 lbs
HSK63A	10.47"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	14.9 lbs
HSK100A	10.47"	1.811"	3.15" (80)	4.33" (110)	19.8 lbs

PAPLEC
Measurably Better

Angle Heads

FS90-6

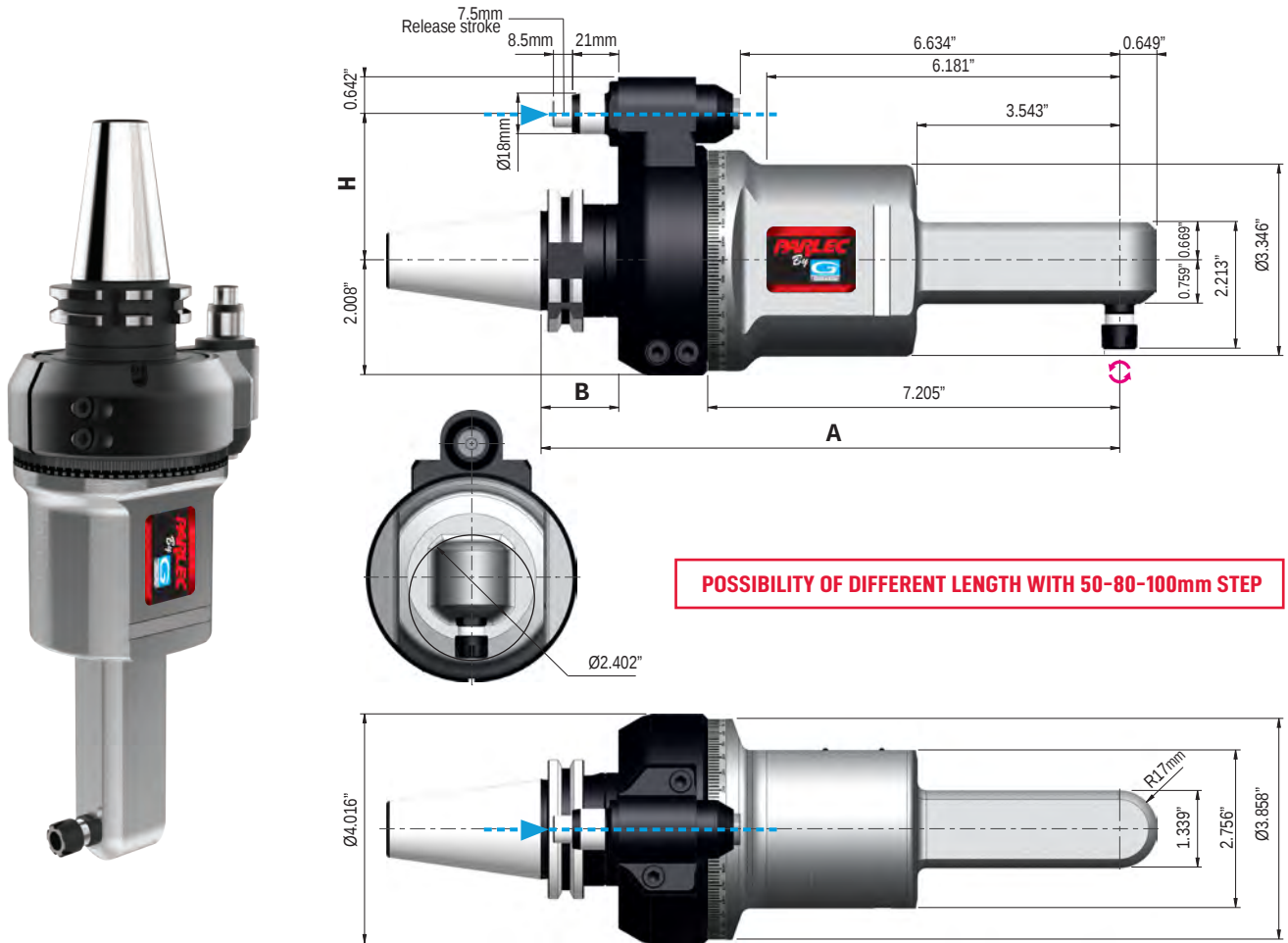


Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
601E	6 mm	1 : 1	8,000	34 ft/lbs	35 in/lbs	Through Positioning Pin	Opposite Spindle	Slim

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	8.60"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	13.5 lbs
BT 40	8.60"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	13.5 lbs
CAT 50	8.60"	1.378"	3.15" (80)	4.33" (110)	18.5 lbs
HSK63A	8.96"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	13.5 lbs
HSK100A	8.96"	1.811"	3.15" (80)	4.33" (110)	18.5 lbs

* Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76–93.

FS90-6L



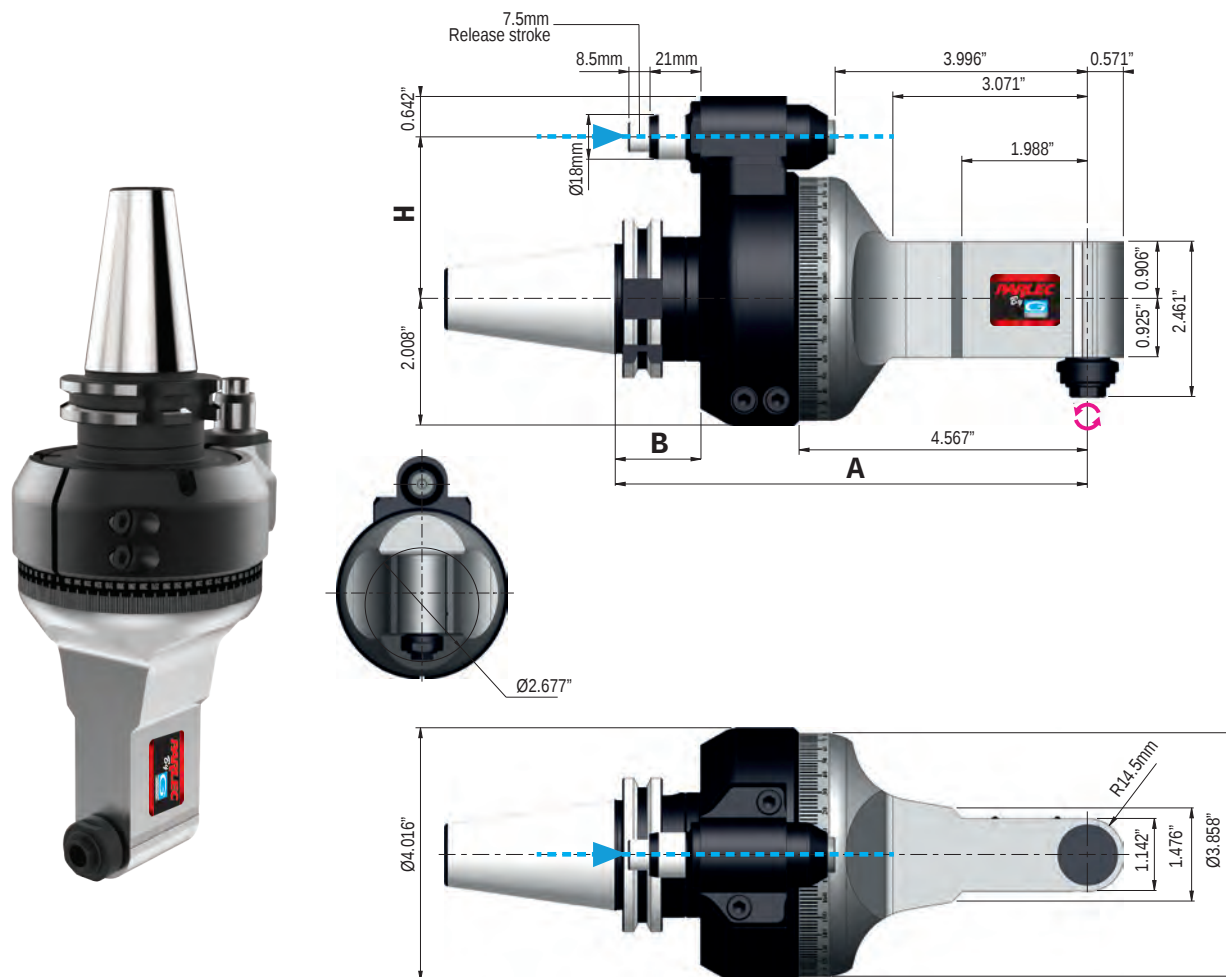
Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER11	1/4"	1 : 1	8,000	34 ft/lbs	35 in/lbs	Through Positioning Pin	Opposite Spindle	Slim, Extended

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	10.12"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	13.5 lbs
BT 40	10.12"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	13.5 lbs
CAT 50	10.12"	1.378"	3.15" (80)	4.33" (110)	18.5 lbs
HSK63A	10.47"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	13.5 lbs
HSK100A	10.47"	1.811"	3.15" (80)	4.33" (110)	18.5 lbs

* Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76–93.

Angle Heads

F90-7

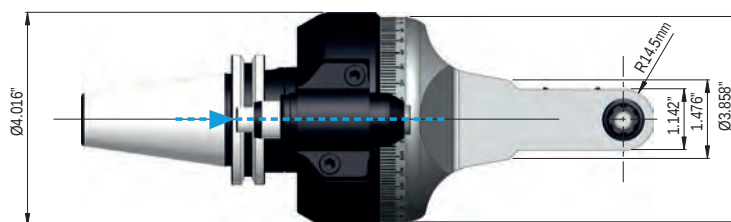
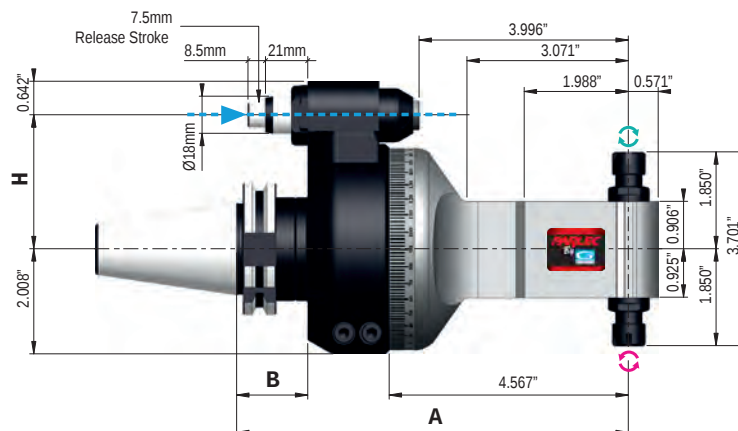
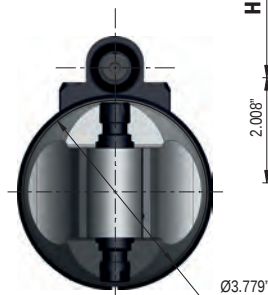


Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER11	1/4"	1 : 1	10,000	29 ft/lbs	53 in/lbs	Through Positioning Pin	Opposite Spindle	Standard

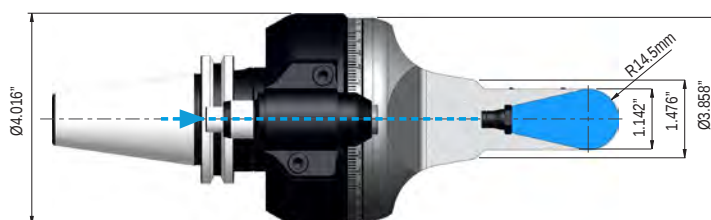
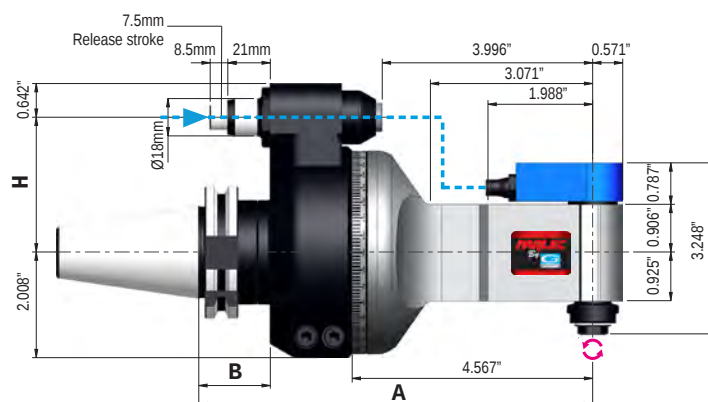
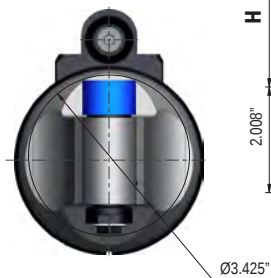
Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	7.48"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	11.0 lbs
BT 40	7.48"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	11.0 lbs
CAT 50	7.48"	1.378"	3.15" (80)	4.33" (110)	15.4 lbs
HSK63A	7.83"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	11.0 lbs
HSK100A	7.83"	1.811"	3.15" (80)	4.33" (110)	15.4 lbs

* Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76-93.

F90-7D

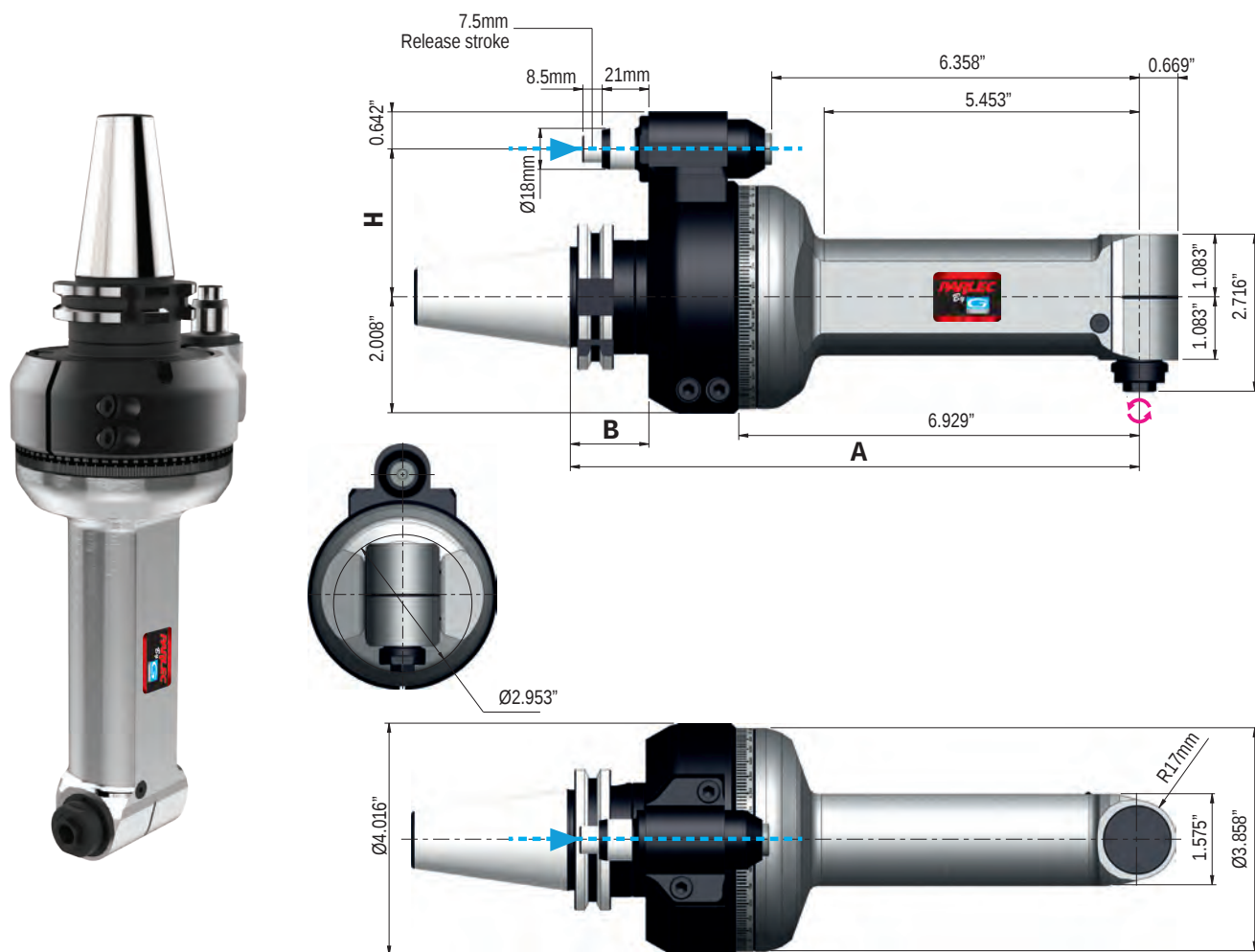


F90-7C



Angle Heads

F90-7L

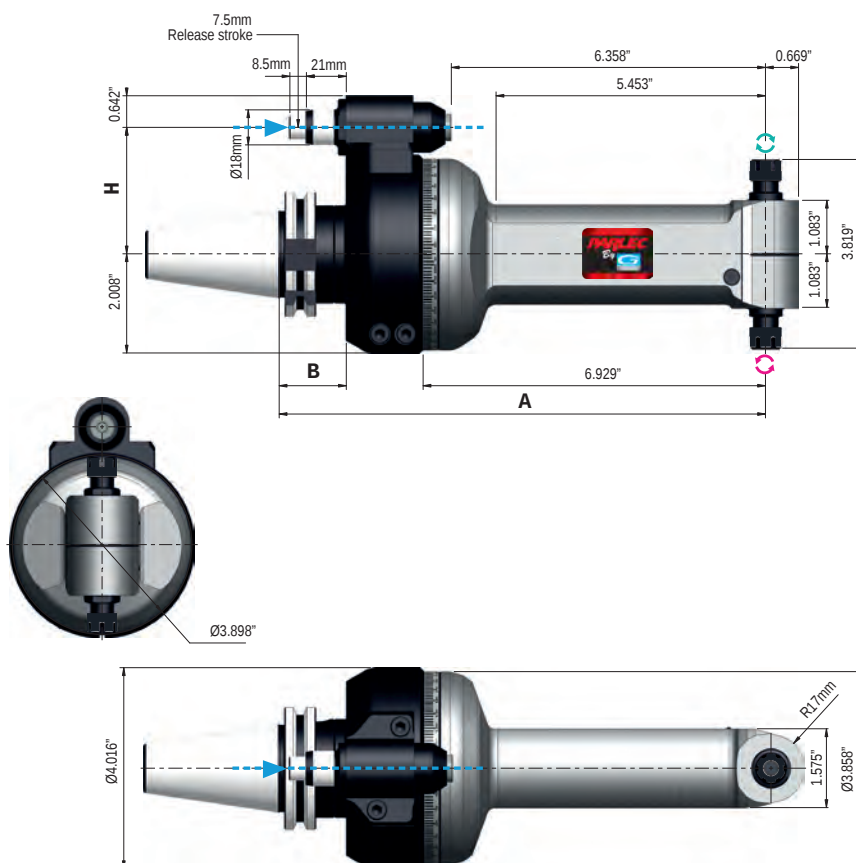


Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER11	1/4"	1 : 1	10,000	40 ft/lbs	53 in/lbs	Through Positioning Pin	Opposite Spindle	Standard, Extended

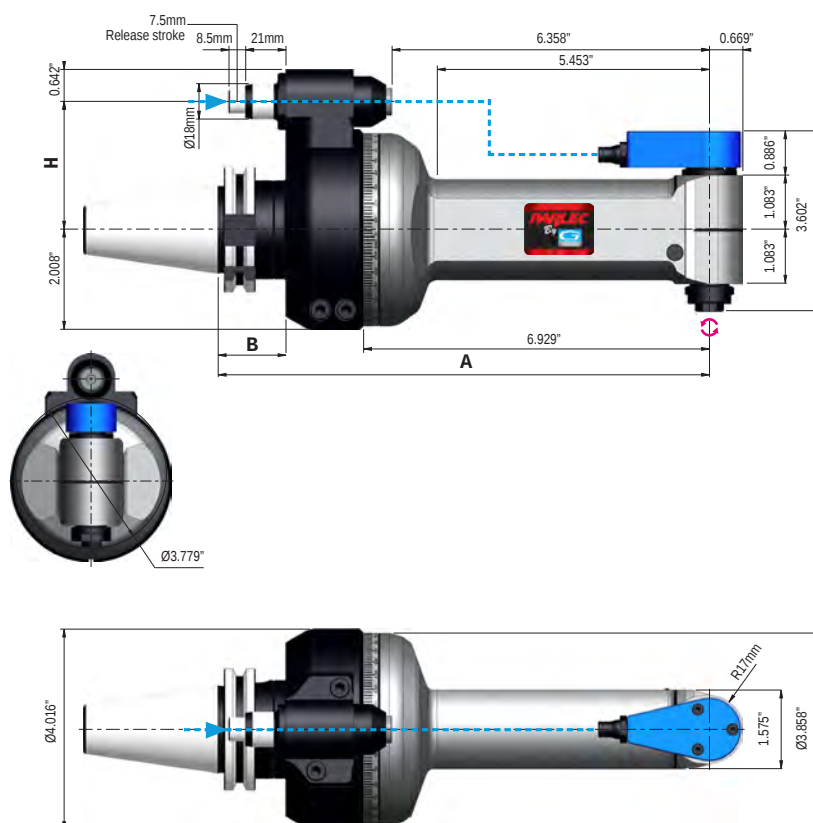
Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	9.84"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	13.8 lbs
BT 40	9.84"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	13.8 lbs
CAT 50	9.84"	1.378"	3.15" (80)	4.33" (110)	18.7 lbs
HSK63A	10.20"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	13.8 lbs
HSK100A	10.20"	1.811"	3.15" (80)	4.33" (110)	18.7 lbs

* Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76–93.

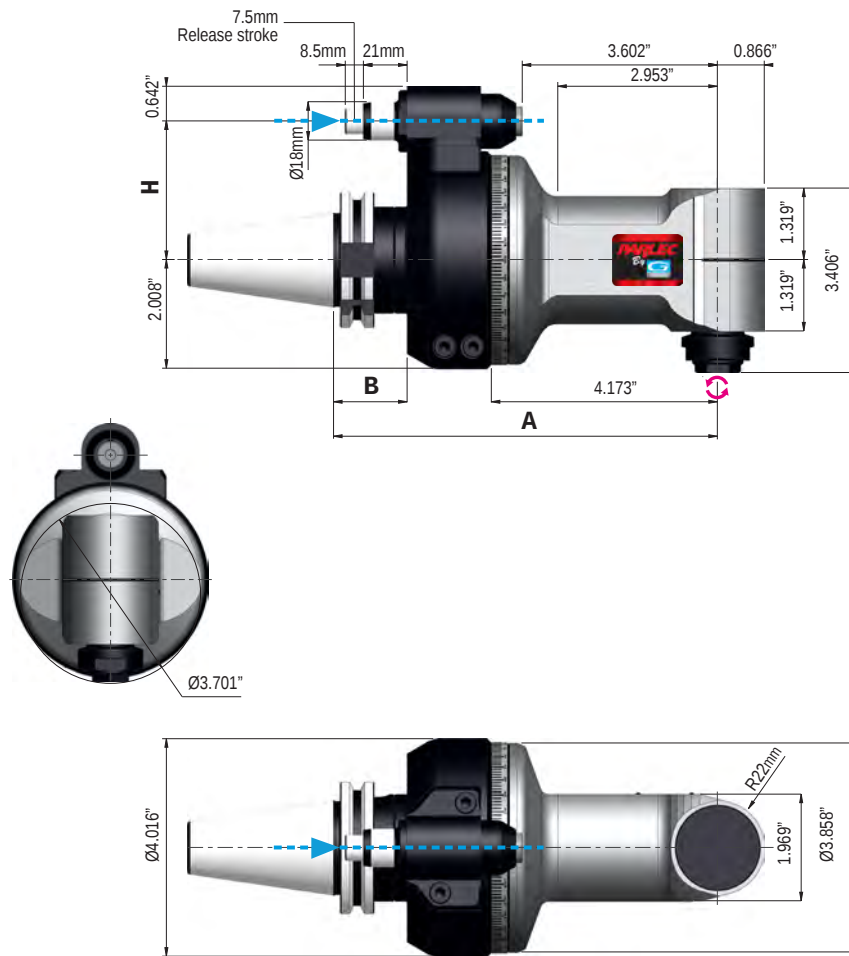
F90-7LD



F90-7LC



F90-10

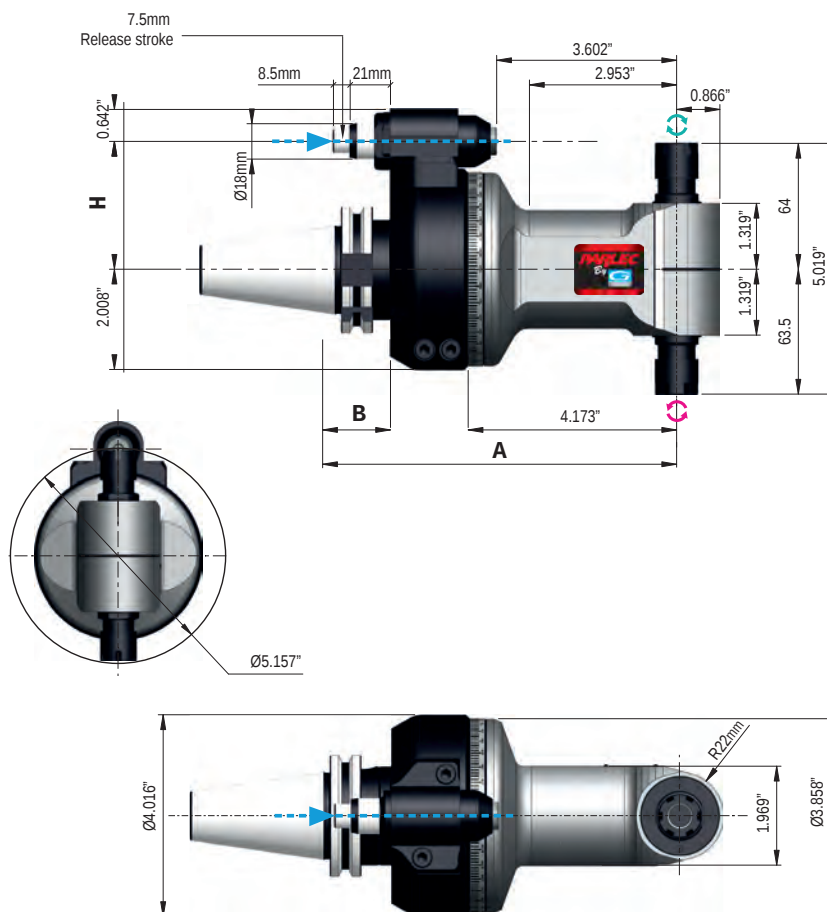


Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivry	Tool Rotation Direction	Series
ER16	3/8"	1 : 1	10,000	90 ft/lbs	97 in/lbs	Through Positioning Pin	Opposite Spindle	Standard

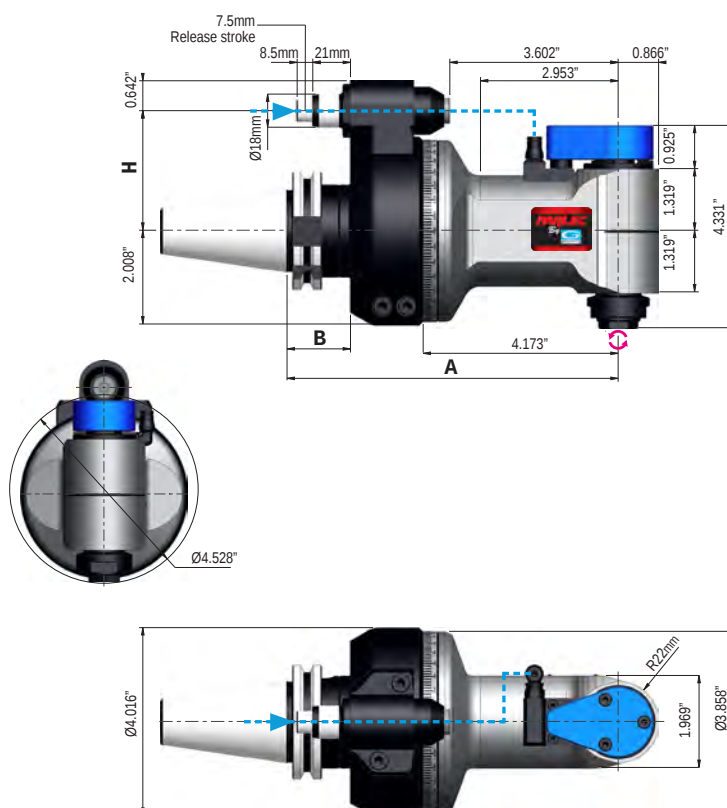
Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	7.09"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	11.6 lbs
BT 40	7.09"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	11.6 lbs
CAT 50	7.09"	1.378"	3.15" (80)	4.33" (110)	16.5 lbs
HSK63A	7.44"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	11.7 lbs
HSK100A	7.44"	1.811"	3.15" (80)	4.33" (110)	16.5 lbs

* Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76–93.

F90-10D

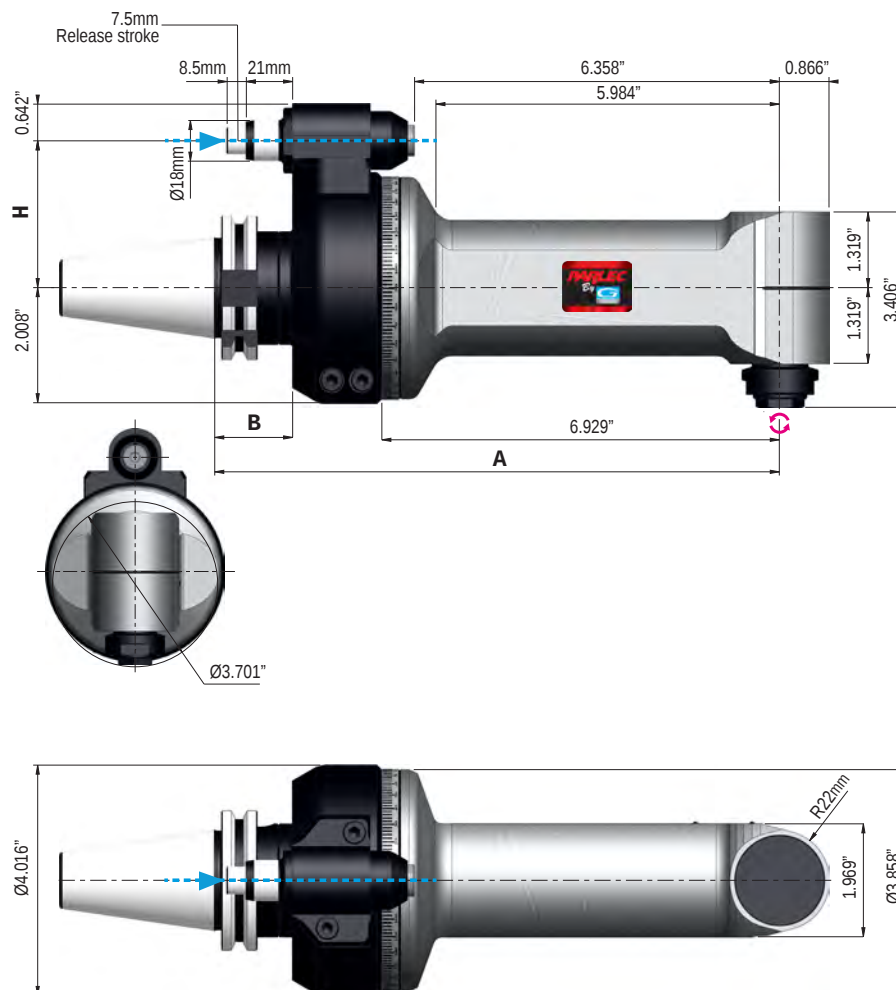


F90-10C



Angle Heads

F90-10L

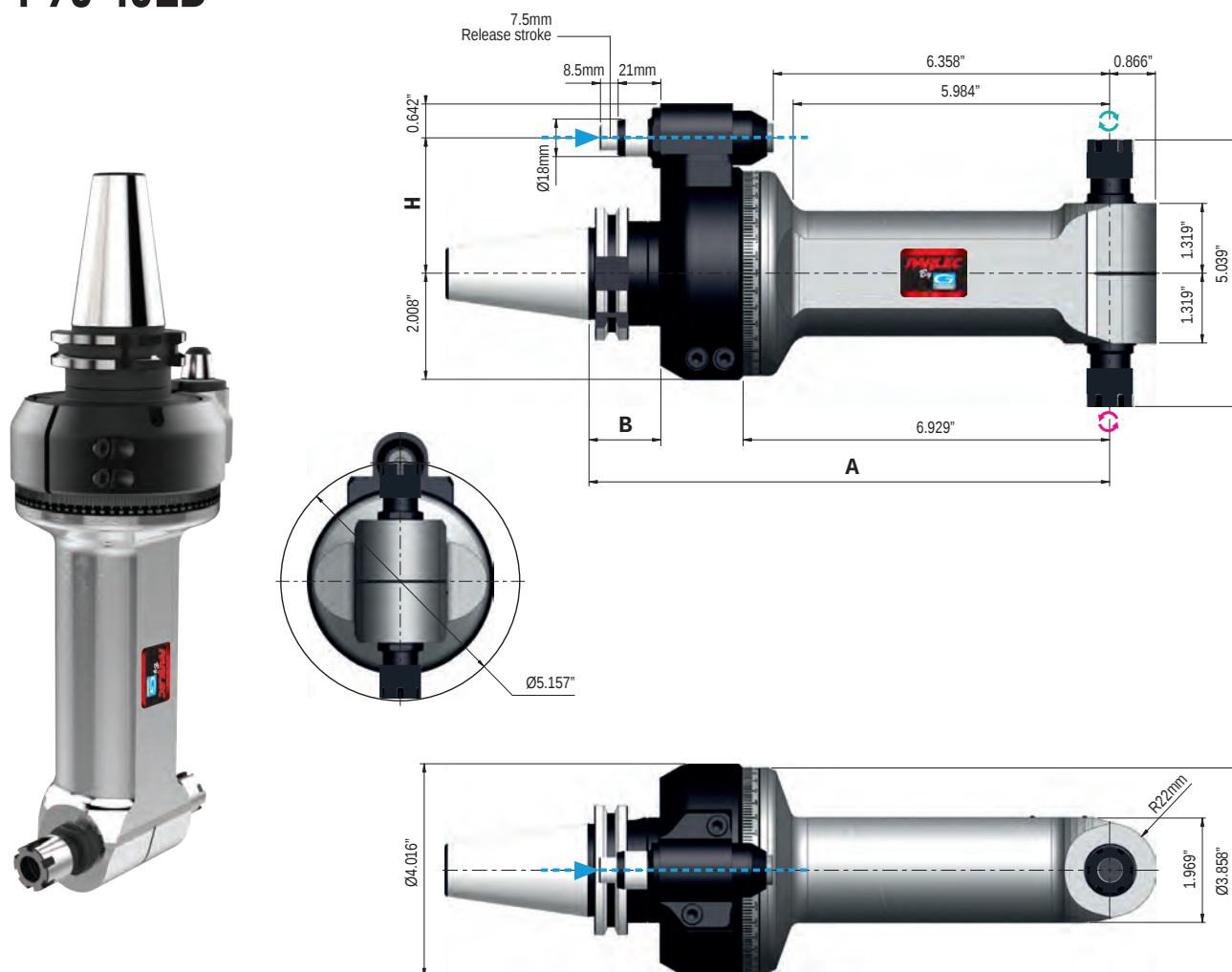


Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER16	3/8"	1 : 1	10,000	90 ft/lbs	97 in/lbs	Through Positioning Pin	Opposite Spindle	Standard, Extended

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	9.84"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	15.2 lbs
BT 40	9.84"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	15.2 lbs
CAT 50	9.84"	1.378"	3.15" (80)	4.33" (110)	20.2 lbs
HSK63A	10.20"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	15.2 lbs
HSK100A	10.20"	1.811"	3.15" (80)	4.33" (110)	20.2 lbs

* Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76–93.

F90-10LD



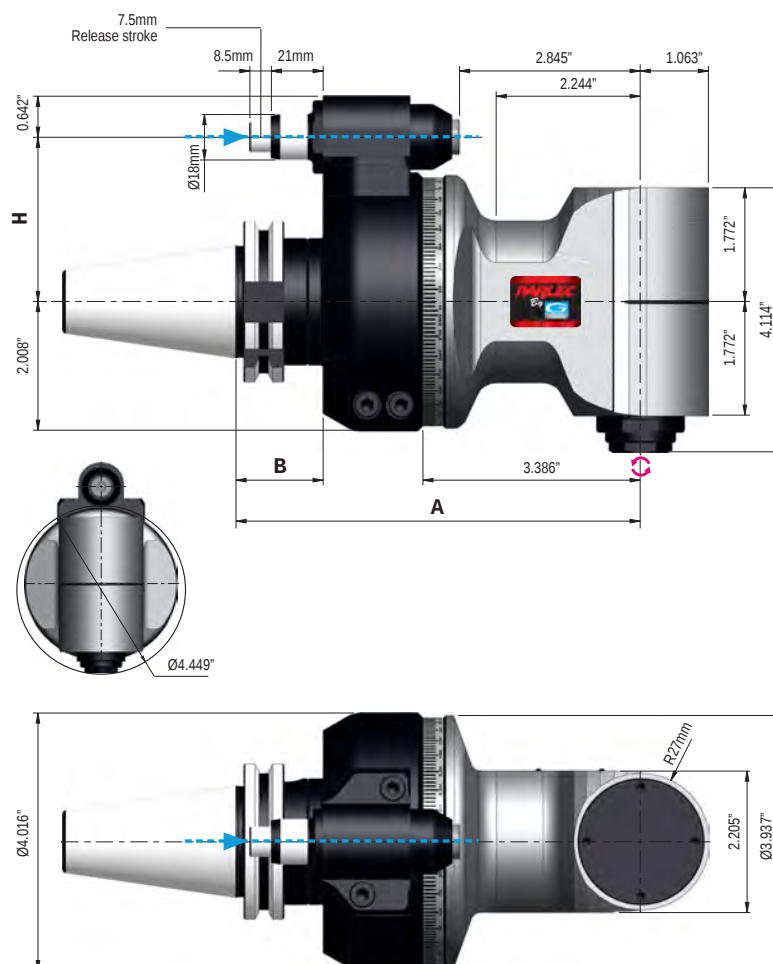
Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER16	3/8"	1 : 1	10,000	90 ft/lbs	97 in/lbs	Through Positioning Pin	One side same, Opposite Spindle	Double Output, Extended

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	9.84"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	15.2 lbs
BT 40	9.84"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	15.2 lbs
CAT 50	9.84"	1.378"	3.15" (80)	4.33" (110)	19.7 lbs
HSK63A	10.19	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	15.2 lbs
HSK100A	10.19	1.811"	3.15" (80)	4.33" (110)	19.7 lbs

* Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76-93.

Angle Heads

F90-13

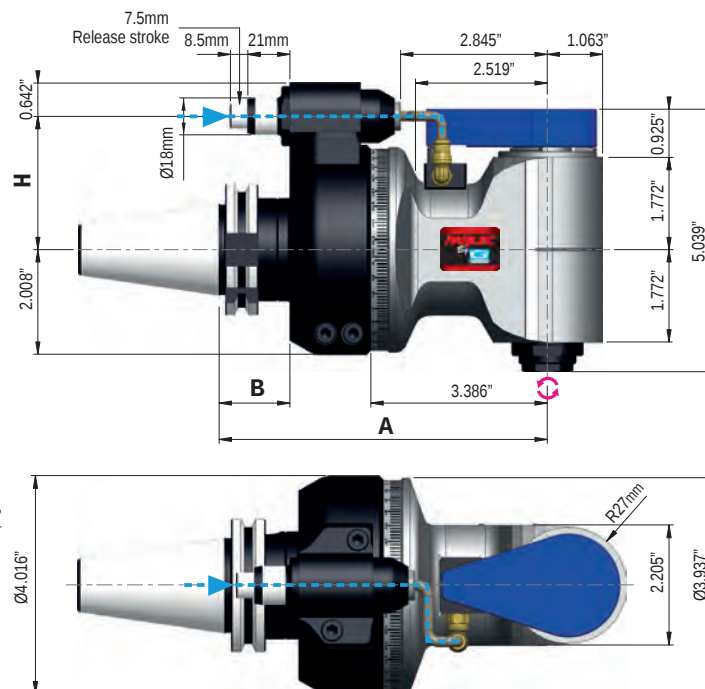
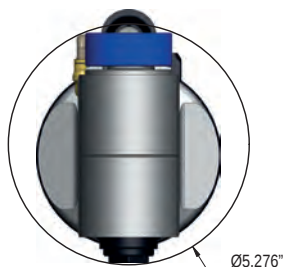


Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER20	1/2"	1 : 1	8,000	182 ft/lbs	238 in/lbs	Through Positioning Pin	Opposite Spindle	Standard

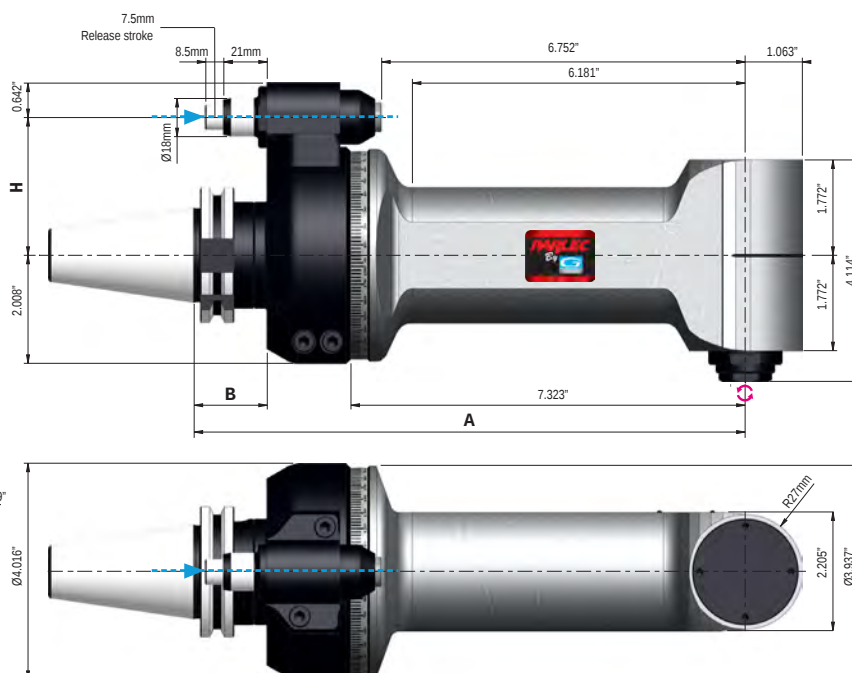
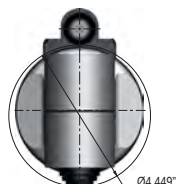
Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	6.30"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	13.9 lbs
BT 40	6.30"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	13.9 lbs
CAT 50	6.30"	1.378"	3.15" (80)	4.33" (110)	18.9 lbs
HSK63A	6.65"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	13.9 lbs
HSK100A	6.65"	1.811"	3.15" (80)	4.33" (110)	18.9 lbs

* Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76–93.

F90-13C



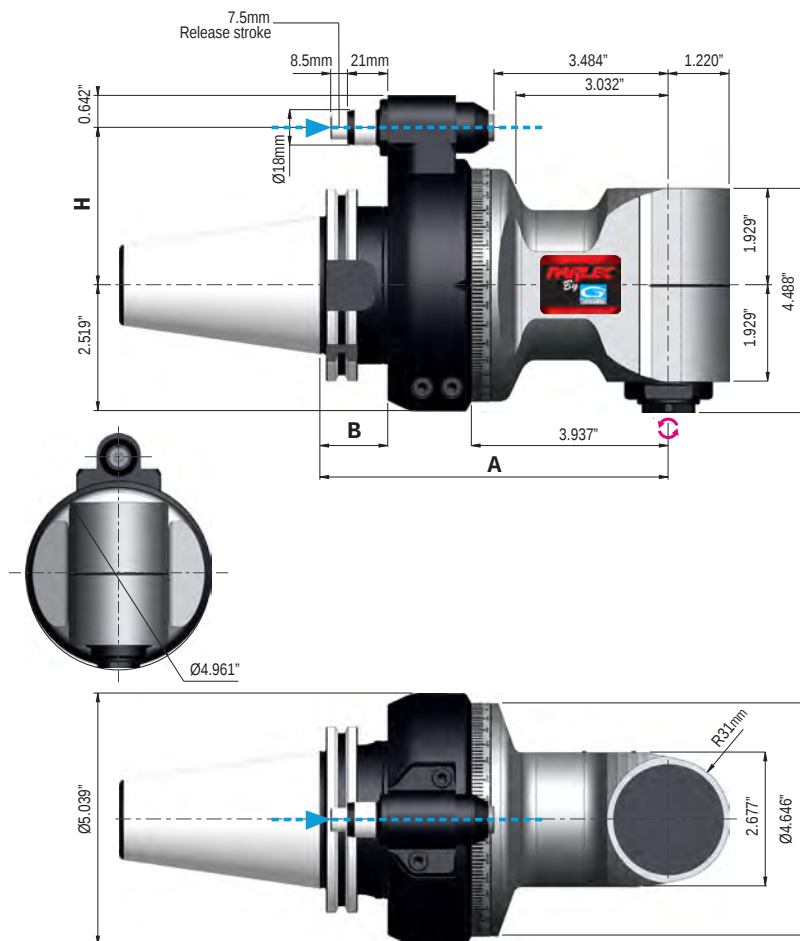
F90-13L



Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	10.24"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	15.3 lbs
BT 40	10.24"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	15.3 lbs
CAT 50	10.24"	1.378"	3.15" (80)	4.33" (110)	20.3 lbs
HSK63A	10.59"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	15.3 lbs
HSK100A	10.59"	1.811"	3.15" (80)	4.33" (110)	20.3 lbs

Angle Heads

F90-16

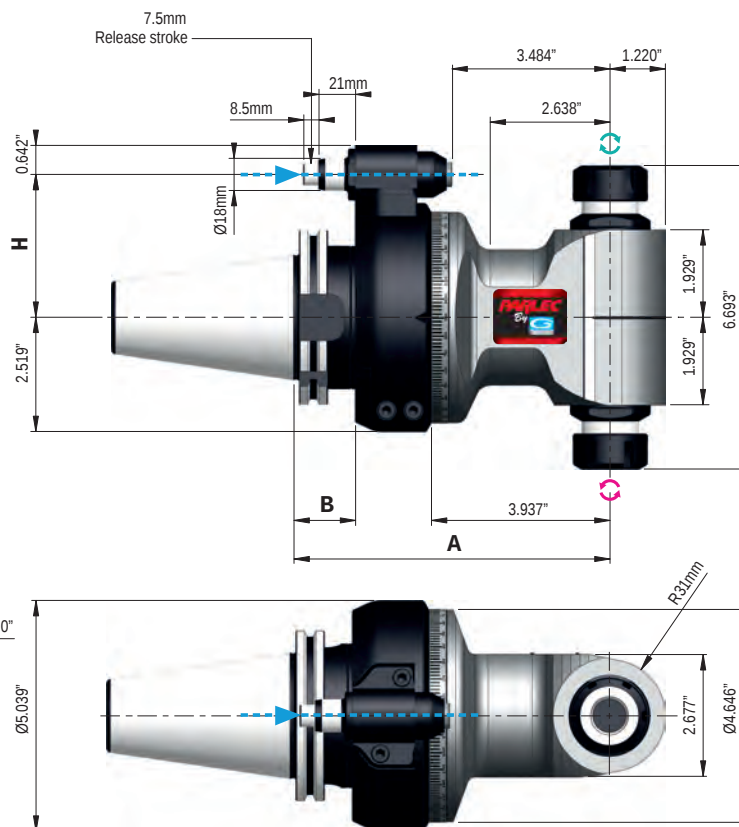


Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER25	5/8"	1 : 1	5,000	234 ft/lbs	407 in/lbs	Through Positioning Pin	Opposite Spindle	Standard

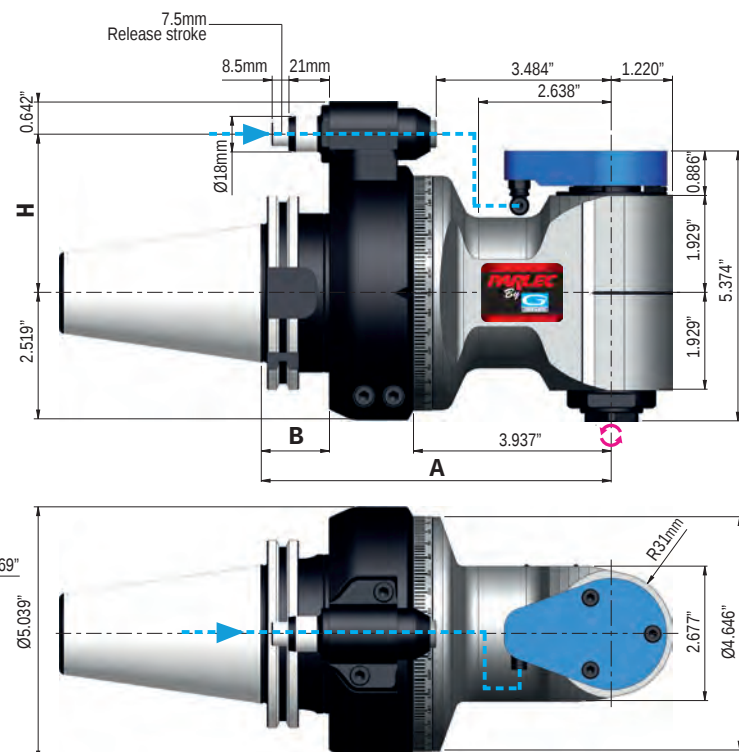
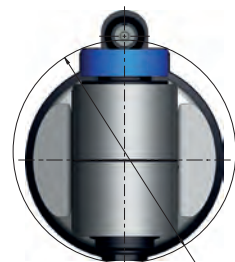
Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 50	6.97"	1.378"	3.15" (80)	4.33" (110)	23.2 lbs
HSK100A	7.32"	1.811"	3.15" (80)	4.33" (110)	23.2 lbs

* Other spindle connections available: BT50, HSK80, C8, and KM80/100. Collets sold separately. See pages 76-93.

F90-16D

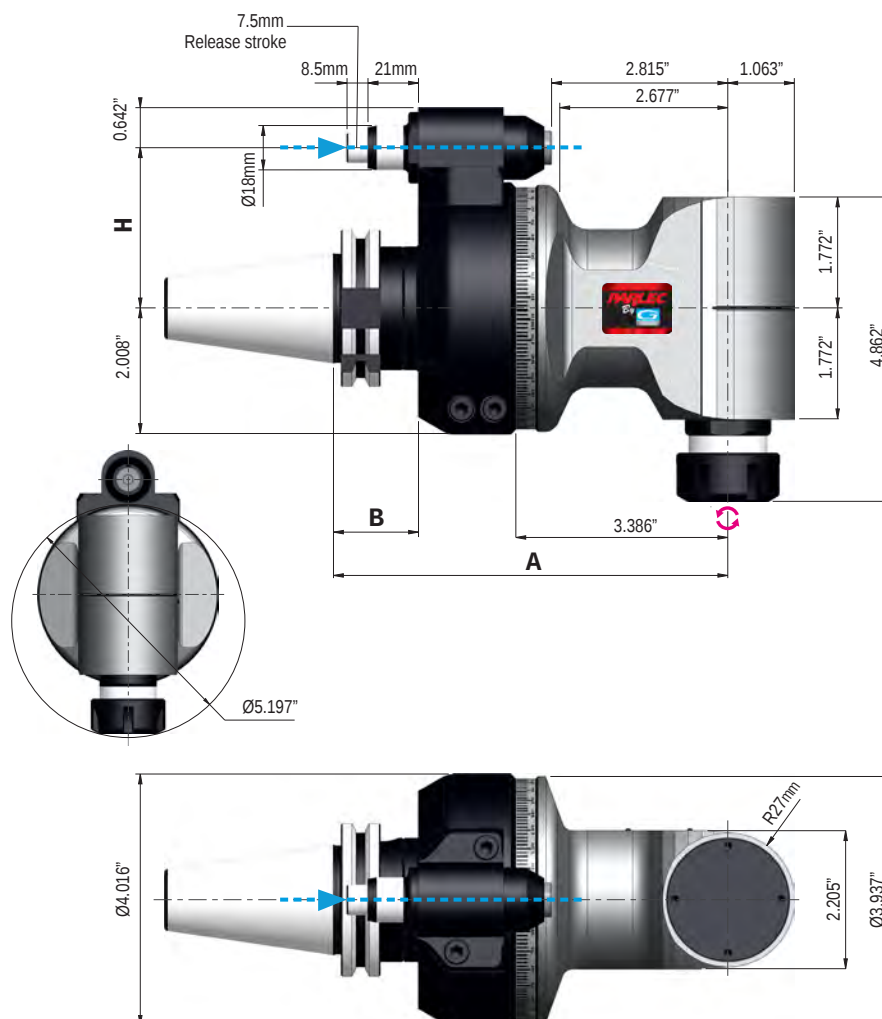


F90-16C



Angle Heads

F90-16S

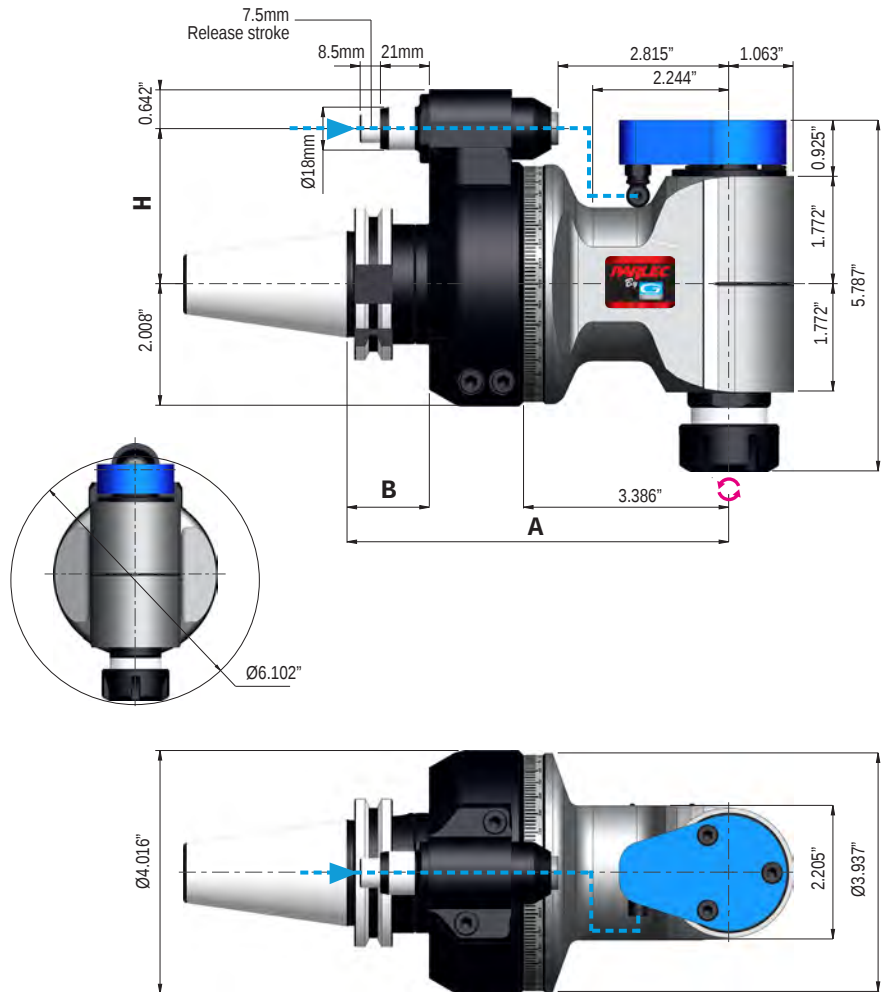


Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER25	5/8"	1:1	8,000	182 ft/lbs	239 in/lbs	Through Positioning Pin	Opposite Spindle	Standard

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	6.30"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	15.2 lbs
BT 40	6.30"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	15.2 lbs
CAT 50	6.30"	1.378"	3.15" (80)	4.33" (110)	19.7 lbs
HSK63A	6.65"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	15.2 lbs
HSK100A	6.65"	1.811"	3.15" (80)	4.33" (110)	19.7 lbs

* Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76–93.

F90-16SC



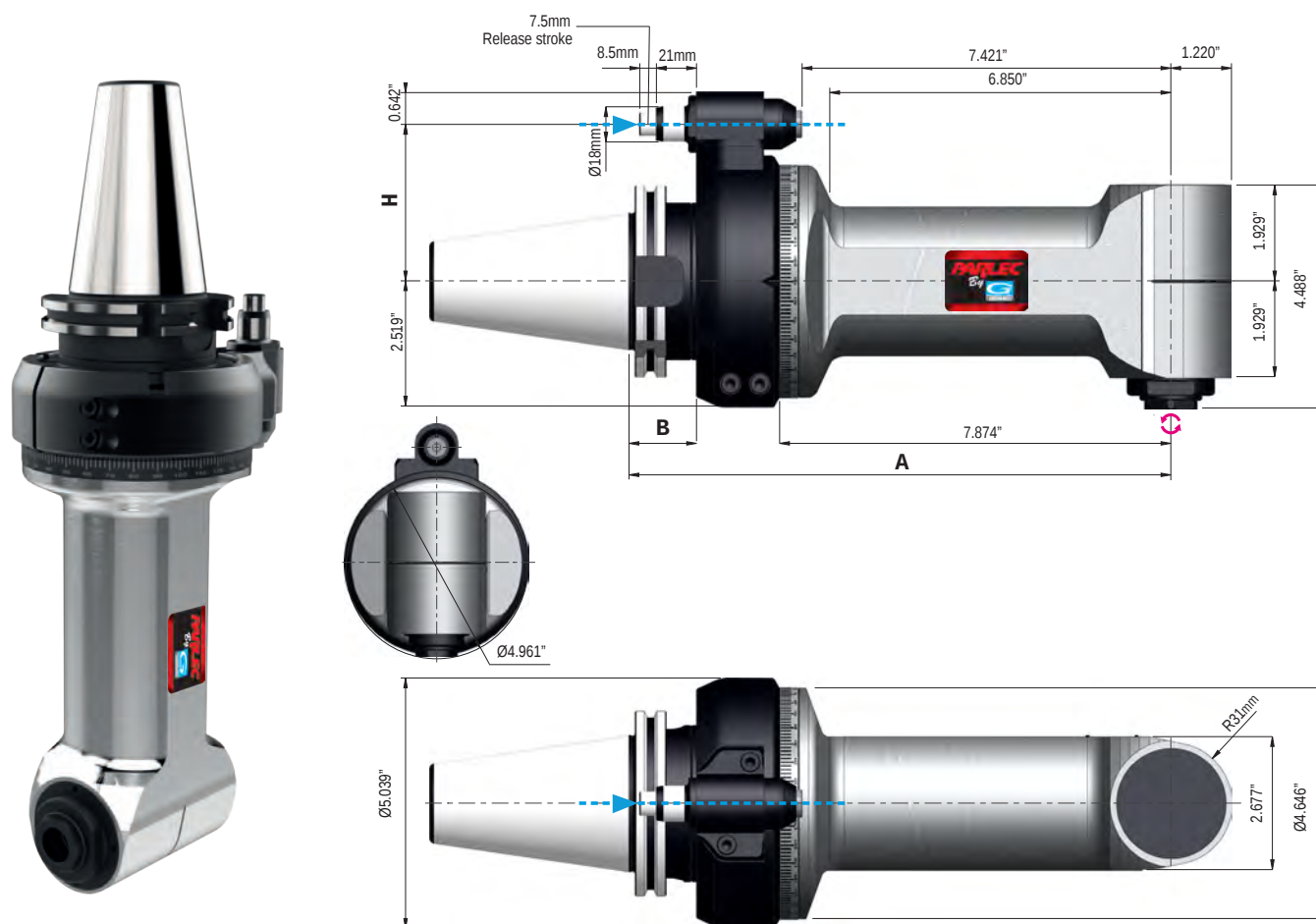
Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER25	5/8"	1:1	8,000	182 ft/lbs	239 in/lbs	Through Positioning Pin	Opposite Spindle	Standard, Coolant

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	6.30"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	15.2 lbs
BT 40	6.30"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	15.2 lbs
CAT 50	6.30"	1.378"	3.15" (80)	4.33" (110)	19.7 lbs
HSK63A	6.65"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	15.2 lbs
HSK100A	6.65"	1.811"	3.15" (80)	4.33" (110)	19.7 lbs

* Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76-93.

Angle Heads

F90-16L

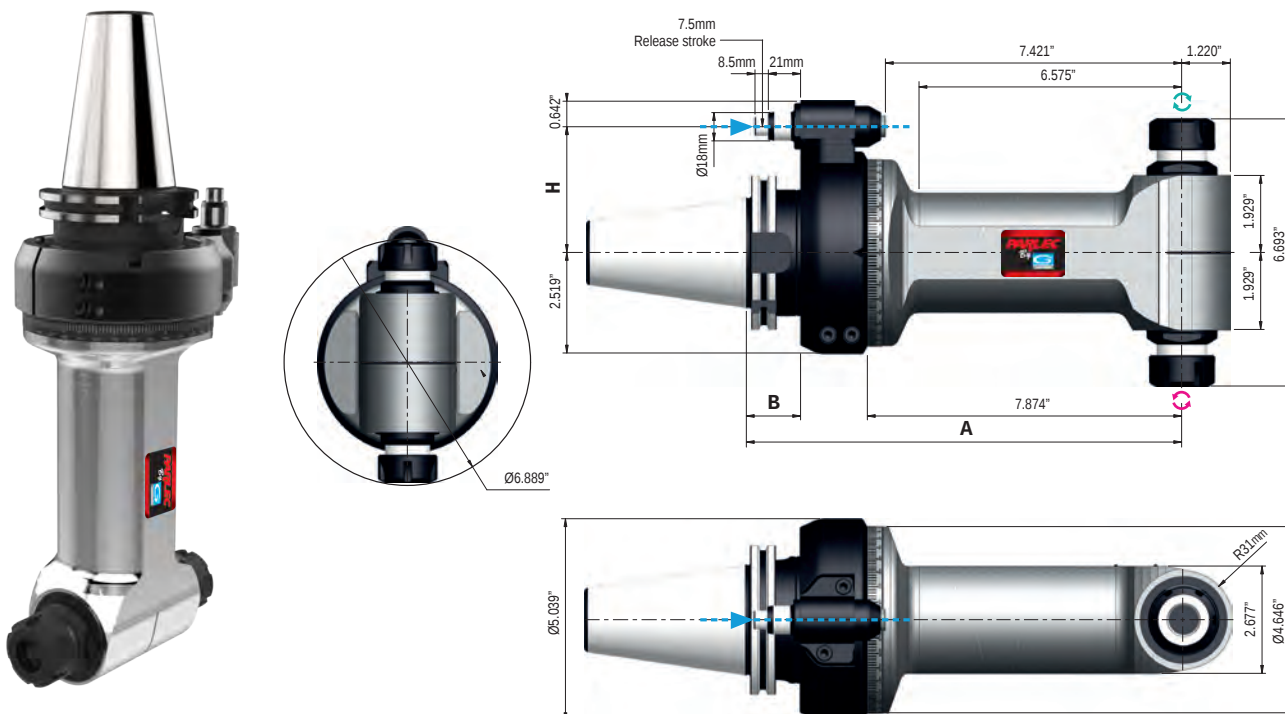


Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER25	5/8"	1 : 1	5,000	234 ft/lbs lbs	407 in/lbs	Through Positioning Pin	Opposite Spindle	Standard. Extended

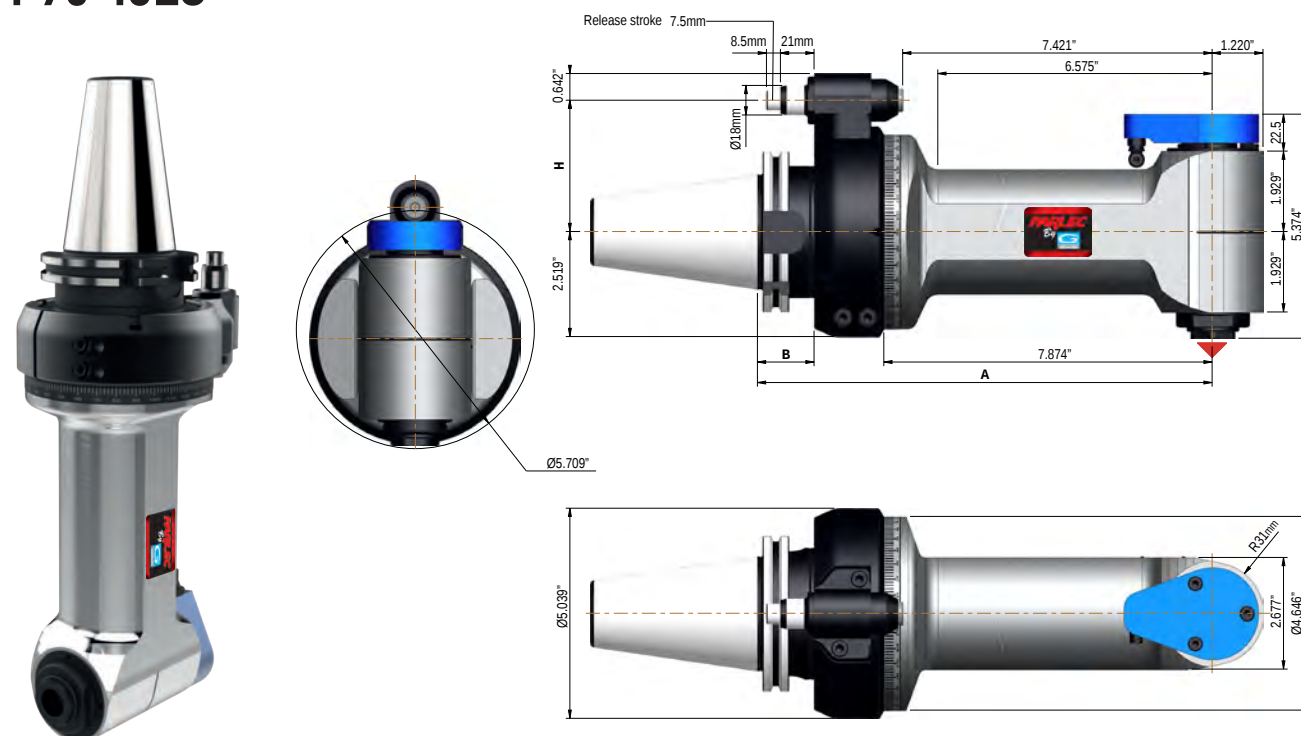
Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 50	10.91"	1.378"	3.15" (80)	4.33" (110)	28 lbs
HSK100A	11.26"	1.811"	3.15" (80)	4.33" (110)	28 lbs

* Other spindle connections available: BT50, HSK80, C8, and KM80/100. Collets sold separately. See pages 76-93.

F90-16LD

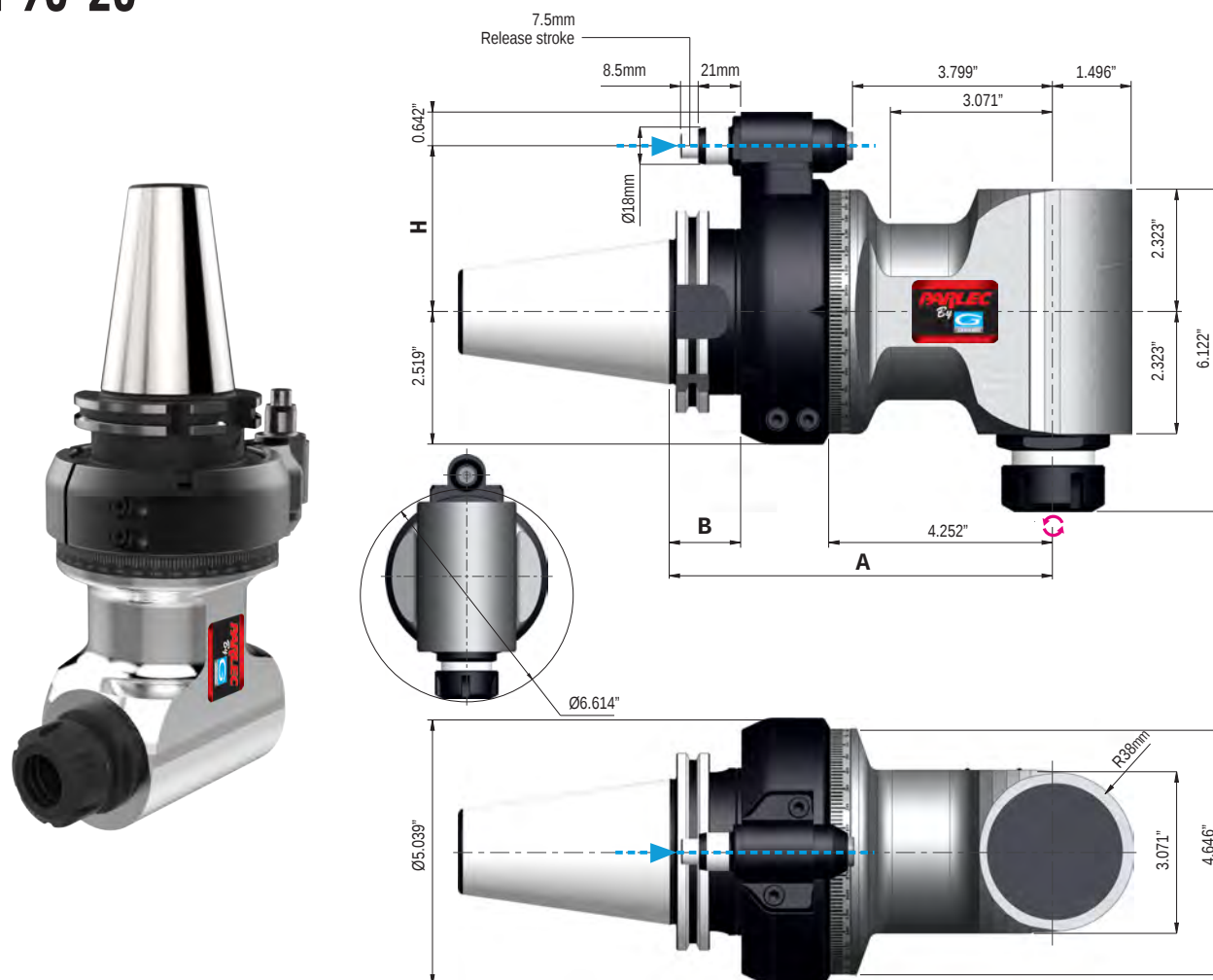


F90-16LC



Angle Heads

F90-20

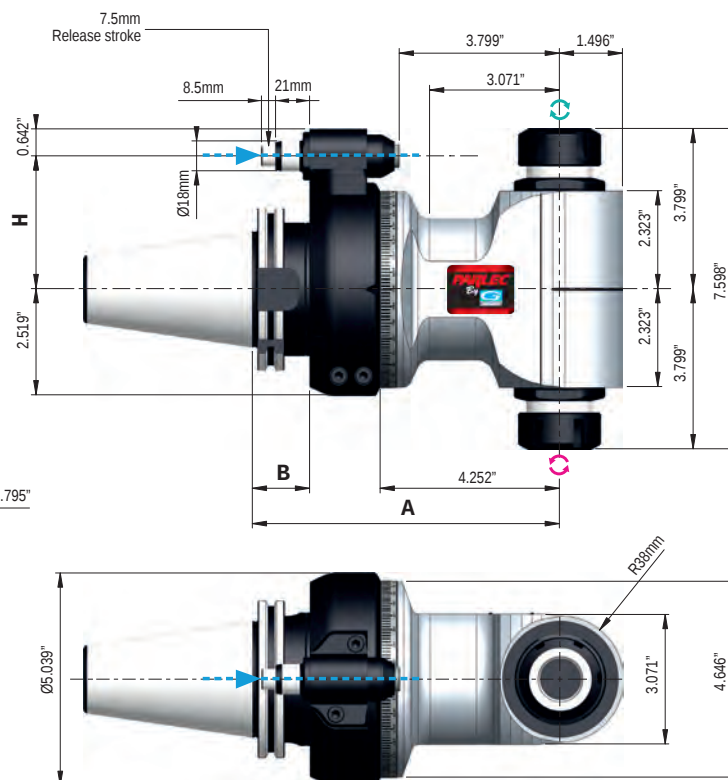
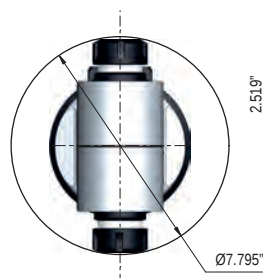


Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER32	3/4"	1 : 1	3,500	328 ft/lbs	752 in/lbs	Through Positioning Pin	Opposite Spindle	Standard

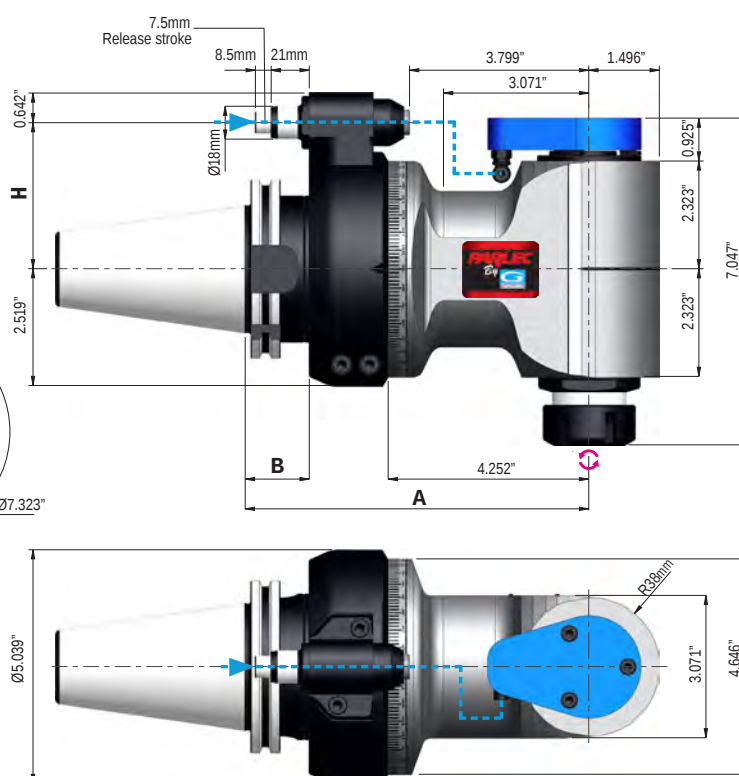
Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 50	7.09"	1.378"	3.15" (80)	4.33" (110)	27.7 lbs
HSK100A	7.64"	1.811"	3.15" (80)	4.33" (110)	27.7 lbs

* Other spindle connections available: BT50, HSK80, C8, and KM80/100. Collets sold separately. See pages 76-93.

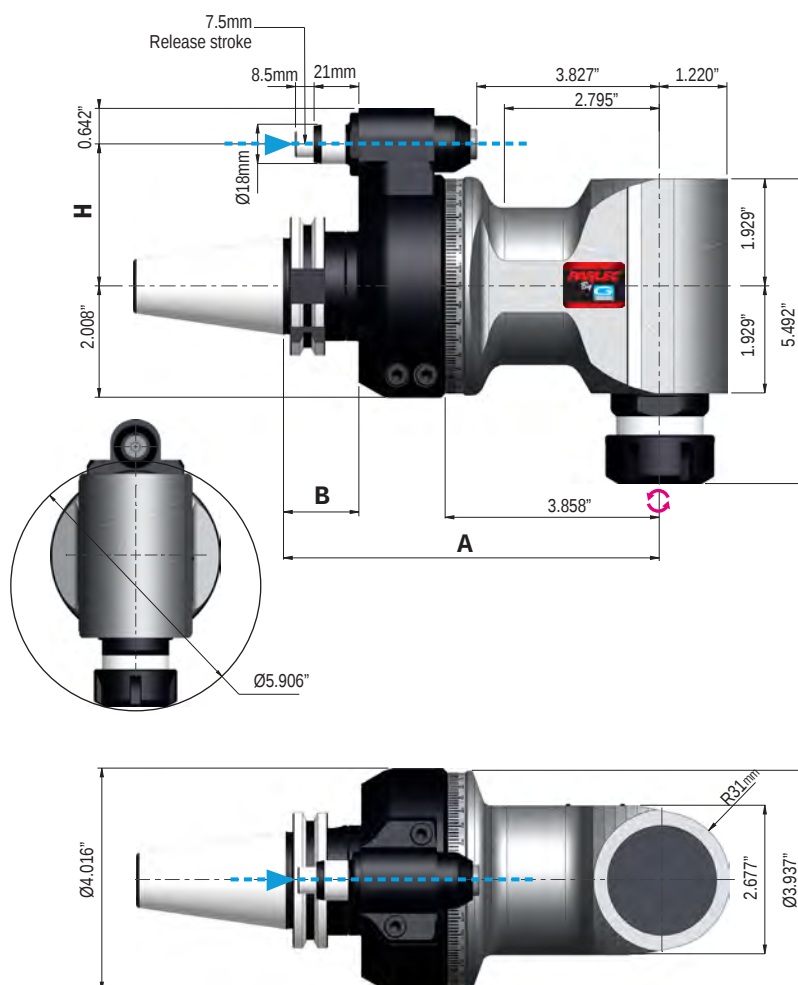
F90-20D



F90-20C



F90-20S

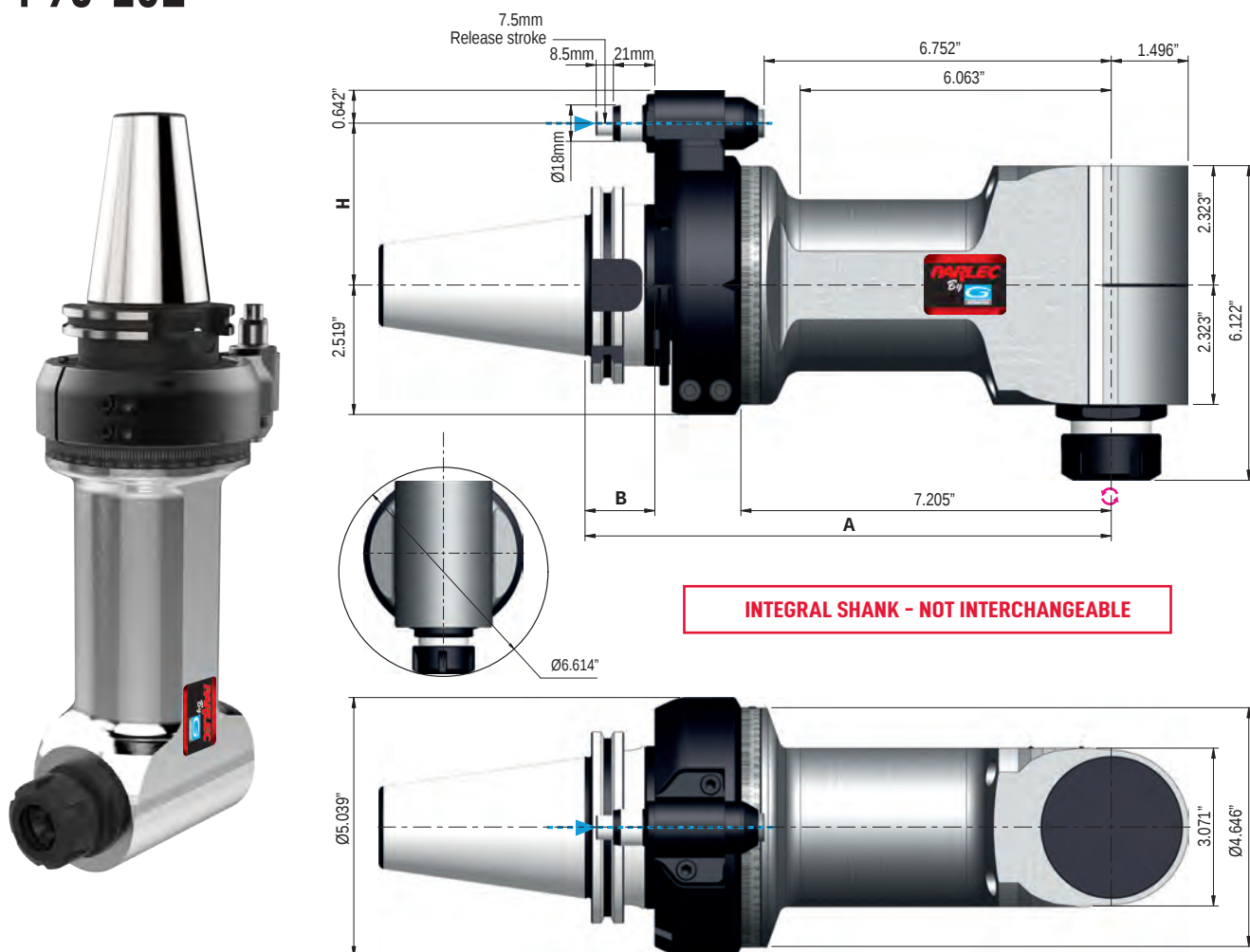


Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delviery	Tool Rotation Direction	Series
ER32	3/4"	1 : 1	5,000	234 ft/lbs	407 in/lbs	Through Positioning Pin	Opposite Spindle	Standard

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	6.77"	1.378"	2.56" (65)	3.15"/4.33" (80/110)	15.1 lbs
BT 40	6.77"	1.378"	2.56" (65)	3.15"/4.33" (80/110)	15.1 lbs
HSK63A	7.126"	1.732"	2.56" (65)	3.15"/4.33" (80/110)	15.1 lbs

* Other spindle connections available: BT50, HSK80A, C5, and KM63. Collets sold separately. See pages 76–93.

F90-20L



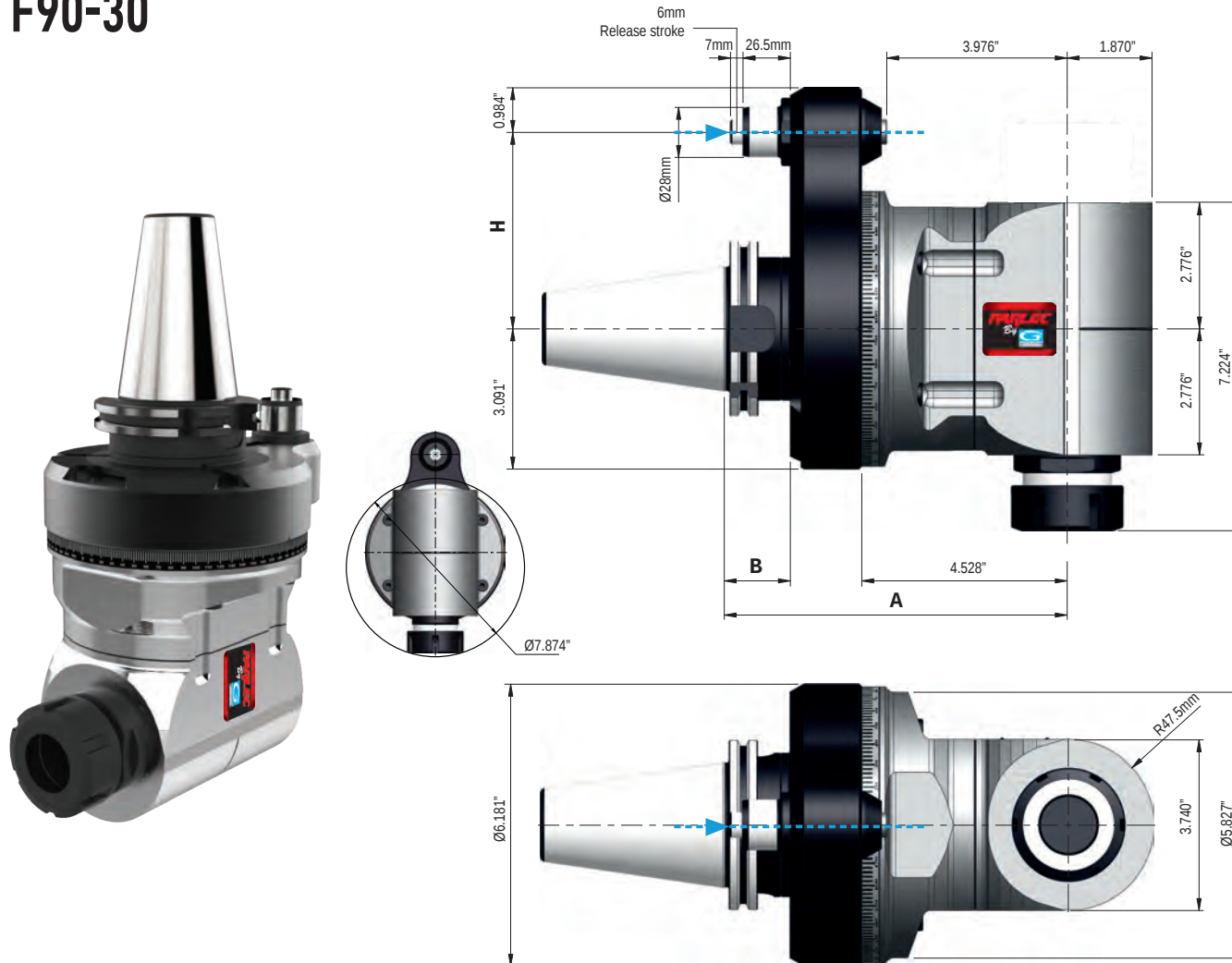
Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER32	3/4"	1:1	3,500	328 ft/lbs	752 in/lbs	Through Positioning Pin	Opposite Spindle	Standard, Extended

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 50	10.24"	1.378"	3.15" (80)	4.33" (110)	29.1 lbs
HSK100A	10.59"	1.811"	3.15" (80)	4.33" (110)	29.1 lbs

* Other spindle connections available: BT50, HSK80, C8, and KM80/100. Collets sold separately. See pages 76-93.

Angle Heads

F90-30

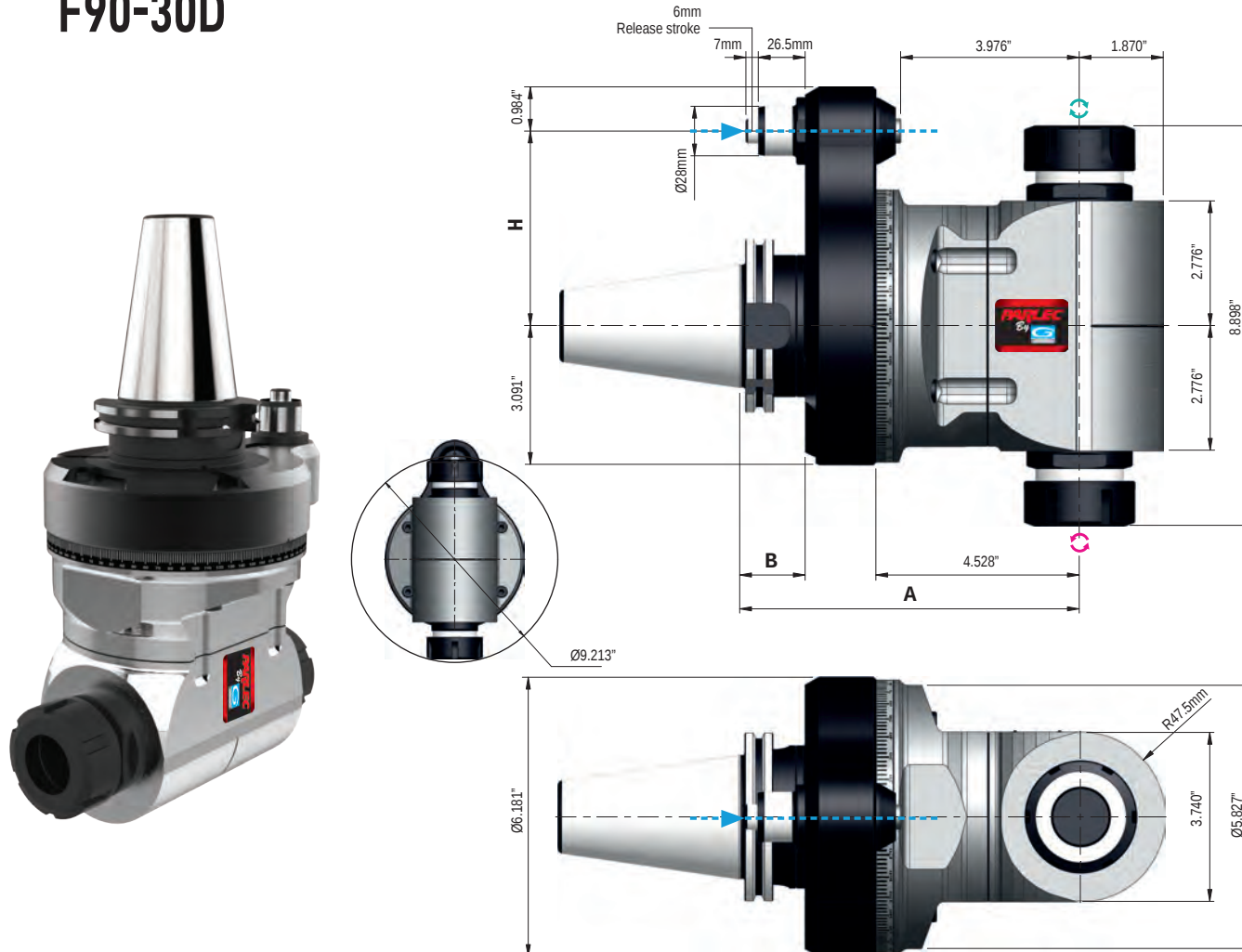


Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER40	1"	1 : 1	2,500	679 ft/lbs	1,195 in/lbs	Through Positioning Pin	Opposite Spindle	Standard

Spindle Connection	A	B	H (mm)	H Option	Weight
CAT 50	7.68"	1.456"	4.33" (110)	-	47.7 lbs
HSK100A	7.91"	1.889"	4.33" (110)	-	47.7 lbs

* Other spindle connections available: BT50, HSK80, C8, and KM80/100. Collets sold separately. See pages 76-93.

F90-30D



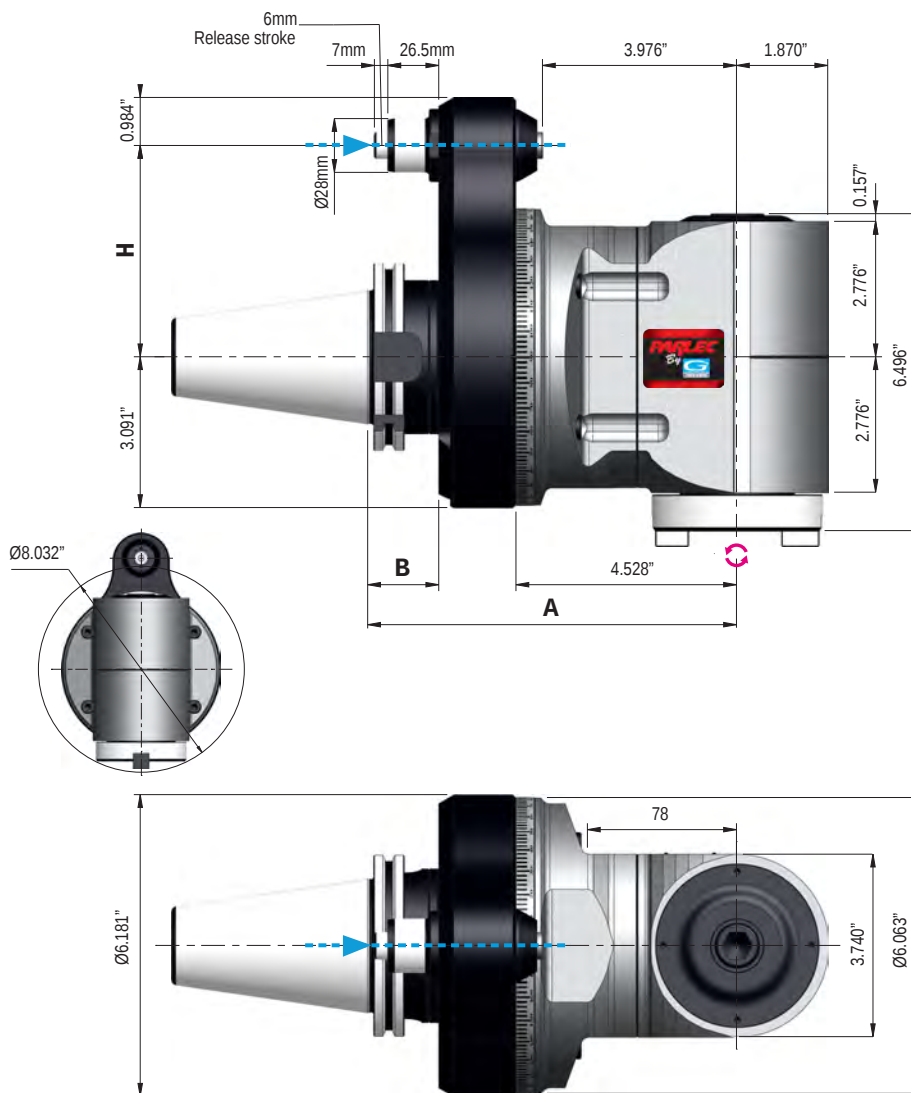
Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER40	1"	1:1	2,500	679 ft/lbs	1,195 in/lbs	Through Positioning Pin	One side same, Opposite Spindle	Double Output

Spindle Connection	A	B	H (mm)	H Option	Weight
CAT 50	7.56"	1.456"	4.33" (110)	-	29.1 lbs
HSK100A	7.91"	1.889"	4.33" (110)	-	29.1 lbs

* Other spindle connections available: BT50, HSK80, C8, and KM80/100. Collets sold separately. See pages 76-93.

Angle Heads

F90-S40



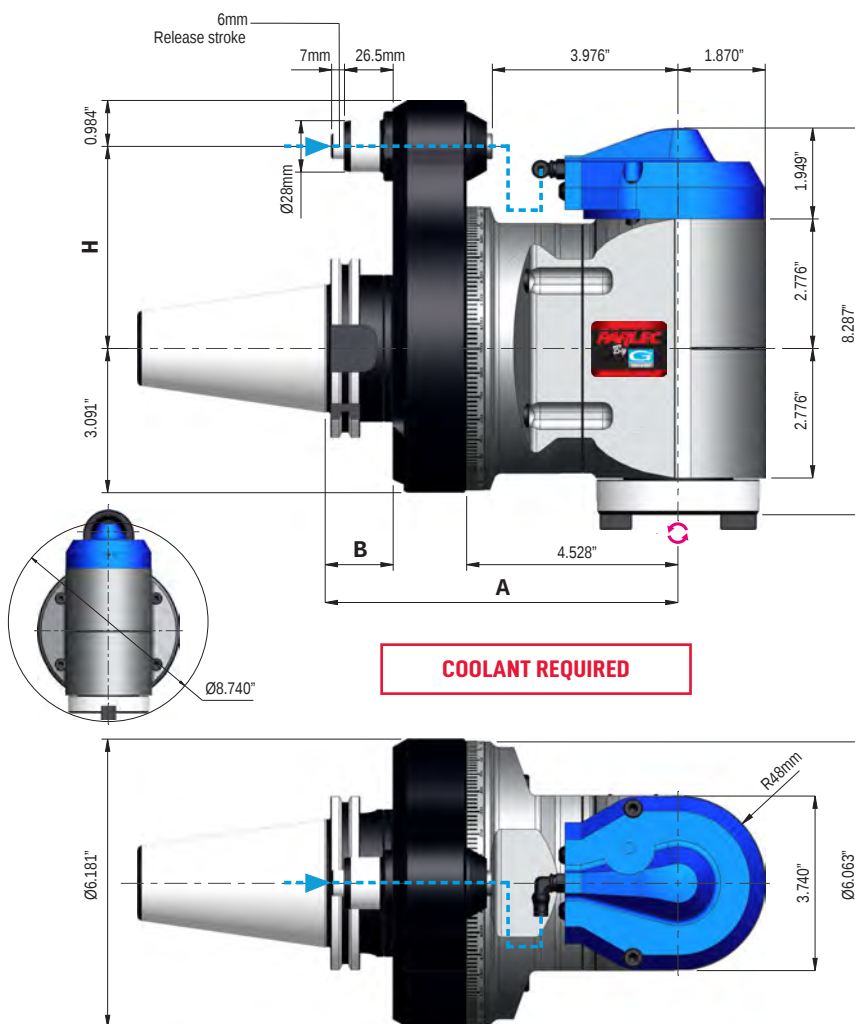
Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
CAT/BT40*	-	1:1	2,500	679 ft/lbs	1,195 in/lbs	Through Positioning Pin	Opposite Spindle	Standard

* Other output options available: HSK63A and C5

Spindle Connection	A	B	H (mm)	H Option	Weight
CAT 50	7.56"	1.456"	4.33" (110)	-	48.0 lbs
HSK100A	7.91"	1.889"	4.33" (110)	-	48.0 lbs

* Other spindle connections available: BT50, HSK80, C8, and KM80/100. Collets sold separately. See pages 76-93.

F90-S40C



Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
CAT/BT40*	-	1:1	2,500	679 ft/lbs	1,195 in/lbs	Through Positioning Pin	Opposite Spindle	Standard, Coolant

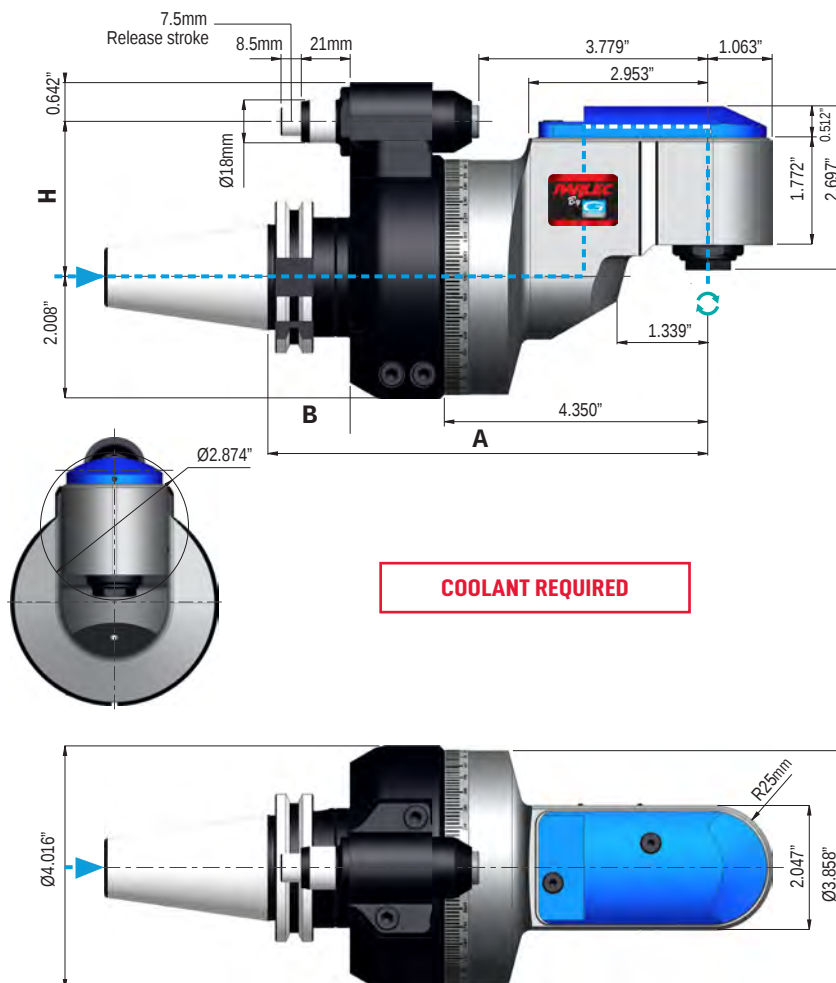
* Other output options available: HSK63A and C5

Spindle Connection	A	B	H (mm)	H Option	Weight
CAT 50	7.56"	1.456"	4.33" (110)	-	48.0 lbs
HSK100A	7.91"	1.889"	4.33" (110)	-	48.0 lbs

* Other spindle connections available: BT50, HSK80, C8, and KM80/100. Collets sold separately. See pages 76-93.

Angle Heads

FR90-10



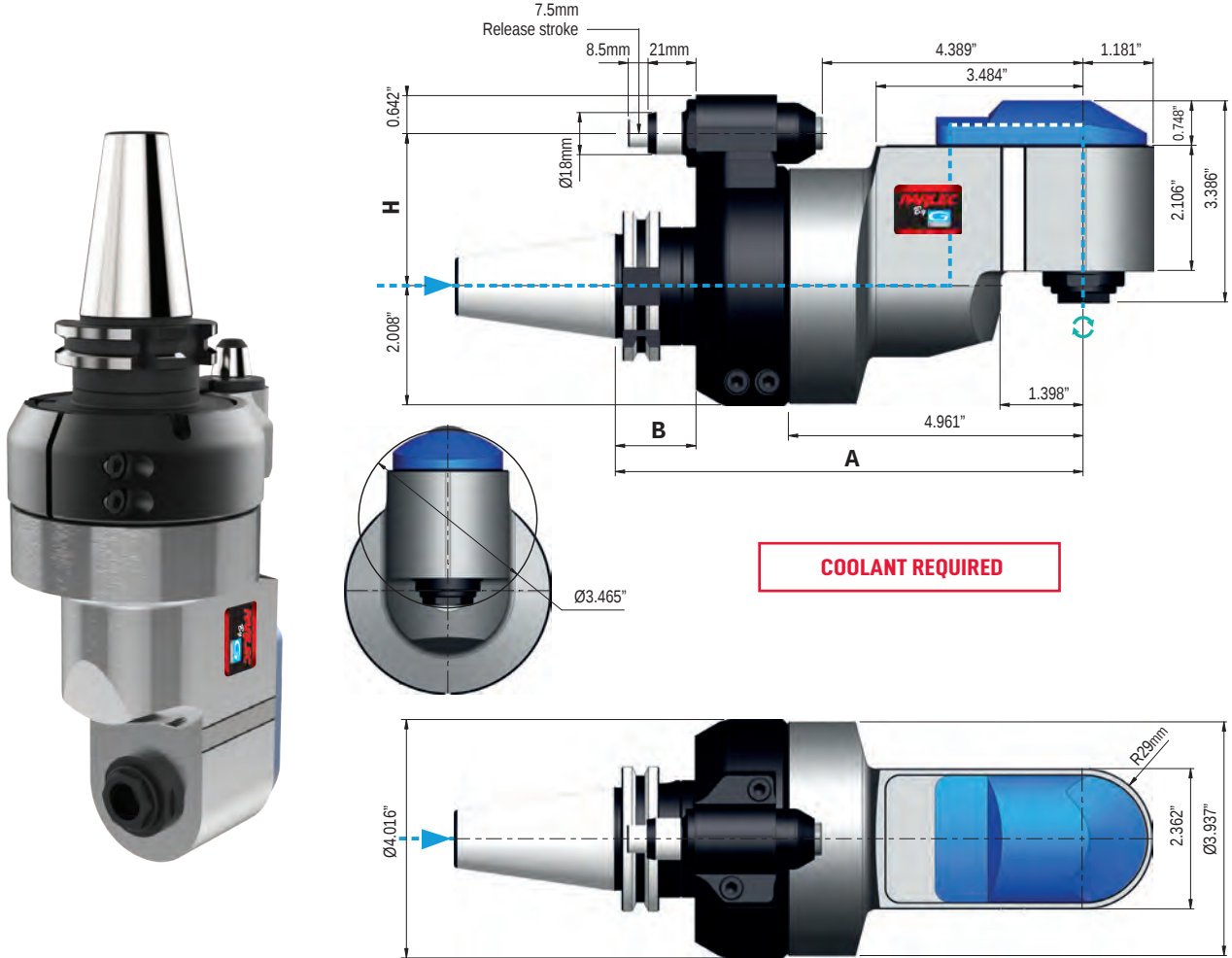
COOLANT REQUIRED

Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER16	3/8"	1:1	6,000	112 ft/lbs	195 in/lbs	Through Spindle 1000 psi	Same as Spindle	Set Back, Standard

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	7.26"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	13.6 lbs
BT 40	7.26"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	13.6 lbs
CAT 50	7.26"	1.378"	3.15" (80)	4.33" (110)	19.1 lbs
HSK63A	7.62"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	13.6 lbs
HSK100A	7.62"	1.811"	3.15" (80)	4.33" (110)	19.1 lbs

* Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76-93.

FR90-13



COOLANT REQUIRED

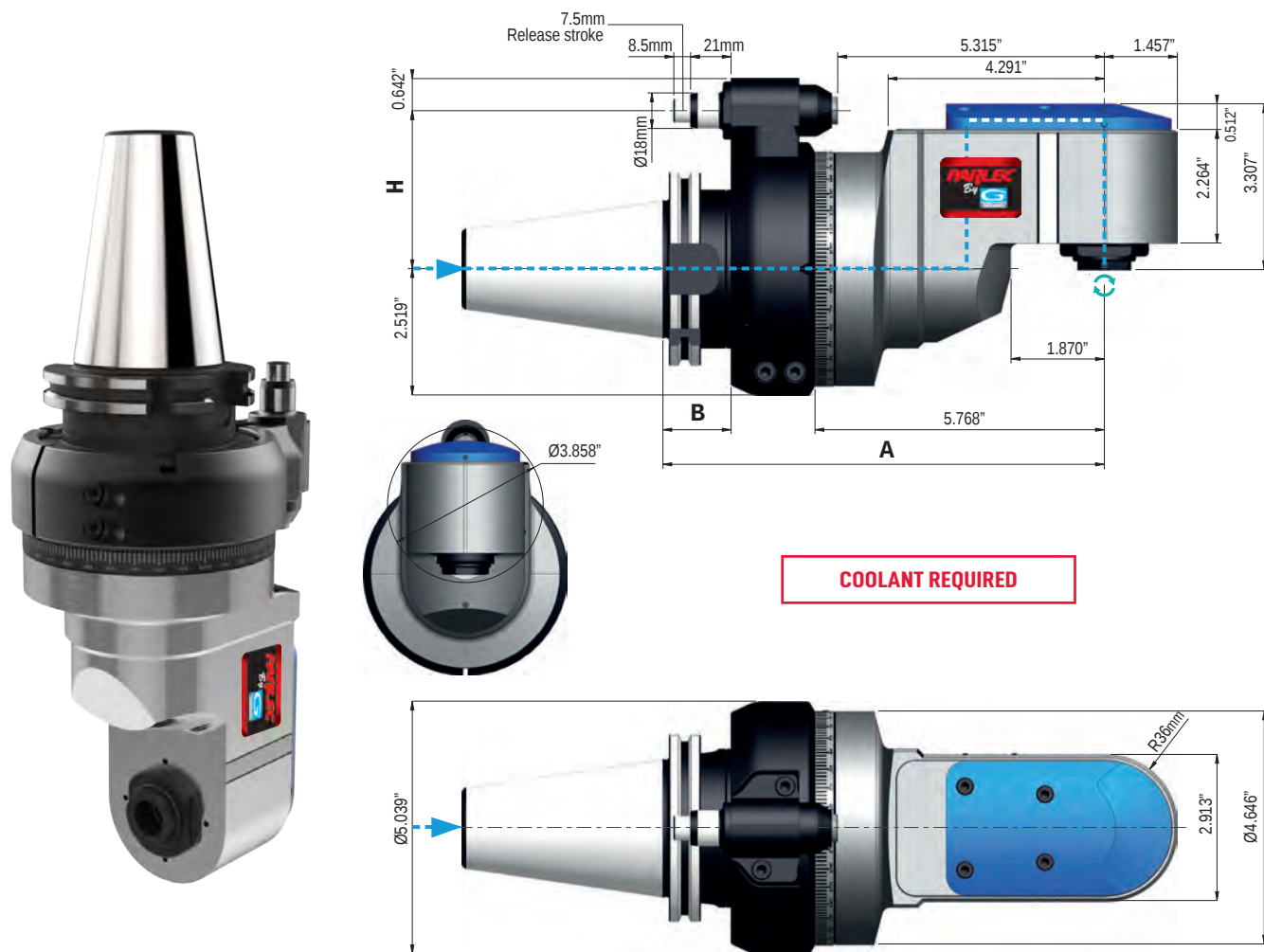
Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER20	1/2"	1 : 1	4,500	128 ft/lbs	354 in/lbs	Through Spindle 1000 psi	Same as Spindle	Set Back, Standard

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	7.87"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	25.8 lbs
BT 40	7.87"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	25.8 lbs
CAT 50	7.87"	1.378"	3.15" (80)	4.33" (110)	30.3 lbs
HSK63A	8.23"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	25.8 lbs
HSK100A	8.23"	1.811"	3.15" (80)	4.33" (110)	30.3 lbs

* Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76-93.

Angle Heads

FR90-16

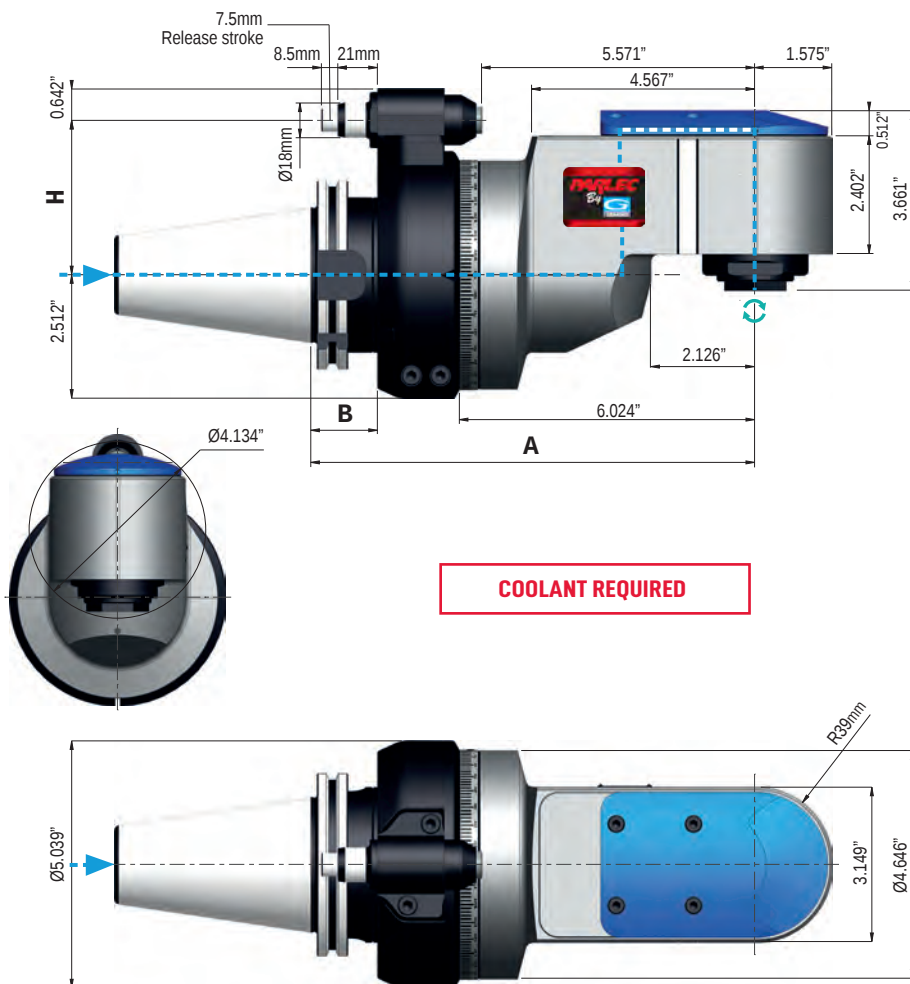


Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER25	5/8"	1 : 1	4,000	182 ft/lbs	708 in/lbs	Through Spindle 1000 psi	Same as Spindle	Set Back, Standard

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 50	8.80"	1.378"	3.15" (80)	4.33" (110)	29.2 lbs
HSK100A	9.15"	1.811"	3.15" (80)	4.33" (110)	29.2 lbs

* Other spindle connections available: BT50, HSK80A, C8, and KM80/100. Collets sold separately. See pages 76-93.

FR90-20



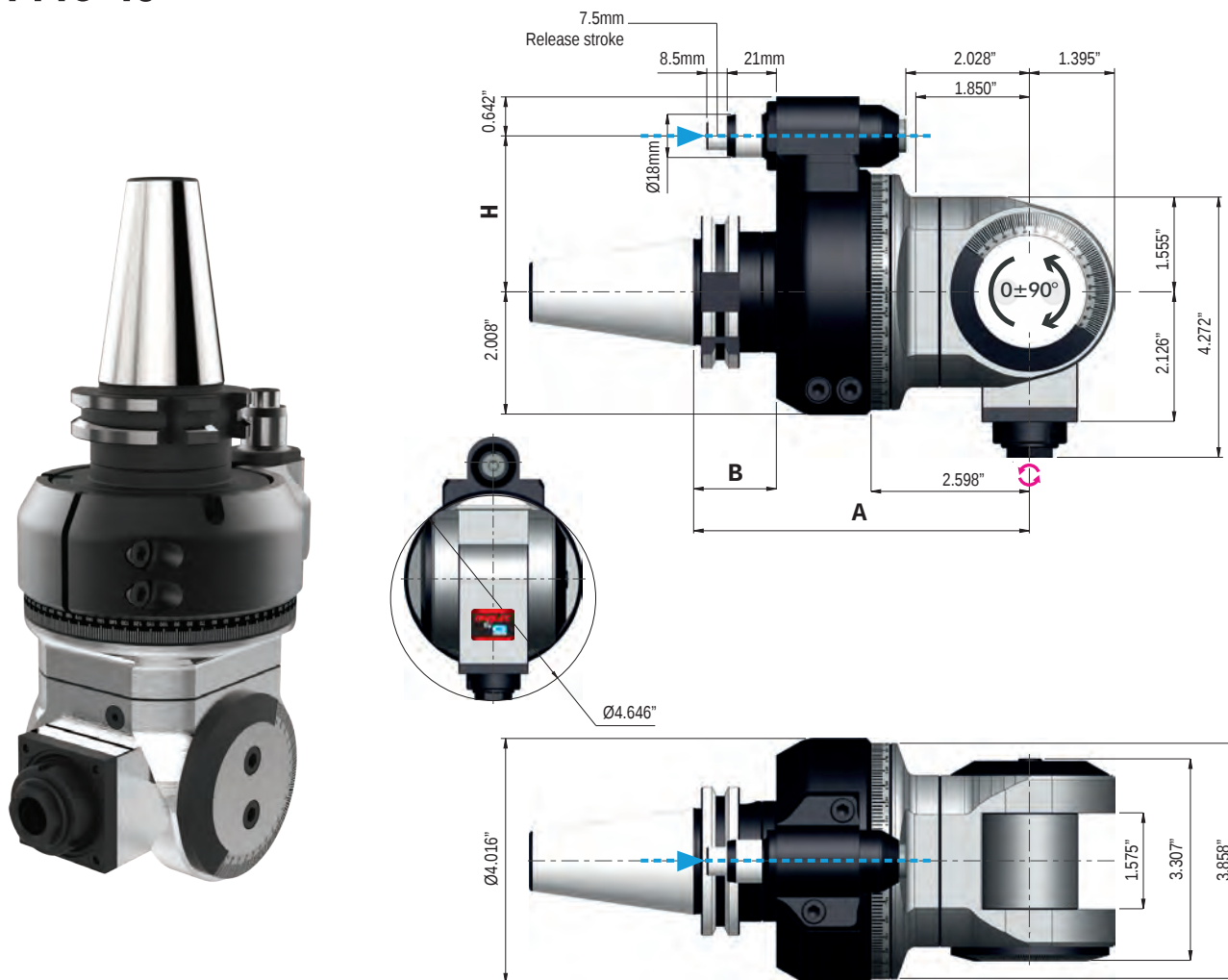
Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delviery	Tool Rotation Direction	Series
ER32	3/4"	1 : 1	3,500	259 ft/lbs	726 in/lbs	Through Spindle 1000 psi	Same as Spindle	Set Back, Standard

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 50	9.06"	1.378"	3.15" (80)	4.33" (110)	32.0 lbs
HSK100A	9.41"	1.811"	3.15" (80)	4.33" (110)	32.0 lbs

* Other spindle connections available: BT50, HSK80A, C8, and KM80/100. Collets sold separately. See pages 76–93.

Angle Heads

FMU-10

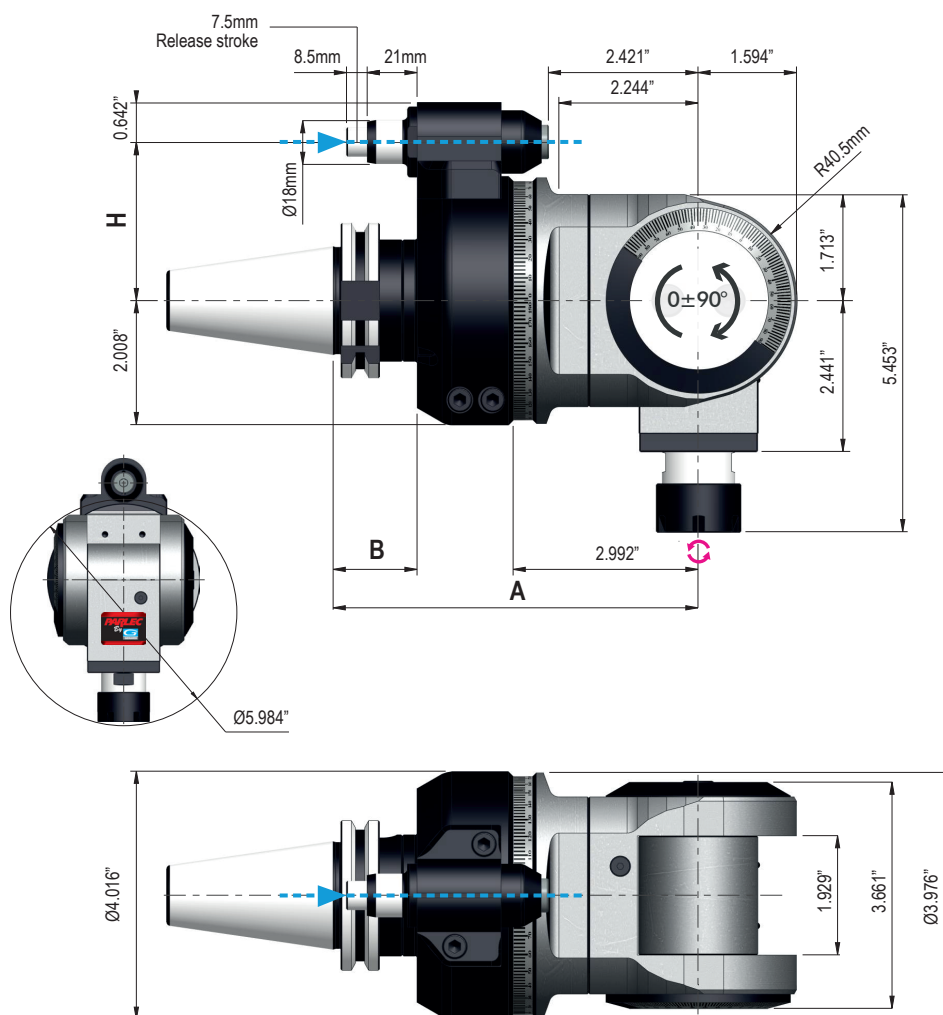


Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER16	3/8"	1 : 1	8,000	124 ft/lbs	80 in/lbs	Through Positioning Pin	Opposite Spindle	Adjustable

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	5.51"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	13.8 lbs
BT 40	5.51"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	13.8 lbs
CAT 50	5.51"	1.378"	3.15" (80)	4.33" (110)	18.3 lbs
HSK63A	5.87"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	13.8 lbs
HSK100A	5.87"	1.811"	3.15" (80)	4.33" (110)	18.3 lbs

* Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76-93.

FMU-16



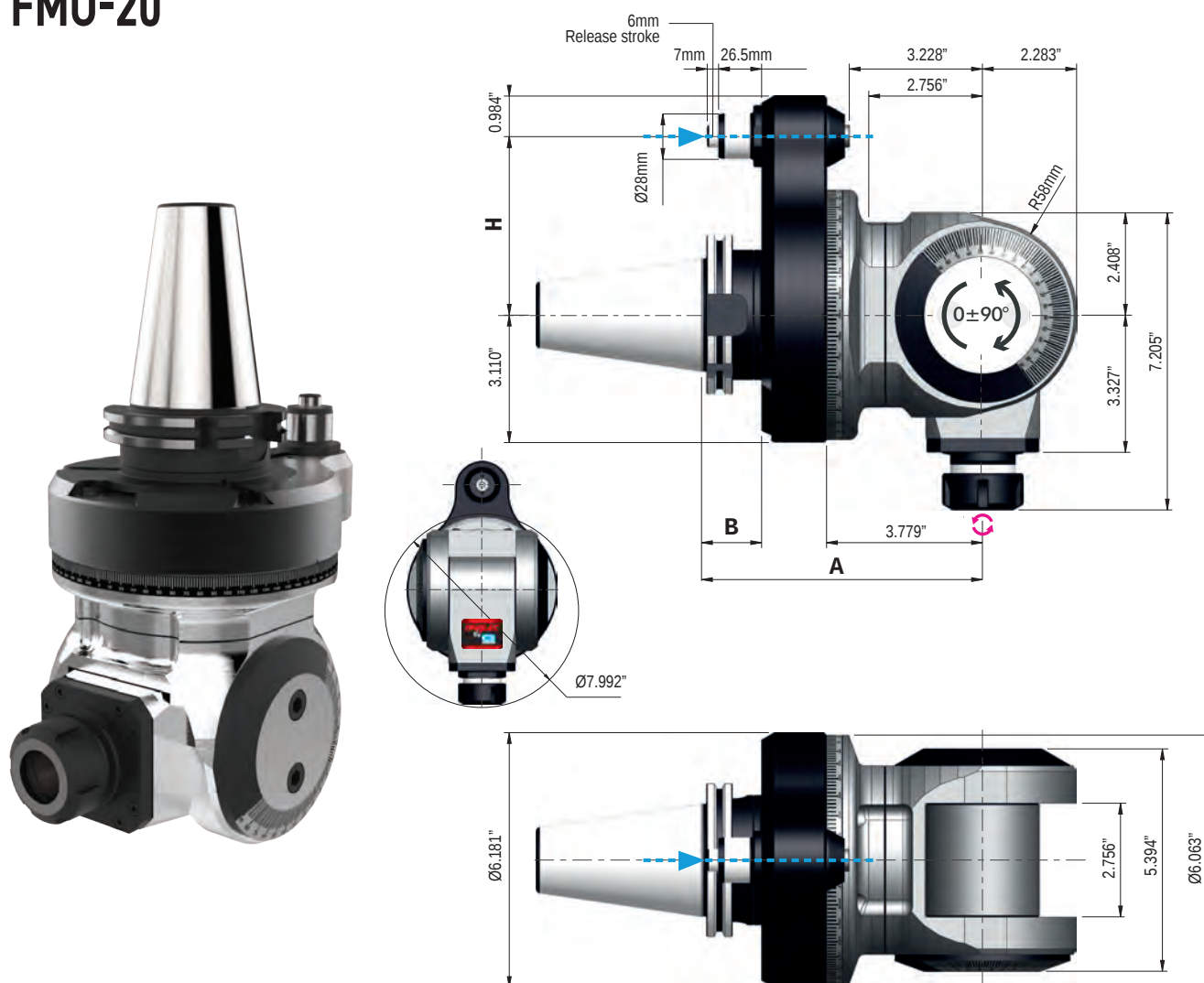
Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER25	5/8"	1:1	6,000	142 ft/lbs	133 in/lbs	Through Positioning Pin	Opposite Spindle	Adjustable

Spindle Connection	A	B	H (mm)	H Option (mm)	Weight
CAT 40	5.91"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	18.0 lbs
BT 40	5.91"	1.378"	2.56" (65)	3.15" / 4.33" (80/110)	18.0 lbs
CAT 50	5.91"	1.378"	3.15" (80)	4.33" (110)	23.1 lbs
HSK63A	6.26"	1.732"	2.56" (65)	3.15" / 4.33" (80/110)	18.0 lbs
HSK100A	6.26"	1.811"	3.15" (80)	4.33" (110)	23.1 lbs

* Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76-93.

Angle Heads

FMU-20



Output	Max. Shank	Gear Ratio	Max. RPM	Max. Axial Load	Torque	Coolant Delivery	Tool Rotation Direction	Series
ER32	3/4"	1:1	2,500	391 ft/lbs	425 in/lbs	Through Positioning Pin	Opposite Spindle	Adjustable

Spindle Connection	A	B	H (mm)	H Option	Weight
CAT 50	6.81"	1.456"	4.33" (110)	-	48.5 lbs
HSK100A	7.17"	1.889"	4.33" (110)	-	48.5 lbs

* Other spindle connections available: BT50, HSK80A, C5/6/8, and KM63/80/100. Collets sold separately. See pages 76-93.

MTC SERIES

MANUAL TOOL CHANGE



F90MTC-16



F90MTC-16L



F90MTC-S40



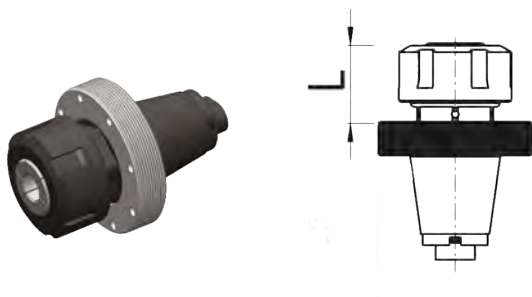
F90MTC-20



F90MTC-20L

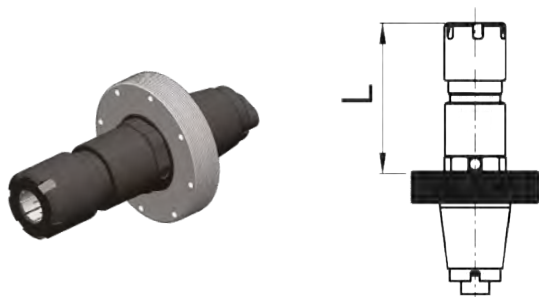
Angle Heads

Modular Quick Change Adapters | For Internal Nuts with External Threads



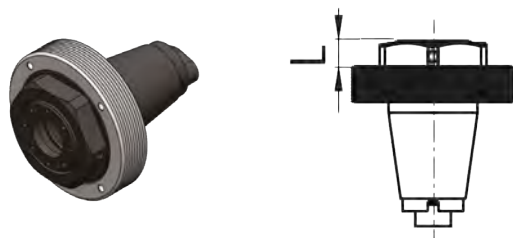
Collet Chuck Adapters with Standard Collet Nuts

Part #	Adapter Connection	Output	L
9.HT.ER25I.16E	ER25	ER16	1.14"
9.HT.ER25I.20E	ER25	ER20	1.22"
9.HT.ER25I.25E	ER25	ER25	1.22"
9.HT.ER32I.20E	ER32	ER20	1.14"
9.HT.ER32I.25E	ER32	ER25	1.22"
9.HT.ER32I.32E	ER32	ER32	1.38"
9.HT.ER40I.25E	ER40	ER25	1.22"
9.HT.ER40I.32E	ER40	ER32	1.38"
9.HT.ER40I.40E	ER40	ER40	1.57"



Extended Length Collet Chuck Adapters with Mini Nuts

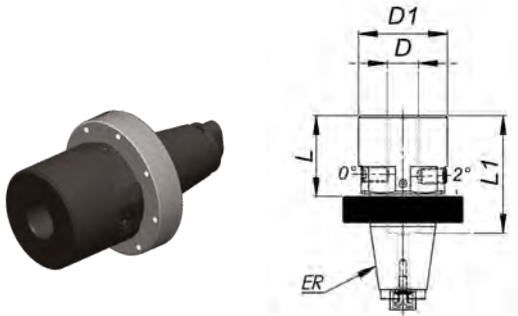
Part #	Adapter Connection	Output	L
9.HT.ER25I.11EL	ER25	ER11	1.18"
9.HT.ER25I.16EL	ER25	ER16	1.57"
9.HT.ER32I.11EL	ER32	ER11	1.57"
9.HT.ER32I.16EL	ER32	ER16	1.97"
9.HT.ER32I.20EL	ER32	ER20	1.97"
9.HT.ER40I.16EL	ER40	ER16	1.97"
9.HT.ER40I.20EL	ER40	ER20	1.97"
9.HT.ER40I.25EL	ER40	ER25	1.97"



Collet Chuck Adapters with Internal Nuts

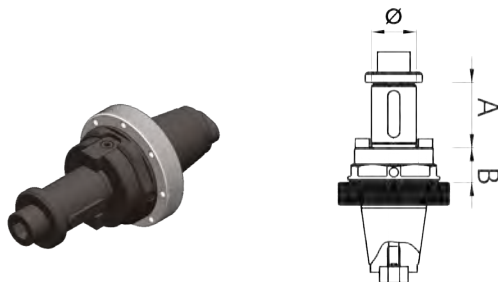
Part #	Adapter Connection	Output	L
9.HT.ER25I.11I	ER25	ER11	.35"
9.HT.ER25I.16I	ER25	ER16	.43"
9.HT.ER32I.20I	ER32	ER20	.43"
9.HT.ER32I.25I	ER32	ER25	.43"
9.HT.ER40I.25I	ER40	ER25	.47"
9.HT.ER40I.32I	ER40	ER32	.55"

Modular Quick Change Adapters | For Internal Nuts with External Threads



End Mill Holder Adapters - Metric

Part #	Adapter Connection	D (mm)	D1 (mm)	L (mm)	L1 (mm)
9.HT.ER25I.W06	ER25	6	19	28	36
9.HT.ER25I.W08	ER25	8	21	28	36
9.HT.ER25I.W10	ER25	10	28	29	40
9.HT.ER25I.W12	ER25	12	34	31	45
9.HT.ER25I.W14	ER25	14	36	31	45
9.HT.ER32I.W06	ER32	6	19	28	36
9.HT.ER32I.W08	ER32	8	21	28	36
9.HT.ER32I.W10	ER32	10	28	29	40
9.HT.ER32I.W12	ER32	12	34	31	45
9.HT.ER32I.W14	ER32	14	36	31	45
9.HT.ER32I.W16	ER32	16	38	34	49
9.HT.ER32I.W18	ER32	18	40	34	49
9.HT.ER32I.W20	ER32	20	45	36	51
9.HT.ER40I.W06	ER40	6	19	28	36
9.HT.ER40I.W08	ER40	8	21	28	36
9.HT.ER40I.W10	ER40	10	28	29	40
9.HT.ER40I.W12	ER40	12	34	31	45
9.HT.ER40I.W14	ER40	14	36	31	45
9.HT.ER40I.W16	ER40	16	38	34	49
9.HT.ER40I.W18	ER40	18	40	34	49
9.HT.ER40I.W20	ER40	20	45	36	51

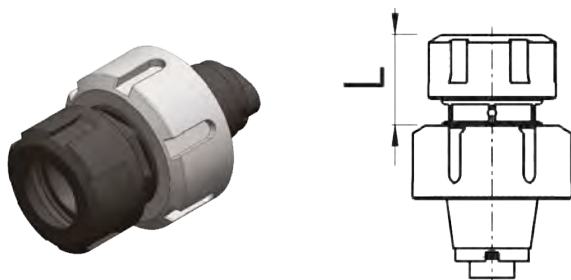


Face Mill Holder Adapters - Metric

Part #	Adapter Connection	Arbor Size (mm)	A (mm)	B (mm)
9.HT.ER25I.P16	ER25	16	27	16
9.HT.ER25I.P22	ER25	22	31	16
9.HT.ER32I.P16	ER32	16	27	17
9.HT.ER32I.P22	ER32	22	31	17
9.HT.ER40I.P22	ER40	22	31	20
9.HT.ER40I.P27	ER40	27	-	-

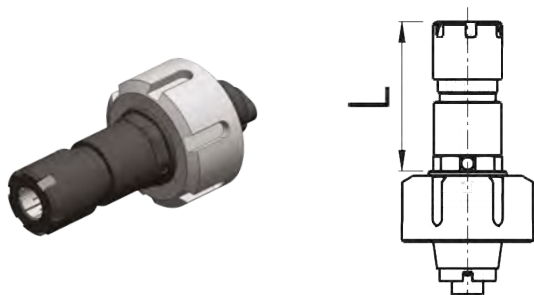
Angle Heads

Modular Quick Change Adapters | For External Nuts with Internal Threads



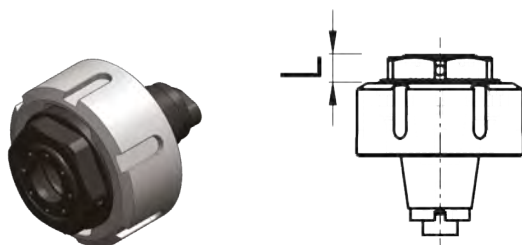
Collet Chuck Adapters with Standard Collet Nuts

Part #	Adapter Connection	Output	L
9.HT.ER25E.16E	ER25	ER16	1.14"
9.HT.ER25E.20E	ER25	ER20	1.22"
9.HT.ER25E.25E	ER25	ER25	1.22"
9.HT.ER32E.20E	ER32	ER20	1.14"
9.HT.ER32E.25E	ER32	ER25	1.22"
9.HT.ER32E.32E	ER32	ER32	1.38"
9.HT.ER40E.25E	ER40	ER25	1.22"
9.HT.ER40E.32E	ER40	ER32	1.38"
9.HT.ER40E.40E	ER40	ER40	1.57"



Extended Length Collet Chuck Adapters with Mini Nuts

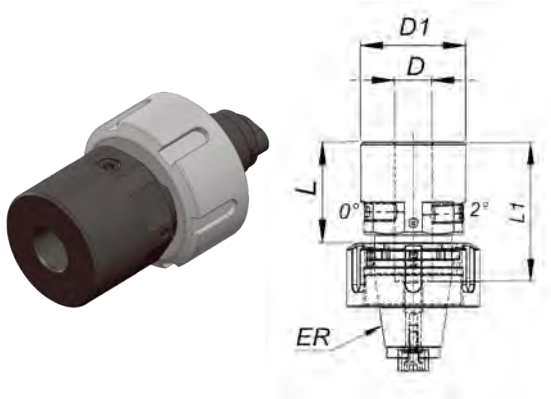
Part #	Adapter Connection	Output	L
9.HT.ER25E.11EL	ER25	ER11	1.18"
9.HT.ER25E.16EL	ER25	ER16	1.57"
9.HT.ER32E.11EL	ER32	ER11	1.57"
9.HT.ER32E.16EL	ER32	ER16	1.97"
9.HT.ER32E.20EL	ER32	ER20	1.97"
9.HT.ER40E.16EL	ER40	ER16	1.97"
9.HT.ER40E.20EL	ER40	ER20	1.97"
9.HT.ER40E.25EL	ER40	ER25	1.97"



Collet Chuck Adapters with Internal Nuts

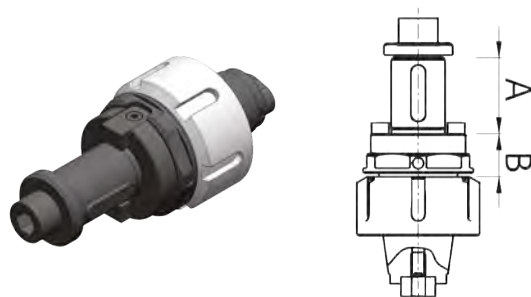
Part #	Adapter Connection	Output	L
9.HT.ER25E.11I	ER25	ER11	.35"
9.HT.ER25E.16I	ER25	ER16	.43"
9.HT.ER32E.20I	ER32	ER20	.43"
9.HT.ER32E.25I	ER32	ER25	.43"
9.HT.ER40E.25I	ER40	ER25	.47"
9.HT.ER40E.32I	ER40	ER32	.55"

Modular Quick Change Adapters | For External Nuts with Internal Threads



End Mill Holder Adapters - Metric

Part #	Adapter Connection	D (mm)	D1 (mm)	L (mm)	L1 (mm)
9.HT.ER25E.W06	ER25	6	19	28	36
9.HT.ER25E.W08	ER25	8	21	28	36
9.HT.ER25E.W10	ER25	10	28	29	40
9.HT.ER25E.W12	ER25	12	34	31	45
9.HT.ER25E.W14	ER25	14	36	31	45
9.HT.ER32E.W06	ER32	6	19	28	36
9.HT.ER32E.W08	ER32	8	21	28	36
9.HT.ER32E.W10	ER32	10	28	29	40
9.HT.ER32E.W12	ER32	12	34	31	45
9.HT.ER32E.W14	ER32	14	36	31	45
9.HT.ER32E.W16	ER32	16	38	34	49
9.HT.ER32E.W18	ER32	18	40	34	49
9.HT.ER32E.W20	ER32	20	45	36	51
9.HT.ER40E.W06	ER40	6	19	28	36
9.HT.ER40E.W08	ER40	8	21	28	36
9.HT.ER40E.W10	ER40	10	28	29	40
9.HT.ER40E.W12	ER40	12	34	31	45
9.HT.ER40E.W14	ER40	14	36	31	45
9.HT.ER40E.W16	ER40	16	38	34	49
9.HT.ER40E.W18	ER40	18	40	34	49
9.HT.ER40E.W20	ER40	20	45	36	51



Face Mill Holder Adapters - Metric

Part #	Adapter Connection	Arbor Size (mm)	A (mm)	B (mm)
9.HT.ER25E.P16	ER25	16	27	16
9.HT.ER25E.P22	ER25	22	31	16
9.HT.ER32E.P16	ER32	16	27	17
9.HT.ER32E.P22	ER32	22	31	17
9.HT.ER40E.P22	ER40	22	31	20
9.HT.ER40E.P27	ER40	27	-	-

MultiPOINT Anti-Rotation System



Made of 4 brace points for:

- Greater rigidity
- Reducing vibration
- Heavy duty machining
- Mounting on any type of machine spindle



Type 1

A	D	H	Option H	Pin Size	Optional Pin Size
1.65 (41.75)	4.02 (102)	2.559 (65)	3.149 (80) / 4.330 (110)	18 mm	28 mm with 110 mm H only
MODELS				AVAILABLE SHANKS	
FL90-13 / 13L • FL90-16 / 16L / 16D • FS90-3 / 3L • FS90-4 / 4L • FS90-6 / 6L F90-7 / 7D / 7C / 7L / 7LD / 7LC • F90-10 / 10D / 10C / 10L / 10LD • F90-13 / 13C / 13L F90-16S / 16SC • F90-20S • F90-20D • FMU-10 • FMU-16 • FR90-10 • FR90-13				<u>CAT</u> 40, 50	<u>DIN (SK)</u> 40, 50 <u>KM</u> 63, 80, 100
					<u>BT</u> 40, 50 <u>ISO 26623</u> C5, C6, C8
					<u>HSK A</u> 63, 80, 100

Type 2

A	D	H	Option H	Pin Size	Optional Pin Size
2.23 (56.75)	5.04 (128)	3.149 (80)	4.330 (110)	18 mm	28 mm with 110 mm H only
MODELS				AVAILABLE SHANKS	
F90-16 / 16D / 16C / 16L / 16LD • F90-20 / 20C / 20L • FR90-16 • FR90-20				<u>CAT</u> 50	<u>BT</u> 50 <u>HSK A</u> 80, 100 <u>ISO 26623</u> C6, C8

Type 3

A	D	H	Option H	Pin Size	Optional Pin Size
-	6.18 (157)	4.330 (110)	-	28 mm	-
MODELS				AVAILABLE SHANKS	
F90-S40 / S40C • F90-30 / 30D • FMU-20				<u>CAT</u> 50	<u>BT</u> 50 <u>HSK A</u> 80, 100 <u>KM</u> 80, 100 <u>ISO 26623</u> C6, C8

ReCOOL ER Nuts

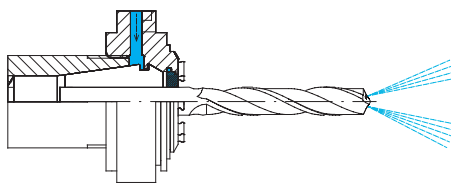


For External Nuts



For Internal Nuts

Coolant Through

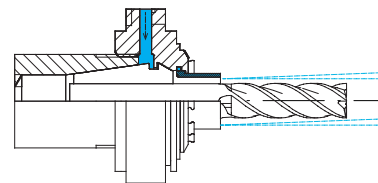


GDS



- Achieve coolant through with ReCool nuts
- Precise cooling at the cutting edge and improved chip removal
- Particularly suitable for deep cavities
- Lubrication of cutting edge
- Best surface quality

External Coolant



GKS



- Achieve external cooling with ReCool nuts
- Applicable on Angle Heads and Driven Tools with internal coolant through suitable nut STDC - MINIC - AXC
- Coolant is fed along the side of the tool to the cutting edge
- Can be used for moderate cavities

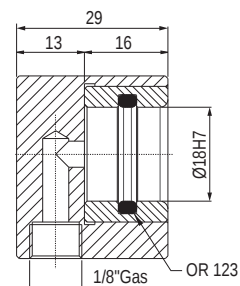
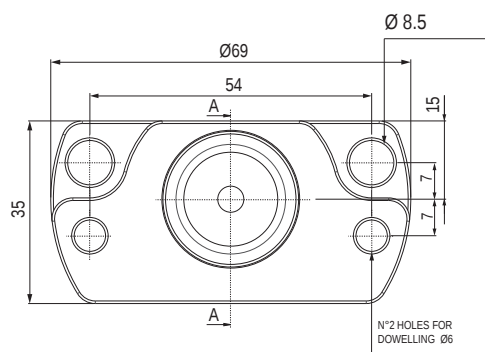
Part #	Collet Size	Fits Angle Head Type	Sealing Ring for Coolant-Through Tooling*	Sealing Ring for External Coolant*	Wrench
9.GR.CR16	ER16	F90-10/10L, FMU-10	9.GD.S16/xx	9.GK.S16/xx	9.CH.16AX
9.GR.CR20	ER20	FL90-13	9.GD.S20/xx	9.GK.S20/xx	9.CH.20AX
9.GR.CR25	ER25	F90-16/16S/16L, FL90-16, FMU-16	9.GD.S25/xx	9.GK.S25/xx	9.CH.25AX
9.GR.CR32	ER32	F90-20/20S/20L, FMU-20	9.GD.S32/xx	9.GK.S32/xx	9.CH.32AX
9.GR.CR40	ER40	F90-S40	9.GD.S40/xx	9.GK.S40/xx	9.CH.40AX

*"xx" denotes tool shank diameter (ex. 9.GD.S16/10 means 10 mm shank diameter)

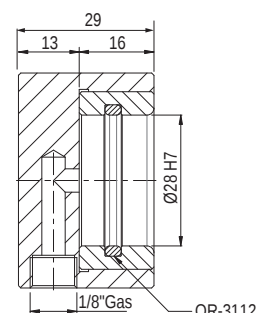
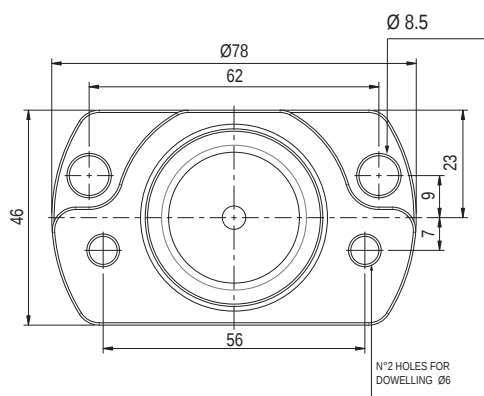
Universal Block - Straight Pin



Ø18



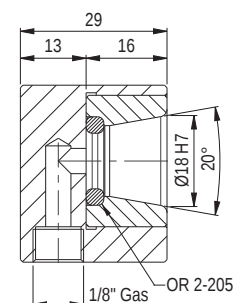
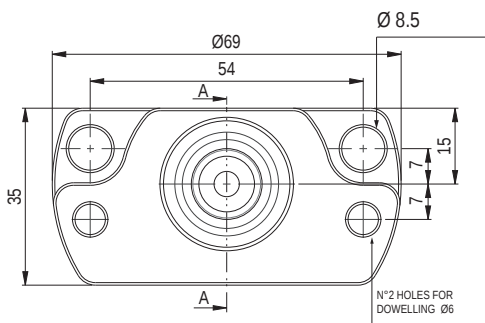
Ø28



Universal Block - Conical Pin



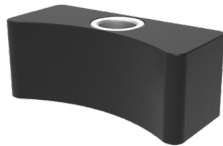
Ø18



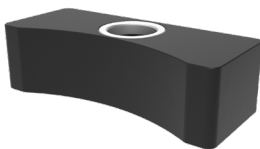
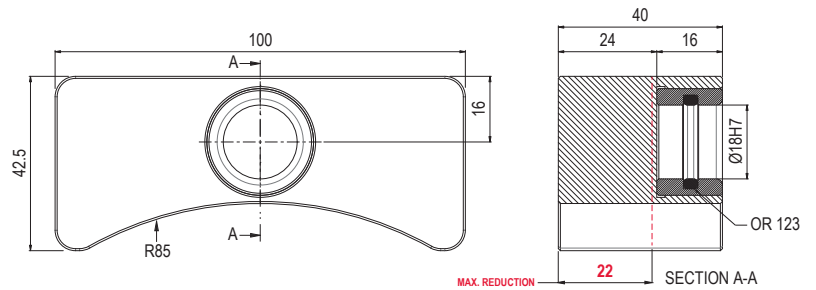
Part #	Bushing / Pin Size
9.F18.INDEX (straight pin, type 1 & 2)	18mm
9.F28.INDEX (straight pin, Type 3)	28mm
9.F18.INDEXC (conical pin, FL series, type 1 & 2)	18mm
*9.F18.INDEX-HAAS21 (straight pin)	18mm
*9.F18.INDEX-HAAS21C (conical pin, FL series)	18mm

* HAAS Blocks - Not Shown

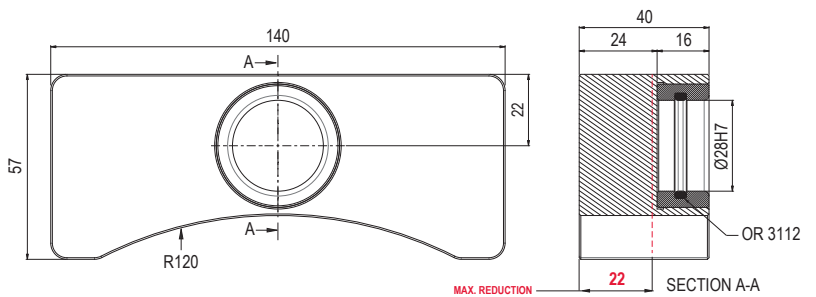
Machinable Block - Straight Pin



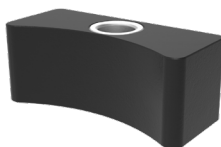
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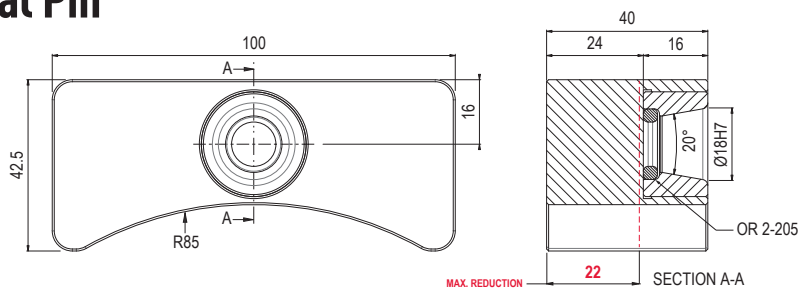
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Machinable Block - Conical Pin



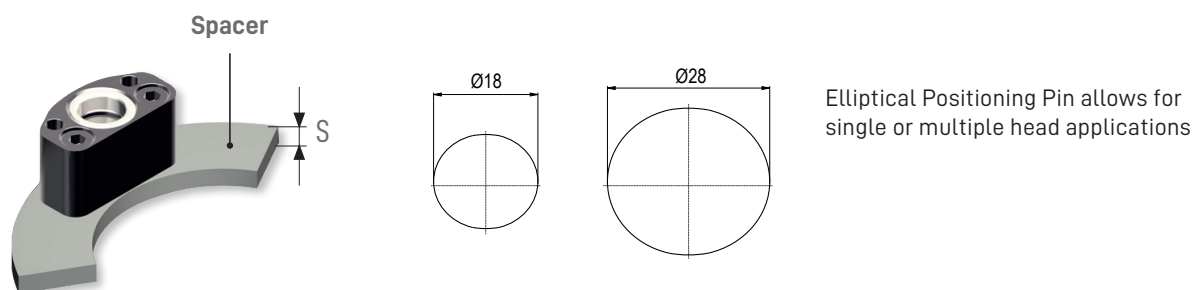
Ø18



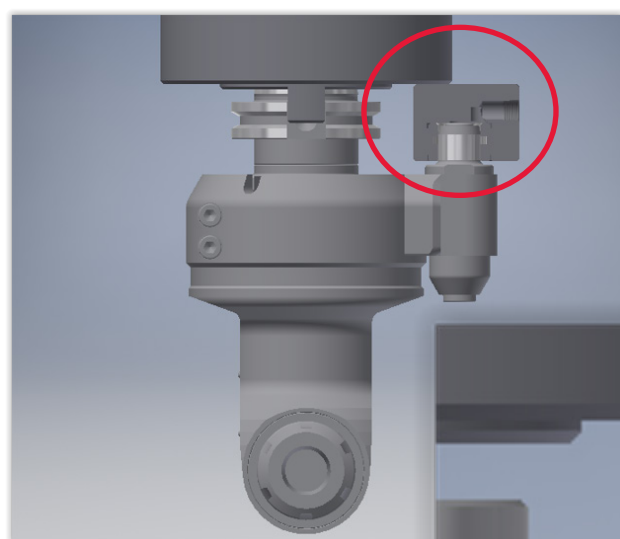
Part #	Bushing / Pin Size
9.G18.INDEX (straight pin, type 1 & 2)	18mm
9.G28.INDEX (straight pin, Type 3)	28mm
9.G18.INDEXC (conical pin, FL series, type 1 & 2)	18mm

Angle Heads

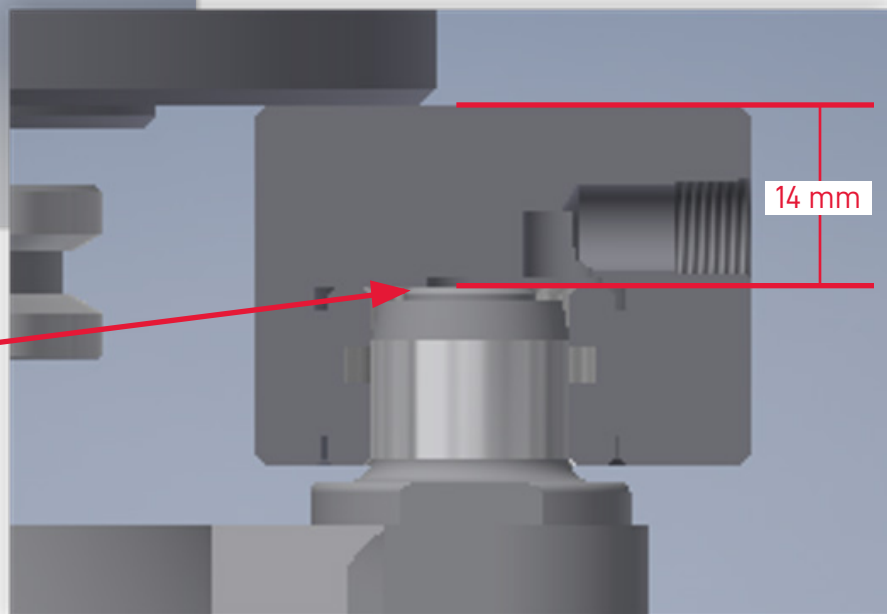
Spacer Calculations | For Determining Need and Size of Spacer



Optional spacer is not provided. "S" thickness is for reference only.
Actual thickness, and/or the need for a spacer, can be calculated below.



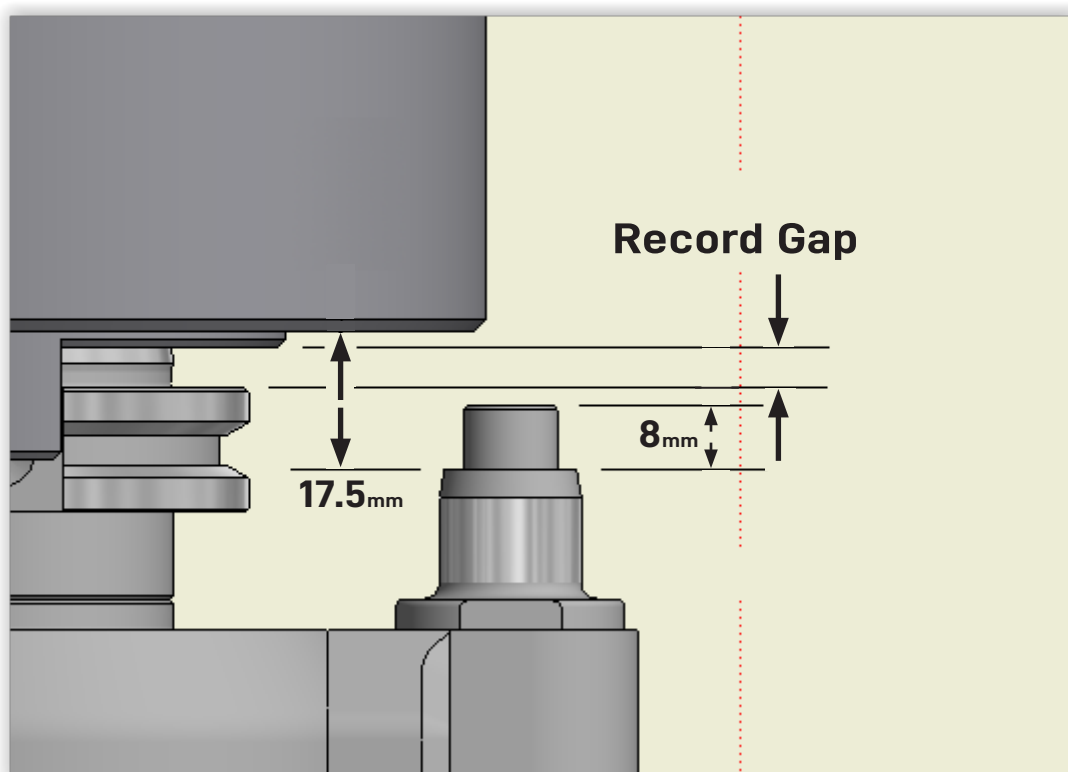
Stop Block shown with cutaway for pin length clarity.
Distance from bottom of the fixed PIN plus 1mm free play is 14 mm. Add spacer between the bottom of the stop block and face of spindle housing if needed.



Correct Free Play 1mm (.040")
when installed into machine
spindle and stop block.

Spacer Calculations | For Determining Need and Size of Spacer

Check gap between fixed pin and face of spindle housing. In this example it is 17.5mm.
The standard stop block is 13mm and the free play is 1mm. ($13 + 1 = 14\text{mm}$)
Calculate $17.5 - 14 = 3.5\text{mm}$ (in this example).
This example requires a 3.5mm spacer.



Record distance between spindle face and toolholder flange. This is important to make sure you have full spindle engagement after final stop block installation. The distance should be the same after initial automatic tool change.