

INSTALLATION GUIDE

*TeraSpin drafting system PK 1601-01
for worsted ring frames*



TeraSpin is a business unit of A.T.E. Enterprises Private Limited, a company engaged in the service of the textile industry since 1939. TeraSpin came into existence in 2012 after A.T.E.'s takeover of SKF India's textile spinning component business. Since then it has been innovating and making continual improvements in quality and reliability in the service of spinning mills and machinery manufacturers around the world.

TeraSpin's product range consists of weighting arms, top rollers & cradles for roving frames and ring frames, spindle bearing units and complete spindles for ring frames and doubling frames. TeraSpin also offers customized upgrades for existing ring spinning and roving frames.

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Published by

A.T.E. ENTERPRISES PRIVATE LIMITED

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Drafting system PK 1601-01 for worsted ring frames

The TeraSpin PK 1601-01 weighting arm is a 3-roller double apron drafting system for worsted ring frames.

Installation of weighting arms

Please ensure the following before fitting weighting arms:

1. The bottom roller and support rod slides must be securely mounted on the roller stand.

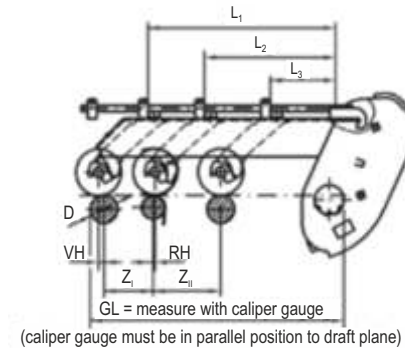
Once this is checked, follow the procedure detailed below for fitting the weighting arm:

1. Slide weighting arms onto the support rod.
2. Insert height setting screw into the guide groove of the support rod and tighten locking screw lightly.
3. Open pendulum arms as far as the stop.
4. Place support rod with previously fitted weighting arms on the support rod slides and tighten the screw.

Adjustment of the draft field

1. Set the draft field setting gauge by using the following formulae:

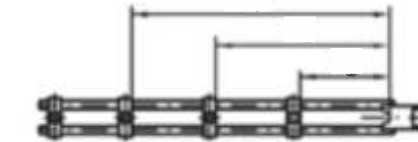
For PK 1601-01 weighting arm



$$L_1 = GL + VH - (D/2) - 64.5$$

$$L_2 = L_1 - Z_1 - VH - RH$$

$$L_3 = L_1 - Z_1 - Z_2 - VH$$



2. Please ensure that the distance between center of front bottom roller to the center of the arm bar is a max. 288 mm.
3. Release the hexagonal socket screw of the weighting elements.
4. Slide the weighting elements towards bracket.
5. Hook the adjusted draft field gauge into the frame.
6. Push the screw of front weighting element, middle weighting element and rear weighting element forward till it touches the 1, 2 and 3 respectively on the draft field gauge and tighten it.
7. Please make sure that distance between center of the rear bottom roller to the center of arm bar should not be less than 60 mm.

Height setting (weighting arm pressure setting)

In the process of weighting arm height gauging, an attempt is made to make the weighting arm bracket parallel to the bottom roller drafting plane. By doing this, the springs are “zero set” and the recommended compression of springs will give the necessary load. TeraSpin's drafting system has a loading system where all three weighting elements exert a load independent of each other. TeraSpin does not recommend use of any load indicator gauge and the height setting tool provided by TeraSpin is sufficient to assure the designated loads. Further, these coil springs have only positive tolerances, which means that under no circumstances (with the proper height gauge) can the load fall below specification. It is due to this very reason that even a slight relaxation in the height setting process doesn't cause any reduction of the load on the rollers. Before starting the height setting procedure, please ensure the following:

1. Set the eccentric load selector of all the weighting elements to GREEN using the tool provided in the setting gauge.
2. Uniform fitting (top rollers with recommended top roller cot diameter and apron cradles suitable for weighting arms) must be used across the entire frame.

Follow the procedure explained below for height setting (weighting arm pressure setting):

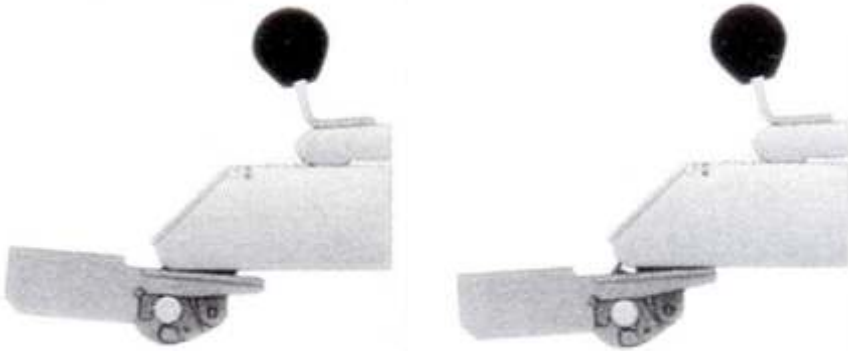
1. Align the weighting arm with respect to the bottom roller flutes. Use the nylon hammer only for light tapping and centering. The use of a steel hammer is strictly prohibited.
2. To start height setting, a pre-load on the bottom rollers and the bottom roller bearings is a must. This is achieved by ensuring an adequate load after pressing the weighting arm with top rollers. The necessary adjustment of the height setting screw is to be done manually. A small part of the height setting screw is to be screwed-in for light loading and with the weighting arm open. This is rough gauging.

3. Please note this is first step of height gauging and hence do not lock the top arms at this stage.
4. Place the height gauge on the axle of the front top roller and push till it stops. A magnet holds the height gauge in position.
5. Adjust the weighting arm pressure by turning the height setting screw until the height gauge is parallel to the bottom edge of the arm (visual check).
6. For correct adjustment see the figure on page 10. Adjust the complete machine in the manner described above.
7. As each weighting arm starts getting loaded and as one reaches towards the end of the machine, the load on the bottom roller also increases. As a result, the previously loaded top arms tends to show less pressure due to the resilience of the bottom rollers. This can be noticed by using the height gauge on already set top arms. Hence no locking of top arms is suggested at this stage.
8. This is followed by final checking of draft field setting and height setting with half-tightening the locking screw.
9. Open and close the top arms one by one before the final tightening of the locking screw. Do normal tightening and then a 15° turn of the allen key/screw ensures adequate torque on the screw. No extension pieces to be used for the allen key for tightening.
10. Please make sure that the adjacent weighting arms remain pressed.

Note: Adjustment of load/height has to be done by opening the weighting arms. If any attempt is made to adjust (increase or decrease) the load with weighting arm pressed, there is a possibility of damage to the components inside the weighting arm, especially the nut of the height adjustment screw.

The above procedure is followed during installation/regular setting and when the top arms on the entire machine are replaced. However, it is not mandatory for a single piece replacement on a running machine.

Weighting arm adjustment too high and too low



Optimisation of TeraSpin drafting for worsted ring frame

The TeraSpin 1601-01 weighting arm is mainly designed for 3-roller double-apron drafting systems for worsted ring frames. It is suitable for spinning wool, man-made fibres and blends of these two fibres as well as dry spun bast fibres up to approx. 200 mm length.

Most common values of draft generally adopted for optimum yarn quality

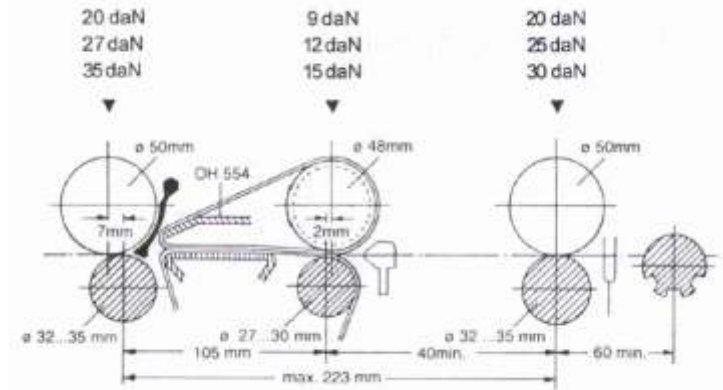
Raw material	Total draft	Remark
Wool	12-30	1. Slightly higher total draft may be selected for twisted roving
Wool/man-made fibres	18-35	
Man-made fibres (cut staple)	20-40	2. In case of blends, one can go for higher total draft with increase in proportion of man-made fibres
Man-made fibres (filament tow)	30-60	

A recessed roller is used as the apron top roller. Thus the drafting system works on the slip-draft principle having a single draft field (between front and back rollers). Depending on the preparation method, twisted or French type roving can be processed on this drafting system.

Rear draft

In 3-roller double apron drafting systems with controlled slip draft of the fibres (recessed roller), it is necessary to pretension the roving at the rear zone. The roving should be guided into the double apron unit in a well-stretched condition. Ideally the rear draft should be set between 1.1 and 1.25.

Draft zone setting



Weighting arm	PK 1601-01	
Cradle	OH 554-000075	
Bottom roller ϕ (mm)#	I	32/35
	II	27/30
	III	32/35
Roller setting (mm)	HF	105
	VF (min)	57
	VF (usual)	>57
	VF (max)	118
	GF (max)*	223
Maximum fibre length (mm)	200	

Dia. of bottom rollers depends on machine manufacturers

*GF = maximum fibre length + approx. 15%

The overhang of the front top roller depends on the condenser used in the front zone. One can go for a maximum of +7 mm overhang of the front top roller. The rear zone setting (VF) depends basically on the maximum fibre length, which can be calculated as the formula below:

$$VF = GF \text{ (calculated)} - 105 \text{ mm (standard front zone setting)}$$

Top roller loading

One can select the appropriate load on each weighting element as per requirement. Generally, it is recommended to opt for a medium load on all the top rollers, i.e. green.

The processing of man-made fibres calls for higher top roller pressure, especially for the front top roller. In this case it may be a good idea to increase pressure to the highest level, i.e. red. Too low pressure on top rollers may also lead to improper drafting which results in undrafted sliver and more end breaks. However, one can set low top roller pressure, i.e. black for fibres having low drag.

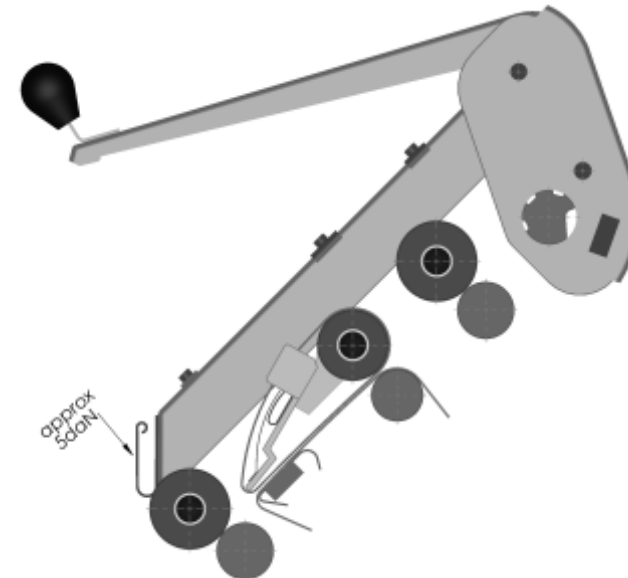
The middle top roller has been designed so that it does not have a positive grip on the fibres. Hence, select the middle top roller pressure such that it just facilitates the reliable running of top and bottom aprons. Excessive pressure on middle top roller may reduce the depth of the top apron roller recess.

Roller position	Load in daN			Weighting element
	Black	Green	Red	
Front	20	27	35	MD 5
Middle (with apron)	9	12	15	XR 5-1
Rear	20	25	30	ME 5

Load adjustment

Load adjustment is effected by means of an eccentric load selector activated by a special wrench. The three different loads on each weighting element can be identified by the colour code on each eccentric load selector.

Partial load relief

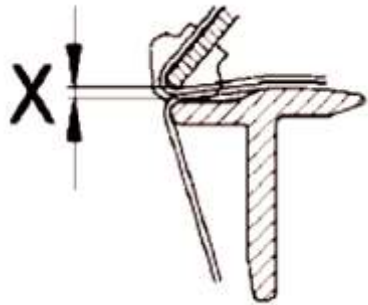


Weighting arms PK 1601-01 are equipped with a partial load relief feature (please refer figure above). Opening the hand lever to its first rest position activates partial load relief. When the machines are going to remain idle for a long time, one can use this feature to release the front top rollers with load reduction to 5 daN.

This prevents the yarn twist from running up beyond the front roller nip and prevents end breakages during the re-start of the machine. Also it prevents moire formation which directly affects yarn quality.

Selection of distance clips

Opening 'X' at apron release point



The vertical distance between the nose bar and the cradle at the nip point (distance 'X' in the figure above) determines the intensity with which the fibres being spun are controlled and guided between the top and bottom aprons in roving frames as well as in ring frames. To achieve optimum drafting conditions, the opening 'X' can be adjusted using distance clips to achieve best quality of yarn (in ring frames) and roving (in roving frames).

Selection of the opening 'X' is also dependent on the following parameters:

1. Type of fibres.
2. Fibre mass in main drafting zone.
3. Yarn/roving count.
4. Type of apron and its thickness.
5. Type of nose bar and its built-in position.
6. Type of cradle.

Considering all the above parameters, one has to select the optimum opening 'X' to have the best combination of yarn quality and smooth working of the ring frame. Generally the narrower the opening 'X', the better the quality of yarn.

However, while an extremely narrow opening 'X' may give better yarn quality, it may affect the performance of the ring frame in terms of more ends down and undrafted roving. The table below has general guidelines to select distance clips to achieve both better yarn quality and smooth working of the ring frame. However, one has to reconfirm and fine tune the opening 'X' by conducting trials.

Choice of distance clips* with TeraSpin cradle OH 554-000075

OLC No.	OLC 0964117	OLC 0964118	OLC 0017705	OLC 0964119	OLC 0017627	OLC 0964120	OLC 0004587	OLC 0004588	OLC 0004589
OLC colour	Red	Yellow	Lilac	White	Grey	Black	Beige	Green	Pink
Opening 'X' in mm	2.6	3.4	3.4	3.7	4.2	4.7	5.6	6.5	8
Up to Ne 10s									✓
Ne 11s to 20s							✓	✓	✓
Ne 21s to 30s					✓	✓	✓	✓	
Ne 31s to 40				✓	✓	✓			
Ne 41s to 50s			✓	✓	✓				
Ne 51s to 60s		✓	✓	✓					
Ne 61s to 70s	✓	✓	✓	✓					
Above Ne 70s	✓	✓							

* Distance clips are not included in the supply of cradle

Top roller cots

In the PK 1601-01 weighting arm, the front and rear top rollers with newly fitted cots should have 50 mm cots diameter after the first grinding. The cot diameter may be reduced by a max. of 3 mm in subsequent grindings. Within this permissible range the load on the top rollers remains almost constant and it is not necessary to readjust the height setting of the weighting arm. The recommended diameter of the top apron roller is 48 mm and this must be kept precisely because of the specified apron length. The top rollers are supplied as loose boss roller without cots. Every customer can mount cots as per their requirement.

Cot grinding intervals depend on the following factors:

1. Quality of the cot.
2. Type of fibres.
3. Climatic conditions.
4. Pressure employed on the top roller.
5. Top roller running time.
6. Finishing agents or other additives.

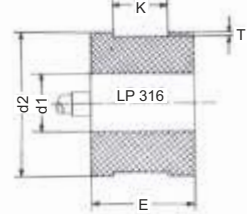

In addition to selecting the cot quality to suit the fibre, the cot should have accurately shaped edges, true, concentric running and a good-grip surface. For the front and rear top rollers it is better to use cots with a shore hardness of 80° to 85° and for the top apron roller, cots with a shore hardness of 75° to 80°.

In case of recessed apron top rollers, deviating fibre characteristics may call for a variety of recess depths T. Ideal values must be determined by in-house trials at the spinning mills, taking fibre masses and fibre properties into consideration.

Recessed middle top roller

The recess depth of the top apron roller is very critical in terms of intensity of fibre guidance and fibre control. It plays a crucial role in achieving desired yarn quality. A too low recess can adversely affect yarn quality and the working of the machine. When high top roller pressure is employed, one must assure adequate recess depth to compensate for the flattening of the cot of the middle top roller.

Application wise commonly used recess depths of middle top roller

<p style="text-align: center;">TOP APRON ROLLER</p> <p style="text-align: center;">LP 316 d1 d2 E K 19 48 34 18</p> 	<p>T = 0.5 mm For French type roving of approx. 1000 tex (Nm 1, Ne 59) and finer</p> <p>T = 1 mm For French type roving of approx. 1000 tex (Nm 1, Ne 59) and coarser, twisted roving of approx. 1000 tex (Nm 1, Ne 59) and finer</p> <p>T = 1.5 mm For twisted roving of approx. 1000 tex (Nm 1, Ne 59) and coarser. Also for the material with poor drafting properties.</p>
 <p style="text-align: center;">Nose bar</p>	<p>Nose bar supports and guides the bottom apron. The slightly convex shape of the top surface of the nose bar provides good fibre guidance and control in the main or front drafting zone.</p> <p>Height of the nose bar above drafting plane:</p> <ul style="list-style-type: none"> ● 2.5 mm – Most commonly employed ● 4 mm (by using replaceable washers) – in special cases ● 0 mm (nose bar aligned with drafting plane) – For the fibre having strong cohesiveness

