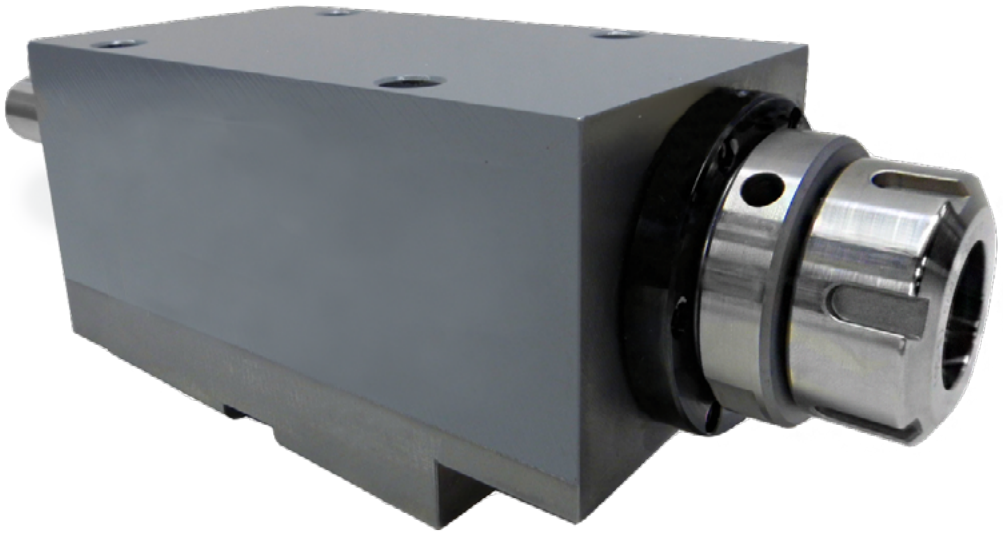
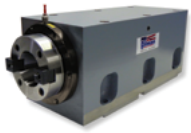
USE AND INSTALLATION HANDBOOK FOR

Belt Driven Spindles

262.377.2434 • 1230 Cheyenne Ave, Grafton, WI • www.gilmanprecision.com



Gilman
SOLUTIONS FOR LINEAR & ROTARY MOTION



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Run-In Procedure

For Grease Lubricated Gilman Precision Belt-Driven Spindles

Gilman grease lubricated spindles must only be operated at or below the maximum speed that it was designed for. Never operate the spindle above its maximum rated speed. Grease lubricated spindles use Lubcon High-Speed L252 grease as a standard. Other greases may have been used depending on the bearing type or the original spindles design parameters.

All spindles are fully run-in at the spindles maximum speed prior to shipment. During shipment, or if the spindle is not used for a period of time after shipment the grease in the bearings may have been displaced. This may require the spindle to be run-in again. If a spindle has had down time (over three months) a run-in may also be necessary.

Spindles in good health should not run at a temperature greater than one-hundred and thirty degrees F.

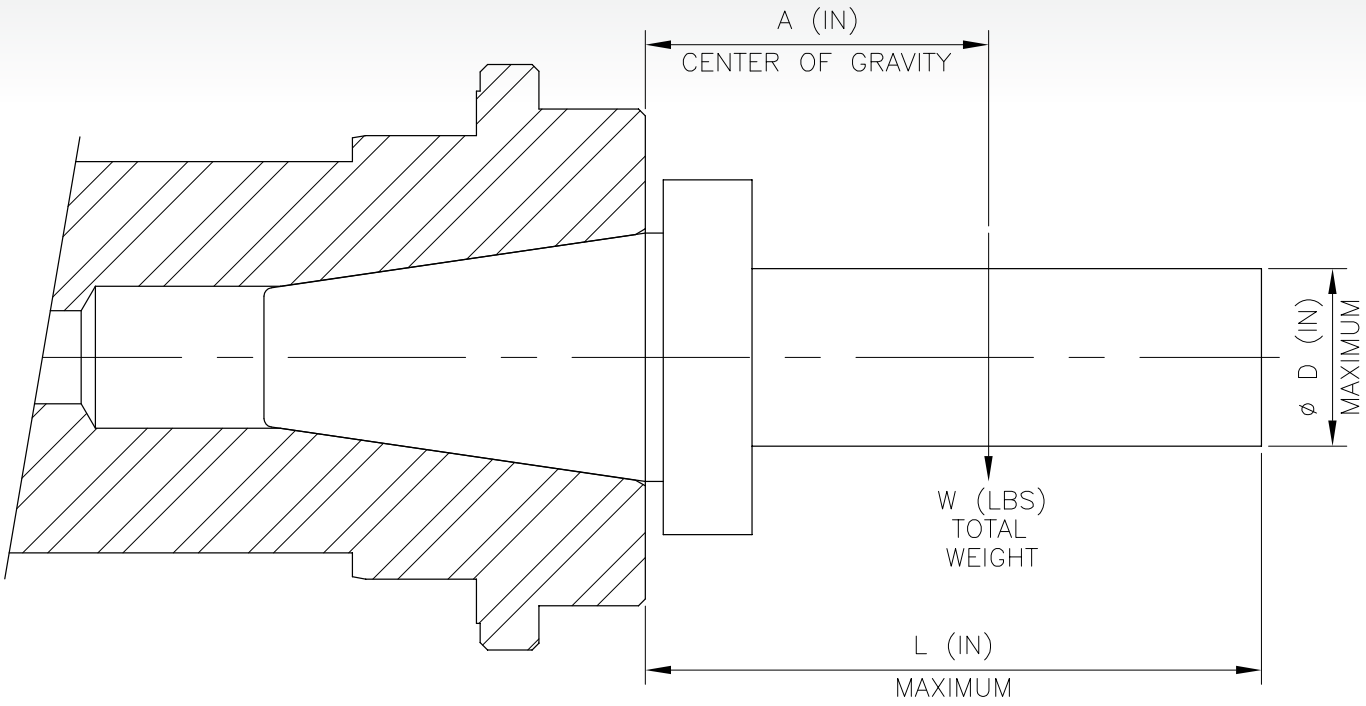
Start the spindle and run it to it's maximum rated speed, recording the temperature over the nose end and drive end bearings. If after thirty minutes of run time the temperature does not exceed 130˚ F. and has stabilized, there is no need to go through the run-in process. If at any time during this process the spindles bearing temperature exceeds 130˚ F, shut the spindle down and allow it to cool to room temperature before going through the run-in process.

Run-in process: Start the spindle at twenty percent of its maximum rated speed. Initially the temperature will rise and then drop and stabilize at a certain value. Only at this point can the spindles speed be increased by another twenty percent. Repeat this process until the spindle has reached its maximum speed. If at any point in the process the temperature over the spindles bearings reaches 130˚ F, the spindle is to be shut down and allowed to cool to room temperature. Failure to allow the spindle to cool to room temperature will result in no advancement in the spindles speed before again reading 130˚ F. Only by allowing the spindle to cool will the grease retract away form the raceway and an advancement of speed toward the spindles maximum speed be made.

Gilman
SOLUTIONS FOR LINEAR & ROTARY MOTION

30, 40 & 50 Steep Taper Spindles

with N.M.T.B. and V-Flange Tool-Holders

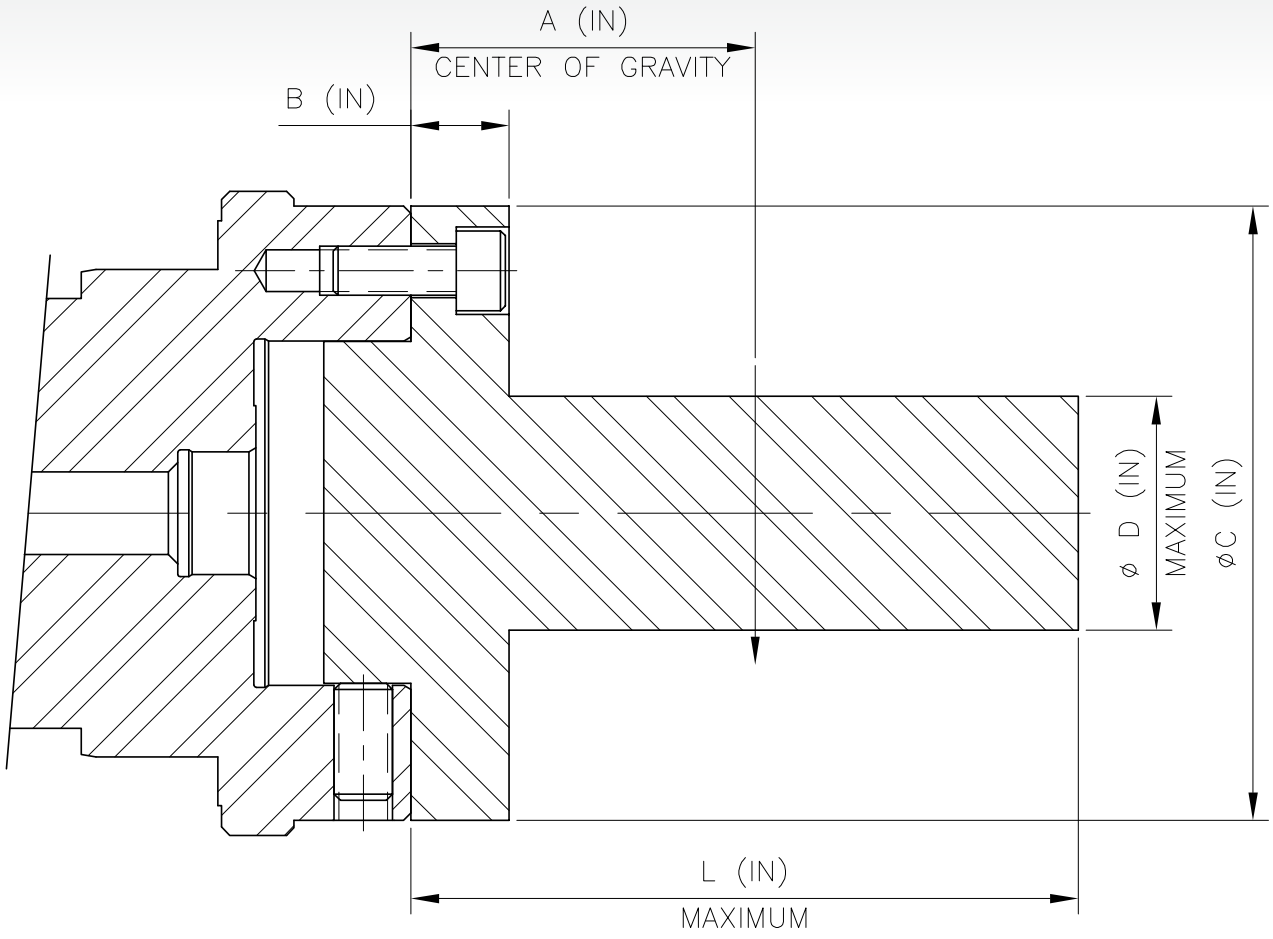


Spindle Size	(A) Moment (in-lbs) Maximum	(D) Diameter (in) Maximum	(L) Length (in) Maximum	Weight (lbs) Maximum
2750-30	0.91	1.75	1.63	1.13
3500-30	3.16	2.75	2.31	4.22
4000-40	17.16	3.66	3.44	9.03
5500-40	42.72	4.56	4.34	17.66
6500-50	121.31	5.25	6.31	36.59
8000-50	242.41	6.53	7.19	36.31

For values less than the maximum tooling to be balanced to ISO G2.5 specifications minimum.
For values greater than the maximum the tooling will have to be balanced with the spindle.

BN Boring Spindles

with Specially Designed Tooling

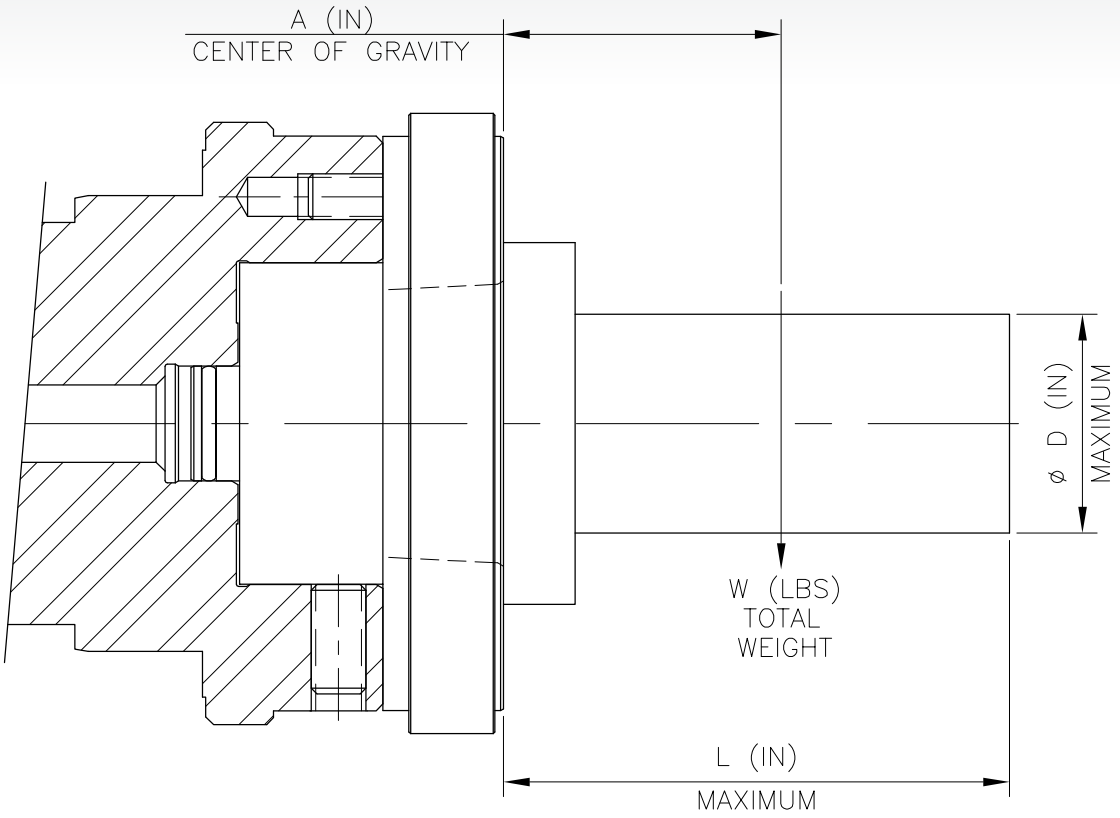


Spindle Size	(A) Moment (in-lbs) Maximum	(B) Length (in)	(C) Diameter (in)	(D) Diameter (in) Maximum	(L) Length (in) Maximum	Weight (lbs) Maximum
2750-BN	1.09	0.50	2.44	1.84	1.63	1.53
3500-BN	3.62	0.50	3.12	2.56	2.19	3.56
4000-BN	17.69	0.63	3.94	3.66	3.44	10.53
5500-BN	43.44	0.63	3.94	4.63	4.28	19.59
6500-BN	107.44	0.81	5.50	5.66	5.50	38.79
8000-BN	224.00	0.81	5.50	7.00	6.44	66.62

For values less than the maximum tooling to be balanced to ISO G2.5 specifications minimum.
For values greater than the maximum the tooling will have to be balanced with the spindle.

HM HSK Manual Clamp Spindles

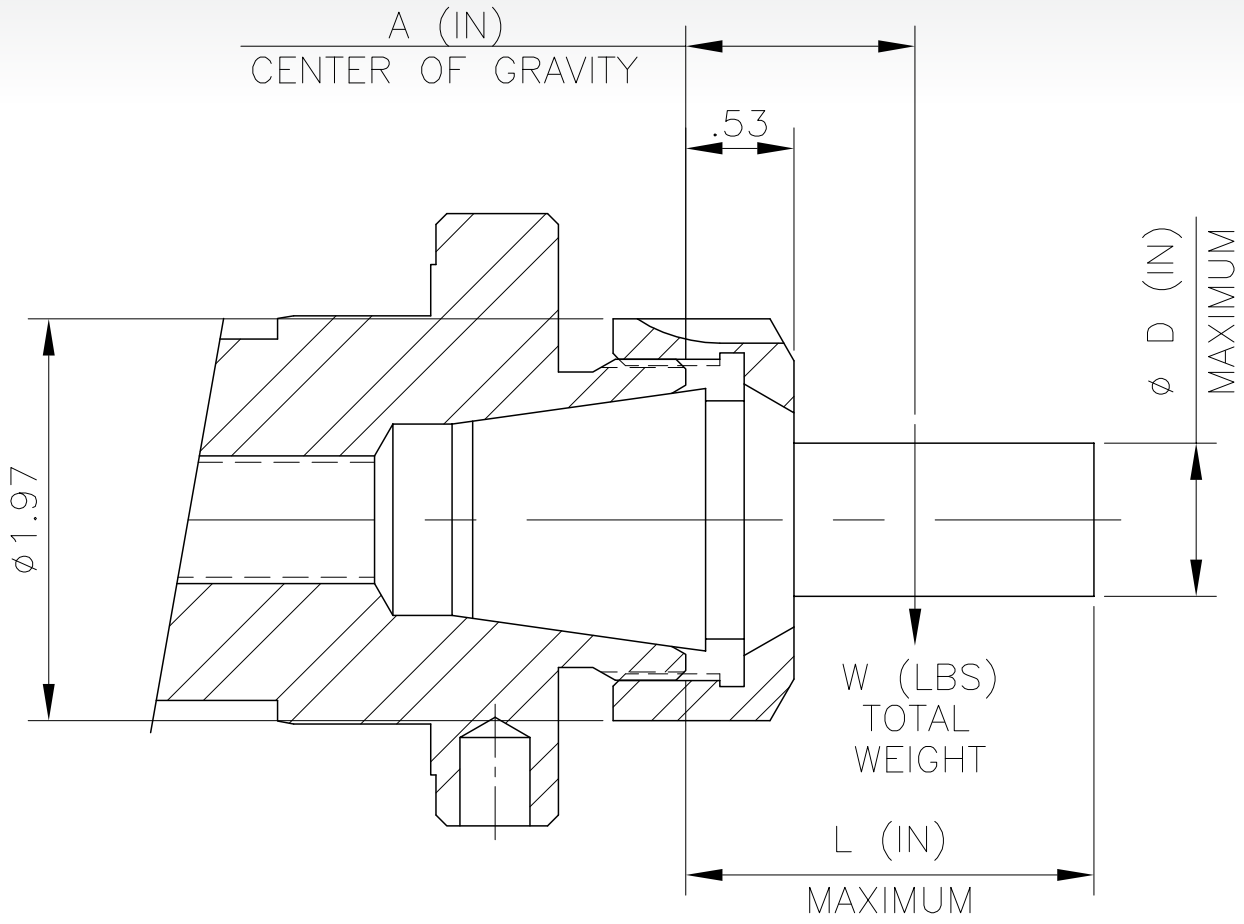
(HSKC40, HSKC50, HSKC63, HSKC100)



Spindle Size	(A) Moment (in-lbs) Maximum	(D) Diameter (in) Maximum	(L) Length (in) Maximum	Weight (lbs) Maximum
2750-HM	0.25	1.47	1.03	0.53
3500-HM	1.38	2.38	1.50	1.69
4000-HM	9.59	3.62	2.59	6.79
5500-HM	29.19	4.69	3.47	15.31
6500-HM	68.19	5.66	4.41	28.97
8000-HM	160.75	7.12	5.38	55.53

For values less than the maximum tooling to be balanced to ISO G2.5 specifications minimum.
For values greater than the maximum the tooling will have to be balanced with the spindle.

ER32 Collet Spindles



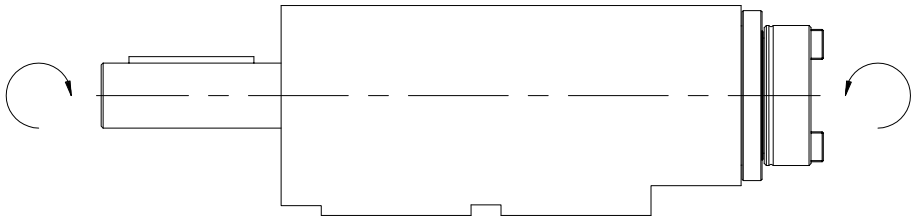
Spindle Size	(A) Moment (in-lbs) Maximum	(D) Diameter (in) Maximum	(L) Length (in) Maximum	Weight (lbs) Maximum
2750-CE	1.03	2.22	1.38	1.41
3500-CE	3.62	2.91	2.00	3.22

For values less than the maximum tooling to be balanced to ISO G2.5 specifications minimum.
For values greater than the maximum the tooling will have to be balanced with the spindle.

Torque Limits

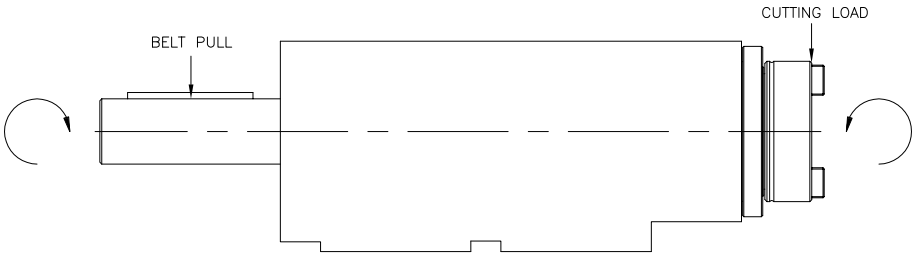
PURE TORQUE LIMITS (DIRECT DRIVE)

Spindle Size	Torque (in-lbs) Maximum
2750	575
3500	1250
4000	3225
5500	6200
6500	8500
8000	11875

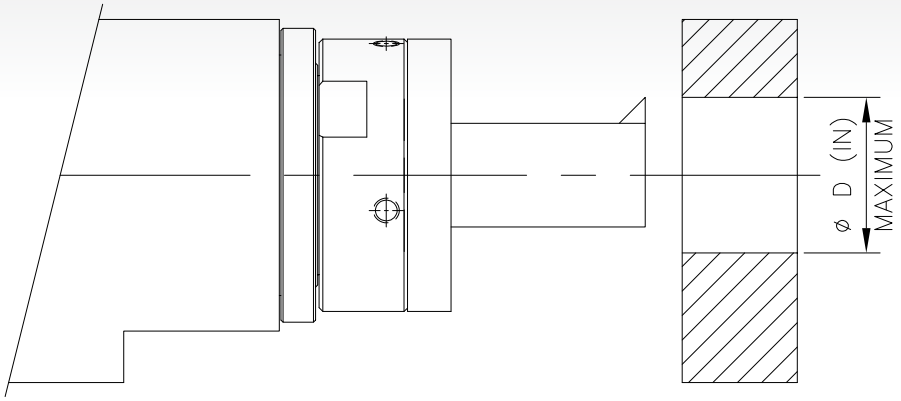


TORQUE LIMITS WHEN RADICAL LOADS ARE PRESENT

Spindle Size	Torque (in-lbs) Maximum
2750	130
3500	525
4000	1000
5500	2150
6500	4100
8000	7450



Boring Limits



Spindle Size	D (in) Maximum
2750	1.19
3500	1.78
4000	2.16
5500	2.75
6500	3.34
8000	3.94

For optimum performance where a high accuracy for size tolerance, hole shape and surface finish are required.

Balancing

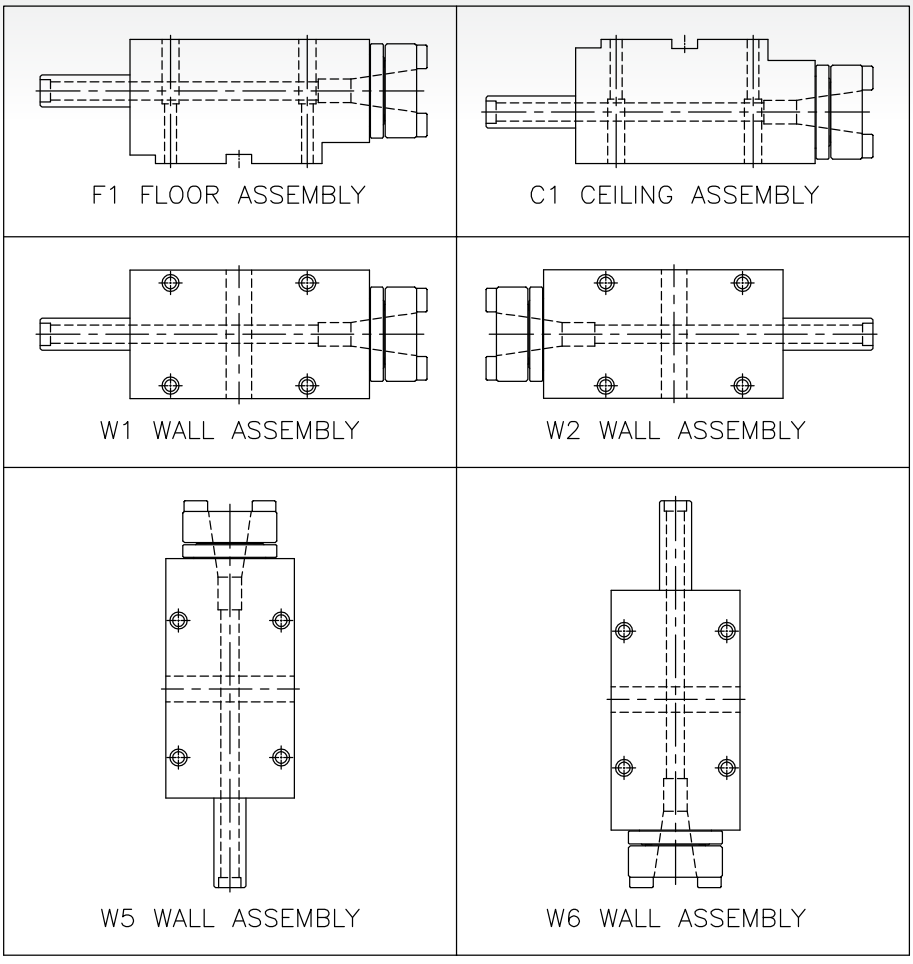
Dynamic balancing will be preformed on spindle equal to and above the speeds given in the table. The balancing grade is ISO G2.5 for the operating speed of the spindle. Spindles that are not belt driven will be balanced using a half drive key. Spindles that are belt driven will be balanced with the pulley/bushing mounted on the shaft and in position. Spindles that are belt driven and supplied as such by Gilman will have the motor/pulley/bushing dynamically balanced. Tooling added to the spindle should always be balanced to ISO G2.5 specifications or better.

Customers can request dynamic balancing at speeds lower than given in the table.

All spindles are vibration tested at operating speed and must pass Gilman's vibration standards, regardless of balancing procedures. During this process if a spindle has been determined to required dynamic balancing, it will be preformed and re-tested.

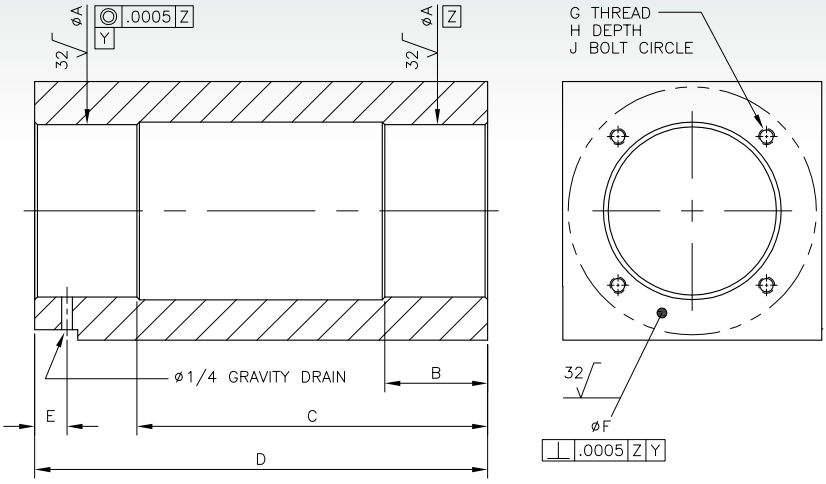
Spindle Size	Spindle Speed
2750	6000
3500	5000
4000	3500
5500	3000
6500	2500
8000	2000

Mounting Positions



Mounting Requirements

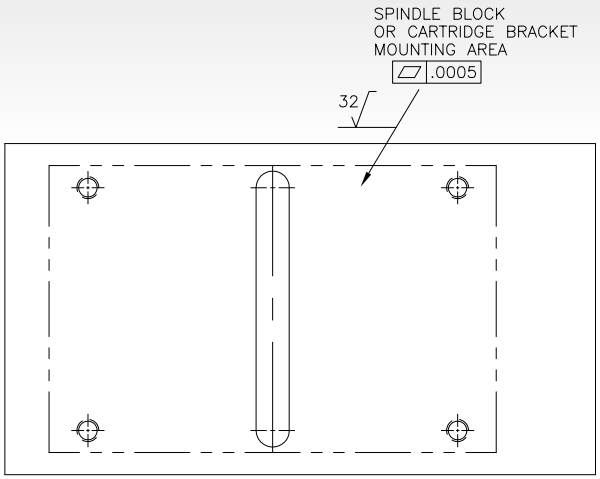
For Cartridge Spindles



Spindle Size	A (in) -0/+0.0005	B (in)	C (in)	D (in)	E (in)	F (in)	(G) Thread	(H) Depth (in)	(J) Bolt Circle (in)
2750C	2.7500	1.44	4.13	6.38	0.44	4.00	5/16 - 18	3/4	3.375
3500C	3.5000	2.19	5.81	8.00	0.63	5.00	5/16 - 18	3/4	4.375
4000C	4.0000	2.38	8.13	10.50	0.75	5.75	3/8 - 16	3/4	4.875
5500C	5.5000	3.25	9.63	12.25	0.75	7.50	1/2 - 13	7/8	6.500
6500C	6.5000	3.75	13.38	16.13	0.75	8.75	1/2 - 13	7/8	7.750
8000C	8.0000	4.63	15.38	18.75	1.00	10.50	5/8 - 11	1 1/4	9.250

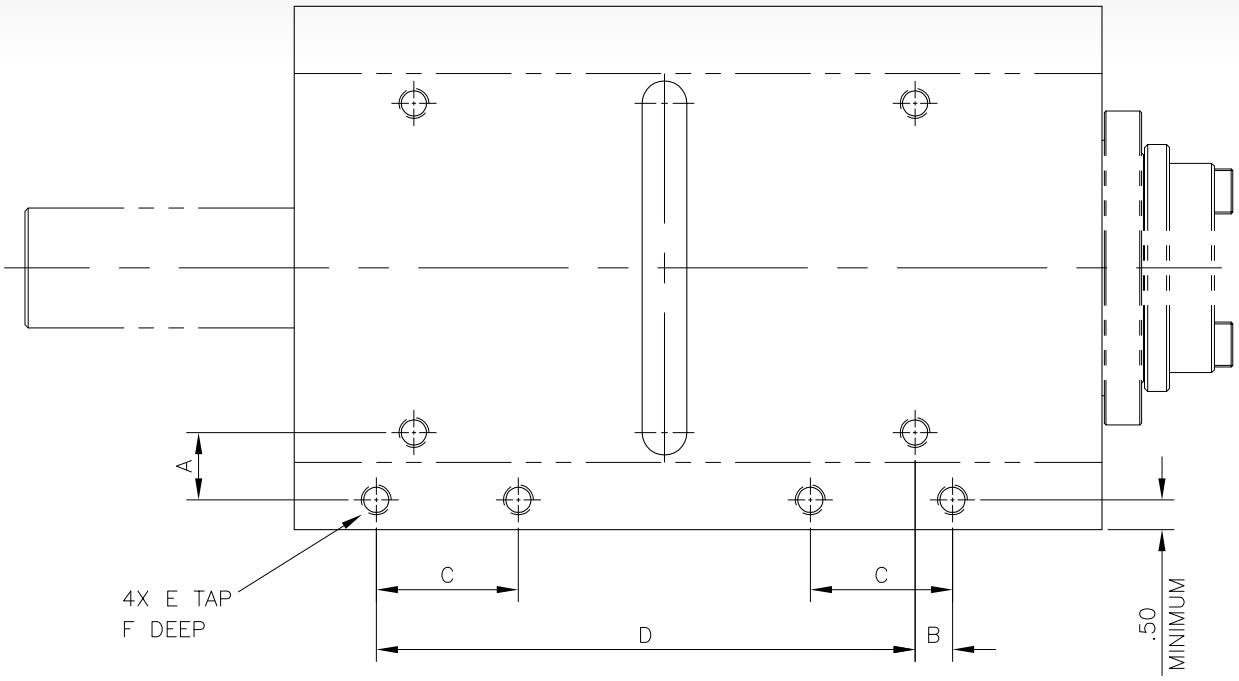
Mounting Requirements

For Block Spindles and Cartridge Spindles Mounted into a Bracket



Jack Block Hole Locations

For Block Type Spindles

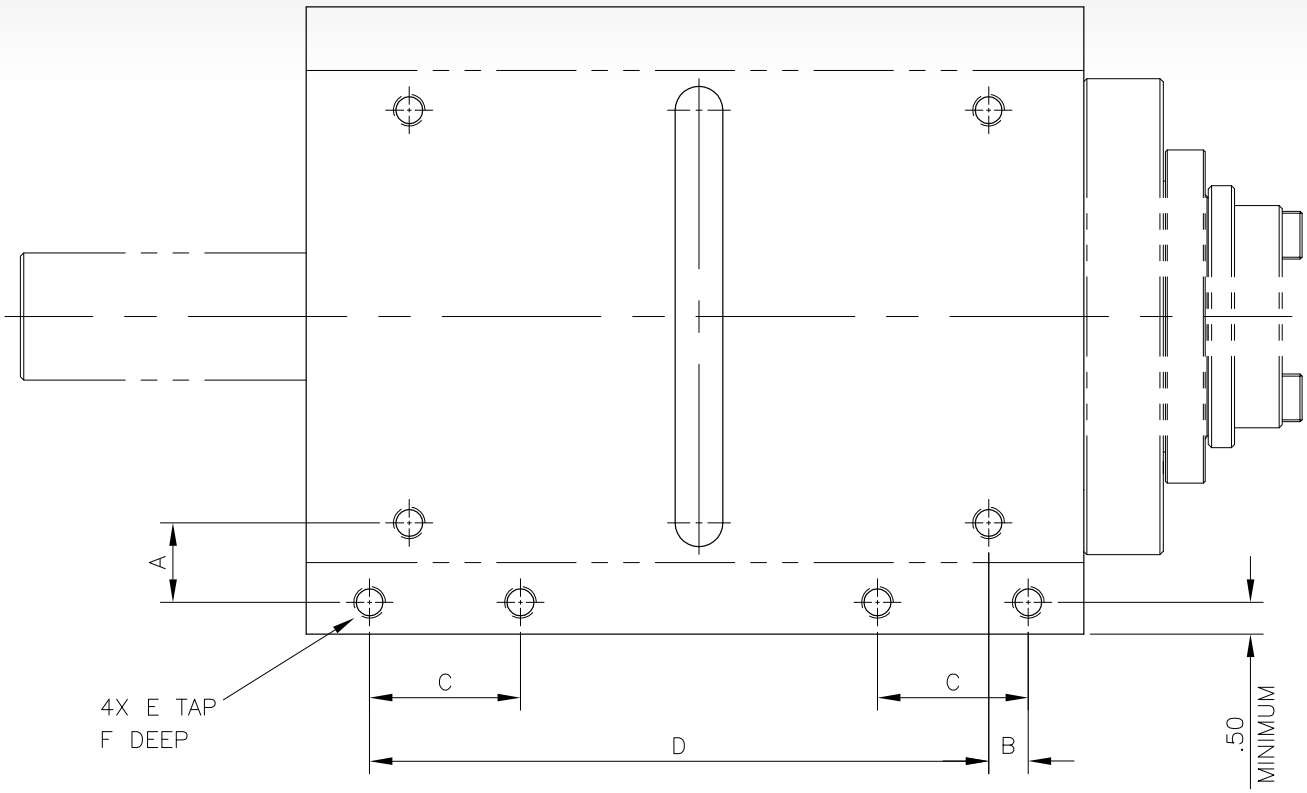


Spindle Size	A (in)	B (in)	C (in)	D (in)	E Tap Size	F (in)	Part Number
2750B	0.750	0.438	1.625	4.438	5/16-18	5/8	B21883
3500B	0.750	0.438	1.625	5.813	5/16-18	5/8	B21883
4000B	0.875	0.438	1.625	7.688	5/16-18	5/8	B21883
5500B	1.125	0.625	2.375	9.000	1/2-13	3/4	B23363
6500B	1.250	0.625	2.375	13.125	1/2-13	3/4	B23363
8000B	1.375	0.625	2.375	15.750	1/2-13	3/4	B23363

Kits are supplied with two jack-blocks and all required hardware.

Jack Block Hole Locations

For Cartridge Type Spindles Mounted in Brackets



Spindle Size	A (in)	B (in)	C (in)	D (in)	E Tap Size	F (in)	Part Number
2750C	0.750	0.438	1.625	4.438	5/16-18	5/8	B21883
3500C	0.750	0.438	1.625	6.062	5/16-18	5/8	B21883
4000C	0.875	0.438	1.625	7.813	5/16-18	5/8	B21883
5500C	1.250	0.625	2.375	9.750	1/2-13	3/4	B23363
6500C	1.250	0.625	2.375	12.125	1/2-13	3/4	B23363
8000C	1.375	0.625	2.375	14.125	1/2-13	3/4	B23363

Kits are supplied with two jack-blocks and all required hardware.

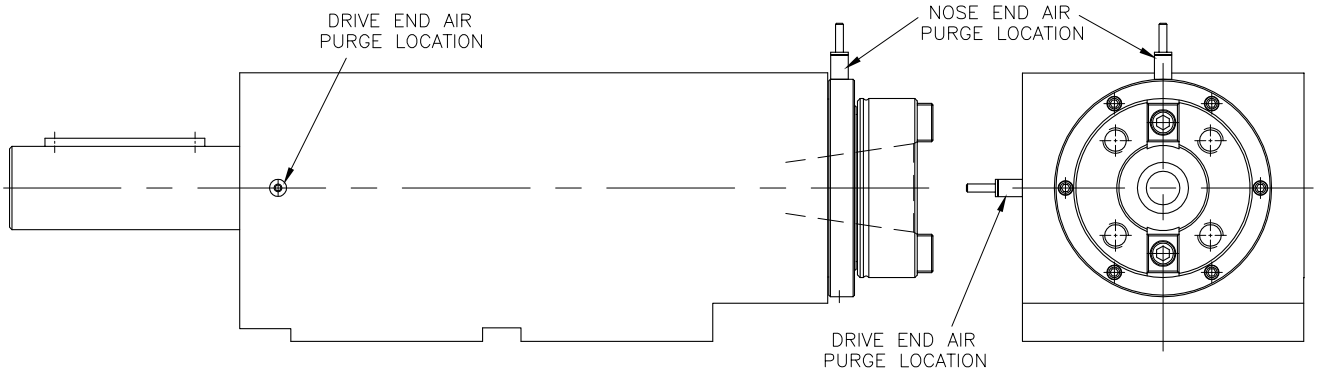
Air Purge

Use air purge when liquids or fine particles are present. Use only clean dry air at 5 to 10 p.s.i. Start air prior to spindle start-up. Run during operation, and continue to run air for 30 minutes after spindle shut-down.

Fittings when supplied are for 5/32 O.D. plastic tubing. Fitting thread sizes are given below for customer supplied fittings. Each port to have its own regulator.

Air Specifications:

Filtration Rating: 10 Microns or better
Dew Point: Less then 15 degrees C
Maximum Line Input Temperature: 27 degrees C

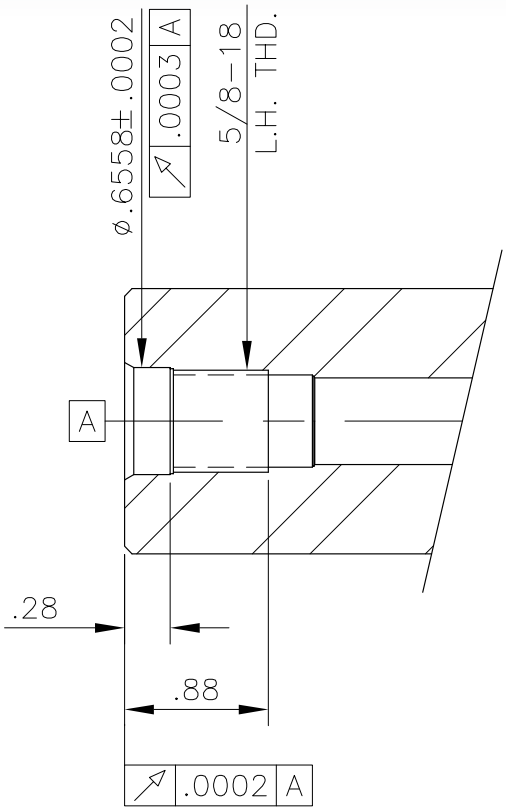


Spindle Size	Nose End	Drive End
2750B	10-32	10-32
3500B	10-32	10-32
4000B	10-32	10-32
5500B	1/8 NPT	1/8 NPT
6500B	1/8 NPT	1/8 NPT
8000B	1/8 NPT	1/8 NPT

Spindle Size	Nose End	Drive End
2750C	10-32	NA
3500C	10-32	NA
4000C	10-32	NA
5500C	1/8 NPT	NA
6500C	1/8 NPT	NA
8000C	1/8 NPT	NA

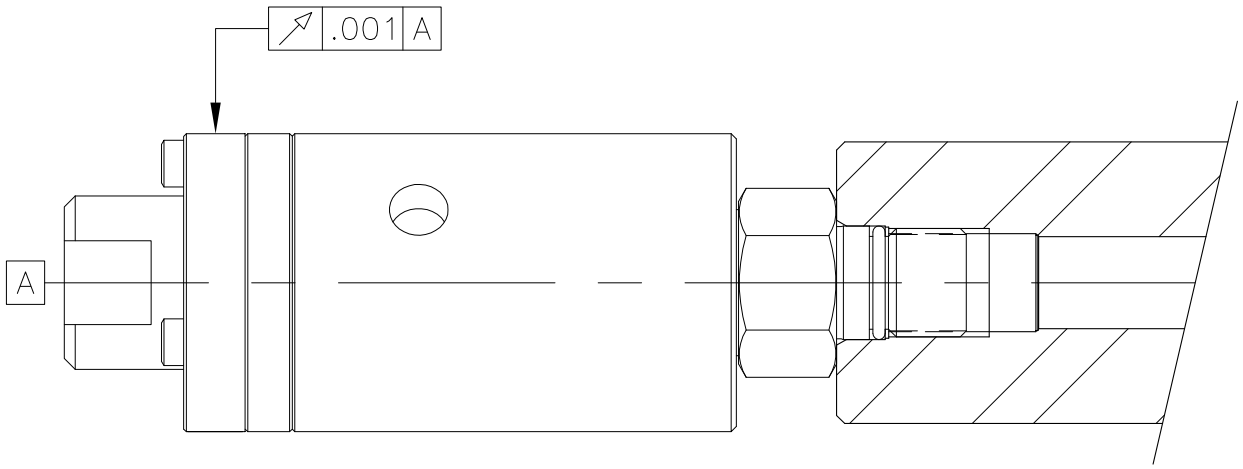
Shaft Alterations for Coolant Unions

SHAFT ALTERATION FOR COOLANT UNIONS



Shaft Alteration Availability			
Spindle Size	Available	Spindle Size	Available
2750-30	NA	4000-HM	YES
2750-BN	YES	5500-40	NA
2750-HM	YES	5500-BN	YES
2750-CE	YES	5500-HM	YES
3500-30	NA	6500-50	NA
3500-BN	YES	6500-BN	YES
3500-HM	YES	6500-HM	YES
3500-CE	YES	800-50	NA
4000-40	NA	8000-BN	YES
4000-BN	YES	8000-HM	YES

UNION RUN-OUT AFTER MOUNTING



Coolant Filtration - 10 Microns or better
Coolant Connection must be soft and MUST NOT load the union.

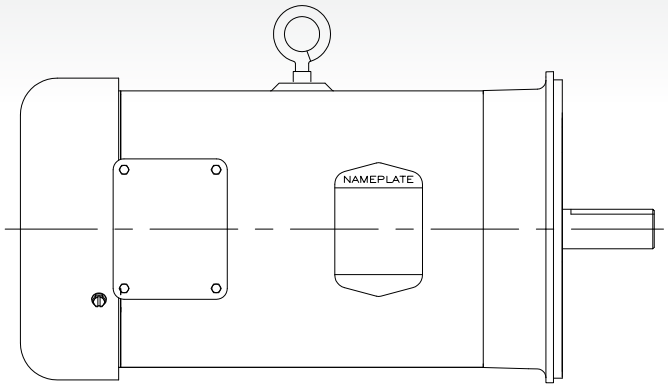
Spindle Belt Drive Motors

Standard Motor Information:

Voltage Operation: 230 or 460
Line Frequency (Hz): 60
Phase Operation: 3
Enclosure: T.E.F.C. or T.E.N.V. (see catalog)
Frame Size: 48C to 286TS (see catalog)
Horse Power Range: 1/4 to 30 (see catalog)
Base Speed Range: 1160 to 3450 (see catalog)

Options:

Voltage: 380 or 575
Line Frequency (Hz): 50
Enclosure: Wash Down Duty
Manufacturer: Customer Determined
Inverter Rated: To 90 Hertz
Inverter Duty:



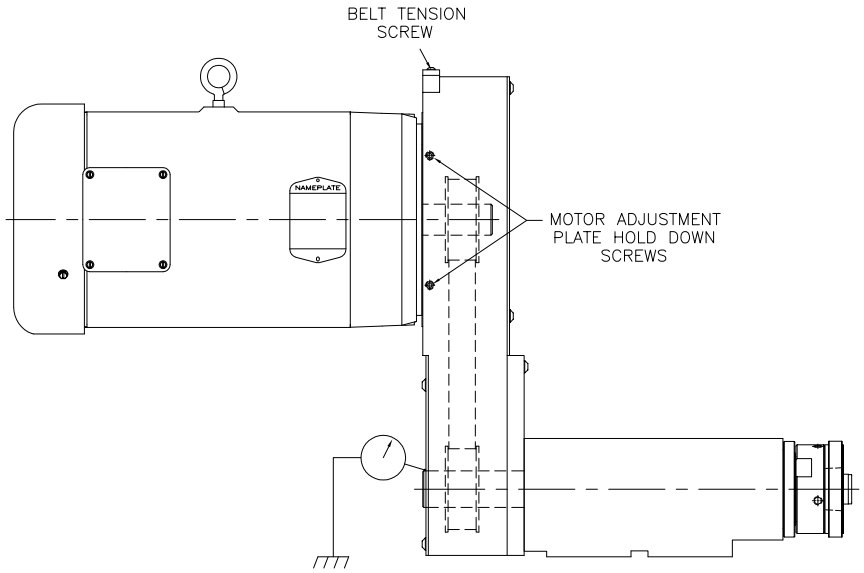
Standard motors are used for operations when spindles will operate a fixed speed.

Belt Tensioning

The Gilman standard is to set-up the belt tension using a sonic meter. Field belt tensioning may be done by checking the shaft deflection.

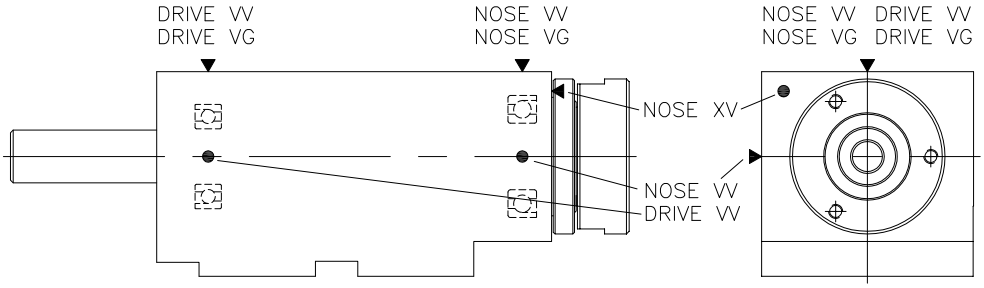
1) Loosen the motor adjustment plate hold down screws
2) Place an indicator on the end of the spindle shaft
3) Turn the belt tension screw until the shaft deflects the amount given in the table based on the spindle size
4) Tighten the motor adjustment plate hold down screws
5) Test the spindle to check for a quiet and smooth running spindle

Spindle Size	Shaft (in) Deflection
2750	0.004
3500	0.002
4000	0.001
5500	0.001
6500	0.001
8000	0.001



Spindle Vibration Standards

A vibration report is supplied along with each spindle. This document explains the terminology used on our reports. Testing is performed on an isolated test stand. Your results may very, depending on mounting. These points should be used to evaluate the spindles health in a preventative maintenance program.

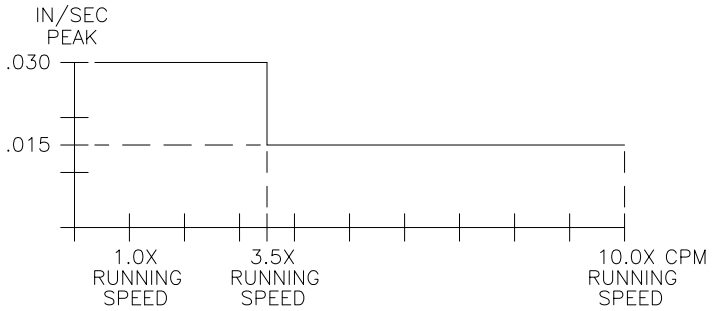


Technical Data	
Nose VV	Nose End Vertical Velocity
Nose VG	Nose End Vertical Acceleration
Nose HV	Nose End Horizontal Velocity
Nose XV	Nose End Axial Velocity
Drive VV	Drive End Vertical Velocity
Drive VG	Drive End Vertical Acceleration
Drive HV	Drive End Horizontal Velocity

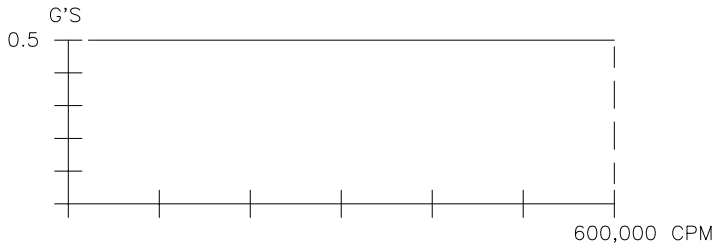
Units	
Velocity	Inches per second peak
Accelerometer	G's Peak
CPM	Cycles per minute

Hardware	
Data Collector	Gilman Microlog CMVA55-K-CE
Accelerometer	Gilman CMSS787A or CMSS786A

VELOCITY



ACCELERATION



*No single frequence may exceed the given amplitudes in the given range.

Spindle Maintenance

For Grease Lubricated Spindles

Daily Maintenance:

Clean the Spindle: Clean the spindle with a cloth or short-haired brush. Never use compressed air to clean the spindle.
Clean the Cone: Remove the tool holder from the cone and clean it. Check the tool holder cone for rust or marks that may be the results of vibrations during machining. Replace damaged tool holders immediately. Clean the tool holder cone and re-insert it into the spindle. Never leave the spindle without a tool holder inserted.

Weekly Maintenance:

Air Purge (if used): Check gages to be sure the correct air pressure is being supplied
Check separators, if they have collected water empty them.
Check filters and replace them if necessary.

Monthly Maintenance:

Bearing Temperature: With the spindle running at its operational speed, check the bearing temperature over the nose end and drive end bearings. They should operate at a temperature less than one-hundred and thirty degrees F. If operating above this temperature down-time should be scheduled for maintenance.

Spindle Storage

Gilman spindle units are precision components. Care must be taken during the storage of these units when they are not in use. Failure to follow these guidelines will have a negative impact on the service life of the spindle.

1) Remove any fluids from the unit that may cause corrosion during storage
2) Apply a light coat of anti-corrosion oil to the outside of the spindle
3) If possible store the unit in the original Gilman packaging. The spindle must be protected against dirt and fluid penetration
4) The storage location temperature is to be between 50 and 100 degrees F with a relative humidity not greater than 60%
5) The storage location must be free from vibration and shock loads
6) Each month of storage the spindle shaft is to rotated by hand. About fifty rotations are all that is needed
7) When the spindle is put back into service follow the run-in procedure

High Precision Spindles

Product Warnings for the Best Results

Gilman Precision spindles are quality, high precision machine components that require special care and handling.

All spindles are long-life grease lubricated with high performance synthetic grease. Gilman Precision provides the proper amount of grease to maintain the bearings and prevent premature failure of the spindle. Please contact Gilman Precision for re-lubrication information for your spindle.

On applications requiring lubrication other than grease, special instructions will be furnished with the spindle.

The mounting surface for a high precision spindle should be rigid and of good surface quality. A surface flatness of .0005 in/ft is required.

The following points should be followed to extend spindle life and performance.

1) *Arrange the gravity drain holes towards the floor on horizontal applications, and away from the work on vertical applications. If you are supplying your own housing, supply an access hole through the housing for drainage. Gilman Precision will supply dimension information if needed.*
2) *Always use balanced tooling to minimize vibration*
3) *Do not hammer spindle arbor*
4) *Make sure tooling and pulleys are tight and in proper position before operating the spindle*
5) *Use quality belts and pulleys. Do not use laced belts. Follow the belt supplier's recommended belt tensioning requirements*
6) *Supply proper tool and belt guarding to protect the operator*
7) *When using air purge, use a minimum of 10 micron air filter system. Air must be clean and dry. Supply pressure of 5-10 PSI is required*
8) *Do not operate the spindle above its rated speed or temperature*
9) *If re-lubrication is required, always use the proper amount and type of grease. Consult Gilman Precision for all lubrication specifications*
10) *Make sure spindle tapers, bores and tooling are clean before assembling*
11) *Make all attempts to protect the spindle from direct coolant spray or chips. High pressure coolant spray directed at the spindle seal area can overcome seals even with air purge. Chips collecting around the spindle can clog seal drain holes and get lodged in the seal mechanism*
12) *Do not tighten cold tools into hot spindle tapers. The spindle tapers and tools should be the same temperature at the time of tool installation*
13) *Never stand the spindle on the end of the shaft*

All Gilman Precision high precision spindles are test run at the specified operating speed and checked for performance and temperature.

Shipping may cause the grease to creep back into the bearings and the spindle may overheat initially. If this happens, shut off the spindle and allow it to cool. Start the spindle again and run until reaching the rated temperature indicated on the inspection form. If overheating continues to occur, consult Gilman Precision. Do not rely on touch when checking spindle temperatures; use a thermometer. Spindles may feel uncomfortable to touch at the proper operating temperature.

By following these recommendations, your quality, high precision Gilman Precision spindle will work efficiently for years to come.

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Gilman Precision
1230 Cheyenne Avenue
P.O. Box 5
Grafton, WI 53204
Telephone: 800-445-6267
or 262-204-2227
Fax: 262-377-9438
E-mail: sales@gilmanprecision.com
www.gilmanprecision.com

Gilman
SOLUTIONS FOR LINEAR & ROTARY MOTION