The Vicmarc Oval Device - VOD

Owner's Manual

Vicmarc Machinery Pty Ltd
Manufacturers of Quality
Woodturning Lathes and Accessories

The Vicmarc Oval Device

Index

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Manufacturers of Quality Woodturning Lathes, Chucks and Accessories

Vicmarc Machinery, a family owned and operated business, has been manufacturing wood turning lathes and accessories for the hobbyist and professional since 1984. The company is dedicated to providing machinery of the highest quality and precision engineering which has secured sales worldwide

Through constant improvement, Vicmarc retains its place as a leader in the field. Vicmarc lathes and chucks are known and respected internationally for their robust design and ease of use. Only the best materials and latest high precision, computer controlled machinery are used in the manufacture of Vicmarc products.

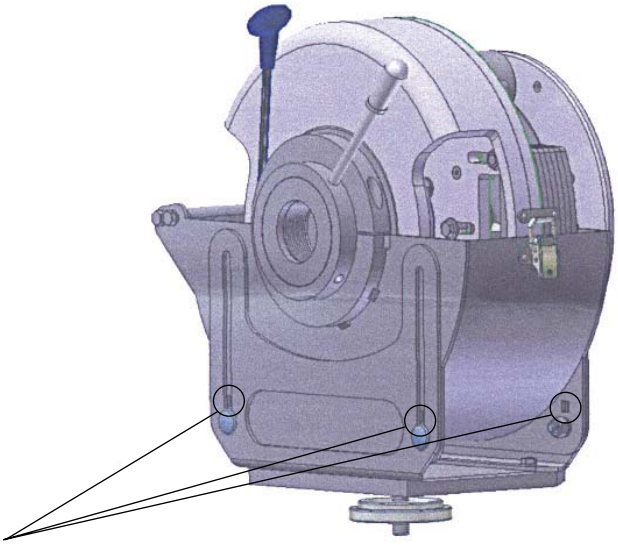
The company continues to respond to the demands of the market, updating and improving at all stages of manufacture

Description

The Vicmarc VOD is an innovative oval turning device. It is belt driven and has an in built balancing system which allows you to turn oval shaped objects at a higher rpm speed, with a smoother and quieter action than conventional oval turning devices. It can be mounted on any lathe with a centre height from 180 to 310mm (preferably with a variable speed).

Specifications

Maximum elliptical difference 120mm
Maximum distance between centres depends on lathe capacity
Maximum centre height 310mm or 620mm swing
Minimum centre height 180mm or 360mm swing
Maximum work piece weight 5kg



For lathes with centre height less than 200mm use the 4 holes above the standard holes to set up the VOD.

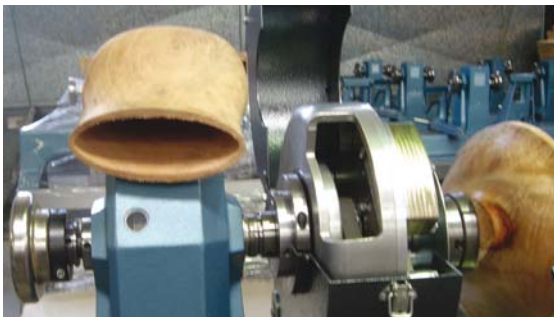
Raised plate edge is the zero mark for oval adjustment (as shown set at 20mm = 80mm oval

Safety First

1. READ AND UNDERSTAND INSTRUCTION MANUAL BEFORE OPERATING WOOD LATHE
2. Always wear eye protection.
3. Do not wear gloves, neckties, jewellery or loose clothing
4. Do not operate without guards in place. Always close the cover before operating.
5. Rough out workpiece before installing on face plate using a bandsaw.
6. Do not mount a split workpiece or one containing a knot
7. Tighten all locks before operating.
8. Ensure the workpiece is not able to rotate on the mount while it is being turned or it will change the centre line position.
9. Rotate workpiece by hand before applying power.
10. Use slowest speed when starting a new workpiece and do not exceed permitted speed.
11. Disconnect machine from power source before making repairs or adjustments.
12. Do not operate while under the influence of drugs alcohol or medication.
13. Remove the tool rest before sanding or polishing.
14. Switch power off when machine is not in use.

Δ Introduction to Ovalturning

Ovalturning is an old art of turning. It has been practised since the late middle ages. There are plenty of examples in museums of oval turned goblets and vessels that were made for the royal treasure chambers of Saxony's electors and Kings from as far back as the 16th century. Later oval frames for paintings and mirrors were manufactured. With the rise of portrait photography the ovalturning of frames became popular. At this time an oval turner was a well paid specialist, as ovalturning requires much more skill than regular woodturning.



In the middle of the 20th century the oval turning had been replaced by more efficient methods in production lines. Today ovalturning is a challenging woodturning technique for the artist craftsperson, restorers and wood turners.

There is a long list of objects that can be turned on the oval device such as frames for pictures, portraits mirrors , shallow and deep bowls, lidded boxes, platters, plates, and bowls. The list is only limited by the imagination of the artist.

For ovalturning an oval device was always necessary to create elliptical forms. Such oval devices have been offered by lathe producing companies since the 1950's, but they had stopped production due to lack of demand. Today there is an increasing interest in ovalturning and though the older style oval lathes are still available - like those of the well known German lathe producer Alexander Geiger - they are very expensive.

Since 1980 there has been many innovations in the design of oval devices to improve the overall running and ease of use for the craftsperson. The disadvantages of the earlier oval devices were continuously greasy slideways and an unbalanced action which lead to vibrations and noise that impaired the quality of the workpiece and made it difficult for craftspeople to work on.

The new Vicmarc Oval Device (VOD) does not have these disadvantages. Due to the design of the VOD the imbalance is compensated for. This has made oval turning much easier to achieve, enabling work at high cutting speeds, almost as high as that which is practised in normal woodturning. The striking noise of the old style oval lathes also does not occur with the new VOD.

Δ Safety with the VOD Turning Lathe

With oval turning there are more hazards to contend with than in regular woodturning. Due to these added dangers it is very important that the following instructions are strictly observed. This applies to ovalturning with tools that are used freehand, mainly scrapers and gouges, but it also applies to the use of tools in cross slides for ovalturning hard materials, e.g. hard wood, nuts, bones, horn, ivory and soft stones such as serpentine.

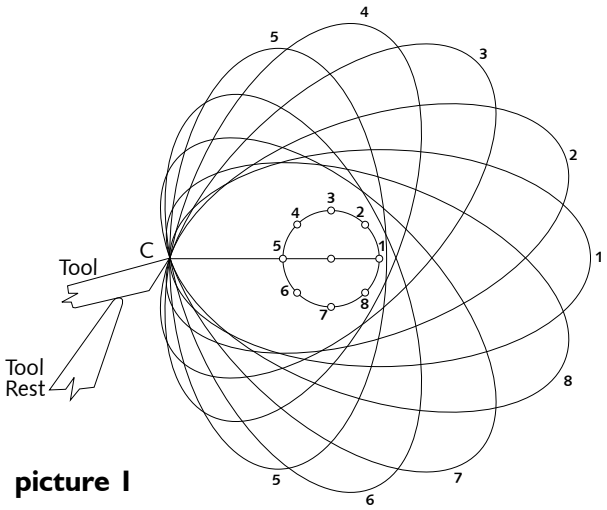
The hazards arise from the elliptical movement of the workpiece as shown in picture 1. It can be seen that the centre of the elliptical workpiece does not remain still, as it would do during regular turning, but it has a circular movement.

During one rotation, the centre of the workpiece takes up all the positions shown in the picture. The workpiece remains still only at the cutting edge of the tool.

It is therefore not possible to see the workpiece or touch the workpiece while the VOD is turning - this is very different to regular wood turning where you can feel the form of the workpiece as you work, if you are careful.

This elliptical movement of the workpiece requires a greater degree of attention when working the piece with hand tools. When the tool is moved towards the workpiece it must be held with both hands and applied to the workpiece very carefully. This same caution is to be shown when taking the tool away from the workpiece. Inattentive and uncontrolled movements of the cutting edge close to the moving workpiece is very dangerous.

The cutting conditions at the edge of the tool are different to ones during normal woodturning. There is a danger that the cutting edge might dig into the workpiece if the tool is not held correctly. At an elliptical surface the angle of relief of the cutting edge changes during every turn



picture 1

(see picture 14 page 11). This is why the oval turning of wood, especially soft wood, requires more skill and practice to get a well finished surface. For the safety of the craftsman it is very important that he or she is standing outside the area where the workpiece moves to avoid injury from shavings or other debris. Safety work wear such as gloves and a face mask should be worn when operating the lathe.

Warning

Under no circumstances should you operate the oval turner with loose belts. If loose, the belt will jump the geared tooth and the oval will be out of alignment causing the tool to catch in operation.

Δ Operating the VOD

The Vicmarc Oval Device is a finely tuned machine that allows you to create oval shaped objects at a higher rpm than conventional oval turning devices. The main parts of the Operating Manual is divided into two sections.

Section 1 is dedicated to the mechanical operations of the VOD. This section covers basic start up procedures of fitting to the lathe, making counter weight adjustments, removing chucks and any adjustments required to fine tune and use the VOD.

Section2 explains the calculations needed and the theoretical side of oval turning. This section explains ellipse geometry, how to work out what settings and counterweights are needed to achieve optimum results.

SECTION 1

Δ procedure 1
Fitting the VOD to the Lathe

Please Note: Before fitting your VOD on the lathe, make sure that the insert and the lathe spindle has been cleaned properly.

- First fit the insert that suits your lathe onto the VOD

1. Mount the VOD on the lathe drive shaft in the same manner that you would to fit a chuck. Ensure that all threads and mounting faces are clean and lubricated.
2. Remove the lathe bed clamping bolt and clamping plate.
3. Loosen the four (4) M8 nuts of the support stand.
4. Hold the lathe bed clamping plate under the bed, insert the bolt in the bottom of the support stand and tighten.
5. Ensure that none of the rotating parts are touching the cover. The cover can be moved back or forward by loosening the centreline adjustment collar.
6. Finger tighten the four (4) M8 nuts of the support stand.
7. Before tightening these nuts measure each side of the bottom half of the casing to ensure it is horizontal on the lathe centre line. This becomes an important reference point when setting the centre line of the oval work piece. When level, tighten the (4) M8 nuts.
8. Once this initial set up is complete the VOD can be removed and remounted on the same lathe without further adjustment, by removing the bed clamping bolt and unscrewing the drive shaft.


1.

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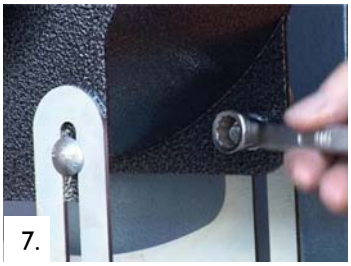
4.


4.


5.


6.


7.


7.

Adjusting the VOD

There are three (3) adjustments that can be made to the VOD to ensure a smooth and accurate operation.

a. **The Balance Weights** - Suit the weight of the work piece
b. **The Length/Width ratio of the Oval** - To determine the oval shape to be made
c. **The Centre Line of the Oval** - To ensure the workpiece is correctly centred for a good cutting action

All calculations required for the setting up of VOD can be seen in section 2

a. The Balance Weights

These are fitted to compensate for the out of centre forces generated by the VOD. These out of centre forces can be split into two (2) categories. **Fixed** and **Variable.** The **Fixed** off centre forces are generated by the drive train drive shaft and face plate or chuck. The **Variable** force is generated by the work piece, which changes weight as it is machined.

The balance weights are adjusted by two methods:

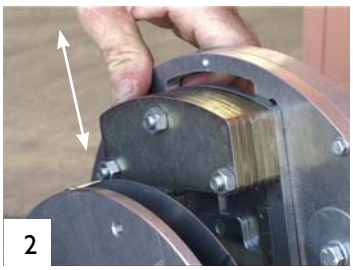
1. changing the number of weights
2. varying the offset. The weights are attached to a sliding plate, which can be adjusted by loosening the 4 nuts on part no. 15 (see diagram P15) and increasing or decreasing the offset of the weights by sliding the plate inwards or outwards.

The offset graduation required for the counterweights **(R_c)** and the weight required to suit the mass of your work piece can be calculated to give you the optimum setting. (See calculations pages 14-16)

In practice a perfect balance will not be achieved because of the variable factor but a compromise, which permits enough RPM to work the timber without excessive vibration, is easily attained.

Please take note that as the workpiece gets lighter during the oval turning process it should be possible to adjust the balance mass by shifting the offset rather than changing the weight.


1.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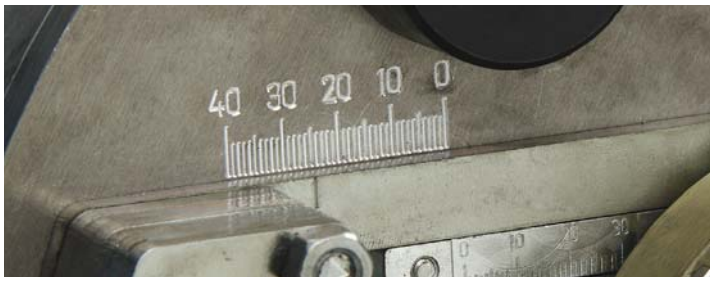


b. The Oval Length Width Ratio

The oval length width ratio can be adjusted by moving the sliding plate that fits inside the balance plate. A scale with graduation between 0-30mm indicates the degree of offset available. The reading is taken from the milled edge. To determine the setting of this offset see calculations on page15.

1. To change the settings loosen the three (3) bolts holding the plate (see diagram 1a), loosen the nut on the belt transitioning pulley (see diagram 1b), and slacken the belt tensioning bolt (see diagram 1c).
2. Adjust the offset to the required amount by rotating the knurled nut (see diagram 2a). Tighten the three (3) bolts holding the plate. Re- tension the drive belt and lock in by tightening the belt pinion nut.

****Please Note:**
With the offset adjusted to 25mm the length of the oval will be 100mm more than the width. The tension on the rear belt should be checked before each job or every time an adjustment has been made. (Front cover removed for illustrative purposes).


1.


1a.


1b.


1c.


2a.


2.

Δ procedure 2

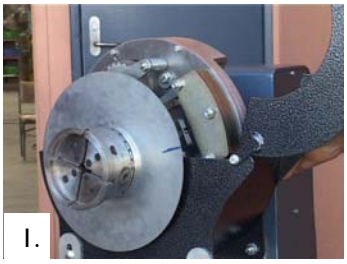
Adjusting the VOD

c. The Centre Line of the Oval

1. Once the workpiece has been mounted in either a chuck or onto the faceplate it is possible to change the alignment of the centre line without disturbing this mounting.

2. This is done by locking the lathe with the indexing knob (2a), loosening the two (2) allen bolts on the locking collar (see diagram 2b) then, rotating the workpiece to the required position by using the tommy bar inserted into the 8mm hole (2c) (ensuring it does not engage into the drive spindle see picture in procedure 8c page 12). Tighten the screws on the collar and disconnect the indexing knob. Then select the method of clamping ie by chuck, faceplate or gluing. Remove the faceplate if it is not necessary.

Note: If part 84 (from the assembly diagram) has been damaged or bent from misuse or an accidental catch, the VOD will no longer turn accurately. It must be 100% square to the mounting plate. This part will need to be replaced if bent or damaged.


1.


2a.


2b.


2c.

Δ procedure 3

Mounting the Workpiece

Raw workpieces can be fixed by screwing them directly, or with a support, onto the face plate or by clamping them into a chuck. For safety reasons it is important that the mounting system is done very carefully. The mounting system must be able to withstand the combined centrifugal and cutting forces while the machine is operating. If the workpiece comes off the mounting, or it should move while on the mounting, personal injury or material damage could occur. The screw chuck which is normally used to fix cross grain pieces during wood turning must not be used while ovalturning as it enables the workpiece to distort which can cause damage. The size of the dovetail jaws needed for oval turning is determined by the size of the bowl to be turned ie. the larger the workpiece the larger the dovetail jaws need to be. If you use small dovetail jaws on a large workpiece there is a high likely hood of the workpiece shifting while being turned and causing damage.

a. Screwing onto the Face Plate

All parts which are screwed onto the face plate must be precisely even. If not the face plate will be subject to undue stress and may bend or even break. It is recommended that bowl stock be fixed directly on the face plate with at least six hexagonal woodscrews Ø6 x 25mm.

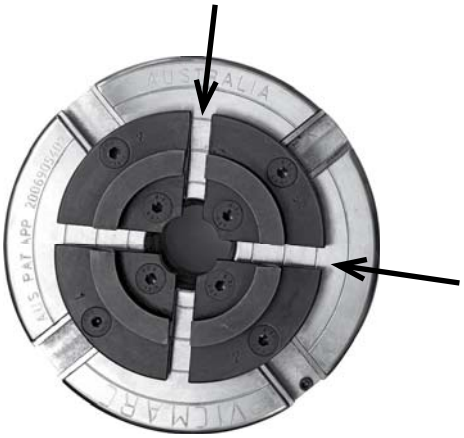
When using soft woods it is safer to fix the stock with longer and thicker woodscrews onto a hard - wood body and then fix this onto the face plate as described above. In order to protect the face plate it is recommended to fix a round disc made from pasteboard, plywood or laminated wood between the workpiece and the face plate.

Because of the centrifugal forces it is important to fix the workpiece as close to the face plate as possible.

b Clamping with Chucks

When clamping the workpiece with chucks, the distance to the face plate should be as small as possible. The chuck must hold the workpiece safely. The arising centrifugal and cutting forces must be well considered. The use of Vicmarc chucks is highly recommended. A large range of jaw styles from standard jaws to bowl jaws is available. (a picture of the bowl jaws is on page 9, picture 9). For extra safety when roughing out oval shapes you can secure the workpiece in the chuck by putting wood screws in between the gaps in the jaws. See picture below.

Another solution is a cup chuck. The ovalturner generally has hardwood discs available which can be screwed onto the face plate and in which he may turn a cup corresponding to the spigot that has been on the workpiece before. The hardwood disc is screwed either from the back onto the face plate with hexagonal woodscrews Ø6 x 25mm or , if there is enough space, from the front with 4 x M8 screws into the thread holes of the face plate.



4 x wood screws screwed in between the jaws into the base of the workpiece will provide extra security when roughing out.

Δ procedure 3

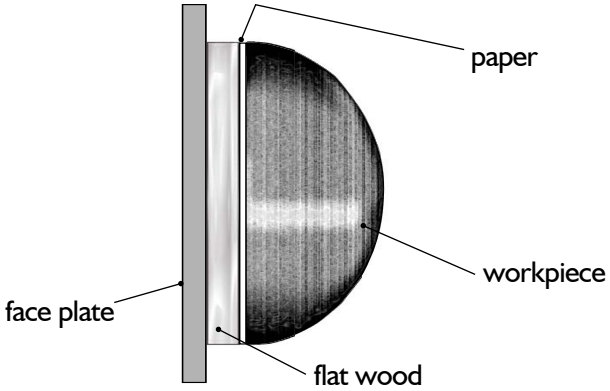
Mounting the Workpiece continued

b Clamping with Chucks continued

If a work piece is to be turned over during turning (i.e. - producing a bowl) it is essential that chuck mounting or faceplate positions be cut or marked on BOTH sides of the workpiece beforehand. This is best carried out on the lathe before the VOD is installed.

c Paper Gluing

Another solution which is simple, but needs a little effort, is the paper gluing of the workpiece. Firstly make a jig from metal or wood or PVC using the hole template from page 24. Mark holes onto a flat piece of wood using the jig. Then drill the holes and screw the wood onto the faceplate. Then paper is glued onto the wood and the workpiece is glued to the paper. The workpiece is parted off on completion.



Δ procedure 4

Aligning the Workpiece

1. Regardless of the shape of the blank workpiece it is necessary to align the grain of the timber with the centerline of the oval.
2. Immediately above the knurled nut there is a reference mark on the main carrier (see diagram 2). Rotate the VOD by hand until this mark is level with the top edge of the outer casing.
3. In this position the centreline of the oval is vertical.
4. If using a chuck, mount the work in the with the grain on this vertical line. If using a faceplate screw the faceplate onto the shaft with the work in place then adjust the oval centreline as previously described. Once the work piece is satisfactorily mounted, set the toolrest to centreline height and mark the oval with a pencil or felt pen resting on the toolrest while turning the assembly by hand..
5. It is now possible to remove the workpiece (marking the chuck or faceplate), bandsaw the blank to the oval shape, and reassemble. This saves a lot of time turning up out of balance blanks.
6. When the underside of a bowl is completed and the workpiece is turned over it must be remounted on exactly the same alignment. This can be achieved by resetting the VOD alignment to the vertical position as previously described, and remounting the workpiece.
7. A final check of alignment can be carried out by marking the workpiece inside the outer edge. This line should be evenly spaced with the outer edge all round.
8. Minor adjustments can be made using the locking collar until alignment is perfect.
9. When the turning is completed the finished bowl can be mounted in the Vicmarc bowl jaws, on a lathe without the VOD fitted. By using only four (4) of the eight (8) mounting blocks on the bowl jaws the oval bowl can be mounted centrally to enable the base to be turned.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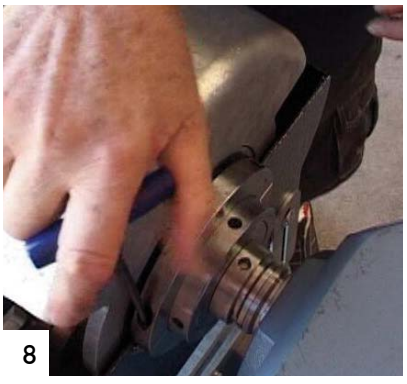
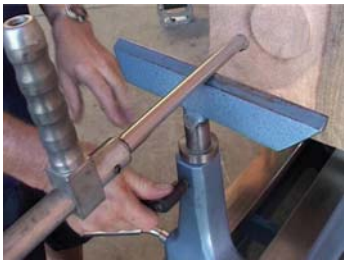

8


9.

Δ procedure 5

The Vicmarc Tool Support System





As described previously to create a perfect oval, all cuts must be made on the horizontal centre line of the lathe. Any cuts above or below centre line will distort the shape of the oval.

Vicmarc has designed the tool support system to enable the user to do this, in conjunction with the normal tool rest. The tool post is mounted in bearings, with a camlock base to secure it in any position on the lathe bed.The three (3) horizontal support bars can be mounted at any height on the tool post. When a tool is inserted in the support system it sits on the tool rest.

The height of the toolrest is to be set so that the cutting edge of the tool (be it a gouge or a scraper) is exactly at the centre line of the lathe. A locking collar for the tool rest post is supplied with the kit. Once this is locked the tool rest can be moved without disturbing this height adjustment.

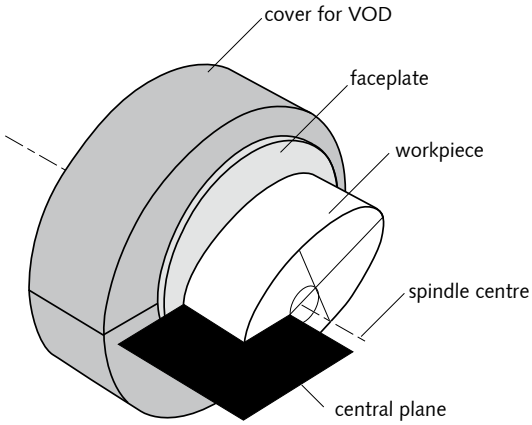
Check the height adjustment of the support bars on the pivoting tool post to ensure the system is moving freely with the tool sitting on the tool rest. Note that this set up needs to be checked each time a tool is changed.

Δ procedure 6

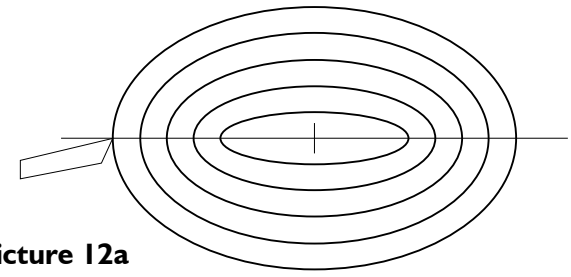
Tool Holding

The art of oval turning is based on the correct position of the tool. With normal woodturning the position of the cutting edge has no impact on the form of the workpiece - it will always be circular. For the ovalturning tool positioning is critical. By not keeping the tool on the central plane there will still be ellipses cut out of the wood but these may be heavily distorted. The following pictures are useful to the beginner to illustrate the specific effects.

Picture 11 illustrates the idea of a central plane. this is an imaginary plane which is located horizontally over the lathe bed at the height of the spindle axis. when looking towards the spindle axis, this imaginary plane is seen as the central line. This central line can be made visible with a light line by means of a projector or a laser. The cutting point or the small cutting area of the cutting edge should always be on this central plane. The Vicmarc tool support system has been designed specifically to keep the tool on this central line for oval turning and does not require a laser line or a projected line. Once set up on centre it will always be on centre no matter the position from which you cut.

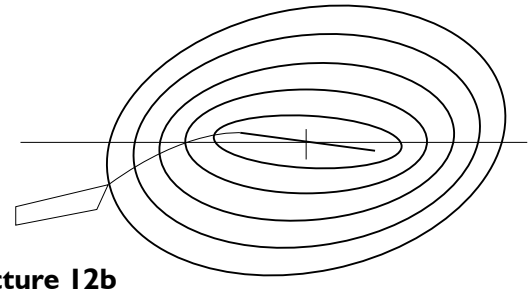


picture 11 central plane



picture 12a

In picture 12a you can see the front of an elliptical workpiece. If the cutting point of the cutting edge is conducted along side the cutting line which corresponds to the central line, parallel ellipses will be made. Geometrically they are concentric, coaxial ellipses. If, however, the cutting point is conducted above or below the central plane (as shown in picture 12b), there will be concentric ellipses too but these will be distorted.

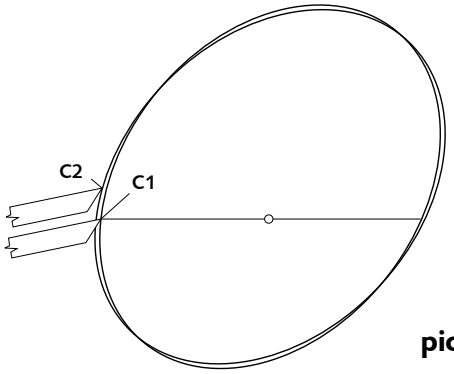


picture 12b

Δ procedure 6

Tool Holding continued

It is useful to draw a line with a pencil onto a slowly turning sample first. In the centre of the front there is a line, not a point as with normal woodturning. From the position of this line one can see if the cutting edge has been led too deep or too high as shown in picture 13. By the way, here there are bad cutting conditions as the cutting speed at both endings of this line are zero.

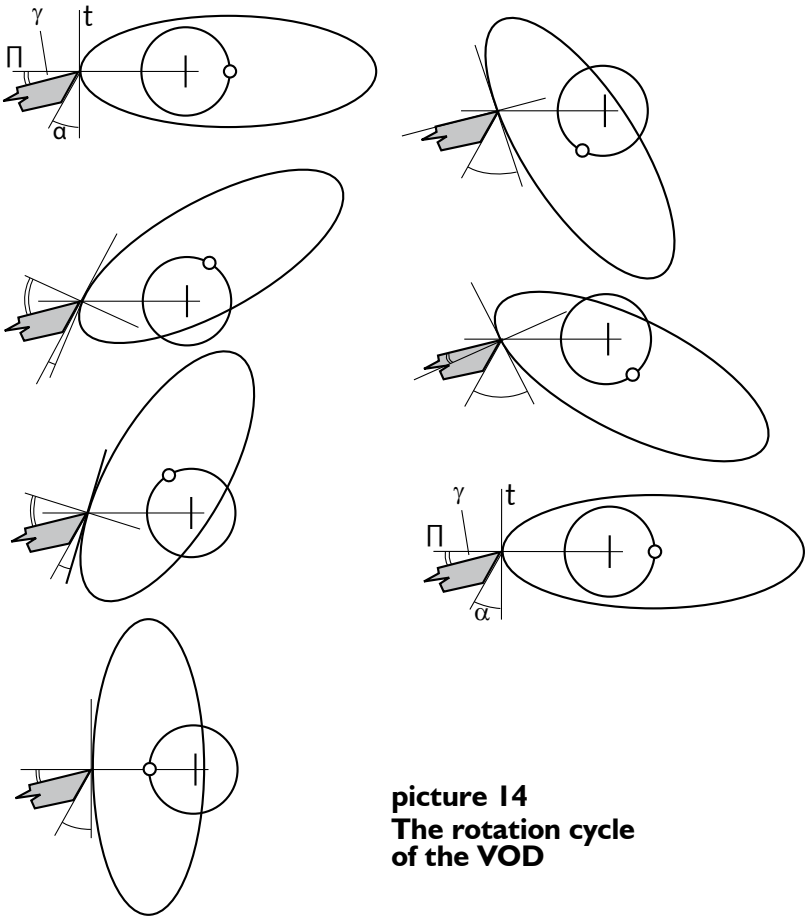


picture 13

Another big difference to normal woodturning of a ellipse surface is the changing of the angle of relief. The ovalturner will also feel this in the tool. You cannot lean the back of the cutting edge against the workpiece

In picture 14 the angle of relief (α alpha) is shown over a complete rotation. During half a turn of the workpiece this angle changes periodically. The clamping angle (γ gamma) might even get negative. Good cutting and neat surfaces demand some practise. Scraping is easy, but cutting with a gouge while oval turning is a craft.

Some craftspeople have developed their skills enough to be able to turn freehand. This is only recommended for very experience oval turners.



picture 14
The rotation cycle of the VOD

Δ procedure 7

Essential Safety Checks before switching on the VOD

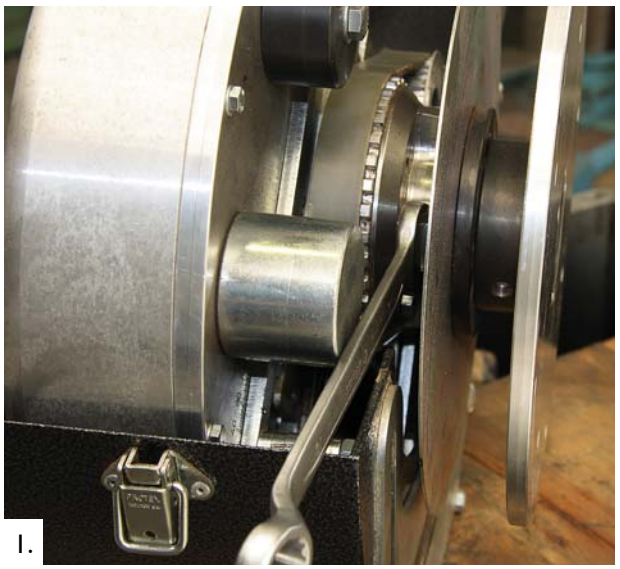
After the adjustments (see procedure 2) and the clamping of the workpiece (see procedure 3) the following points must be checked:

- All screws and nuts for the adjustment and the fixing of the workpiece have to be tightened. All woodscrews must grip tightly into the wood.
- The toolrest is in the right position and fixed with both levers.
- Either the adjustment plate 30 has been turned two times or the face plate 45 with the workpiece has been turned one time by hand to ensure that no collision can happen.
- Close the cover for the VOD and fix the safety equipment.
- Ask all other persons to leave the work area.

Δ procedure 8

8a Removing Faceplate or Chuck

There are four pickup points for the 18mm spanner (supplied) to be inserted for removal of the face plate or chuck. This is to prevent stress on the drive belts. Insert the spanner on the drive shaft behind the chip cover plate (see picture 1). The end of the spanner can rest on the outer casing preventing the VOD from turning and then remove the chuck or faceplate.



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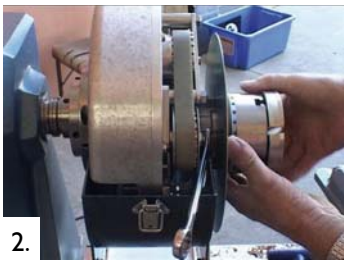


2.

3.

8b Removing VOD from Lathe

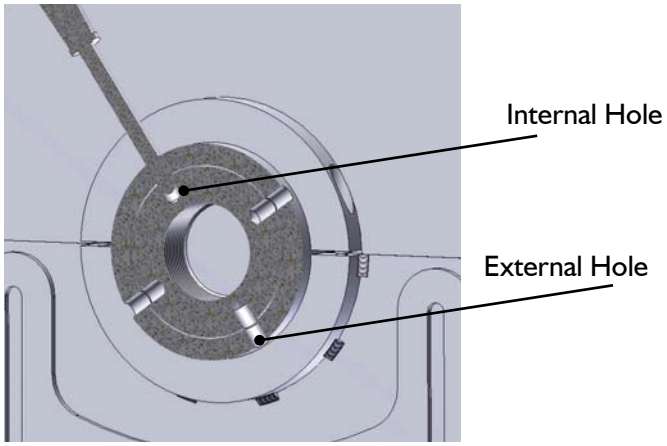
Lock the lathe spindle and unscrew the insert of the VOD (see diagram 1) by using the C Spanner supplied. DO NOT attempt to unscrew the VOD from any other point. Do not attempt to unscrew the VOD by turning the aluminium body as this will damage internal mechanisms.

1.

2.

8c Removing the insert from the VOD

To remove the insert from the VOD put the tommy bar into the external hole and rotate the spindle until the internal hole is located (See illustration). Once the bar is in both holes the VOD spindle will be locked. The insert can then be removed using the C spanner supplied.



General Maintenance

Minimal maintenance of the VOD and the ellipse gearing is necessary. There is no need to grease but some grease on the threads of the screws which are moved and tightened is recommended

The dust which occurs while turning and grinding does partly collect at the rotating ellipse gear due to the suction effect of the rotation inside the case. With regard to the durability of the tooth belt bay, brushing and vacuuming off the dust from time to time is highly recommended. While turning the use of a suction system close to the workpiece to collect the shavings and the dust is a very common practise and is recommended.

9a Tensioning the belt

It is very important to the operation of the VOD that the belts are maintained at the correct tension.

To do this you must first undo the M8 bolt (1/4 turn approx as per picture 1 - the cover has been removed for illustrative purposes).

Undo the cambolt as shown (picture 2). Then turn the cam to tension the belt. (picture 3). When there is no flex left in the belt (taking care not to over tighten the belt) the M8 bolt should be re tighten. Then re tighten the cam bolt.

Warning

Under no circumstances should you operate the oval turner with loose belts. If loose, the belt will jump the geared tooth and the oval will be out of alignment causing the tool to catch in operation.

1.

2.

3.

9b Adjust taper roller

To adjust the taper roller bearings remove the chuck face plate pickup and place the spanner on the two nuts as shown in picture. Preload a little, but only tighten sufficiently so the unit still spins freely with no clearance.

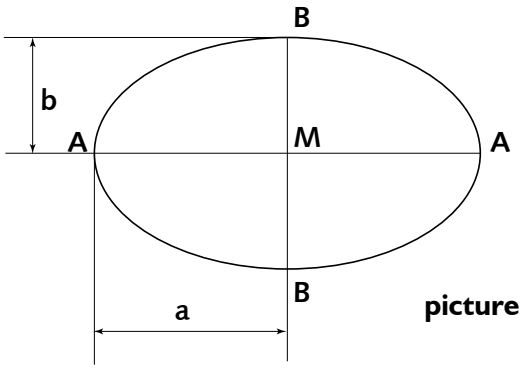
SECTION 2

Ellipse Geometry

There are some basics about ellipse geometry which everyone should know. This is not absolutely necessary for ovalturning, but it does help to understand the principles to be able to accurately draw the elipse onto the blank and set up the length width ratio (see page 7) on the VOD .

It is possible to draw the ellipse after mounting the wood onto the VOD and then rotating the spindle (see page 9)

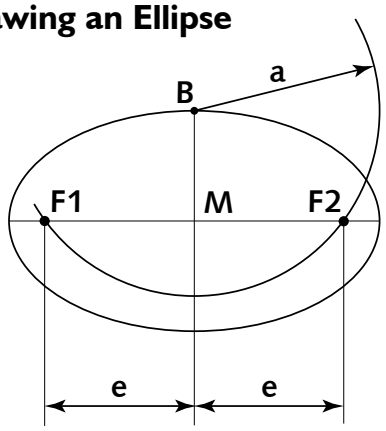
Every ellipse has two axes which are perpendicular to each other at the centre **M**. The two halves of the axes are called semi axes. The long axis **AA** has the length 2**a** (2 x **a**), the small axis **BB** has the length 2**b**. The length



picture 1

of the semi axes are respectively a and b (see picture 1). Their difference is **d** = **a - b**. This difference in the semi axes (d) is the diameter of the circle shown in picture 5. This is the circle around which the centre **M** is moving during VOD operation. Accordingly its radius is **r** = **d**/2.

Drawing an Ellipse

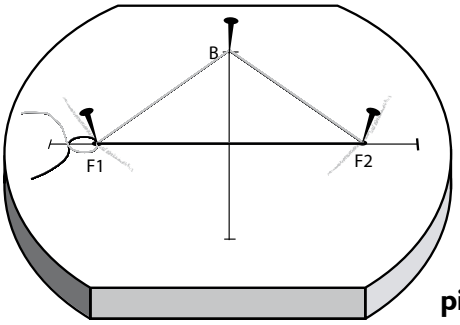


picture 2

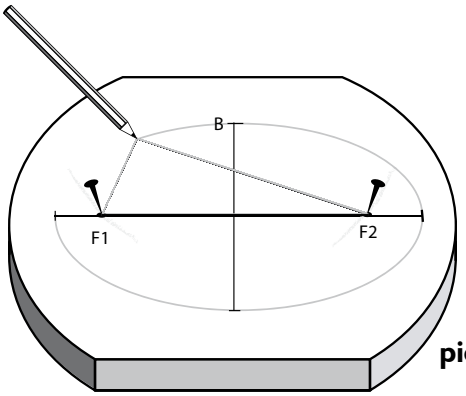
In both points **A** and both points **B** the ellipse has its apexes. The eccentricity e is also important. The eccentricity shows the distance of the two focal points **F1** and **F2** on the long axis from the centre **M** of the ellipse. These focal points are essential for the marking of an oval with a string.

When marking out an ellipse you know the length of each of the two axes **AA** and **BB**. If you take one **B** point as centre and describe a circle with the radius **a** (semi axis **a**), this circle will cut the long axis at the two focal points **F1** and **F2**. (Mathematically **e** = √(**a**2-**b**2)).

Drawing an ellipse with a string is the easiest way to draw an ellipse if the axes are given. A nail has to be hammered into each of the focal points **F1** and **F2** as well as into point **B**. Now a thread is knotted tightly around each of these three nails (See picture 3). (Its length is **L**=2**a**=2**b)**. Then the nail at point **B** is removed and replaced by a marker, with which an ellipse can now be drawn while keeping the string tight (See picture 4).



picture 3



picture 4

Example:

An ellipse for a dish with the semi axes a = 80mm and b = 60mm shall be drawn on a board in order to cut the brute for the dish off this board with a bandsaw or a compass saw.

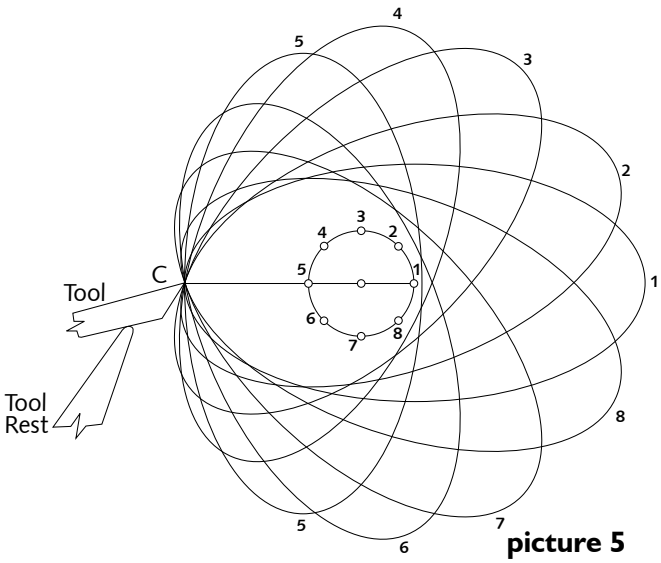
First choose a centre point to work from. Then you have to draw both axes through this centre M and measure out their lengths a and b.
Now you can calculate $e = \sqrt{(a^2 - b^2)} = \sqrt{80^2 - 60^2}$ *mm equals 52.9mm using a calculator*

or

you can now use a pair of dividers to determine the focal points by describing an arc of a circle around B with the radius "a" (see picture 2).

You then get the three points B, F1 and F2 which are necessary for the marking of the ellipse with a string (See picture 2)
For the drawing of ellipses there is also a special pair of dividers which are used to cut ellipses out of glass plates.

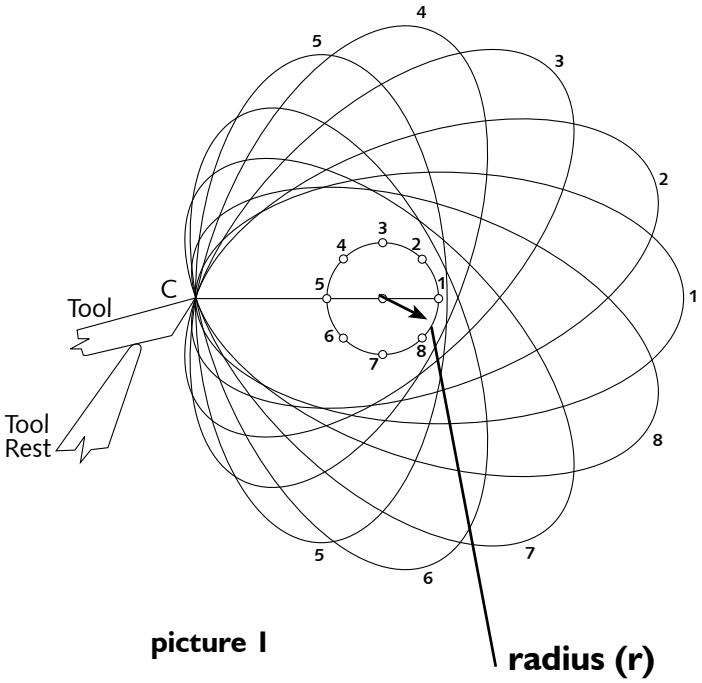
The formula shown above are the only ones which are needed to determine an ellipse.



picture 5

VOD Adjustments and Calculations

Before starting the VOD the following THREE calculations have to be made. Once these have been made you will use this information and apply it to the mass range diagrams at the back of the manual. This will give you the necessary values to adjust the Oval Length Width Ratio **(r)**, set the Balance Weights **(m_w)** and the Counter weight offset. **(r_c)**



picture 1

Δ calculation 1

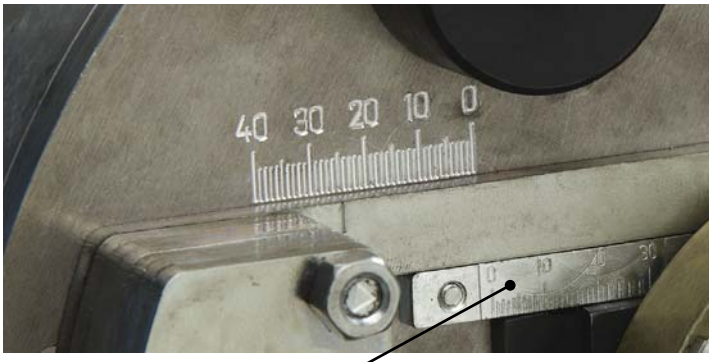
Radius (r) Calculations and Adjustments

The radius (**r**) is the radius of the circle on which the centre M of the ellipse moves during operation. (see picture 1). The setting of this value compensates for this movement

Its length is half of the difference of the semi axes, which means **r** = d/2 = (a-b)/2. Thus **r** can be calculated using the the lengths of the axes of the ellipse which is to be turned.

The Oval Length Width Ratio graduations are set to this figure to give optimum operation conditions. To adjust the Oval Length Width Ratio see procedure 2 on page 7.

Using the example from the previous page.
r= (80mm - 60mm)/2 = 10mm



width length ratio graduations

Δ calculation 2

CounterWeight (m_w) Calculations

The counterweight in the VOD is there to offset the imbalance caused by the mass of the workpiece and clamping system. Accurate calculations will assist greatly towards the smooth operation of the VOD. The procedure is as follows.

- Weigh the stock of the work piece and those parts which be used to fix the workpiece to the VOD e.g. the faceplate or the chuck.

An example of these calculations follows:

Mass of the stock:	1 . 2 K g
Mass of the two jaw chuck including screws	0.65kg
Sum of the masses m_w	1.85kg

Mass Range Diagrams

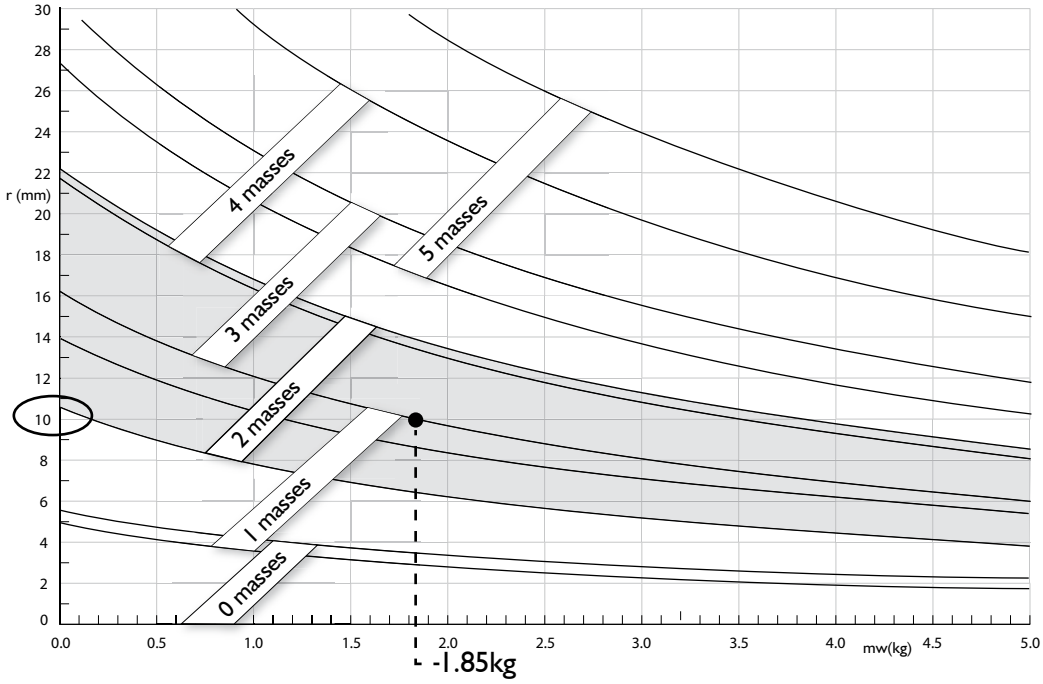
Now you can Refer to the Mass Range Diagrams starting on page 17. (examples Below). With the radius of the circle (**r**) worked out previously, and the calculated weight of the workpiece and clamping system **(m_w)** you can determine how many weights are required for your particular workpiece.

Example:

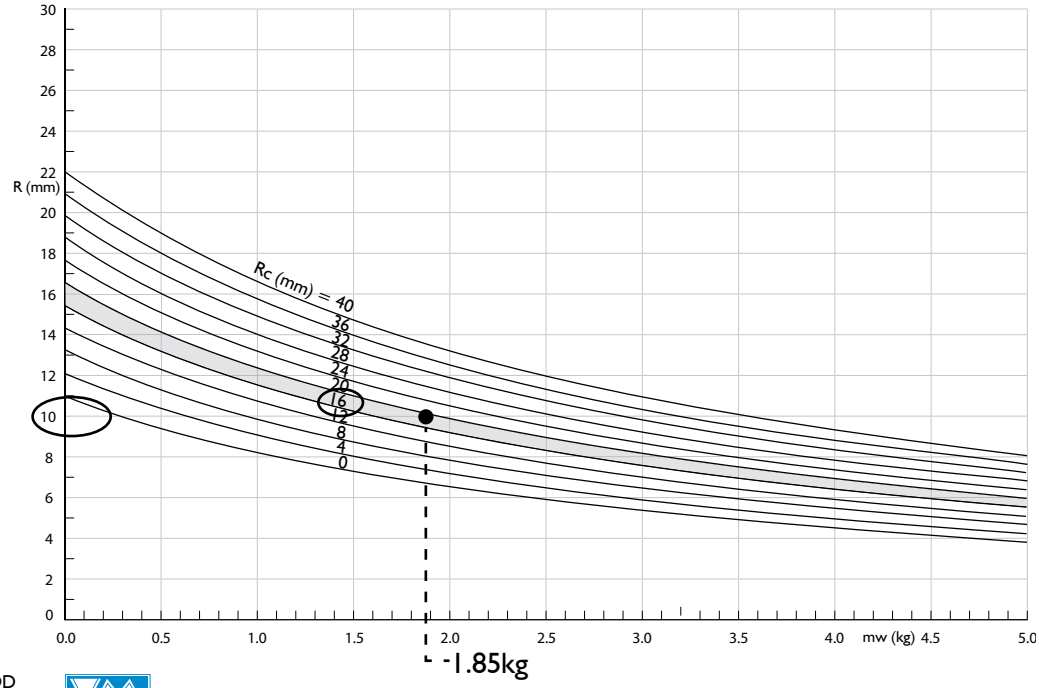
- The mass sum m_w = 1.85kg and the radius r = 10mm have been calculated
- Now you refer to the Master Mass Range Diagram and you find that these results correlate with a point on the graph within the 2 masses range.
- You then go to the Mass Range Diagram for 2 masses and find that these results give you an **R_c** value within the 16mm range.
- Now you can set the Balance Weight graduations as per procedure 2 on page 7

Notice: When turning down material e.g. when turning out a raw bowl, the mass to be balanced diminishes and so a new radius has to be determined and adjusted.

The Balance weight graduations **(R_c)**

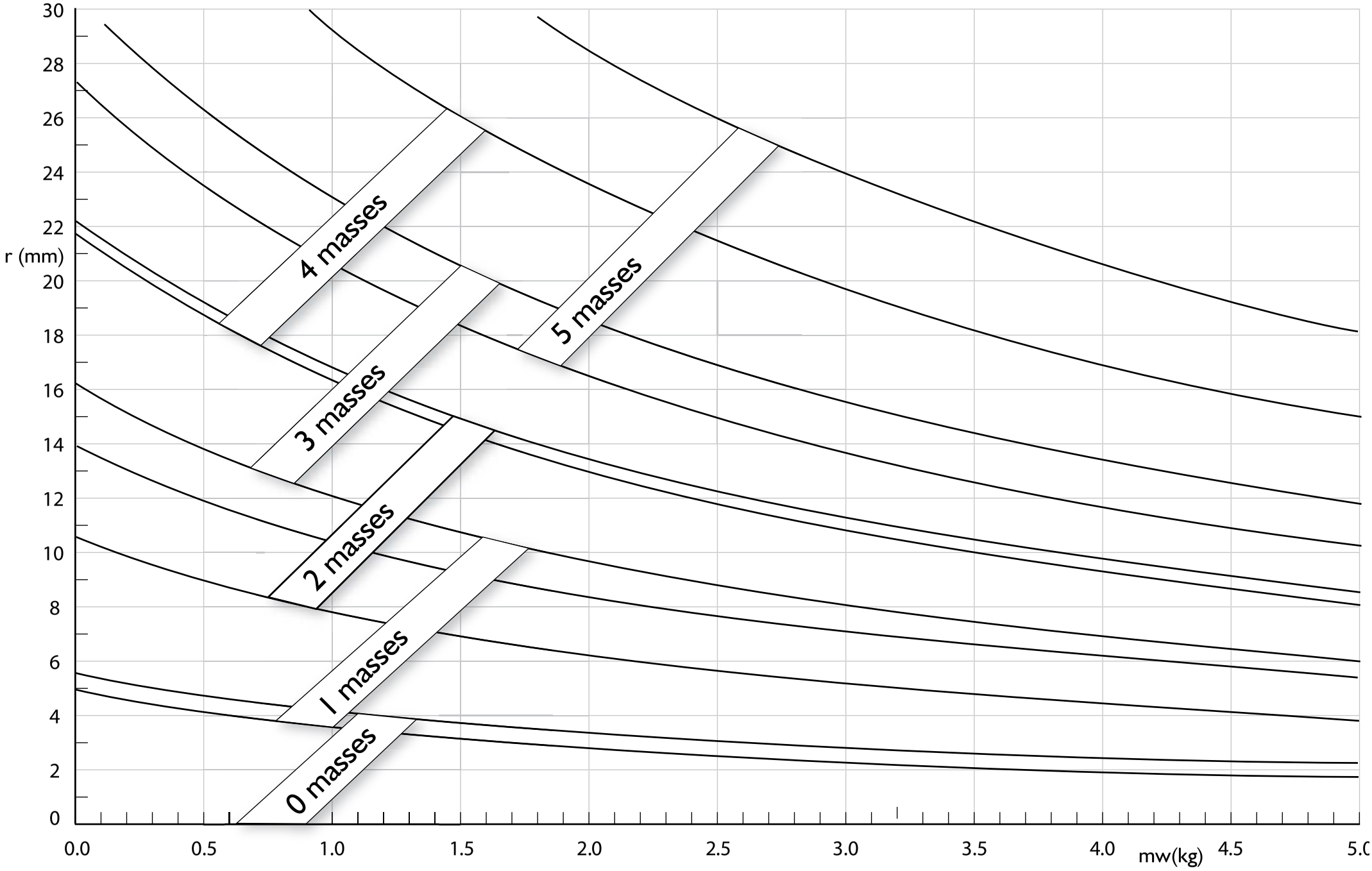


The Master Mass Range Diagram showing the counterweight needed for a mass of 1.85 kg

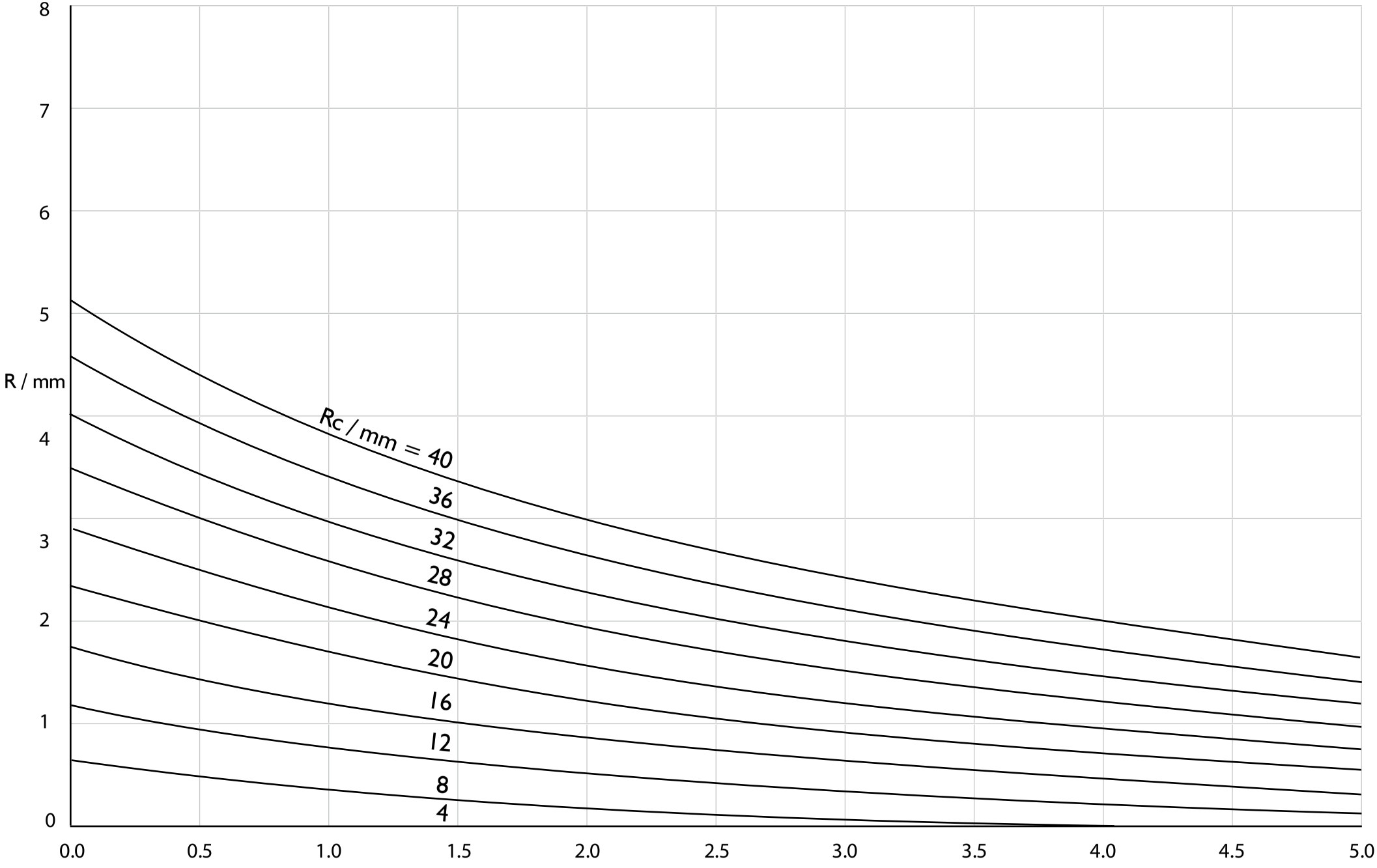


The Mass Diagram for 2 masses showing that the counterweight offset value **(R_c)** is in the 16mm range

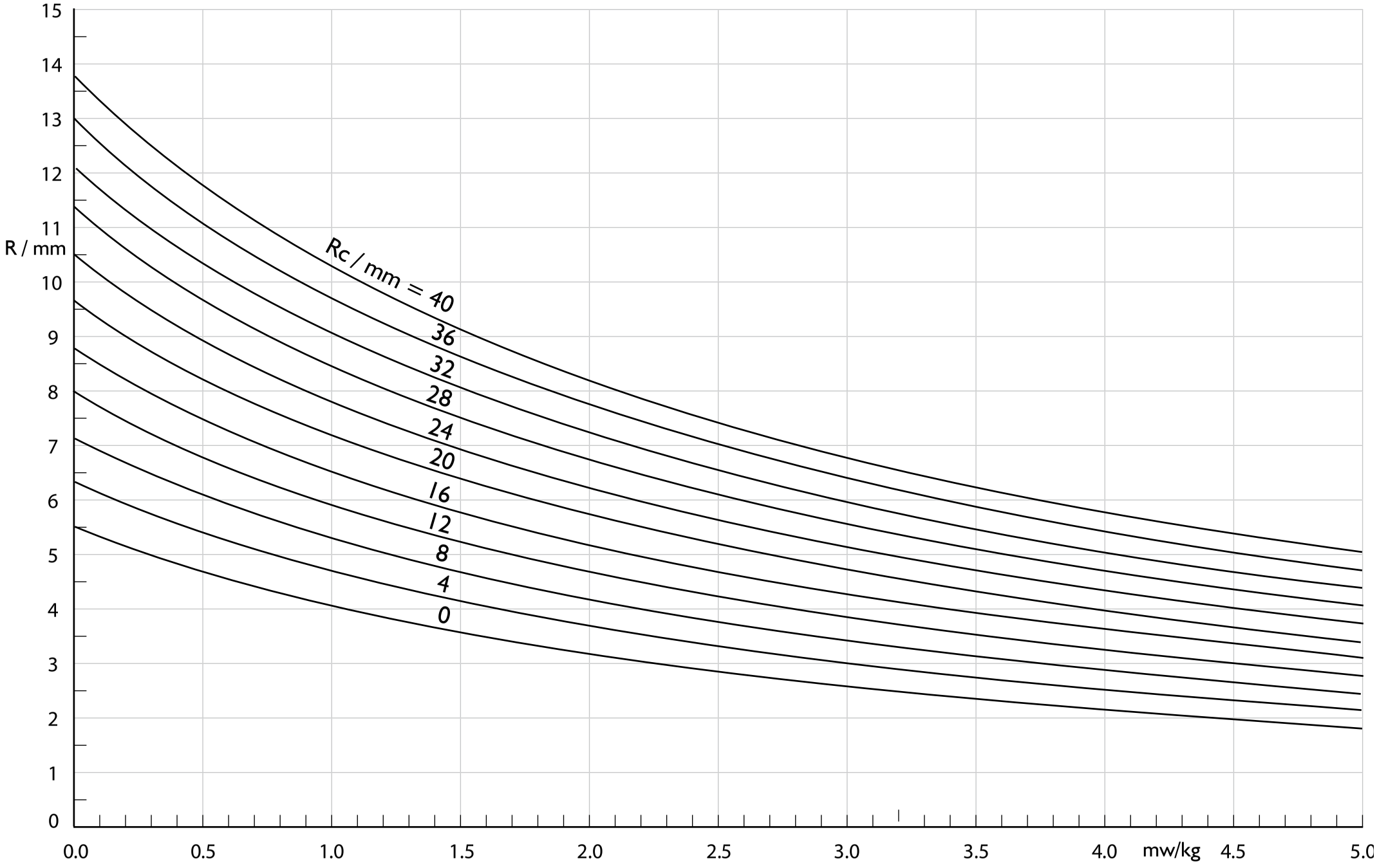
Master Mass Range Diagram



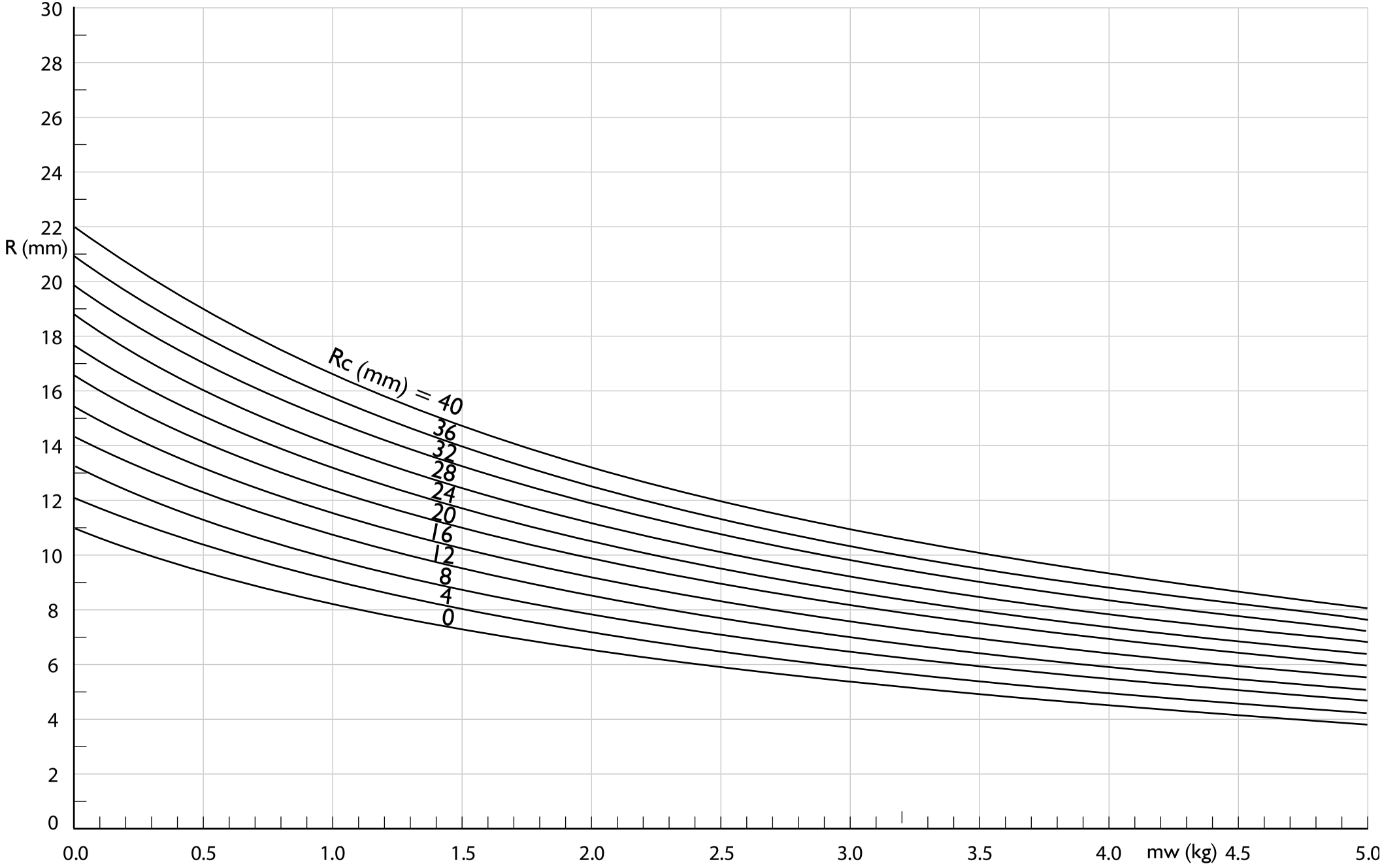
Mass Range Diagram for 0 Mass



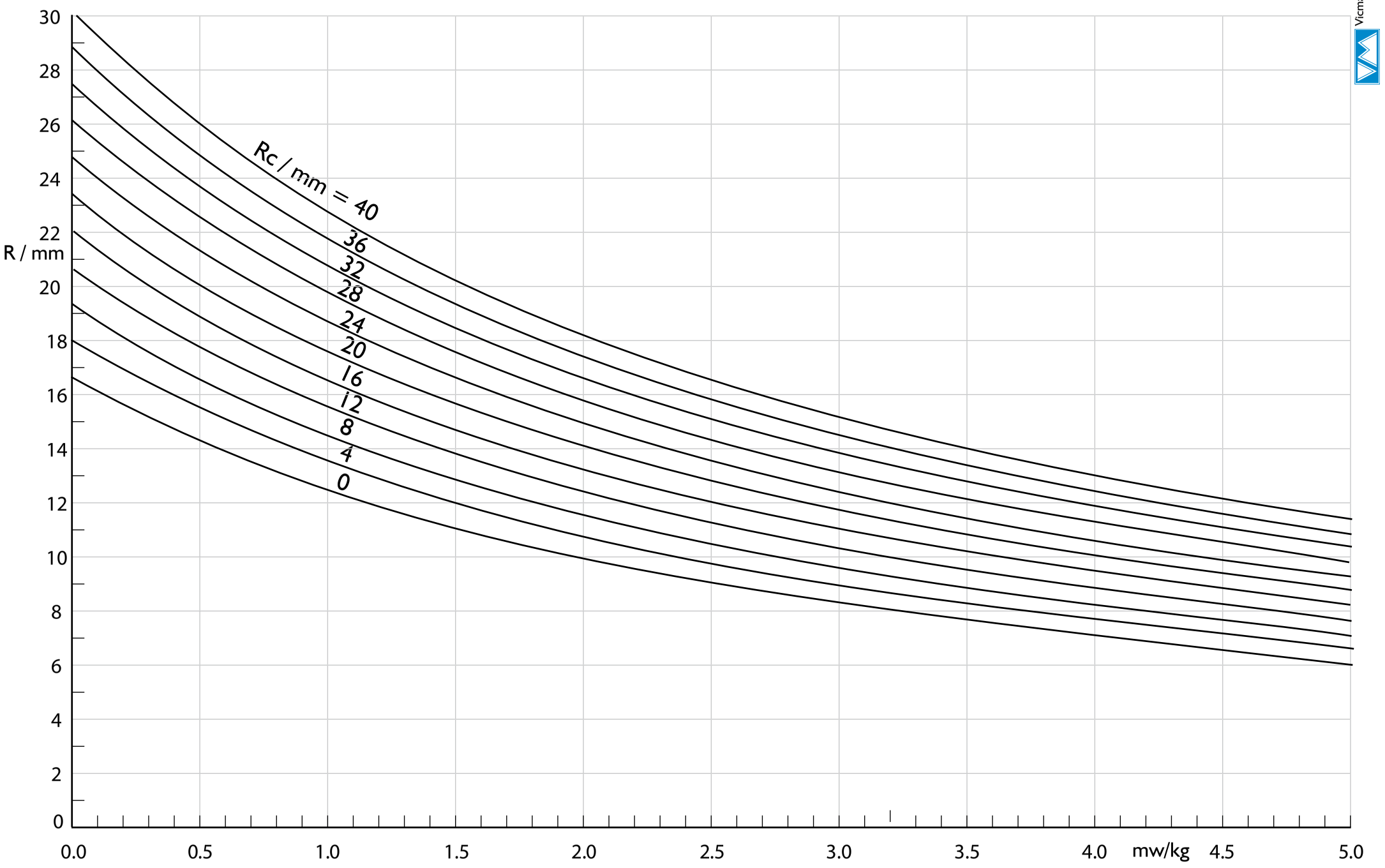
Mass Range Diagram for 1 Mass



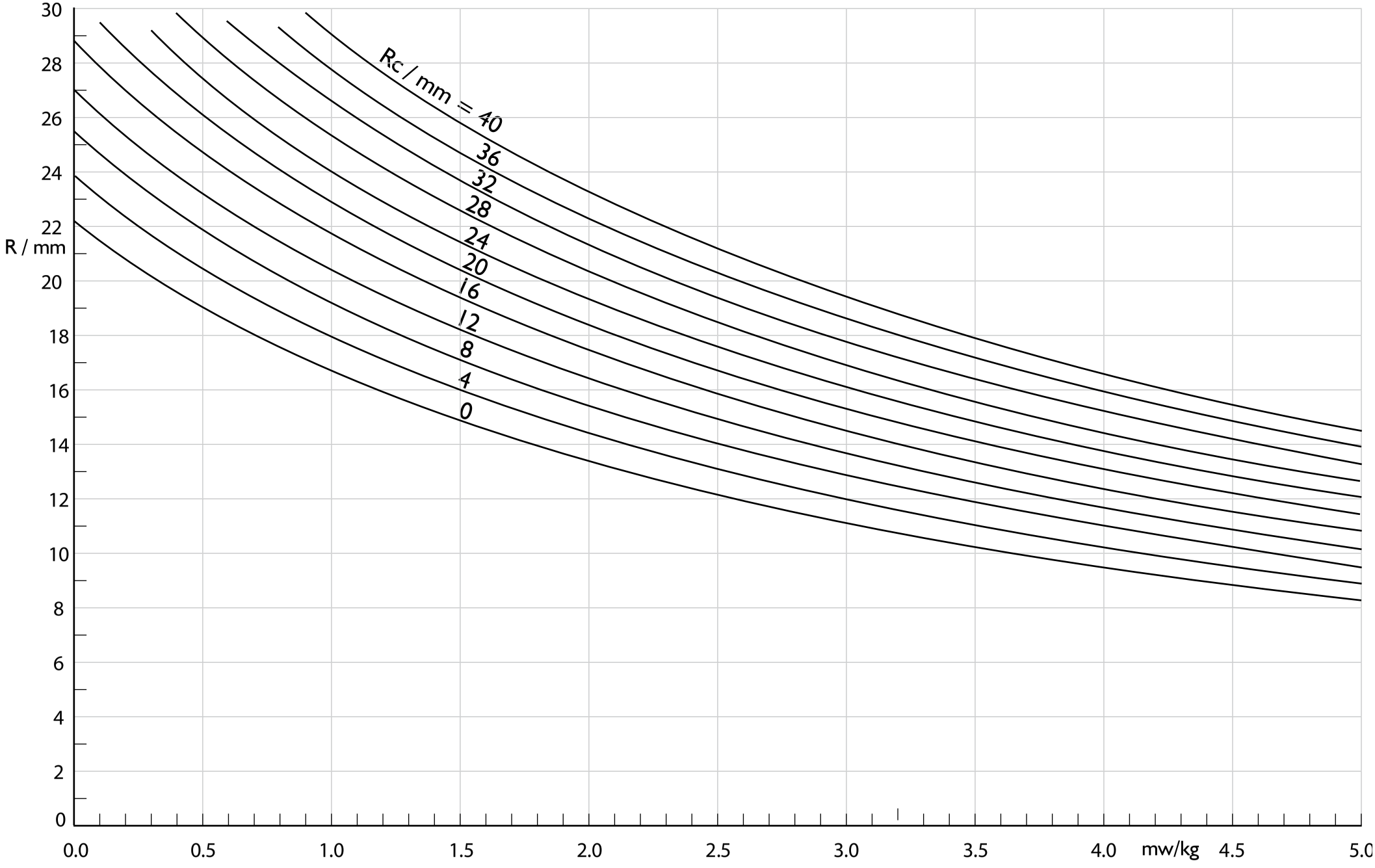
Mass Range Diagram for 2 Masses



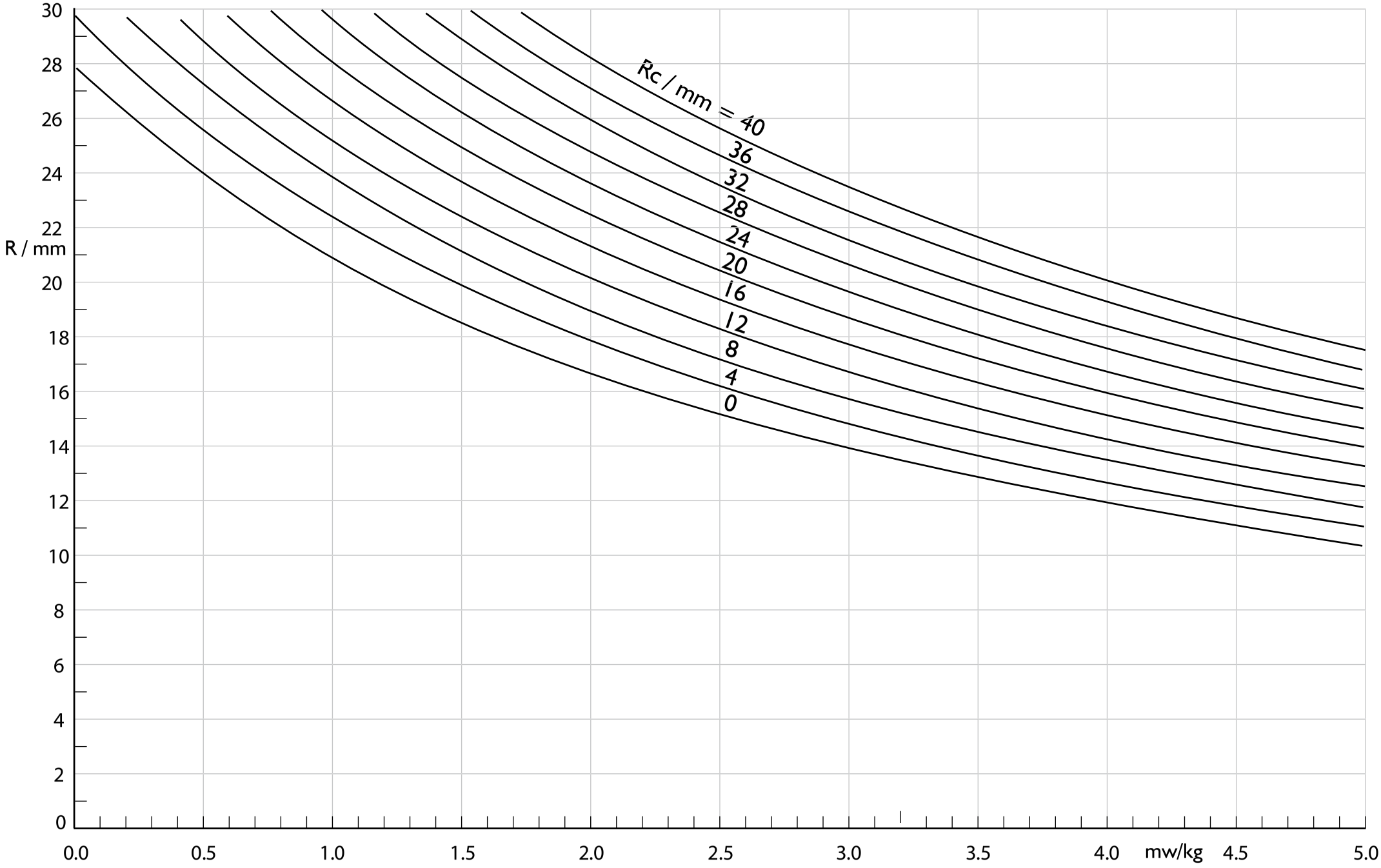
Mass Range Diagram for 3 Masses



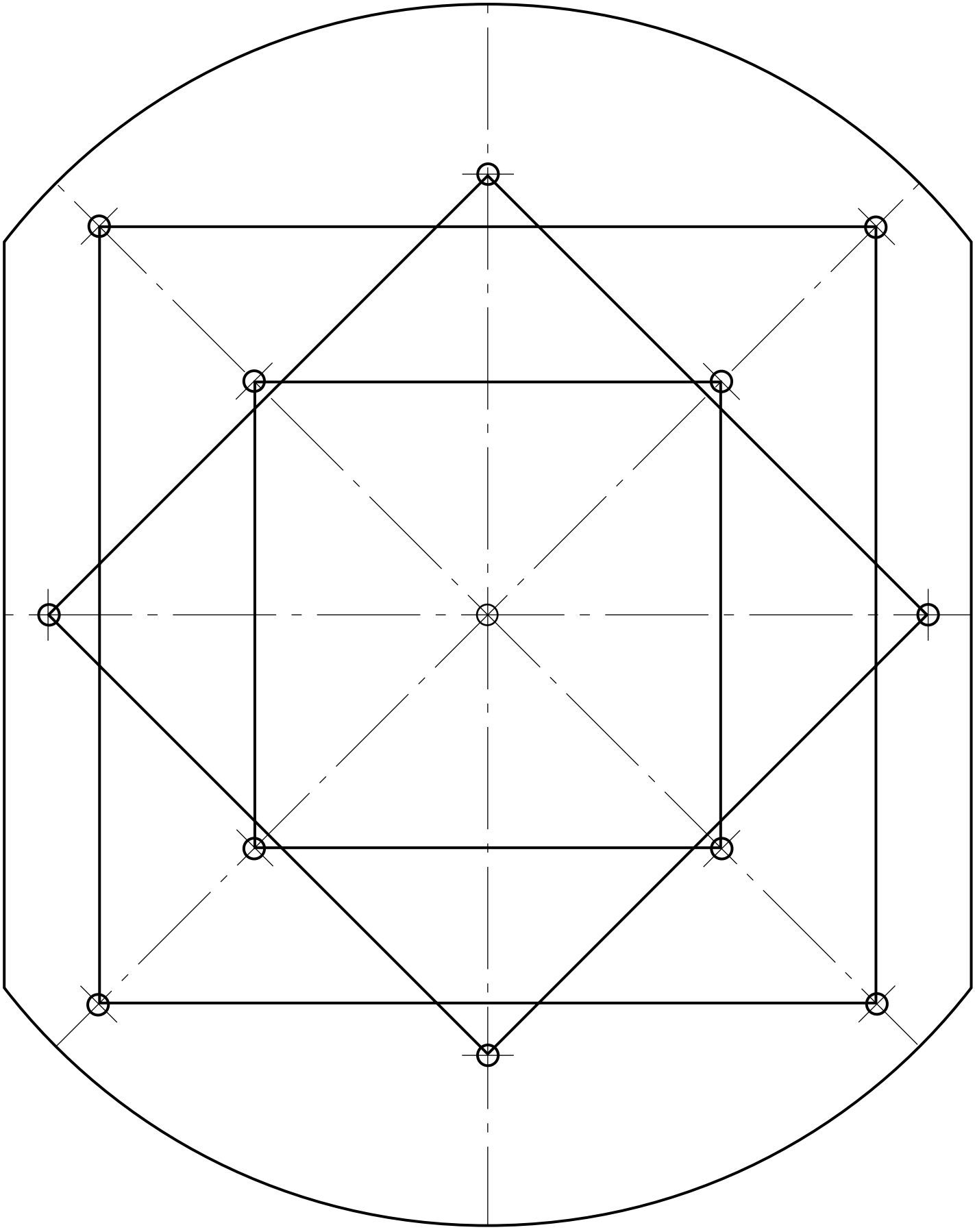
Mass Range Diagram for 4 Masses



Mass Range Diagram for 5 Masses



Face Plate Hole Positioning Template

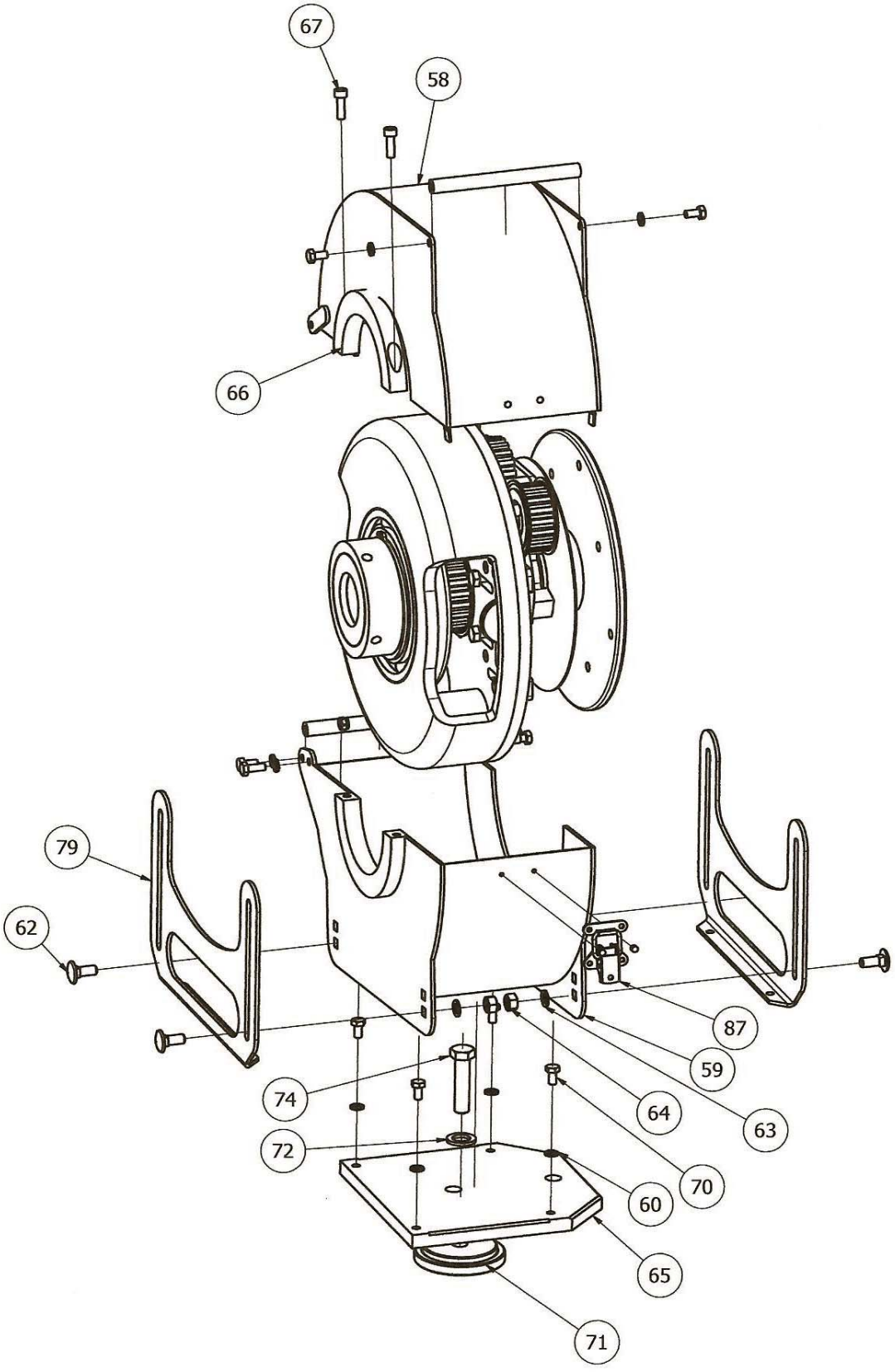


Construction and Mechanism of the VOD

In order to ensure the safe operation of the VOD we recommend infinitely variable speed transmission for heavy lathes from 200kg onwards. First the insert fitting onto the head stock spindle nose has to be fixed into the oval device. After the oval device has been screwed onto the spindle of the lathe, the support of the VOD has to be mounted so that the upper edge of the lower part of the metal covering is brought exactly into the horizontal line

The construction and the mechanism of the elliptical gear unit of the oval lathe is illustrated in the next two diagrams. The assembling and disassembling of the VOD for the replacement of the tooth belt and other wearing parts is only to be performed by authorized workshops. The tension of the tooth belt can be adjusted by following procedure 9 in Section 1.

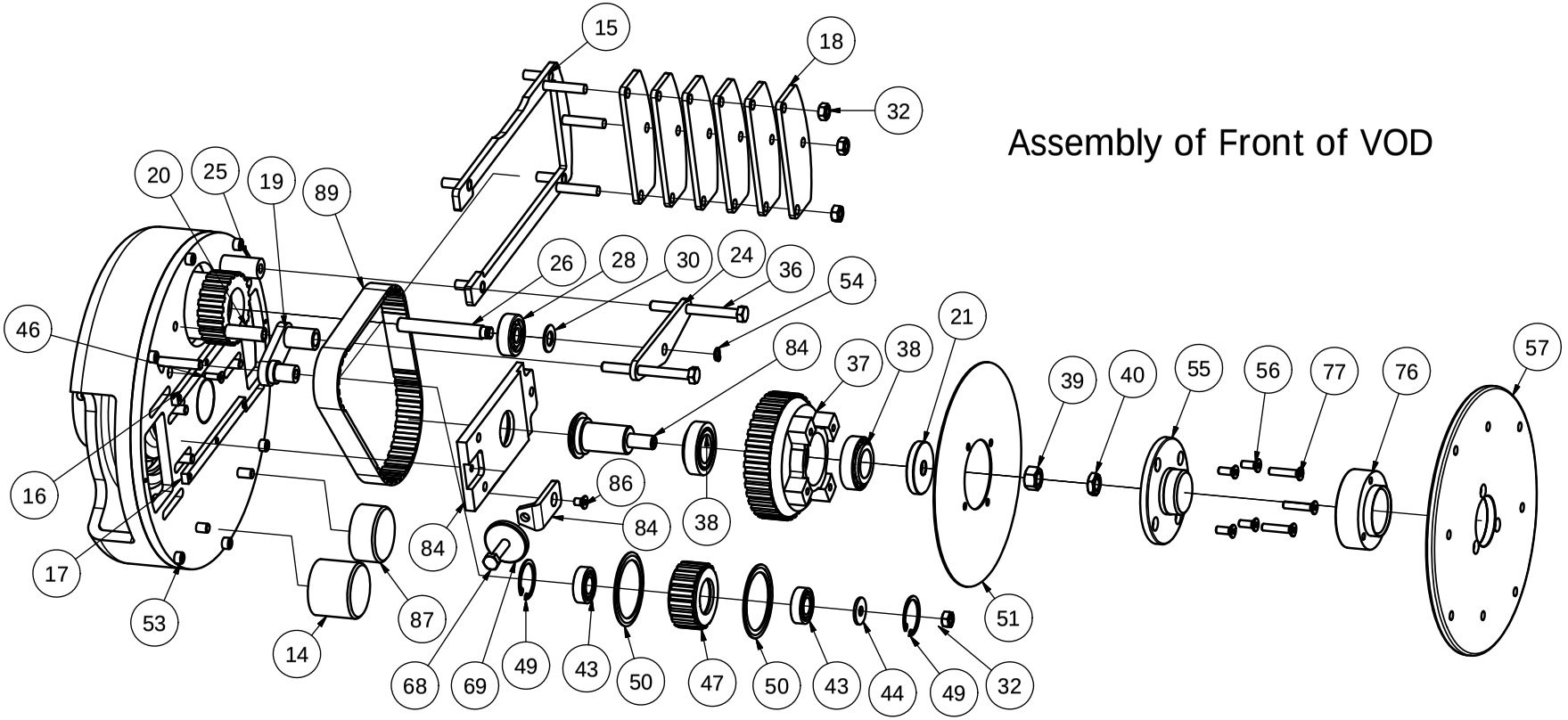
Assembly of the outer of the VOD



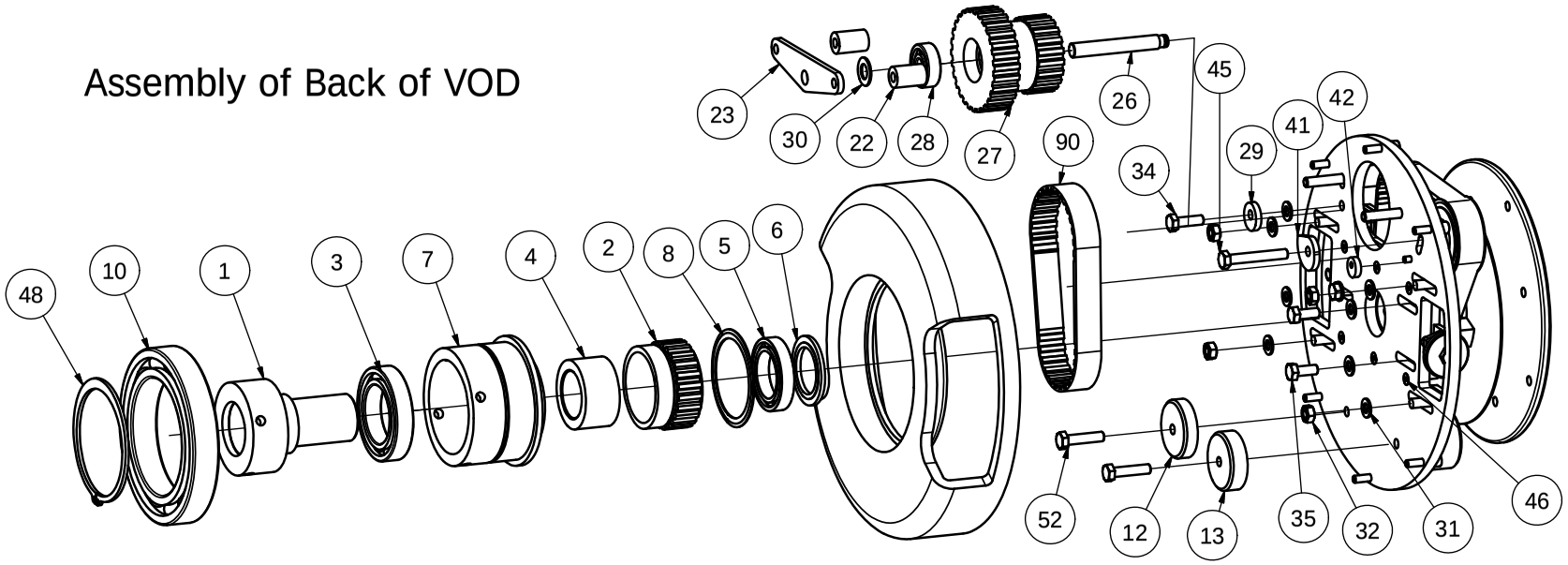
Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	Z00070	Input Spindle
2	1	Z00088	Input Sprocket
3	1		Ball Bearing 50-80-16 6010
4	1	Z00093	Bush for Input Spindle 32mm
5	1		Ball Bearing 40-62-12 61908
6	1	Z00094	Bush for Input Spindle 4mm
7	1	Z00097	Sleeve for Input Spindle
8	1	V01555	Flange for Input Sprocket
9	1	Z00068	Flange Support Housing
10	1		Ball Bearing 100-150-24 6020
11	1	Z00074	Slide Plate
12	1	Z00077	Fixed Weight 12mm
13	1	Z00076	Fixed Weight 15mm
14	1	Z00075	Fixed Weight 40mm
15	1	V01552	Counterweight Bracket
16	1	Z00091	Counterweight Bracket Rail
17	1	Z00092	Counterweight Bracket Rail With Scale
18	6	Z00099	Counterweight
19	1	Z00082	Idler Sprocket Bracket
20	1	Z00095	Bush for Idler Sprocket
21	1	Z00078	Locking Washer
22	2	Z00096	Spacer for Dual Sprocket Support Input
23	1	V01561	Inner Support Plate
24	1	V01560	Outer Support Plate
25	1	Z00086	Spacer for Dual Sprocket Support Output
26	1	Z00080	Shaft For Dual Sprocket
27	1	Z00079	Dual Sprocket
28	2		Ball Bearing 12-37-12 6301
29	1	Z00085	Eccentric for Input Belt Tensioner
30	2	V00955	Washer M12-24-1.6
31	9	V00932	M8 Plain Washers
32	9	V00600	Hexagon nuts M8
33	2		Hexagon head screws M6x16
34	1	V01565	Hexagon head screws M8x25
35	3		Hexagon head screws M8x20
36	2		Hex-head bolt M8x85
37	1	Z00090	Output Sprocket
38	2	V00065	Tapered roller Bearings 25-47-15 32005
39	1	V00602	Hexagon nuts M12
40	1		Hexagon thin nuts M12x6
41	1	V01558	Cam Tensioner for Idler Sprocket
42	1	Z00087	Eccentric for Output Belt Tensioner
43	2		Ball Bearing 15-32-9 6002
44	1	V01460	Washer M8-21-2
45	1	V01557	Hexagon head screws M8x55

Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
46	7	Z00691	Countersunk Socket Head Screw M5x16
47	1	Z00081	Idler Sprocket
48	1		External Circlip ø100
49	2	V00226	Internal Circlip ø32
50	2	V01556	Flange for Idler Sprocket
51	1	V01559	Front Cover Plate
52	2	V00685	Hexagon head screws M8x35
53	6		Socket Head Cap Screw M6x25
54	1	V00216	External Circlip ø10
55	1	V01326	Adaptor M40x2
56	4	Z00695	Countersunk Socket Head Screw M6x16
57	1	V01566	Faceplate
58	1		Weldment Cover Top
59	1		Weldment Cover Bottom
60	8	V00988	Washer M6-12-1.2
61	2	V00605	M6 Nylock Nut
62	4	V01357	Cuphead Bolts M8x20
63	4		Cover Leg Washer
64	4		Hexagon nuts M8
65	1	V01551	Cover Base Plate
66	1		Cover Clamping Ring Top
67	2	V00986	Socket Head Cap Screw M6x20
68	1	Z00084	Hexagon head screws M8x45
69	1	Z00083	Adjusting Knob
70	6		Hexagon head screws M6x12
71	1	V00635	Clamping Plate 62mm
72	1		Washer 14mm
73	4	V00668	Rivet
74	1	V00112	Hexagon head bolt M12x50
75	1	Z00101	Cover Handle
76	1	V01335	Faceplate Adapter M40x2
77	3		Countersunk Socket Head Screw M6x30
78	2	V01550	Cover Leg
79	1	V00056	Tommy Bar
80	1		DVD
81	1	V01230	13mm Spanner
82	1	V01231	18mm Spanner
83	1	V01234	5mm T-Bar
84	1		Slide Bracket
85	1		Latch
86	1		Countersunk Socket Head Screw M6 x 10
87	1		Fixed Weight 24mm
88	1		C-Spanner
89	1		Belt T10-560
90	1		Belt T10-440

Assembly of Front of VOD



Assembly of Back of VOD



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The Vicmarc® Guarantee

Vicmarc Machinery, manufacturers of Vicmarc machine tools, hereby guarantee the purchaser of the Vicmarc Oval Device (VOD) that the device was precision engineered from the finest materials available and was thoroughly inspected and tested before leaving the factory.

If, within 12 months following the date of delivery, the VOD is proven to have been defective as a result of faulty materials or workmanship, Vicmarc Machinery will repair or replace the VOD free of charge. This guarantee is subject to the following conditions:

1. The VOD shall be returned to Vicmarc Machinery within 12 Months with a brief description of the complaint.
2. The name and address of the purchaser, together with the date of purchase and supplier details shall accompany the parts.
3. Vicmarc Machinery will accept no responsibility whatsoever under the guarantee or otherwise if the VOD is not used strictly in accordance with the instructions supplied, or if the fault can be reasonably be explained by carelessness or negligence.
4. The purchaser is responsible for all costs incurred in transport and packaging to and from Vicmarc Machinery.
5. In the case of accident, liability is expressly excluded when the VOD is tampered with or altered without authorisation.

Overseas purchasers are advised to obtain local guarantees from their VOD agent. Conditions may vary to those detailed above.

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