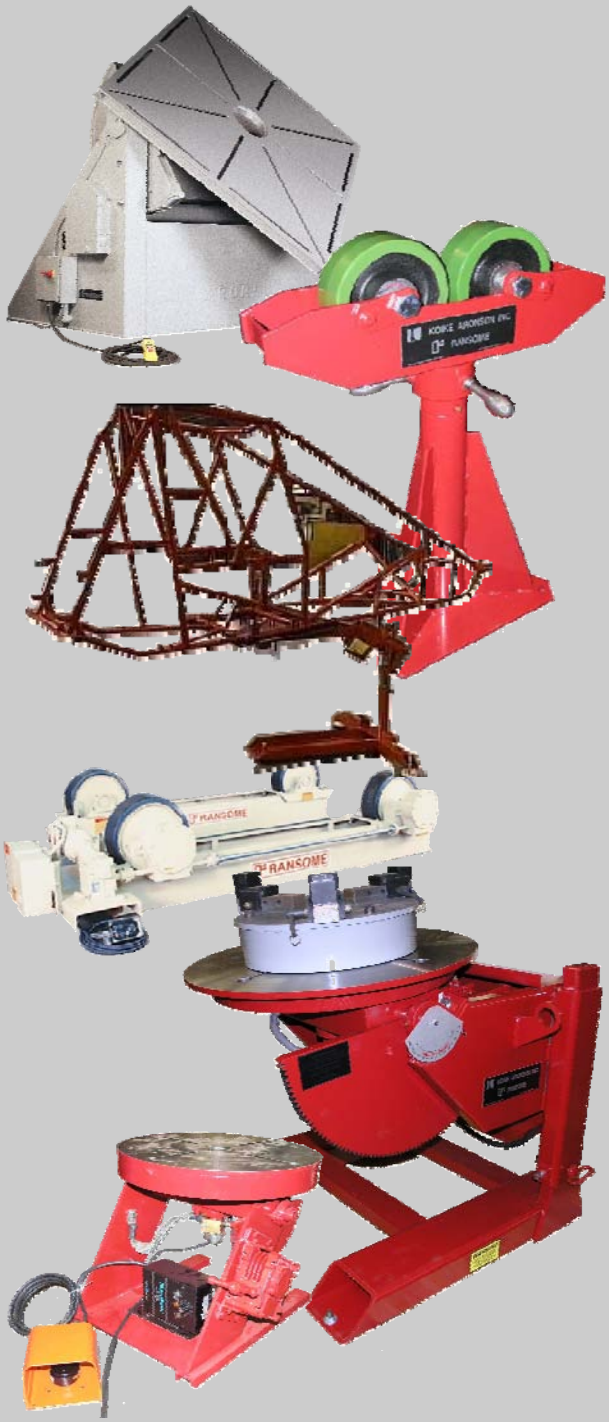
Positioneering Workbook

A Guide To Positioners, Turning Rolls, And Manipulators



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Preface

What's This Workbook For:

The Positioneering Workbook was conceived to compliment the Handbook of Positioneering for evaluating applications and selecting specific model Positioners. It's the literature information, specification sheets, informal work sheets, and crib notes used for years in the industry condensed and organized for easy use. Although the Workbook was designed to compliment the Handbook of Positioneering, it's function as a standalone model applications manual can not be discounted.

Who's This Workbook For:

It makes no difference if you're an expert or a novice, if you're in engineering, manufacturing, purchasing, or sales, the Positioneering Workbook gives you a simple, logical checklist to successfully select the right positioning equipment for the right job.

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Why Use a Positioner

You should use a positioner because welds made in the flat or slightly downhand position are made faster, better, cheaper, and in many cases safer than out-of-position welds. Without the use of a positioner, welds made in the vertical or overhead position are commonly deposited at the relatively low rate of as little as 3 pounds per hour. When properly positioned deposition rates can easily exceed 10 pounds per hour, depending of course on the thickness and mass of the parts being welded. The use of automatic process equipment can eliminate the need for the operator to hold the arc further increasing productivity. Positioned welds look better and quality is more easily controlled requiring less operator skill and producing less fatigue. Of course, it is possible to make positioned welds without using a positioner. Small weldments can be clamped in a vise, large ones moved with a crane. But these simplified methods seldom allow the ideal position to be attained, and are much more time consuming and hazardous to employ. Probably the first step toward the production of low cost, efficient welded products lies in the design of the weldment. But the second step (even ahead of welding process selection) is USE A POSITIONER. Put your self (and your weldment) in a good position for increased profits.

What does a positioner do?

First, of course, it provides a means to place the weldment in the ideal position for downhand welding. But sometimes a positioner performs another important function: it provides the weld travel speed by securing a welding head in a fixed position and allowing the positioner to move the part. This eliminates the operator variable, and is another major step toward better welds.

Positioners are manufactured in various styles and configurations to accommodate different weldments and procedures :

Universal Balance

The Universal Balance Positioner allows the weldment to be mounted so that it can be moved by hand about its own center of gravity. Universal Balance Positioners can also be equipped with powered faceplate rotation for powered circumferential welds. They range in load capacity from 25 to 4000 lbs.

Special Utility

This group includes various small Positioners including non-balanced bench mounted units and floor bench mounted units with powered faceplate rotation. Their application is similar to the Universal Balance, except that the load is not balanced about its center-of-gravity. They would be selected for smaller, lighter loads, usually under 500 lbs.

Gear Driven Positioner

This type provides powered rotation of a work-piece, and in addition gives powered gear driven control of the table tilt. The table can be tilted from horizontal, through vertical to 45 degrees past the vertical. This type is often called a “Flat - 135 degree” Positioner. Powered table rotation is variable speed to permit making circumferential welds at any desired speeds. Gear driven positioners are offered from 1,000 lbs. to 1,000,000 lbs. capacity. Various accessories extend the versatility of these units.

Headstock/Tailstocks

These units permit long work-pieces to be mounted between centers and turned. Headstocks permit a work-piece to be turned at controlled speed about a horizontal axis. When used with a Tailstock, the combination forms a welding lathe. Since a Headstock/Tailstock combination is normally not mounted in precision alignment like an engine lathe, it is important that the means used to mount the work-piece allow a small amount of “float” or angular misalignment.

Floor Turntables

The Floor Turntable Positioner allows a weldment to be rotated about the vertical axis just a few feet off the floor. Variable Speed powered rotation is standard.

Turning Rolls

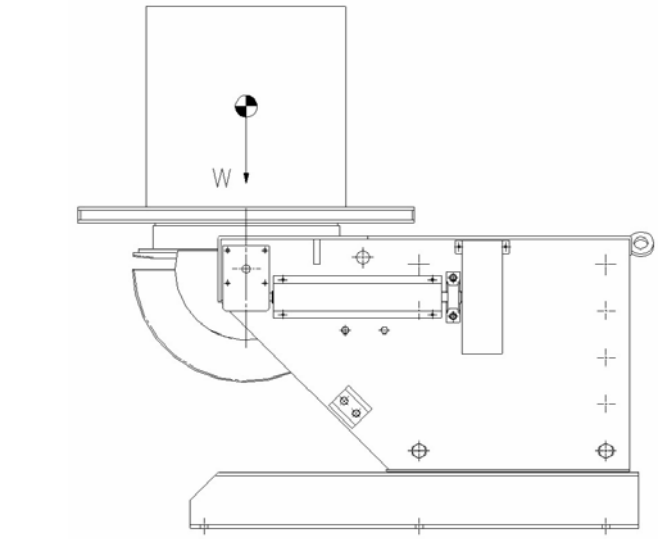
This device provides rotation of long cylindrical work-pieces such as tanks and cylinders for making circumferential welds.

Manipulators

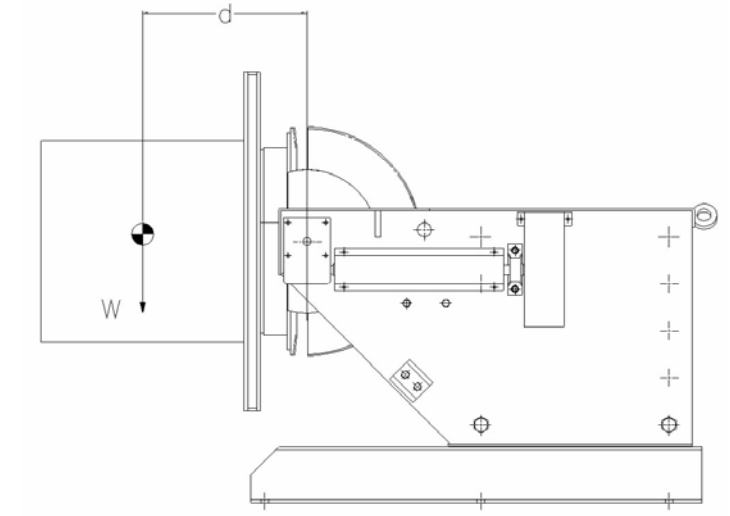
Where a positioner positions the work-piece, a manipulator positions the welding head over the work-piece. It provides various combinations of lift (vertical motion of the head), reach (horizontal motion of the head), or kingpin rotation (rotation of the entire manipulator on vertical axis through the mast). The various motions are available either powered or manual, and powered versions may be fixed speed or variable.

How do I select the right positioner for my job?

Selection of the type of positioners depends upon the size and shape of the work-piece. The descriptions and specifications in this brochure, will assist in making this selection. Selection of the size or rating of the positioner depends upon the weight of the work-piece and also on the location of its center-of-gravity. If a work-piece is mounted on a gear driven positioner, directly ove the rotation axis, the weight will act straight down and will exert no torque load on the tilt gearing, like this:

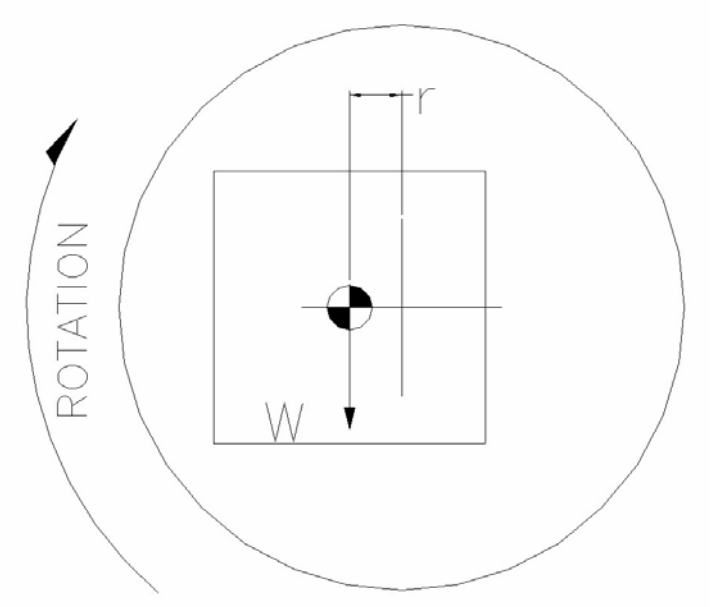


As the positioner is tilted, the weight of the work-piece exerts a turning moment around the tilt axis, like this:



ment which is equal to W x d. Information is provided in the specifications to enable the user to select the proper positioner depending upon the location of the center-of-gravity. Ratings are given for a specified distance above the surface of the work-plate, and is stated as W (Lbs.) @ d" (CG Overhang). A table in the Gear Driven section shows the tilt capacity of the gear driven positioner models at various CG distances.

If the work-piece is mounted with its CG off the rotation axis, and the table is other than horizontal, the rotation drive will have to exert a torque in order to lift the CG as the table rotates, like this:



The positioner must be selected so that the rotation drive has adequate torque capacity to handle the load, which is equal to $W \times r$. This is stated in the specifications by giving the rotation torque in lb-in of "W (Lbs.) x r" (off center). Multiply your work-piece weight in pounds time the eccentricity (distance from CG to rotation axis) to check this.

As an example of the above, the HD20 has a 2000 lb. capacity if the CG is 6" above the surface of the table and 6" off center from the rotation axis.

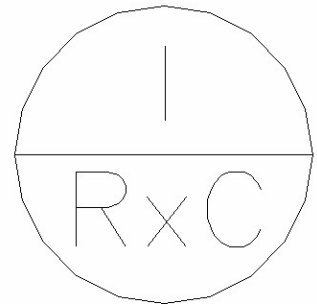
Other Factors to Consider

Swing Clearance

When selecting a positioner, don't forget to leave clearance to swing the work above the floor when the table is in the full tilt position. This is a common error in specifying positioners. A rotating weldment obviously will have trouble trying to penetrate a concrete floor. But Koike Aronson has simple solutions for large work pieces. Aronson positioners are available with either manually adjustable bases, or powered Elevating bases which adjust the table height for larger work. Fixed based machines also can be elevated by using a riser or sub-base. When we know what you expect to position, we can help you decide which base is best.

Calculating Surface Speed

Positioner motions are rated in revolutions-per-minute (rpm) for both tilt and rotation. To weld at a desired inch per- minute (ipm) (mm/s) rate, you must convert from ipm (mm/s) to rpm to select the positioner drive speed you need. There is a very simple formula you can use to do that. It's I=RC. The "I" in the formula stands for ipm (mm/s) surface speed. The "R" is rpm and the "C" is work-piece circumference in inches (millimeters). When you use the formula, make sure that all units are the same for I and C. Don't mix up inches, feet, and millimeters in one calculation. Revolutions-per-minute, of course, do not change with the measurement system selected. Suppose that you want to weld a 60 in (1520mm) diameter work-piece at 12 ipm (5mm/s) surface speed. How many rpm do you need? First, determine the circumference for a 60 in (1520mm) diameter work-piece. It is 60 in x **π** (or 3.1416), which equals a 188.5 in (4790mm) circumference. Second, divide the desired 12 ipm (300mm/s) surface speed by the work-piece circumference. The result is 0.001 rps or 0.064 rpm. That means that the table must turn 0.001 revolution per second, 0.064 revolutions in one minute, or 3.84 revolutions per hour. An easy way to remember the formula is to find whatever unknown quantity you need when the other two are known by using this diagram.



Cover the quantity on the diagram (either, I, R, or C) with your finger and perform the remaining calculation. For example, to find R (rpm), cover up the R. You then see the I (ipm) must be divided by C (circumference). Depending on how large a diameter (slow rpm) and how small a diameter (fast rpm) you need to weld, the positioner's speed range should be selected accordingly. In most instances, the standard speed ranges will be adequate. Optional speed ranges are available.

Speed Regulation

When using a positioner to turn an unbalanced (eccentric) load, the load moment imposed on the positioner will vary. Consider the problem of welding an elbow to a straight piece of pipe held by the positioner. The welding must be done at a constant surface speed, even though the elbow exerts varying forces throughout rotation.

Koike Aronson Ransome Positioners use Variable frequency drives and motors with dynamic braking to provide a constant speed throughout rotation. Sensor-less flux vector drive are used standard on most Positioners with optional full flux vector drives available. Additional braking resistors may be used for larger loads and highly eccentric situations.

Turning Rolls

Selection of turning rolls is based on two factors: the load carrying capacity of the wheels, and the turning capacity of the drive. Both are listed in the specifications. Turning capacity becomes significant only if the load is eccentric, and then the considerations apply as an eccentric load on a positioner. The eccentric load in Ib-in divided by the diameter of the vessel in inches must not exceed the Tractive Pull listed in the specifications.

Other Factors to Consider

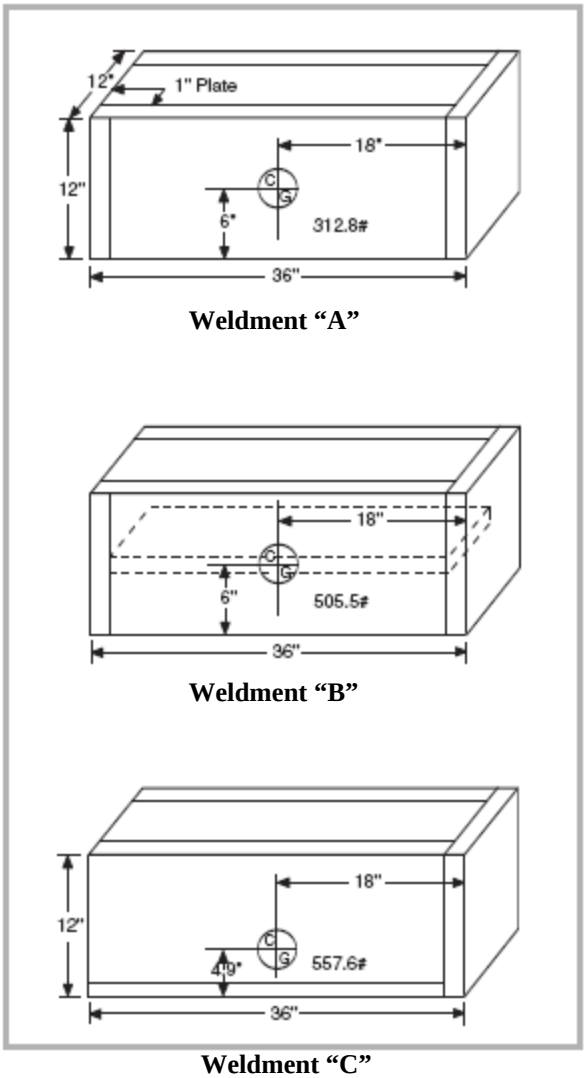
Practical Center of Gravity as it Effects Gear Driven Positioners

1. The CG of a weldment is usually near the center of the weldment.
2. The CG of a weldment is exactly in the center of asymmetrical weldment.
3. “A” is a symmetrical weldment: There is no top or bottom, just two ends and two sides of 1” steel plate. Each end is 1x12x12 and weighs 40.8#. Each side is1x12x34, weighs 115.6#. 115.6# x 2, plus 40.8# x 2 equals 312.8#. (Steel weighs approximately .283pounds/cubic inch.) If one end is secured to the table of a Gear Driven Positioner, the CG will be 18” out from or above the table. If either side, or the open top or bottom is secured to the table, the CG will be 6” above it.
4. “B” is also a symmetrical weldment: A 2” plate rib has been added in the middle, making the weldment a stiff column. The 2x10x34 steel rib weighs 192.7# so the weldment now weighs 505.5#. The rib being right in the middle added weight equally in opposite directions from center, so the CG is still in dead center.
5. “C” is an un-symmetrical weldment: We want a box instead of a column, so we add a 2” thick bottom to weldment “A”. 2x12x36 steel weighs 244.6# so total weight is now 557.6#. But the CG will not be at 7”, halfway from top or bottom, because we added nothing to the top to balance the weight of the bottom. We made no change at either end, and the bottom is as much left as right, so the CG remains 18” in from either end.
6. The CG always moves toward any part that is added to a symmetrical weldment. Locating the CG is a function of moments. “Moment” means force or tendency to produce motion. A Moment is weight multiplied by length (Arm). Like a lever. And like a lever, we must have a hinge point, a reference plane. The top surface of a Gear Driven Positioner’s table is our reference plane. Load Capacity Tables give ratings for various distances the CG is above the table, so this is very handy. Whenever possible, weldments should be mounted with the heavy side next to the table, so let’s figure it that way.
7. Each separate symmetrical part will have a known weight and CG, and the CG will be a known distance from the table top surface. Multiplying weight by distance (arm) gives the pound-inch (lb-in) moment of the part. Adding all the moments and dividing by total weight gives the location of the CG of the weldment.

We don’t need to take each end and each side separately because the side and ends make symmetrical mass weighing 312.8#, with the CG in the center of that mass. With the 2" plate between it and the table, the CG will be 8" above the table. 312.8# x 8" =2502.41b-in.

The 244.8# bottom’s CG is 1" above the table.
244.8# x l" = 244 lb-in.

Adding 244.8 lb-in and 2502.4 lb-in equals 2747.2 lb-in Total Moment. Dividing 2747.2 lb-in Total Moment by557.6 Total Weight locates the CG 4.9” above table top surface.



Universal Balance Positioner

(1) First find the Center of Gravity of Rotation

When a work-piece is placed on the worktable of an Aronson Positioner with its center of gravity located on the worktable rotational axis, it will be balanced on that axis. It will, therefore, be very easy to rotate on that axis, even if it is ten times heavier than the operator. In fact, it rotates so easily that a friction band had to be fitted to the worktable of the Positioner to provide a drag effect and to enable the operator to place and stop the work-piece wherever he wants. It is very easy to find the center of gravity of two dimensions, but all work-pieces have three dimensions, and all weldments require movement in two opposing axes, to obtain all possible positions.

(2) Balance is achieved by adjusting the worm gear so that the tilt axis intersects and the center of gravity located on the rotation axis.

The Worktable is at one end of the Arm and a worm and worm gear segment are at the other end. The Arm and the Gear Box are integral. A Shaft at the extreme end of the gear box rotates in Tapered Roller Bearings, in a barrel shaped housing. A simple adjustment of the worm by the operator will change the angle of the arm, allowing the tilt axis of the arm to intersect the center of gravity of the work-piece in the third dimension. With both axes intersecting the center of gravity of the work-piece, it can be pushed or pulled by your hand and simply put wherever you want it. . . effortlessly. . . because it is in balance. This is the principle of the Koike Aronson Universal Balance Positioner.

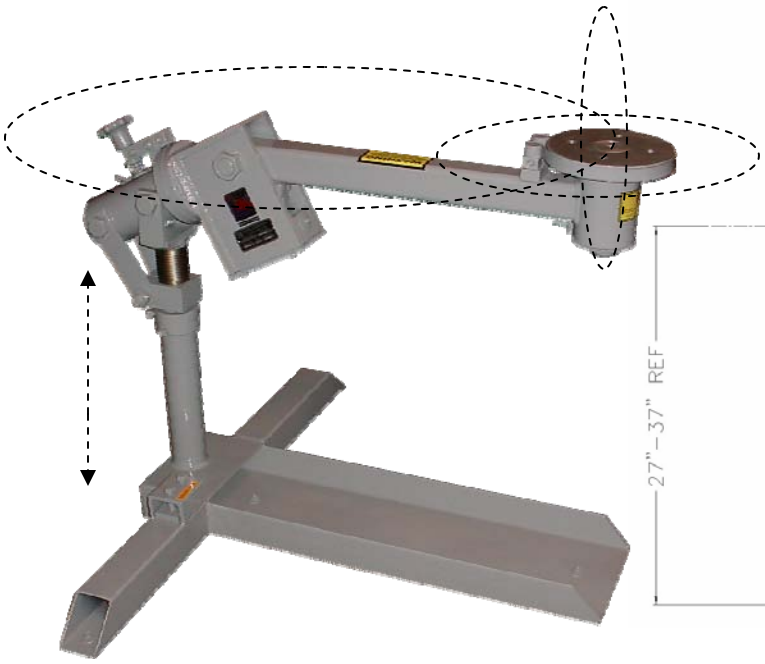
(3) Determining Load Capacity Universal Balance positioners are rated for overhanging loads from the table surface.

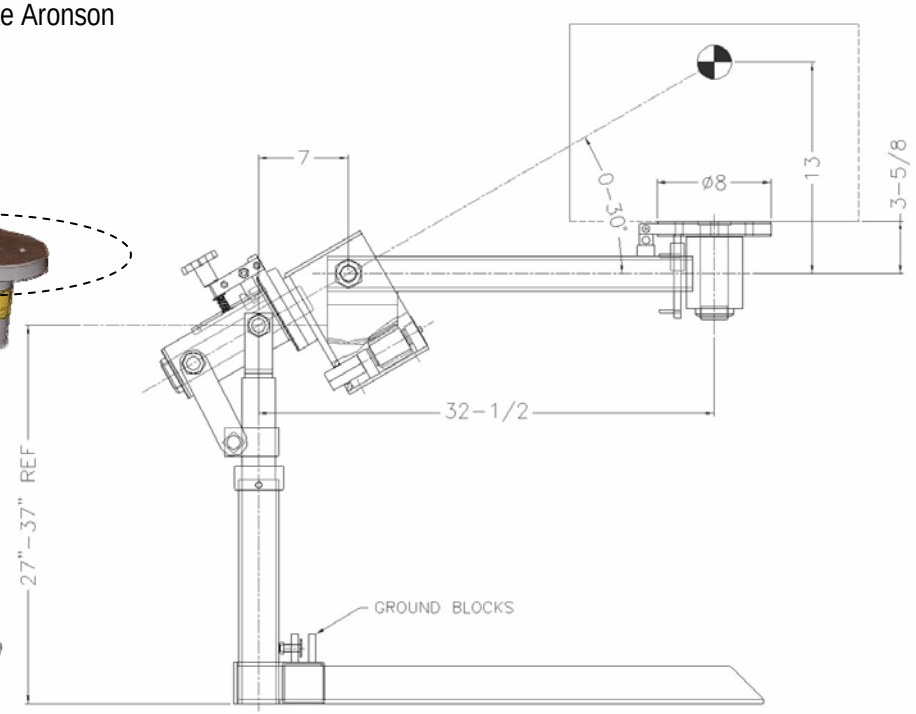
A typical rating is “1000 lb at 12 in. (453 kg at 300 mm) CG height.” That means that the work-piece can weigh as much as 1000 lb (453 kg) when its CG overhang does not exceed 12 in. (300 mm) from the table surface.

In the drawing below, a CG symbol is shown with a dimension of 13 in. (330 mm) above the centerline of the work arm. This indicates the maximum CG height that can still be intersected by the tilt axis within the 30°angle adjustment range.

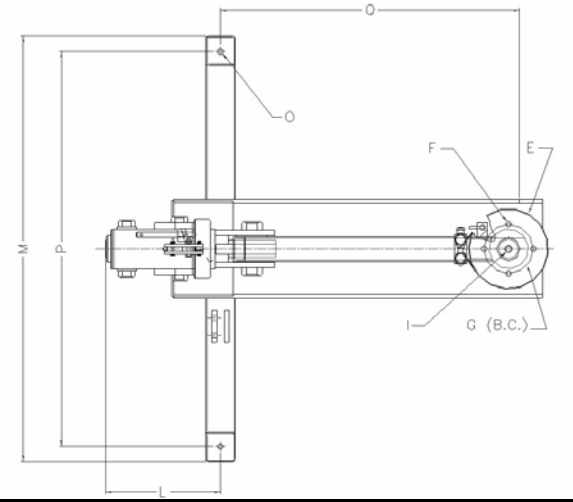
Since the distance from the table top to the centerline of the work arm is 3.625 in. (92 mm), the CG axis for balancing purposes can only be 9.375 in. (238 mm) above the table top. Any greater distance indicates the need for counterweights.

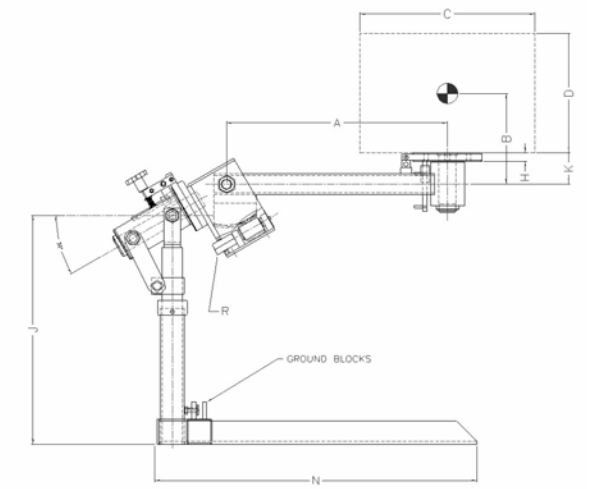
Don’t confuse the two separate CG considerations for Universal Balance positioners. One specification tells what load fits the weight rating of the positioner. The CG shown in the sketch shows the maximum CG height that can be intersected by the tilt axis for a given model.





Universal Balance Specifications





SPECIFICATIONS	C25	C100	C1000	C2000	C4000
Maximum Load	25 Lbs.	100 Lbs.	1,000 Lbs.	2,000 Lbs.	4,000 Lbs.
DIM A, Overhang,	6-1/2”	11”	32”	35”	51-1/2”
DIM B, Max. CG Height	3”	4-3/4”	14-1/2”	16”	33-1/2”
DIM C, Max. Part Diameter	14”	20”	66”	75”	96”
DIM D, Max. Part Length	16”	24”	100”	100”	96”
DIM E, Table Diameter	1-1/2”	5”	8”	8”	12”
DIM F, Hole Size	10-32	1/4” Slots	17/32”	17/32”	1-1/32”
DIM G, Bolt Circle	1-1/4”	4 Slots	5”	5”	8”
DIM H, Table Thickness	1/4”	1/4”	15/16”	1”	1-1/2”
DIM I, Pilot Hole	10-32	1/4-20	1/2-13	3/4-10	1”-8 x 1.25
DIM J, Height Range	6-1/4” Fix	5” Fix	27”- 37”	30”- 36”	41-1/2” Fix
DIM K, Table to Tilt Axis	7/8”	2”	3-5/8”	3-1/8”	6”
DIM L, Rear Overhang	1-1/2”	2-1/8”	4-3/4”	8”	1”
DIM M, Base Overall Width	6”	4-1/2”	43”	43”	58”
DIM N, Base Overall Length.	9”	4-1/2”	37-3/4”	48”	78”
DIM O, Anchor Hole Size	9/32” (4)	13/32” (4)	9/16” (4)	9/16” (6)	13/16” (8)
DIM P, Anchor Hole Width Centers	5-1/4”	3-3/4”	40”	40”	55”
DIM Q, Anchor Hole Length Centers	8-1/4”	3-3/4”	33”	39”	-
DIM R, Wrench Size	1/4”	1/2”	1”	1”	2-1/4”
Type of Base	Plate	Plate	“T”	“T”	“T”
Tilt Axis Brake	Yes	No	Yes	Yes	Yes
Tilt Axis Pinlock	No	No	Yes	Yes	Yes
Rotation Axis Brake	Yes	No	Yes	Yes	Yes
Rotation Axis Pinlock	No	Yes	Yes	Yes	Yes
Bearing type	Ball	Tapered	Tapered	Tapered	Tapered
Ground Current Conduction	N/R	300 Amps	800 Amps	1200 Amps	2000 Amps
Power Axis Available	No	No	Yes	Yes	Yes
Shipping Weight	15 Lbs.	30 Lbs.	340 Lbs.	500 Lbs.	1,300 Lbs.

Special Utility B1/B3 Positioners

Keep little things from becoming big problems.

Scale down everything and put it on a work bench. That will give you some idea of what we have for bench welding light duty machining, inspection, wiring and assembly. Or mount it on casters and roll it around. If it's in the 50 to 500 lb. capacity range, we have a model for the application. Some of our models are no more complicated than a rotating vise. Others may be small, but very sophisticated. Take one of our bench-mounted, powered positioners for example. It has rotation, tilt, drive, and an enclosed motor with special lubricants. It's used in controlled-atmosphere chambers for welding titanium, zirconium, and hafnium. We sell a large variety of special accessory items. Examples are speed indicators that read in both rpm's and ipm's. We have self-centering welding chucks for work of various diameters. For the large number of configurations and capacities available, refer to the individual series literature.

Worksheet - Special Utility, B1/B3

1. TOTAL LOAD WEIGHT _____ Lbs. (Including Fixture)

2. PIECE PART DIMENSIONS:

   LENGTH _____ Inches

   WIDTH _____ Inches

   HEIGHT _____ Inches (Above Table)

   MAXIMUM SWING CLEARANCE/RADIUS _____ Inches

3. OVERHANG C/G _____ Inches
(Distance the center of gravity of the load is from the surface of the table)

4. OFF-CENTER C/G _____ Inches
(Distance the center of gravity of the load is from the center of rotation)

5. ROTATION AXIS: ◯ MANUAL ◯ POWERED, Variable Speed

6. TILT AXIS: ◯ MANUAL ◯ POWERED, Constant Speed

7. TABLE:

   ◯ ROUND _____ Inches Diameter (Standard)

   ◯ SQUARE _____ Inches Square

8. PRIMARY POWER: _____ Volts, _____ Phase, _____ Hertz
(Standard: 115/1/60)

9. ACCESSORIES:

_____

_____

_____

10. NOTES:

_____

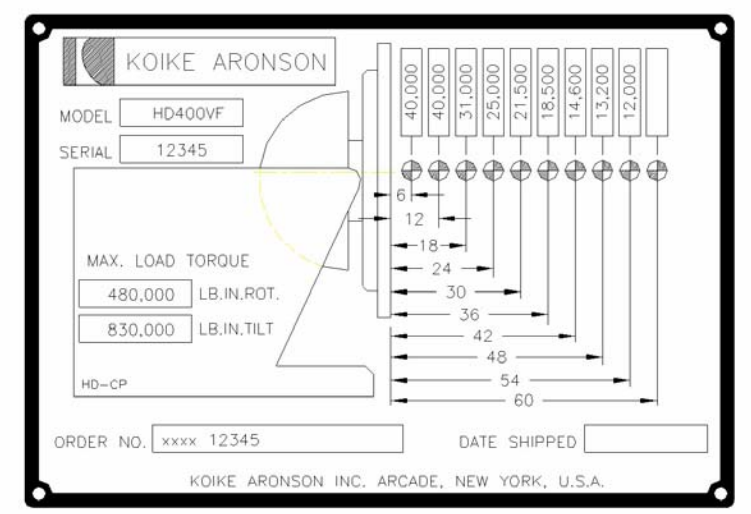
_____

_____

Gear Driven Positioners

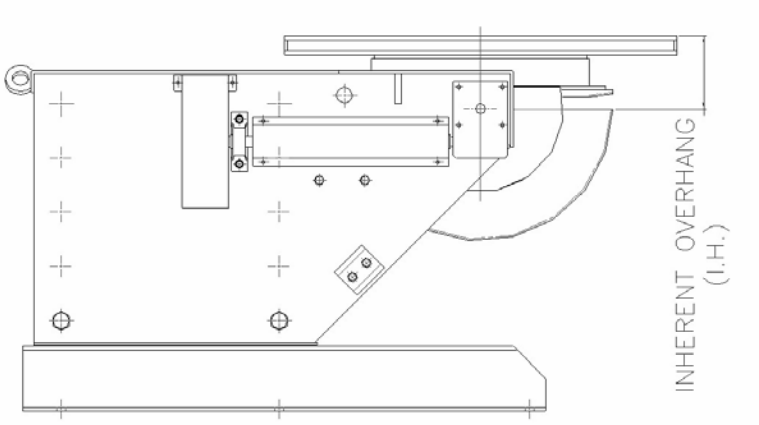
HOW TO SELECT AGEAR DRIVEN POSITIONER TO BEST MEET YOUR NEEDS

The illustration below shows a typical capacity plate that we attach to each Aronson Gear Driven Positioner. This happens to be the capacity plate for a Model HD400 Aronson Gear Driven unit. An HD400 is designed to handle loads up to 40,000 lbs (18,140kg) with a CG at a distance from the surface of the table of 12" (300mm). All the information required for loading the positioner is either on the capacity plate, or it can be simply calculated from the data on the plate.



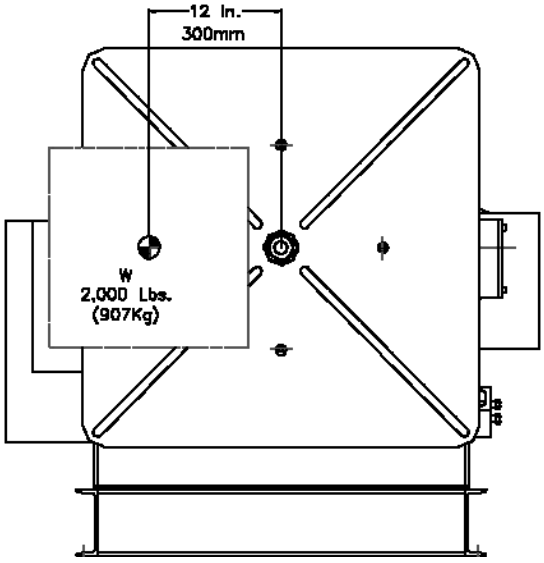
Tilt Torque Load:

To find your weldments' Tilt Torque Load, add the Inherent Overhang (Inches) to the distance (Inches) the weldments' CG is from the table top surface. This is measured perpendicular to the table top surface. Then multiply this total distance in Inches by the weight of the weldment. Do not exceed the maximum load torque shown in the "tilt" column on next page.



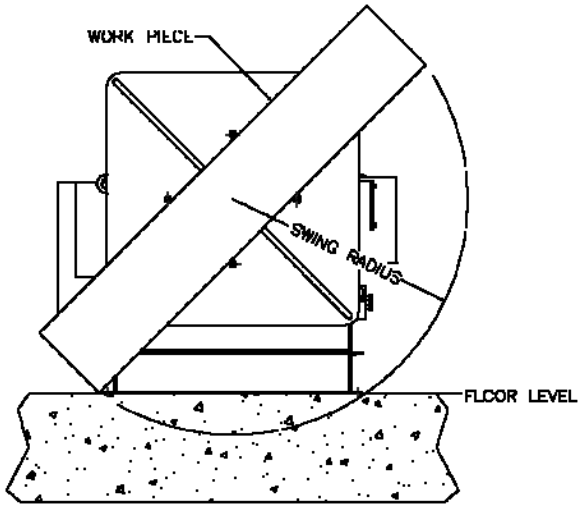
Rotation Torque Load:

To find your weldments' Rotation Torque Load, multiply the weldment weight in Pounds by the distance in inches that Center-of-Gravity (CG) will be from the center of the table. This measurement is taken parallel to the table surface. Do not exceed the maximum load torque shown in the "rotation" column.



How About Swing Clearance:

When selecting a positioner, don't forget to leave clearance to swing the work above the floor when the table is in the full tilt position. This is a common error in specifying positioners. For excessive work-pieces, Aronson positioners are available with manually adjustable bases, or powered Elevating bases which adjust the table height for larger work. Fixed-base machines also can be elevated by using a riser or sub-base.



Comprehensive Load Capacity Table

Model	Available G Model	Rotation Torque In/Lbs.	Tilt Torque In/Lbs.	INH O.H. inches	CG @ 6”	CG@ 12”	CG@ 18”	CG@ 24”	CG@ 30”	CG@ 36”	CG@ 42”	CG@ 48”	CG@ 54”	CG@ 60”	CG@ 66”	CG@ 72”
10P	—	6,000	10,500	4.5	1,000	635	466	365	—	—	—	—	—	—	—	—
HD20	—	12,000	21,000	4.5	2,000	930	730	600	520	450	400	360	325	—	—	—
HD25	—	15,000	31,875	6.8	2,500	1,700	1,285	1,035	875	750	650	580	520	470	430	400
HD30	—	36,000	56,250	6.8	—	3,000	2,270	1,830	1,530	1,300	1,100	1,000	900	830	760	700
HD45	—	54,000	84,375	6.8	—	4,500	3,400	2,750	2,300	1,975	1,720	1,530	1,380	1,250	1,150	1,100
HD60	—	72,000	123,000	8.5	—	6,000	4,650	3,790	3,200	2,750	2,400	2,200	1,900	1,700	1,600	1,500
HD100	—	120,000	205,000	8.5	—	10,000	7,700	6,300	5,300	4,600	4,000	3,600	3,200	3,000	2,700	2,500
HD160	—	192,000	336,000	9.0	—	16,000	12,400	10,000	8,600	7,400	6,600	5,900	5,300	4,800	4,400	4,000
HD240	—	288,000	504,000	9.0	—	24,000	18,500	15,000	13,000	11,000	9,800	8,800	8,000	7,300	6,700	6,200
HD400	**G400**	480,000	840,000	9.0	—	40,000	31,000	25,000	21,500	18,500	16,400	14,600	13,200	12,000	11,000	10,200
HD500	**G500**	600,000	1,050,000	8.8	—	50,000	39,000	32,000	27,000	23,400	20,600	18,500	16,700	15,200	14,000	13,000
HD600	**G600**	720,000	1,260,000	9.0	—	60,000	46,500	38,000	32,000	28,000	24,500	22,000	20,000	18,000	16,500	15,500
HD700	**G700**	840,000	1,470,000	9.0	—	70,000	54,500	44,500	37,500	32,500	28,500	25,500	23,000	21,000	19,500	18,000
	G850	1,020,000	1,800,000	9.0	—	85,000	66,600	54,500	48,000	42,000	37,000	32,000	29,000	26,000	24,000	22,000
	G1200	1,440,000	2,880,000	12.0	—	120,000	96,000	80,000	68,600	60,000	53,400	48,000	43,600	40,000	37,000	34,200
	G2200	2,640,000	5,400,000	12.5	—	220,000	177,000	148,000	127,000	111,000	100,000	89,000	81,000	74,000	69,000	64,000
	G3500	4,200,000	9,300,000	14.5	—	350,000	286,000	240,000	210,000	184,000	160,000	145,000	135,000	125,000	115,000	107,000
	G7000	5,000,000	18,600,000	14.5	—	700,000	570,000	480,000	420,000	368,000	320,000	290,000	270,000	250,000	230,000	214,000
	G10000	12,000,000	30,000,000	18.0	—	1,000,000	890,000	760,000	665,000	590,000	540,000	485,000	440,000	410,000	380,000	335,000

Models and specifications subject to change without notice.
For models greater than 1,000,000 Lbs. capacity, please consult Factory

Worksheet- Gear Driven Positioners

1. TOTAL LOAD WEIGHT _____ Lbs. (Including Fixture)

2. PIECE PART DIMENSIONS:

   LENGTH _____ Inches

   WIDTH _____ Inches

   HEIGHT _____ Inches (Above Table)

   MAXIMUM SWING CLEARANCE/RADIUS _____ Inches

3. OVERHANG C/G _____ Inches
(Distance the center of gravity of the load is from the surface of the table)

4. OFF-CENTER C/G _____ Inches
(Distance the center of gravity of the load is from the center of rotation)

5. ROTATION AXIS: ◯ POWERED, Variable Speed ◯ SPECIAL RPM REQUIRED _____ RPM

6. TILT AXIS: ◯ POWERED, Constant Speed ◯ SPECIAL RPM REQUIRED _____ RPM

7. TABLE:

   ◯ ROUND _____ Inches Diameter (Standard on Ransome Model)

   ◯ SQUARE _____ Inches Square (Standard on Aronson Model)

   ◯ MACHINED SURFACE (optional)

8. PRIMARY POWER: _____ Volts, _____ Phase, _____ Hertz
   (Most Standard At: 430/3/60)

9. ACCESSORIES:

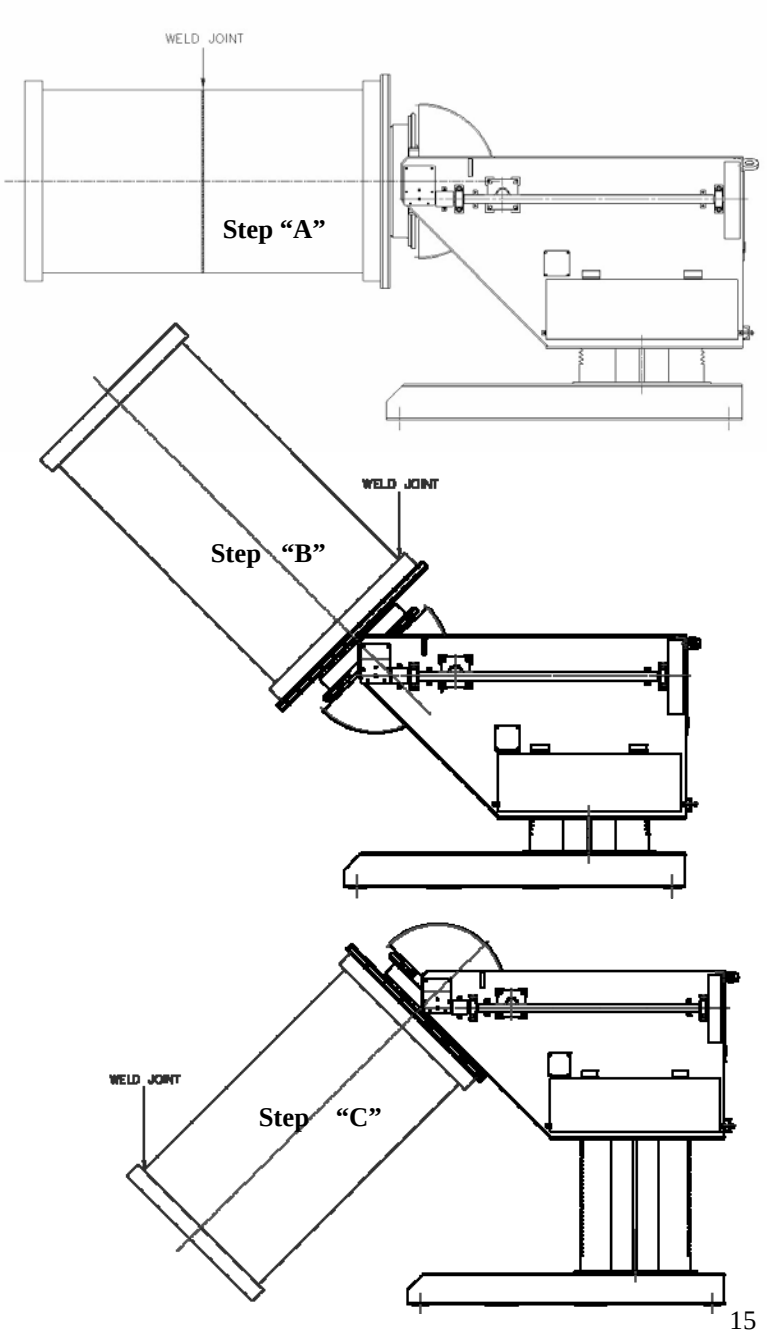
10. NOTES:

11. MODEL (if known): _____

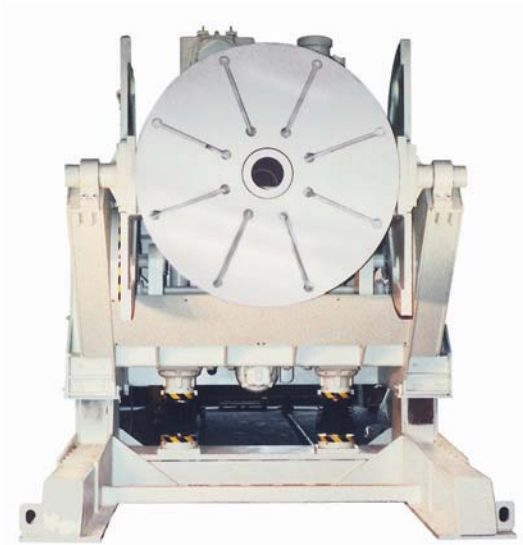
Elevating Positioners

The sketch shows three different welds made on a spool-shaped work-piece by one Koike Aronson Geared Elevation Positioner. In the first step (A), the table rotates as a girth weld is completed at a constant operator height. Then in (B) the operator tilts the table up 45 degrees and completes a fillet weld on the rotating table at a specific height. In Step (C) the Positioner's height is increased, then the table is tilted down to the 135 degree position and a final fillet weld is added while the table rotates. Due to low working heights, makeshift operator platforms are eliminated, creating much safer working conditions.

Koike Aronson / Ransome Elevating Positioners are available in both Multiple post / Rack and pinion lift and ball screw elevation design. Both tilt, and rotational torque requirements are calculated in the same manner as Gear Driven Positioners (page 12). The elevation stroke should be derived from the required swing radius (diameter) that the work piece requires. Elevation components for both models are sized by the factory to correspond with the required load/size Elevating Positioner selected.



GE500VF, Rack and Pinion Elevation rated at 50,000 Lbs. Capacity



250PE, Screw Jack Elevation rated at 25,000 Lbs

Comprehensive Load Capacity Table

This comprehensive capacity chart provides the necessary information you need to select Aronson Geared Elevation Positioners. You should select the Positioner model based on the greatest torque requirement, either rotation or tilt torque.

Model	Rotation Torque In/Lbs.	Tilt Torque In/Lbs.	INH O.H. inches	CG @ 6”	CG@ 12”	CG@ 18”	CG@ 24”	CG@ 30”	CG@ 36”	CG@ 42”	CG@ 48”	CG@ 54”	CG@ 60”	CG@ 66”	CG@ 72”
GE25	15,000	27,500	5.0	2,500	1,600	1,200	950	780	670	580	520	460	420	380	350
GE30	36,000	60,750	8.2	—	3,000	2,300	1,880	1,600	1,375	1,200	1,075	975	890	820	750
GE45	54,000	91,125	8.2	—	4,500	3,500	2,800	2,400	2,050	1,800	1,600	1,450	1,300	1,200	1,100
GE60	72,000	123,000	8.5	—	6,000	4,650	3,790	3,200	2,750	2,400	2,200	1,900	1,700	1,600	1,500
GE90	108,000	184,500	8.5	—	9,000	7,000	5,700	4,800	4,150	3,650	3,250	2,950	2,700	2,480	2,300
GE120	144,000	252,000	9.0	—	12,000	9,300	7,600	6,450	5,600	4,950	4,400	4,000	3,650	3,350	3,100
GE180	216,000	369,000	8.5	—	18,000	13,900	11,350	9,600	8,300	7,300	6,500	5,900	5,400	4,950	4,600
GE250	300,000	512,500	8.5	—	25,000	19,400	15,800	13,300	11,500	10,200	9,000	8,200	7,500	6,900	6,400
GE500	600,000	1,050,000	8.8	—	50,000	39,000	32,000	27,000	23,400	20,600	18,500	16,700	15,200	14,000	13,000
GE850	1,020,000	1,800,000	9.0	—	85,000	66,600	54,500	48,000	42,000	37,000	32,000	29,000	26,000	24,000	22,000
GE1200	1,440,000	2,880,000	12.0	—	120,000	96,000	80,000	68,600	60,000	53,400	48,000	43,600	40,000	37,000	34,200
GE3500	2,640,000	9,300,000	14.5	—	350,000	286,000	240,000	210,000	184,000	160,000	145,000	135,000	125,000	115,000	107,000

Models and specifications subject to change without notice.
For models greater than 350,000 Lbs. capacity, please consult Factory

Worksheet- Elevating Positioners

1. TOTAL LOAD WEIGHT _____ Lbs. (Including Fixture)
2. PIECE PART DIMENSIONS:
   - LENGTH _____ Inches
   - WIDTH _____ Inches
   - HEIGHT _____ Inches (Above Table)
   - MAXIMUM SWING CLEARANCE/RADIUS _____ Inches
3. OVERHANG C/G _____ Inches
(Distance the center of gravity of the load is from the surface of the table)
4. OFF-CENTER C/G _____ Inches
(Distance the center of gravity of the load is from the center of rotation)
5. ROTATION AXIS: ◯ POWERED, Variable Speed ◯ SPECIAL RPM REQUIRED _____ RPM
6. TILT AXIS: ◯ POWERED, Constant Speed ◯ SPECIAL RPM REQUIRED _____ RPM
7. ELEVATION AXIS: (only specify if there is a preference)
   - ◯ GEAR RACK (Aronson Style)
   - ◯ BALL SCREW (Ransome Style)
8. TABLE:
   - ◯ ROUND _____ Inches (Standard on Ransome models)
   - ◯ SQUARE _____ Inches (Standard on Aronson models)
   - ◯ MACHINED SURFACE (optional)
9. PRIMARY POWER: _____ Volts, _____ Phase, _____ Hertz
10. ACCESSORIES:

_____

_____

_____

11. NOTES:

_____

_____

_____

12. MODEL (if known): _____

Headstock/Tailstock Positioners

The quality features Koike Aronson builds into their headstock/tailstock positioners assures safety, precision and long machine life.

Head and Tailstock Positioners can help you:

- Make high quality “positioned” welds while reducing production and handling costs. * Long fabrications, elliptical vessels, railroad and truck frames can be positioned easily.
- Model selections handle 2500 Ib to 240,000 Ib weldments. Optional accessories allow application versatility.

Headstock/Tailstock Features

1. Boxed section table designs on many models have more strength than solid plate tables and less deflection. Various sizes available, round or square.
2. Precision pilot holes facilitate centering loads and fixturing. Thru-Hole (hollow) spindles can be supplied for preheat and purge piping.
3. Full clamping length table slots have nut access holes in back. Slots are self-cleaning.
4. Grounding blocks for positive clamping of ground cable terminals to assure continuous, non-varying weld circuit conduction. Optional Sliding copper ground shoes are also available.

5. Steel and all-welded construction give utmost strength. Boxed section design has maximum rigidity without excessive weight.

6. NEMA12 dust-tight enclosures protect the motor controls from contamination. Disconnect switches Variable Frequency drives assure reliable and safe operation.

7. Dust and oil-tight pendants with safety control circuits allow remote operation of tables, even when wearing heavy welding gloves.

8. Brakes motors assist in holding position. Motors are protected inside of chassis.

9. Worm-gear drive reductions, lifetime lubricated, control maximum loads, precisely and safely. Welded steel gear cases won’t break or shift under load.

10. Anti-friction tapered roller bearings of high capacity on spindles are preloaded for maintenance-free weld ground conduction.

11. Heavy duty precision final drive gearing for smooth rotation and minimum lost motion of table is guarded for life.

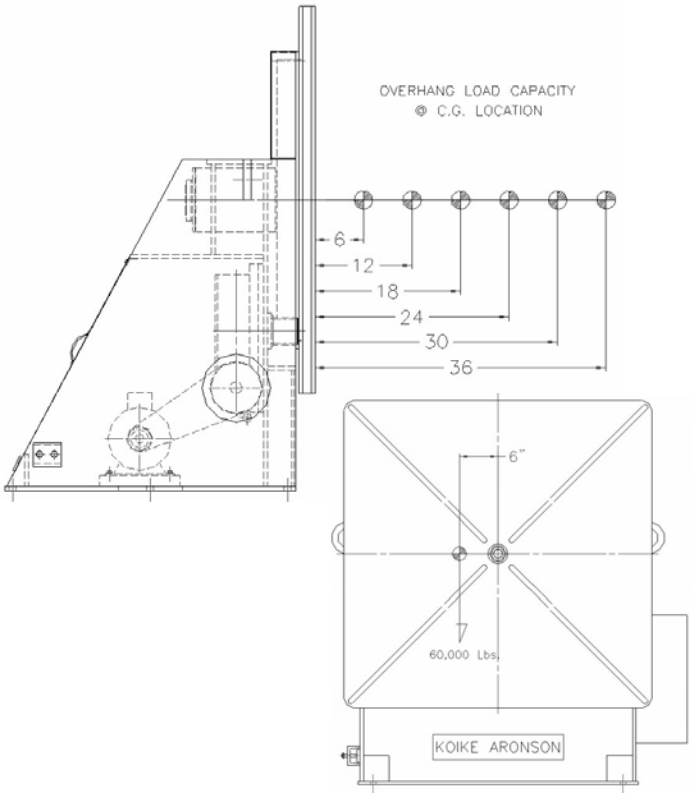
Selecting Headstock/Tailstock Positioners

How to Select a Headstock/Tailstock To Best Meet Your Needs:

Head and tail units are rated for overhanging loads. Determine the weight and how far ahead of the table the CG (Center-of-Gravity) of the work-piece will be located, then select the proper model from the chart on page 21.

When head and tail units are used together, the load weight is shared by both units. As explained below, the weight is imposed on the flexible point of the clamping fixtures. The distance that the flexible point is ahead of the table determines the overhanging load on the head and tail units. This load can be compared to the chart on page 21, using the CG rating that corresponds to the flexible point's distance away from the table.

The headstock must also assure adequate rotational torque. Determine the distance that the load's CG will be from the rotation axis, then multiple this distance in inches by the pounds of load weight to find "LBS- IN" of torque requirement. The chart on page 21 gives these ratings. For example, a 60,000 lb load with the CG at 6"off-center will require 360,000 Lb-In of torque. The Tailstocks with freewheeling tables do not need torque ratings.



Importance of "Universal-Joint" attachment to weldment to Headstock & Tailstock

A. Rigid Mounting.

To be avoided- When rotating inaccurate work-pieces rigidly mounted between head and tail units that might be misaligned, great stresses are created that can tear the work from the table, or damage the work and positioners. Even if everything holds, rotation drag is created which could stall the headstock. A flexible connection between the load and tables to relieve misalignment is highly recommended.

B. Pilot Mounting.

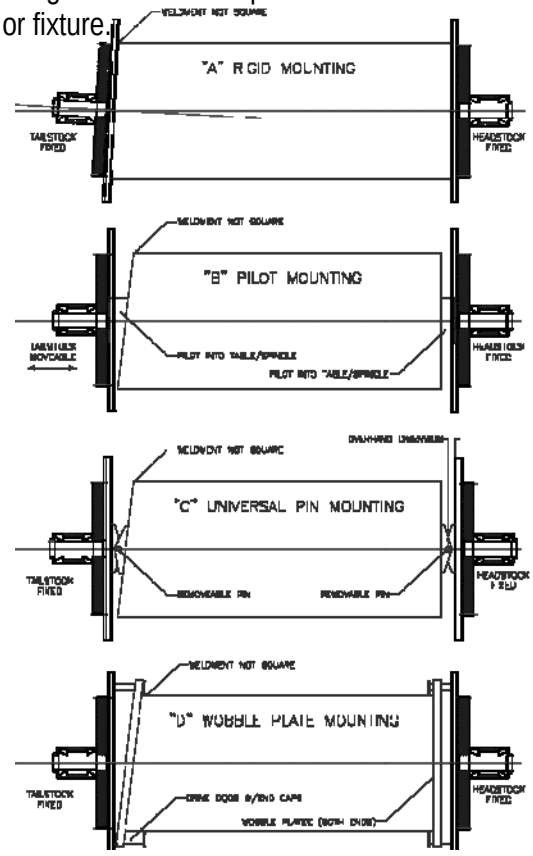
A stub-shaft attached to each end of the work-piece and then engaged loosely into hollow table-receptacles will relieve misalignment. The stub-shafts also take the shear load of the work. This approach requires that the tail stock be movable on wheels and track to allow engagement of the stub-shafts during set-up. To impart rotation, drive dogs must be used at each end.

C. Universal Pin Mounting.

Loose pins through clevis-type connections provide flexibility and setup without having to move the tailstock. The load weight on the head and tail units is imposed on the pins, at a distance ahead of the table. Always keep the flexible point as near to the table as possible. Pilot mounting (sketch B) is ideal from this standpoint. Drive dogs for rotation are needed to save the pins from heavy torsional loading.

D. Wobble Plate Mounting.

Four round drive dogs extend through holes in each wobble plate and carry the load, as well as impart rotation. Caps on end of drive dogs insure wobble plates do not slide off work piece, part or fixture.



Elevating Headstock/Tailstock Positioners

Powered Elevation keeps work close to floor for each loading, adjusts to convenient welding height and lift full load for swing clearance height, safely.

ARONSON STYLE PATENTED “GEARED ELEVATION” HEADSTOCK/TAILSTOCK POSITIONERS

Geared Elevation has posts with rack teeth and chassis with lift pinions. All pinions are geared together and must run together. The chassis is always level and steady. With loading down on the front racks and a lesser reactionary force up on the rear racks it is impossible for all the teeth to wear out and fail simultaneously, regardless of length of service or magnitude of the load. If the heavier loaded front teeth wear out or break, the chassis will jam and will not crash down as the strong teeth at the rear are holding safely.

RANSOME STYLE “BALL SCREW ELEVATION” HEADSTOCK/TAILSTOCK POSITIONERS

The “Ball Screw” Elevation design makes maximum use of proven commercially available components, both in the elevation and guidance systems.

Elevation is by means of commercial Ball screw jacks for high duty cycle operation, driven by a worm/wormgear arrangement. Elevation uses two of these screw jacks for redundancy, coupled together and driven by a common motor.

Guidance is by means of wide, large diameter cam followers bearing on flat guide-ways, or Linear Bearings and ways depending on size. Guidance is provided on front and back of two columns that rigidly support the cantilevered load.

In the case of Headstock / Tailstock Elevating Positioners, the synchronization between Head and Tailstock utilizes AC Variable Frequency drives that provide dynamic synchronization during the elevation cycle, as well as absolute mechanical resynchronization at full stroke, at either top or bottom limits. Periodic mechanical resynchronization at end of travel may be required.

Comprehensive Load Capacity Table
Elevating Headstock/Tailstock Positioners

Model	Load off Rotation CG Lbs. @ 6”	Rotation Torque In/Lbs.	Max Load Between Head & Tail (Lbs.)	CG@ 6”	CG@ 12”	CG@ 18”	CG@ 24”	CG@ 30”	CG@ 36”	CG@ 42”	CG@ 48”	CG@ 54”	CG@ 60”	CG@ 66”	CG @ 72”
HS2VF	2,500	30,000	—	2,500	2,500	1,100	850	700	600	500	450	400	350	325	300
TS2	2,500	—	—	2,500	2,500	1,100	850	700	600	500	450	400	350	325	300
HTS5VF—GE	5,000	30,000	5,000	LOAD EVENLY DISTRIBUTED BETWEEN HEAD & TAILSTOCK											
2H/2T-PE	5,000	30,000	5,000												
3H/3.5T-PE	6,000	36,000	6,000	LOAD EVENLY DISTRIBUTED BETWEEN HEAD & TAILSTOCK											
HS4VF	4,500	54,000	—	4,500	4,500	2,000	1,550	1,300	1,100	950	800	750	650	600	550
TSVF	4,500	—	—	4,500	4,500	2,000	1,550	1,300	1,100	950	800	750	650	600	550
HTS9VF—GE	9,000	54,000	9,000	LOAD EVENLY DISTRIBUTED BETWEEN HEAD & TAILSTOCK											
3.5H/3.5T-PE	9,000	54,000	9,000												
HS6VF	6,000	72,000	—	6,000	6,000	4,400	3,450	2,850	2,400	2,100	1,850	1,650	1,500	1,400	1,250
TS6	6,000	—	—	6,000	6,000	4,400	3,450	2,850	2,400	2,100	1,850	1,650	1,500	1,400	1,250
HTS12VF—GE	12,000	72,000	12,000	LOAD EVENLY DISTRIBUTED BETWEEN HEAD & TAILSTOCK											
4H/4T-PE	12,000	72,000	12,000												
HS10VF	10,000	120,000	—	10,000	10,000	7,350	5,850	4,850	4,100	3,600	3,200	2,850	2,600	2,350	2,200
TS10	10,000	—	—	10,000	10,000	7,350	5,850	4,850	4,100	3,600	3,200	2,850	2,600	2,350	2,200
HTS20VF—GE	20,000	120,000	20,000	LOAD EVENLY DISTRIBUTED BETWEEN HEAD & TAILSTOCK											
5H/5T-PE	20,000	120,000	20,000												
HS16VF	16,000	192,000	—	16,000	16,000	12,000	9,600	8,000	6,850	6,000	5,300	4,800	4,350	4,000	3,850
TS16	16,000	—	—	16,000	16,000	12,000	9,600	8,000	6,850	6,000	5,300	4,800	4,350	4,000	3,850
HTS32VF—GE	32,000	192,000	32,000	LOAD EVENLY DISTRIBUTED BETWEEN HEAD & TAILSTOCK											
6H/6T-PE	32,000	192,000	32,000												
HS20VF	20,000	240,000	—	20,000	20,000	15,000	12,000	10,000	8,550	7,500	6,650	6,000	5,450	5,000	4,600
TS20VF	20,000	—	—	20,000	20,000	15,000	12,000	10,000	8,550	7,500	6,650	6,000	5,450	5,000	4,600
HTS20VF – GE	40,000	240,000	40,000	LOAD EVENLY DISTRIBUTED BETWEEN HEAD & TAILSTOCK											
HS25VF	25,000	300,000	—	25,000	25,000	18,900	15,200	12,750	10,950	9,600	8,550	7,700	7,000	6,400	5,950
TS25	25,000	—	—	25,000	25,000	18,900	15,200	12,750	10,950	9,600	8,550	7,700	7,000	6,400	5,950
HTS50VF—GE	50,000	300,000	50,000	LOAD EVENLY DISTRIBUTED BETWEEN HEAD & TAILSTOCK											
7H/7T-PE	50,000	300,000	50,000												
HS30VF	30,000	400,000	—	30,000	30,000	22,850	18,450	15,500	13,350	12,200	10,450	9,400	8,550	7,850	7,250
TS30	30,000	—	—	30,000	30,000	22,850	18,450	15,500	13,350	12,200	10,450	9,400	8,550	7,850	7,250
HTS60VF—GE	60,000	400,000	60,000	LOAD EVENLY DISTRIBUTED BETWEEN HEAD & TAILSTOCK											
8H/8T-PE	80,000	480,000	80,000	LOAD EVENLY DISTRIBUTED BETWEEN HEAD & TAILSTOCK											
HS45VF	45,000	540,000	—	45,000	45,000	34,400	27,850	23,400	20,150	17,700	15,800	14,250	13,000	11,900	11,000
TS45	45,000	—	—	45,000	45,000	34,400	27,850	23,400	20,150	17,700	15,800	14,250	13,000	11,900	11,000
HTS90VF—GE	90,000	540,000	90,000	LOAD EVENLY DISTRIBUTED BETWEEN HEAD & TAILSTOCK											
10H/10T-PE	100,000	600,000	100,000	LOAD EVENLY DISTRIBUTED BETWEEN HEAD & TAILSTOCK											
HS80	80,000	960,000	—	80,000	80,000	61,150	49,500	41,600	35,850	31,500	28,100	25,350	23,100	21,200	19,600
TS80	80,000	—	—	80,000	80,000	61,150	49,500	41,600	35,850	31,500	28,100	25,350	23,100	21,200	19,600
HTS160VF-GE	160,000	960,000	160,000	LOAD EVENLY DISTRIBUTED BETWEEN HEAD & TAILSTOCK											
16H/16T-PE	160,000	960,000	160,000												
HS120VF	120,000	1,440,000	—	120,000	120,000	92,000	75,000	83,000	54,000	48,000	42,000	38,000	35,000	32,000	30,000
TS120	120,000	—	—	120,000	120,000	92,000	75,000	83,000	54,000	48,000	42,000	38,000	35,000	32,000	30,000
HTS240VF-GE	240,000	1,440,000	240,000	LOAD EVENLY DISTRIBUTED BETWEEN HEAD & TAILSTOCK											

Worksheet- Head/Tailstock Positioners

1. TOTAL LOAD WEIGHT _____ Lbs. (Including Fixture)
2. PIECE PART DIMENSIONS:

   LENGTH: _____ Inches

   WIDTH: _____ Inches

   HEIGHT: _____ Inches (Above Table)

   MAXIMUM SWING CLEARANCE/RADIUS _____ Inches
3. OVERHANG C/G _____ Inches

SPECIFY: HEADSTOCK/TAILSTOCK
(Distance the center of gravity of the load is from the headstock/tailstock table surface of the table)

DISTANCE BETWEEN TABLE FACES _____ Inches

4. OFF-CENTER C/G _____ Inches
(Distance the center of gravity of the load is from the center of rotation)
5. ROTATION AXIS: ○ POWERED, Variable Speed ○ SPECIAL RPM REQUIRED _____ RPM
6. CHASSIS:

   ○ FIXED CENTERLINE HEIGHT _____ Inches

   ○ MANUAL ADJUSTABLE BASE,

   MIN C/L HEIGHT _____ Inches, MAX C/L HEIGHT _____ Inches

   ○ GEAR RACK (Aronson Style)

   ○ BALL SCREW (Ransome Style)
7. MOBILE SUB-BASE: (Option) SPECIFY FOR: HEADSTOCK/ TAILSTOCK

   ○ MANUAL

   ○ POWERED

   ○ TRACK, TRAVEL REQUIRED _____ Inches
8. TABLE:

   ○ ROUND _____ Inch Diameter (Standard on Ransome models)
   ○ SQUARE _____ Inch Square (Standard on Aronson models)
   ○ MACHINED SURFACE (Optional)
9. PRIMARY POWER: _____ Volts, _____ Phase, _____ Hertz (Standard 460/3/60)
10. ACCESSORIES:

    _____

    _____

    _____
11. NOTES:

    _____

    _____
12. MODEL (if known): _____

Floor Turntable Positioners

Turntables are single-axis Positioners that provide only rotation in the horizontal plane. Koike Aronson/Ransome turntables have load capacities from 250lbs to 400,000lbs (93 kg to 181,440 kg) or more. Single-axis turntables are not as versatile as gear-driven Positioners, but they cost less. Turntables can be used for flame cutting, assembly, x-ray inspection, positioning work for machining (under a drill press), as well as for positioning weldments. It is far less time consuming for a welder to stand in one spot and let the turntable bring the weld seam to him, than for the welder to move around the work dragging welding cables.

Turntable Capacity Ratings:

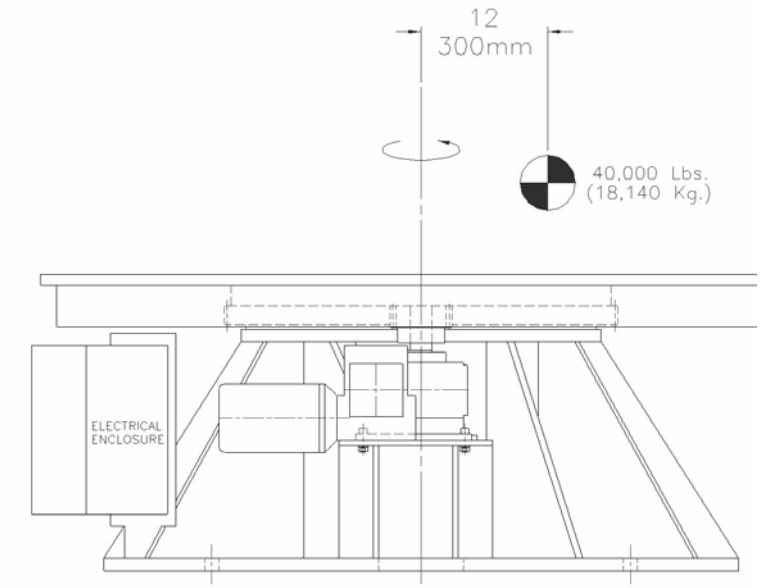
The basic rating system for turntables is given in pounds of capacity at a point 12 in. (300 mm) off-center from the table's rotation axis. Even though there is no overhanging load, the off-center CG location does create a bending moment on the table's spindle.

A typical capacity rating might be 40,000 lb-in. (450kg-m) with the CG 12 in. (300 mm) off center. To determine the off-center load capacity, multiply the weight of the work-piece by the turntable's rated CG distance off center.

For example, a 40,000 lb (18,140 kg) work-piece x12 in. (300 mm) off center has a 480,000 lb-in. (550 kg-m) load movement. If a turntable with this capacity is selected, the combination of work-piece weight and CG location should not exceed the 480,000 lb-in. (550 kg) load moment.

Even though the load moment of a heavier work-piece with a CG closer than 12 in. (300 mm) might not exceed 480,000 lb-in. (550 kg), other considerations such as inertia of heavier work-pieces and shocks during loading become an overriding consideration in selecting a machine of proper total load capacity.

Outboard table roller supports may be required depending on table diameter and loading conditions.



Turntable rated for 480,000 In-Lbs (550 Kg-m) @ 12 inches (300mm) CG distance.

Worksheet- Floor Turntable Positioners

1. TOTAL LOAD WEIGHT _____ Lbs. (Including Fixtures)

2. PIECE PART DIMENSIONS:

   LENGTH _____ Inches

   WIDTH _____ Inches

   HEIGHT _____ Inches (Above Table)

   MAXIMUM SWING CLEARANCE/RADIUS _____ Inches

3. OFF-CENTER C/G _____ Inches
(Distance the center of gravity of the load is from the center of rotation)

4. ROTATION AXIS:

   ○ POWERED, Variable Speed

   ○ SPECIAL RPM REQUIRED _____ RPM

5. TABLE:

   ○ ROUND _____ Inch Diameter (Standard)

   ○ SQUARE _____ Inch Square

   ○ MACHINED SURFACE (optional)

6. PRIMARY POWER:

   _____ Volts, _____ Phase, _____ Hertz (Most Standard at 430/3/60)

7. ACCESSORIES:

   _____

   _____

   _____

8. NOTES:

   _____

   _____

   _____

9. MODEL (if known): _____

Turning Rolls

Quality features built into Koike Aronson/Ransome Turning Rolls help keep your production and profits up. Built to take heavy use while providing accurate, dependable service, Koike Aronson/Ransome Turning Rolls will keep your production rolling out and your profits rolling in. In addition to the structural features shown below, Koike Aronson/Ransome Turning Rolls are produced in the widest range of styles and capacities in the industry. This assures you of the right style and size to meet your needs. Quality, value and dependability are the hallmarks of all Koike Aronson/Ransome turning rolls from the smallest to the largest.

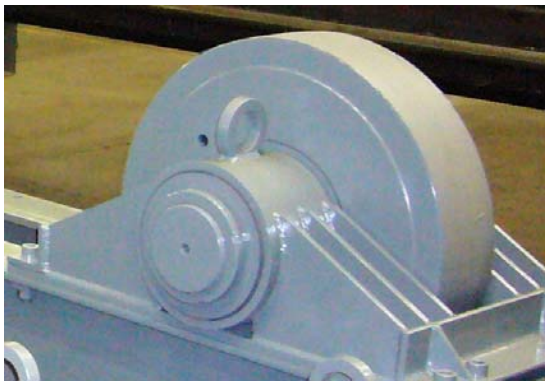
While Aronson and Ransome design features are different, both offer equivalent capacities and safety features. Choosing a design style can be as simple as matching current rolls that are currently used, or preference with a specific design philosophy.

ARONSON STYLE TURNING ROLL FEATURES

OVERLOAD DISCS:
Precisely made, to prevent overloads from rupturing tires. Not just discs of steel placed beside tires, but accurately designed and proven to prevent tires from bulging over discs and shearing material from sides of tires. They do not contact loads that are within rated capacity of the Turning Rolls.

TIE-ROD AXLES:
Effectively reduce axle bending, controlling drive gear backlash.

FABRICATED BEARING HOUSINGS:
Aronson All-Steel, Timken Pillow Blocks, built expressly for Turning Rolls, have shock-load capacity many times the load rating, side thrust capacity equal to radial load capacity, and are LUBRICATED FOR LIFE.



RANSOME STYLE TURNING ROLL FEATURES

SOLID WELDED WHEEL/AXEL ASSEMBLIES:
Solid welded and machined wheel and axle assemblies aid in wheel alignment and ease in tire replacement. Tire assemblies are pressed directly onto all steel welded axles/hubs.

PURCHASED BEARING HOUSINGS:
Large capacity pillow block bearing construction, allows easy maintenance and less down-time for repairs.

Turning Roll Load Capacity Table

Model	Load Per unit Lbs. (Ton)	Total Load 1Drive/ 1Idler Lbs. (Ton)	Total Load 1Drive/ 1 Idler Lbs. (Ton)	Tractive Pull	Speed Range IPM	Rubber Wheel Dimension	Steel Wheel Dimension	Diameter Range
PRD3	3,000 (1.5)	6,000 (3)	9,000 (4.5)	1,200	1.4 - 40	θ12" x 3-1/2"	N/A	3-1/2" - 40"
PRI3	3,000 (1.5)	6,000 (3)	9,000 (4.5)	—	2,500	θ12" x 3-1/2"	N/A	3-1/2" - 40"
WRD / WSD 5	5,000 (2.5)	10,000 (5)	15,000 (7.5)	1,200	1- 50	θ12" x 4"	θ12" x 4"	6" - 13'
WRI / WSI 5	5,000 (2.5)	10,000 (5)	15,000 (7.5)	—		θ12" x 4"	θ12" x 4"	6" - 13'
APRR / APRS	5,000 (2.5)	10,000 (5)	15,000 (7.5)	1,200	1.16—58	θ16" x 2-1/2"	θ16" x 2-1/2"	5" - 12'
AIRR / AIRS	5,000 (2.5)	10,000 (5)	15,000 (7.5)	—		θ16" x 2-1/2"	θ16" x 2-1/2"	5" - 12'
WRD / WSD 10	10,000 (5)	20,000 (10)	30,000 (15)	1,800	1 - 50	θ12" x 4-1/2"	θ12" x 4"	6" - 13'
WRI / WSI 10	10,000 (5)	20,000 (10)	30,000 (15)	—	—	θ12" x 4-1/2"	θ12" x 4"	6" - 13'
AAPRR / AAPRS	10,000 (5)	20,000 (10)	30,000 (15)	1,800	1.1—58	θ16" x 5"	θ16" x 5"	5" - 12'
AAIRR / AAIRS	10,000 (5)	20,000 (10)	30,000 (15)	—	—	θ16" x 5"	θ16" x 5"	5" - 12'
WRD / WSD 20	20,000 (10)	40,000 (20)	60,000 (30)	3,000	1 - 50	θ12" x 12"	θ12" x 4-3/4"	6" - 13'
WRI / WSI 20	20,000 (10)	40,000 (20)	60,000 (30)	—	—	θ12" x 12"	θ12" x 4-3/4"	6" - 13'
AAAPRR / AAAPRS	20,000 (10)	40,000 (20)	60,000 (30)	3,000	1.2—60	θ16" x 10"	N/A	5" - 12'
AAAIRR / AAAIRS	20,000 (10)	40,000 (20)	60,000 (30)	—	—	θ16" x 10"	N/A	5" - 12'
WRD / WSD 30	30,000 (15)	60,000 (30)	90,000 (45)	6,000	0.8 - 40	θ20" x 6"	θ20" x 5"	8" - 18'
WRI / WSI 30	30,000 (15)	60,000 (30)	90,000 (45)	—	—	θ20" x 6"	θ20" x 5"	8" - 18'
BPRR / BPRS	30,000 (15)	60,000 (30)	90,000 (45)	6,000	0.86 - 43	θ20-1/2" x 7"	θ20-1/2" x 5"	7" - 20'
BIRR / BIRS	30,000 (15)	60,000 (30)	90,000 (45)	—	—	θ20-1/2" x 7"	θ20-1/2" x 5"	7" - 20'
WRD / WSD 40	40,000 (20)	80,000 (40)	120,000 (60)	6,000	0.8 - 40	θ20" x 6"	θ20" x 5"	8" - 18'
WRI / WSI 40	40,000 (20)	80,000 (40)	120,000 (60)	—	—	θ20" x 6"	θ20" x 5"	8" - 18'
WRD / WSD 60	60,000 (30)	120,000 (60)	180,000 (90)	7,200	0.8 - 40	θ20" x 12"	θ20" x 5"	8" - 18'
WRI / WSI 60	60,000 (30)	120,000 (60)	180,000 (90)	—	—	θ20" x 12"	θ20" x 5"	8" - 18'
CPRR / CPRS	60,000 (30)	120,000 (60)	180,000 (90)	7,200	0.86 - 43	θ20-1/2" x 14"	θ20-1/2" x 5"	7" - 20'
CIRR / CIRS	60,000 (30)	120,000 (60)	180,000 (90)	—	—	θ20-1/2" x 14"	θ20-1/2" x 5"	7" - 20'
WRD / WSD 80	80,000 (40)	160,000 (80)	240,000 (120)	8,000	0.7 - 35	θ20" x 16"	N/A	8" - 18'
WRI / WSI 80	80,000 (40)	160,000 (80)	240,000 (120)	—	—	θ20" x 16"	N/A	8" - 18'
WRD / WSD 90	90,000 (45)	180,000 (90)	270,000 (135)	8,000	0.7 - 35	θ20" x 18"	θ20" x 5"	8" - 18'
WRI / WSI 90	90,000 (45)	180,000 (90)	270,000 (135)	—	—	θ20" x 18"	θ20" x 5"	8" - 18'
DPRR / DPRS	90,000 (45)	180,000 (90)	270,000 (135)	8,000	0.8 - 40	θ20-1/2" x 21"	θ20-1/2" x 5"	7" - 20'
DIRR / DIRS	90,000 (45)	180,000 (90)	270,000 (135)	—	—	θ20-1/2" x 21"	θ20-1/2" x 5"	7" - 20'
WRD / WSD 120	120,000 (60)	240,000 (120)	360,000 (180)	16,000	0.7 - 35	θ20" x 24"	θ20" x 5"	8" - 18'
WRI / WSI 120	120,000 (60)	240,000 (120)	360,000 (180)	—	—	θ20" x 24"	θ20" x 5"	8" - 18'
EPRR / EPRS	120,000 (60)	240,000 (120)	360,000 (180)	16,000	0.72 - 36	θ20-1/2" x 28"	θ20-1/2" x 5"	7" - 20'
EIRR / EIRS	120,000 (60)	240,000 (120)	360,000 (180)	—	—	θ20-1/2" x 28"	θ20-1/2" x 5"	7" - 20'
WRD / WSD 160	160,000 (80)	320,000 (160)	480,000 (240)	16,000	0.7 - 35	θ20" x 24"	θ20" x 5"	8" - 18'
WRI / WSI 160	160,000 (80)	320,000 (160)	480,000 (240)	—	—	θ20" x 24"	θ20" x 5"	8" - 18'
WRD / WSD 200	200,000 (100)	400,000 (200)	—	16,000	0.7 - 35	θ20" x 32"	θ20" x 5"	8" - 18'
WRI / WSI 200	200,000 (100)	400,000 (200)	—	—	—	θ20" x 32"	θ20" x 5"	8" - 18'
WSD 300	300,000 (150)	600,000 (300)	—	25,000	1 - 48	N/A	θ28" x 5"	24" - 20'
WSI 300	300,000 (150)	600,000 (300)	—	—	—	N/A	θ28" x 5"	24" - 20'
WSD 400	400,000 (200)	800,000 (400)	—	38,000	1 - 48	N/A	θ28" x 5"	24" - 20'
WSI 400	400,000 (200)	800,000 (400)	—	—	—	N/A	θ28" x 5"	24" - 20'
WSD 600	600,000 (300)	1,200,000 (600)	—	38,000	1 - 48	N/A	θ30" x 7"	24" - 20'
WSI 600	600,000 (300)	1,200,000 (600)	—	—	—	N/A	θ30" x 7"	24" - 20'

Worksheet- Turning Rolls

1. TOTAL LOAD WEIGHT _____ Lbs. (Including Fixture)
2. PIECE PART DIMENSIONS:
   - DIAMETER RANGE _____ Inches TO _____ Inches
   - LENGTH RANGE _____ Inches TO _____ Inches
3. CENTER OF GRAVITY LOCATION:
   - _____ Inches OFF CENTERLINE OF ROTATION
   - _____ Inches FROM END OF VESSEL
4. WHEEL ROTATION:
   - ◯ POWERED, Variable Speed
   - ◯ SPECIAL IPM REQUIRED _____ RPM
5. WHEEL MATERIAL:
   - ◯ RUBBER
   - ◯ STEEL
   - ◯ PHENOLIC (Special material for turbine rolls)
   - ◯ URETHANE (Special applications, High Heat, Non-marking, etc.)
6. NUMBER OF IDLERS REQUIRED _____
7. STYLE OF ROLL (determined by matching to existing rolls of specific specifications)
   - ◯ ARONSON
   - ◯ RANSOME
8. PRIMARY POWER: _____ Volts, _____ Phase, _____ Hertz (Standard 460/3/60)
9. ACCESSORIES:

   _____

   _____

   _____

10. NOTES:

    _____

    _____

    _____

11. MODEL (if known): _____

Manipulators

HOW TO SELECT THE CORRECT SIZE OF MANIPULATOR TO BEST MEET YOUR NEEDS

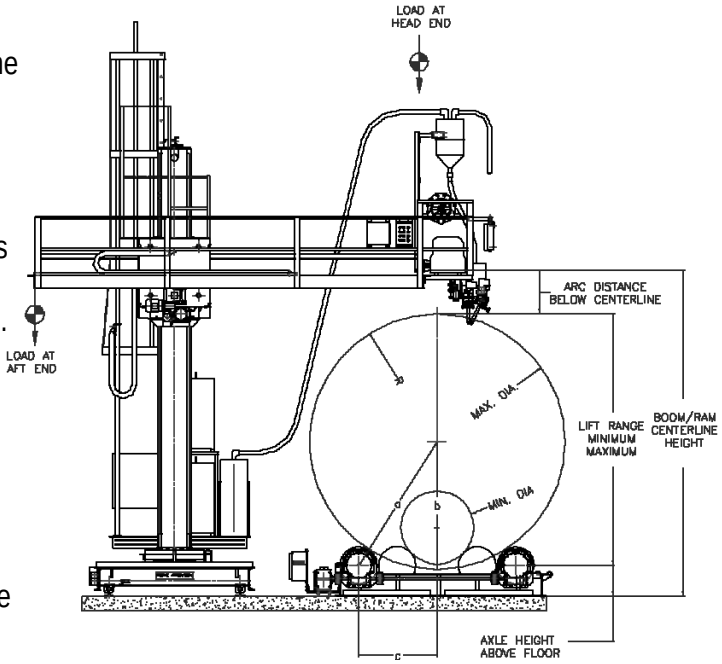
To select the correct size of Manipulator, not only the Reach and Lift Ranges must be determined, but also the required load capacity. The Reach Range is selected according to the desired extreme locations of the Arc horizontally. The Lift Range is selected according to the extreme locations of the Arc vertically. A typical welding set-up is shown in the sketch. The distance to the top of the vessel above the floor can be determined by first finding "side b" of the triangle a-b-c, with known values for "a" and "c" using the formula $b = \sqrt{a^2 - c^2}$. Then add the value of "b" to the Axle Height above floor, plus the "R" Radius of the vessel. Next add the distance from the Arc to the Centerline of the Boom. This will give you the maximum required for the Lift Range. Follow the same procedure to find Arc height needed for the smallest vessels.

The load capacity considered must include all welding equipment, operator, catwalks, chairs and any other options added to the base machine frame.

To Determine the Right Length of Track

When a Car is used to travel the Arc longitudinally the length of the vessel, the required Track can be determined by adding the length of the Car's frame to the amount of Arc travel desired. afford the correct total Track length.

Track sections are available in 10', 12', 14' and 16' lengths, a combination of which will afford the correct total Track length.



Load in pounds on either / or both ends of Boom

	CRICKET	LOCUST-I	LOCUST-II	SCARAB-I	SCARAB-II	SCARAB-III	44	66	99	1212	SHD	XHD	XXHD
SIZE													
4X4	150						150						
6X6		400	600	1700				250					
7X7		350	500	1500				250					
8X8		300	500	1500				250	500				
9X9			400	1300				250	500				
10X10			400	1300				250	500				
12X12			300	1100	2200				500	750			
14X14				900	1900					750	1000		
16X16					1600					750	1000		
18X18					1300					750	1000		
20X20					1000	3000					1000	1500	2000
22X22						2600						1500	2000
24X24						2200						1500	2000
26X26						1800						1500	2000
28X28						1400							1500
30X30						1000							1000

Manipulators

Quality features built into Koike Aronson/Ransome Manipulators help keep your production and profits up. Built to take heavy use while providing accurate, dependable service, Koike Aronson/Ransome Manipulators will keep your production rolling out and your profits rolling in. In addition to the structural features shown below, Koike Aronson/Ransome Manipulators are produced in the widest range of styles and capacities in the industry. This assures you of the right style and size to meet your needs. Quality, value and dependability are the hallmarks of all Koike Aronson/Ransome Manipulators from the smallest to the largest.

While Aronson and Ransome design features are different, both offer equivalent capacities and safety features. Choosing a design style can be as simple as matching current models that are presently owned, or preference with a specific design philosophy.

ARONSON STYLE GEAR ELEVATING MANIPULTORS

RACK AND PINION LIFT:
All welded gearboxes with aluminum bronze gearing and hardened drive pinions provide years of maintenance free operation.

CONCAVE WHEEL / ROUNDWAY CONSTRUCTION:
Concave wheels partially encompass roundways providing a long line of contact assuring accurate guidance. The roundway itself is utilized for zero backlash traction of preloaded concave wheels.

CARRIAGE DRIVE LOCATED ON CARRIAGE CARRIER:
With the drive located directly on the carriage carrier overall height can be reduced while providing maximum lift available.

RANSOME STYLE CHAIN LIFT MANIPULATORS
Includes Spring Loaded anti-fall devise.

HIGH CAPACITY CAM ROLL BEARINGS:
Constructed with high capacity, readily available cam roll bearings, maintenance and repair is quick and simple.

OPEN RAM DESIGN:
With and open Ram design, conduit, wireways and cable management is neat and convenient.

RACK AND PINION REACH DRIVE:
Rack and pinion Ram drive provides positive travel for all welding applications.

Worksheet- Welding Manipulator

1. OVERALL DIMENSIONS:
   MAXIMUM REACH REQUIRED _____ Feet (measured from CL of Mast/Upright)

   MINIMUM REACH REQUIRED _____ Feet (measured from CL of Mast/Upright)
   - ○ VARIABLE SPEED (Standard)
   - ○ MANUAL (Small models only)

   MAXIMUM LIFT REQUIRED _____ Feet (measured from CL of Boom/Ram)

   MINIMUM LIFT REQUIRED _____ Feet (measured from CL of Boom/Ram)
   - ○ CONSTANT SPEED (Standard)
   - ○ VARIABLE SPEED (Special Applications)
   - ○ MANUAL (Small models only)

   MAXIMUM HEIGHT OVERALL _____ Feet

2. MAXIMUM LOAD REQUIRED ON END OF BOOM/RAM _____ Lbs.

3. MAST/UPRIGHT ROTATION:
   - ○ NONE
   - ○ MANUAL
   - ○ POWERED

4. BASE:
   - ○ NONE (Mast/Upright anchors directly to floor)
   - ○ SELF STANDING (Requires no floor anchors)

5. TRAVEL CAR:
   - ○ MANUAL
   - ○ POWERED, Constant Speed (used for positioning only)
   - ○ POWERED, Variable Speed (used for welding axis)
   - ○ TRACK, TRAVEL REQUIRED _____ Inches

6. STYLE OF MANIPULATOR
   - ○ ARONSON (Rack and pinion lift, friction reach, roundways w/ machined rollers)
   - ○ RANSOME (Chain lift, rack and pinion reach, replaceable ways, taller HOA dimension)

7. PRIMARY POWER: _____ Volts, _____ Phase, _____ Hertz
(Standard 460/3/60)

8. WELDING EQUIPMENT MOUNTING:

9. ACCESSORIES:

10. NOTES:

11. MODEL (if known): _____