

Spiracon™

Planetary Roller Screw

MM-PRS-SPIRACON-EN-02

Installation & Maintenance Manual



Contents

SPIRACON
PLANETARY ROLLER SCREW
INSTALLATION & MAINTENANCE MANUAL
MM-PRS-SPIRACON-EN-02

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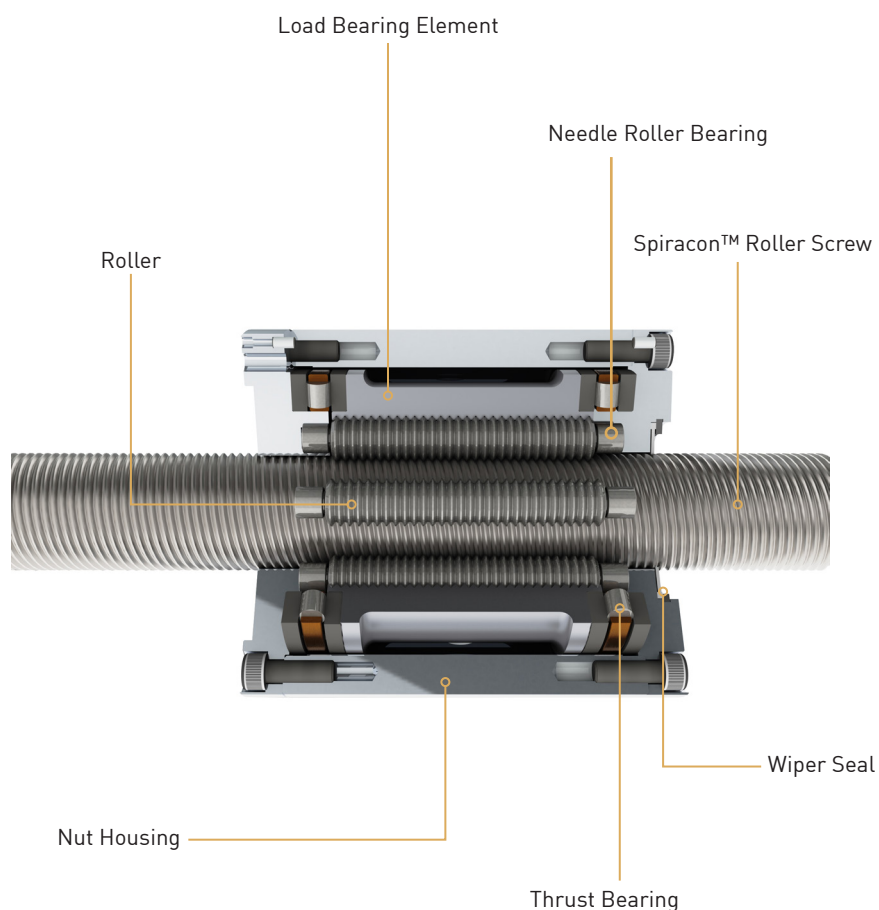
1.1 Spiracon Roller Screw Overview

Go beyond the performance of ball screw with our high performance Spiracon™ Planetary Roller Screw. It's a unique design to meet unique needs for linear motion applications.

There are 10 standard Spiracon™ roller screw models, with diameters from 15 mm to 120 mm, each with a choice of up to 3 leads. Dynamic load capacities of over 1000 kN (100 tonnes) and linear speeds of over 30 m/min are possible. Where the standard range does not meet the application specification, special roller screws can be designed to meet customers' specific requirements (Page 9).

Principle of Operation

The Spiracon™ system consists of a multi-start screw with an involute thread form and a number of planetary rollers with annular grooves, which engage with the screw. These rollers also engage with a grooved load bearing element, which transmits the load through roller thrust bearings, to the nut housing. The rolling action results in a high efficiency mechanism, while the line contact and hardened and ground construction achieves a high dynamic load carrying capacity, together with almost no axial backlash or wear.



1.3 Introduction

Spiracon planetary roller screws are exclusively designed for carrying out linear motion movements in accordance with the specification detailed in Power Jacks product information and this maintenance manual.

Any other application other than specified or one going beyond the above mentioned capacity is unauthorised. The manufacturer is not liable for damages resulting from such applications. The user alone has to bear the risk.

Since the roller screws can be applied in various areas, the user is responsible for the specific application of use.

The Spiracon planetary roller screws have been designed to comply with Machinery Directive 2006/42/EC and with the relevant essential health and safety requirements as applies to the equipment itself. Where fitted, Electric Motors conform with Low Voltage Directive 2006/95/EC and EMC Directive 2004/108/EC.

1.4 Safety Instructions in The Operating Manual



This symbol indicates potential dangers to people.
Comply with the instructions in order to avoid injury.



This symbol indicates potential dangers to the unit.
Comply with the instructions in order to avoid damage to the unit.



This symbol indicates special information on:

- The best possible use of the unit
- How to facilitate operation of the unit

1.5 Residual Risk and Hazards

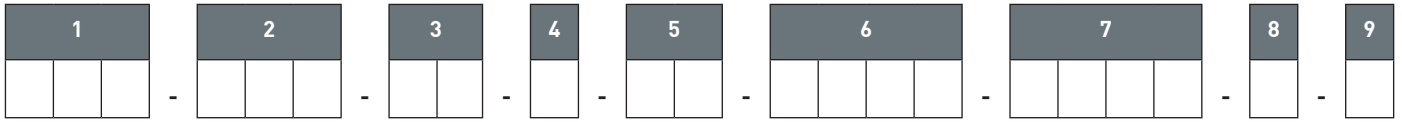
- 1.5.1 Should a risk of damage to material or injury to persons remain despite the structural safety of the Spiracon roller screw(s), the user must draw attention to such hazards by means of suitable warning notices and written instructions indicating safety precautions.

1.6 Operating Personnel

- 1.6.1 The Spiracon planetary roller screws are designed according to state-of-the-art technology and are in line with applicable safety regulations. However, the general risks of personal injury or damage to property connected with the use of such machinery cannot be completely eliminated. Therefore the units may only be assembled and operated by competent and qualified personnel and only be used for the authorised application.
- 1.6.2 Therefore a careful study of this operating manual should be made before attempting to use or service the unit and particular attention should be paid to the safety instructions.
- 1.6.3 Work to be performed on electrical parts, such as:
- Installation of limit switches
 - Mounting of the drive
 - Check of the direction of rotation
- should only be carried out by qualified electricians.
- 1.6.4 The Spiracon planetary roller screws and the installation should be inspected by the operating and supervising personnel for externally visible damage and defects at least once every shift. Any changes (including the operational conditions) which may affect the safety are to be reported immediately.

2. Spiracon™ Roller Screw Product Code

The product code is of the following form:



(1) Product

SPT - Spiracon™ Screw and Nut.

SPS - Spiracon™ Screw only.

SPM - Spiracon™ Nut only.

(2) Model

A 3 figure code taken from the Technical Chart (Page 14).

(3) Lead

A 2 figure code taken from the Technical Chart (Page 14).

(4) Pitch

A 1 figure code taken from the Technical Chart (Page 14).

(5) Direction of Thread

RH - Right Hand

LH - Left Hand.

(6) Overall Screw Length

A 4 figure code to represent the overall screw length in mm.

2.1 Example Part Number



(1) Spiracon™ Screw and Nut

(2) Model 65

(3) 36 mm Lead

(4) 6 mm Pitch

(5) Right Hand Thread

(6) 1540 mm Overall Screw Length

(7) 1450 mm Screw Threaded Length

(8) 1 Spiracon™ Nut

(9) Standard Nut Mounting Holes

Notes:

1. In all enquiries, the customer should supply a detailed drawing, indicating the screw end matching details.
2. The above part number defines a standard catalogue unit. Where a standard unit does not meet the customer's requirement, PowerJacks will be pleased to design a special unit.
3. All goods are sold subject to our Standard Conditions of Sale, a copy of which is available upon request.

2. Spiracon™ Standard Performance

Main Features of Spiracon™ Roller Screws

- High dynamic load capacity
- High efficiency
- High positional accuracy
- Long life and low maintenance
- Same nut fits both right and left handed screws
- Hardened and ground rolling elements
- Clean operation
- Low noise

Efficiency

The Spiracon™ roller screw has an efficiency of typically 85%. Power consumption is therefore minimised, and a compact screw system is possible. Such a high efficiency means that the screw is not self-sustaining, and a braking system is needed to prevent back driving.

Tolerancing

The highly accurate machining and assembly of each roller screw means total axial play of less than 0.01mm can be achieved. The cumulative pitch error in the screw is typically less than 0.005 mm per 300 mm. Combined with a high stiffness, this means that accurate and repeatable positioning is possible. The screw straightness is within 0.1 : 1000. However roller screws are made to order for each specific application and tolerancing may vary on an application requirement basis.

Operating Life

Operating life is dependent upon the dynamic load. The maximum dynamic loads are detailed in the product brochure and are equivalent to 1000000 revolutions of the screw. To determine actual operating life, please refer to "How to select a Spiracon™ Roller Screw in the same brochure. Where severe operating conditions exist, please consult our Technical Sales Department.

Guiding the Load

Loads should be guided, to remove any possible side load from the Spiracon™ nut. The guide system will also resist the torque developed by the roller screw mechanism.

Mounting

The Spiracon™ nut can be mounted using the standard mounting holes and location diameter. Screw end machining to suit thrust bearings is provided, or this can be specified to suit customer requirements. Mounting for operation in any orientation is possible.

Operating Environment

All units are constructed and finished to suit industrial operating conditions. Normal operating temperatures are from -10°C to +50°C. However, Power Jacks products have been proven in very low operating temperatures (-30°C - Arctic) and in higher temperatures (+70°C - steelworks). Wiper seals prevent the entry of large particles into the nut mechanism, and bellows can be provided to protect the screw. Please contact our Technical Sales Department to discuss hostile or hazardous operating environments.

4.1 General Installation Notes

4.1.1 Before installing new parts, remove any rust preventative, protection grease etc.

4.1.2 Check before immediate installation for possible transit damage.

4.1.3 Components which have been stored for a long time (over 1 year) should be re-lubricated in working conditions before they are put into operation.

4.1.4 Before putting the Spiracon planetary roller screw(s) into service, the User must ensure that the plant in which it is installed complies with all applicable directives, especially those regarding health and safety at work.



4.1.5 Handle the roller screw with care. The Spiracon roller screws should be handled with care to avoid damaging the machined surfaces and the threads of the roller screw.

4.1.6 Before putting the units into service, check the lubricant level in the roller nut and lubricate the screw threads. If necessary top up the lubricant to the required level.



4.1.7 Do not mix greases of different nature or specifications.

4.1.8 If the same type of grease already in use is not available, remove all of the existing lubricant completely and flush its interior thoroughly with a light solvent before refilling with a new lubricant.

4.1.9 The structure on which the Spiracon roller screw(s) are mounted must have ample strength to carry the maximum load, and should be rigid enough to prevent undue deflection or distortion of the roller screws supporting members.

4.1.10 It is essential that the Spiracon roller screw(s) be carefully aligned during installation so that the roller screw is running true and the connecting shafts are exactly in line.

4.1.11 When installing several roller screws to move a common load/item/structure, the roller screws should first be connected to the structure (refer 4.4). The load should be equally distributed between the roller screws. The roller screws drive end should then be connected taking care not to turn the roller screw and lose the roller screw position relative to the structure.

4.1.12 After the Spiracon roller screw(s) is installed, shafting, gearboxes, motors, etc., are coupled together it should be possible to turn the main drive by hand (no load on roller screws). If there are no signs of binding or misalignment, the roller screw system is then ready for normal operation.

4.1.13 After the Spiracon roller screw(s) are installed, they should be operated through their full travel four or five times under minimum load conditions. If the arrangement operates satisfactorily and there are no signs of binding or misalignment the Spiracon roller screw(s) are ready for normal operation. Refer to section 5 for typical operating performance checks.

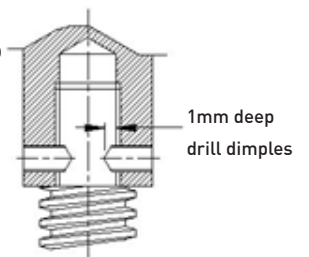
4.2 General Instructions for fitting detachable ends on roller screws

In most circumstances the roller screw is delivered without an end fitting assembled to the unit, however detachable end fittings are available.

- 4.2.1 It is important that the detachable ends are securely fixed to the roller screw and the following procedure should be adhered to.
- 4.2.2 Thread the detachable end on to the roller screw and tighten up as hard as possible without damaging the components.
- 4.2.3 Select a twist drill which is a free fit in the tapped holes of the detachable end. Using these holes as a drill guide, drill dimple only into the roller screw. Clean out swarf and remove detachable end. Select another drill which matches the set screw diameter and, using the drill dimples as a guide, drill into the roller screw a full diameter depth of 1mm below the root diameter of the threads. Refit detachable end.
- 4.2.4 Fit the knurled point set screws (supplied with detachable ends) firmly in place ensuring that point of set screws make contact with bottom of drill dimples. Secure the set screws with chemical thread locking compound (e.g. Loctite).



- 4.2.5 If roller screws with anti-rotation devices are involved, and it is required to line up end fitting surfaces in a fixed relationship to the structure centre line, it will be necessary to face the underside of the detachable end to obtain the required relationship. This operation should be done carefully as only a few hundredths of a mm (thousands of an inch) removed from the attachment is equivalent to a fair amount of rotational movement. After the correct relationship has been obtained with the attachment firmly tightened up, proceed to install the roller screw in accordance with this manual.



4.3 Unpacking and installation

4.3.1 Remove the Spiracon planetary roller screw(s) from their container. Dispose of the packaging material and the desiccant in an environmentally friendly way.

4.3.2 Lift the screws with soft slings around the Spiracon roller screw using a spreader bar to reduce the screw deflection while lifting.



4.3.3 **WARNING** - The Spiracon nut has a high efficiency and will travel along the screw under its own weight if the Spiracon roller screw - nut combination is tilted off the horizontal.



4.3.4 If the Spiracon roller screw is to be lifted into the vertical position then remove the Spiracon roller nut or attach a collar to the screw to prevent the Spiracon roller nut travelling down the screw under its own weight.

4.4 Mounting

4.4.1 The Spiracon nut can be removed from the screw for installation or maintenance purposes.

4.4.2 It is recommended that the Spiracon roller screw be protected from contamination and debris when installed by fitting covers or expanding bellows.

4.4.3 When installing the Spiracon roller screw into the position use soft slings as required wrapped around the screw, ref above.



4.4.4 **WARNING** – Do not use wire ropes or chains to handle Spiracon roller screw.



4.4.5 Before starting assembly work, check the directions of rotation of all roller screws, gearboxes and drive motors with regard to the required direction of travel of each roller screw in the application.

4.4.2 All components must be carefully aligned, as alignment errors increase stress and power consumption and lead to overheating and premature wear.



4.4.3 When installing roller screws ensure that the alignment of the roller screw in its support bearings is within 0.1/1000 millimetres.



4.4.4 Before attaching a drive unit, the roller screw should be turned through its entire stroke by hand, without load. Variations in the amount of force required and/or marks on the screw or guides indicate alignment errors. Loosen the relevant mounting bolts and adjust positioning until the correct alignment is achieved.







4.4.5 All mounting bolts must be re-tightened after a short period of operation.

4.4.6 Mount the roller screw by fixing the roller nut body to the structure by either its standard mounting points or via a mounting accessory like a trunnion. The screw ends should be supported in bearings.

4.4.7 Verify that the structural attachment that connects to the roller screw end fitting or nut is aligned throughout the roller screw stroke before connecting to the roller screw.



4.4.8 Take care when fitting couplings. A blow on a shaft end could cause internal nut damage.

-  4.4.9 Shaft alignment is critical, check on installation
-  4.4.10 Once the Spiracon roller screw is installed clean the screw thoroughly and lightly coat with grease applied with a paintbrush. Note that the screw will be supplied either lightly coated with grease or if supplied un-greased, coated with Shell ENSIS Fluid. The Shell ENSIS Fluid can be removed with Shell Cleanforce or other hydrocarbon solvent.
- 4.4.11 If travel limit switches are fitted to the installation, set the travel switches to operate at the required travel to ensure that the Spiracon roller nut cannot be driven into a solid stop.
-  4.4.12 It is recommended that initial setting of limit switches is carried out by manually rotating the Spiracon roller screw to position the switch activators correctly.
-  4.4.13 **WARNING** - Do not operate the installed Spiracon roller screw until all travel limit switches are commissioned.
- 4.4.14 Check that the grease nipple in the Spiracon roller nut is visible when the screw - nut is installed.

4.5 Regulations

The following regulations must be complied with:



- The relevant local regulations for the prevention of accidents.
- Generally recognized safety regulations.
- National regulations.

5.1 Operational Recommendations

- 5.1.1 Select a roller screw which has a rated capacity greater than the maximum load that may be imposed on it.
- 5.1.2 The roller screw(s) should have a greater stroke than is needed in the actual installation. Should it be necessary to operate the roller screw(s) at the extreme limits of travel it should be done cautiously.
- 5.1.3 It is important that the roller nuts should not be moved beyond the extreme ends of thread on the roller screw, otherwise serious damage may result.
- 5.1.4 Roller screw end stops (if fitted) are to prevent over-travel or loss of screw/nut. These are not load supporting and should be treated as an emergency device only and must not be allowed to come into contact with the roller nut during normal working cycles otherwise serious damage will result to the roller nuts internal mechanism.
- 5.1.6 The roller screws should not be permitted to accumulate dust and grit on the threads. If possible, roller screws should be returned to a covered position (protected) when not in use.

5.2 Wipers




- 5.2.1 There are two different types of wipers fitted to Spiracon roller nuts, a brush type and a plastic type. The wiper, fitted to each end of the roller nut, retains the majority of the grease, allowing a film of grease to remain on the screw thread, and prevents the ingress of debris into the roller nut that may cause damage.









WARNING - Incorrect mounting of the wipers will result in incorrect operation of the roller nut.

- 5.2.1 Brush Type Wiper
 - 5.2.1.1 The brush type wiper is retained in a recess at each end of the nut and is removed by releasing the retaining circlip, with standard circlip pliers, and removing / replacing the brush wiper. There is no specific orientation of the brush wiper.
- 5.2.2 Plastic Type Wiper
 - 5.2.2.1 The plastic type wiper is retained in a recess at each end of the nut by a dowel pin. The plastic type wiper has a thread form to match the roller screw and they are not interchangeable between positions or between nuts. Before removal of the roller nut from the Spiracon roller screw identify the wiper position relative to the roller nut. When assembling the roller nut onto the roller screw ensure that the wipers are flush with the face of the roller nut, i.e. that there is a gap between the bottom of the recess and the inside face of the wiper, or as defined on the Power Jacks drawing. This ensures that the wiper is free on the Spiracon roller screw thread and not cross-threaded relative to the roller nut.

5.2.3 Plastic Wiper Replacement

-  5.2.3.1 If required pack the space between the rollers of the nut with grease before assemble to the roller screw.
- 5.2.3.2 To fit replacement wipers to an existing nut first remove the wiper location dowel pin from the wiper recess in the nut.
- 5.2.3.3 Wind the Spiracon roller nut onto the roller screw.
-  5.2.3.4 Wind the wiper along the screw and into the recess in the roller nut against the recess face. Unwind the wiper creating a gap of 1 to 2mm between wiper and bottom of recess and mark position of location dowel on wiper.
- 5.2.3.5 Drill hole suitable for location dowel in the wiper.
-  5.2.3.6 Position wiper on roller screw in roller nut recess, ensuring the 1 to 2mm gap is present and fit the location dowel through the wiper into the roller nut.

6.1 General Maintenance Notes

-  6.1.1 Maintenance and replacement work must be done by an expert maintenance technicians trained in the observance of applicable laws on health and safety at work and the special ambient problems attendant on the installation.
-  6.1.2 Before doing any work on the unit, the operator must first switch off power to the roller screws drive system and ensure that it is out of service, as well as taking all necessary precautions against it being accidentally switched on again or its parts moving without warning.
-  6.1.3 All additional environmental safety precautions must be taken (e.g. elimination of residual gas or dust, etc.).
-  6.1.4 Before doing any maintenance work, activate all safety equipment and, if necessary, inform persons working in the vicinity. In particular, mark off the area around the unit(s) and prevent access to any equipment, which, if activated, might be the cause of unexpected health and safety hazards.
-  6.1.5 Replace worn components with original spare parts only.
- 6.1.6 Use the lubricants (oil and grease) recommended by the Manufacturer.
- 6.1.7 When working on the units, always replace gaskets and seals with new original ones.
-  6.1.8 If a bearing requires replacement, it is good practice to also replace the other bearing supporting the same shaft.
- 6.1.9 Power Jacks recommend replacing the lubricant after all maintenance work where a unit has been dismantled (completely or partially).
- 6.1.10 The above instructions are aimed at ensuring efficient and safe operation of the Spiracon roller screw unit.
- 6.1.11 The Manufacturer declines all liability for injury and damage to components due to the use of non-original spare parts and non-routine work, which modifies the safety requirements without the express prior authorisation of the Manufacturer.
- 6.1.12 Refer to the specific spare parts list when ordering spare parts for products.
- 6.1.13 Do not dump polluting liquids, worn parts and maintenance waste into the environment. Dispose of all such materials as stipulated by applicable legislation.

6.2 Regular Maintenance

Also refer to section 6.3

6.2.1 Lubrication Of The Roller Screw

- 6.2.1.1 The roller screws are shipped with the roller nut packed with grease (unless otherwise called for) which should be sufficient for one month of normal operation.
- 6.2.1.2 **IMPORTANT NOTE** – Lubricant suitability is dependent on duty cycle and ambient temperature. However in general recommended lubricants in section 7 are suitable for operation in an ambient temperature of -10°C to +50°C. If in doubt consult with Power Jacks prior to installation and operation.
- 6.2.1.3 The maintenance engineer should establish a lubrication programme based on the roller screws duty and use.
- 6.2.1.4 The roller screw thread requires a light grease film to be applied at Installation. The roller screw should not be over greased.
- 6.2.1.5 Note excessive grease should be avoided.
- 6.2.1.6 It is recommended that the roller screw be fitted with bellows or covers to protect the exposed screw from contamination from dirt and debris.
- 6.2.1.7 If the roller screw or its system is fitted with a brake ensure that under no circumstances lubricant gets into the brake as this can cause brake failure due to loss of friction.

6.2.2 Lubrication Intervals - General

- 6.2.2.1 Regularly check and top up lubrication in the Spiracon roller screw(s).
- 6.2.2.2 Refer to section 7 for recommended lubricants.

Item	Operation Type	Lubrication Interval	Grease Type
1	Normal	Check & lubricate as required every 6 months (minimum)	Molybdenium disulphide grease or equivalent. Refer Section 7
2	Arduous	Check & lubricate as required every 1 week	Molybdenium disulphide grease or equivalent. Refer Section 7

- 6.2.2.3 Planetary roller screws are not supplied with lubricant on the screw thread as it is exposed. Before operation suitable grease must be applied to the screw threads.

6.3 Check Unit Operational Performance

- 6.3.1 Remove dust / dirt / debris deposits from the unit(s).
- 6.3.2 Check that noise at constant load does not vary. Excessive vibration or noise can indicate wear of a part or failure of a bearing.
- 6.3.3 Check for lubricant leaks from the gaskets/seals, caps and casings.

- 6.3.4 Check all bolted joints/couplings for wear, deformation or corrosion and tighten them down fully without over tightening.
- 6.3.6 If driven by an electric motor check the power absorption and voltage against the nominal values given on the motor's nameplate.

6.4 Repair of Power Jacks Spiracon Roller Screw



- 6.4.1 Power Jacks recommend that a Spiracon planetary roller screw is returned to Power Jacks for repair. A full inspection and repair service is available.

6.5 General Rebuild Procedure



Power Jacks recommend the following procedures for assembly and disassembly of a roller screw.

- 6.5.1 Tag critical parts to facilitate reassembly.
- 6.5.2 Place all screws, washers and other small fixing components in a tagged bag/box with the associated product on which they are to be used referenced on the tag.
- 6.5.3 Mark mating surfaces to ensure proper meshing.
- 6.5.4 Clean and lubricate all parts as required.
- 6.5.5 All seals must be replaced when rebuilding.
- 6.5.6 All screws, washers and other small component parts must be replaced if damaged in any way.
- 6.5.7 Replace damaged or "frozen" lubrication fittings with new ones.

6.6 Replacing Parts

- 6.6.1 Do not hesitate to replace parts and/or components if they are not able to guarantee safe and reliable operation.
- 6.6.2 Never improvise repairs.



- 6.6.3 The use of non-original spare parts not only voids the warranty but also can compromise unit operation.

6.7 Required Tools

- 6.7.1 A press, coupling puller, impact extractor and common hand tools.

6.8 Lifting Units

- 6.8.1 When lifting, use accessories such as eyebolts, snap hooks, screw clamps, straps, ropes, hooks etc. which are certified and adequate for the load.
- 6.8.2 Use soft slings around the body of the roller screw unit and a spreader bar to reduce the screw deflection while lifting.
- 6.8.3 Do not lift by placing chains or hooks around screw thread.



- 6.8.4 WARNING – Do not use wire ropes or chains to handle Spiracon roller screw.



- 6.8.5 WARNING - The Spiracon nut has a high efficiency and will travel along the screw under its own weight if the Spiracon roller screw - nut combination is tilted off the horizontal.

- 6.8.6 If the Spiracon roller screw is to be lifted into the vertical position then remove the Spiracon roller nut or attach a collar to the screw to prevent the Spiracon roller nut travelling down the screw under its own weight.

6.9 Cleaning

- 6.9.1 External Cleaning



- 6.9.1.1 Clean all dust and process waste off the unit. Do not use solvents or other products, which are incompatible with the construction material and do not direct high-pressure jets of water at the unit.

- 6.9.2 Internal Cleaning

- 6.9.2.1 Remove lubricant from unit and do not re-use old lubricants.



- 6.9.2.2 Flush a unit's interior thoroughly with a light solvent before refilling with new lubricant.

6.9.3 Warning

- 6.9.3.1 Provide adequate ventilation during the use of cleaning agents; avoid prolonged breathing of fumes and contact with skin.
- 6.9.3.2 Use clean hot water or a soap solution for general cleaning of painted surfaces.
- 6.9.3.3 Dry parts thoroughly after cleaning.

6.10 Painting

- 6.10.1 If a unit is to be painted, tape the nameplate, mounting surfaces and seal rings to prevent contact with solvent prior to painting.

7 Recommended Lubricants

Table 1

Manufacturer	Lubricant
Rocol	Sapphire Hi-Pressure

8.1 Recommendations

8.1.1 Spiracon planetary roller screws are fully supported by Power Jacks. Spare parts and repairs are available.



8.1.2 It is recommended that when a roller screw is used in a production critical environment where the cost of downtime far exceeds the cost of the roller screw a complete spare roller screw unit is stocked by the customer. This allows the worn/damaged unit to be returned to Power Jacks for repair by trained personnel. Alternatively it allows time for a new replacement roller screw to be manufactured.

8.1.3 When enquiring about replacement parts or a complete unit please send the following information to Power Jacks:

- Roller Screw Serial Number
- Roller Screw Model Number
- Original Purchase Order Number (if known).
- Power Jacks Sales Order Number (if known)
- Your Contact Details (essential)

9.1 General Storage Recommendations

Recommendations for storing the products are indicated below:

- 9.1.1 Store in a clean and dry environment, free from dirt and dust.
- 9.1.2 Roller screw Storage Temperature: -10°C to +50°C.
- 9.1.3 Do not store the unit in excessively humid conditions or where it is exposed to the weather (do not store outdoors).
- 9.1.4 Do not place product directly on the ground.
- 9.1.5 Store product(s) on a stable base and make sure that it is not subjected to accidental displacement.
- 9.1.6 Store the unit(s) in the packaging provided for shipping (if allowed).
- 9.1.7 If products are to be stored for more than 6 months, the following additional precautions must be taken:
 - 9.1.7.1 Cover all machined external surfaces with a rust-proofing product.
 - 9.1.7.2 Fill the unit with appropriate lubricant if not supplied with lubricant.
- 9.1.8 All rotating parts should be turned by hand a few revolutions per month. If this is not practical, then an external drive should be used to run the unit(s) for a few revolutions.

9.2 Long Term Storage

In the event that a roller screw(s) is to be stored for more than 6 months prior to installation/commissioning, Power Jacks Ltd should be consulted to discuss preservation requirements.

10.1 General Disposal Guidance

- 10.1.1 This must only be done by operators trained in the observance of applicable laws on health and safety at work.
- 10.1.2 Do not dump non-biodegradable products, lubricants and non-ferrous materials (rubber, PVC, resins, etc.) into the environment. Dispose of all such materials as stipulated by applicable environmental protection legislation.
- 10.1.3 Do not attempt to re-use parts or components which appear to be in good condition after they have been checked and/or replaced by qualified personnel and declared unsuitable for use.

11.1 Warranty Definitions

When used in these conditions the following words have the meanings set out opposite them below:

Company:	Power Jacks Limited
Contract:	The contract between the Company and the Customer for the supply of the Goods.
Customer:	The party to whom the Goods are to be supplied under the Contract
Goods:	The goods to be provided under the Contract
Writing:	Includes facsimile or electronic transmission and comparable means of communication

11.2 Warranty Statement

The Company warrants that any Goods sold by it under Power Jacks standard terms and conditions of sale will be free from defects caused by faulty materials or poor workmanship but gives no warranty and makes no representation whatsoever express or implied as to any other matters including without limitation condition merchantability or fitness for any purpose.

The Company shall incur no liability under this warranty unless:

- The Company is promptly notified in Writing upon discovery of any such defects by the Customer and the Customer forthwith ceases to use the defective Goods unless otherwise authorised by the Company; and
- The defective item is immediately returned to the Company, transportation charges being prepaid by the Customer or the Company is, at its option, given the opportunity to remedy any defect.

The Company's warranty as specified above is limited to a period of 12 months from the date of delivery (ex-works Power Jacks) and its liability shall be limited to replacing, repairing or issuing credit at its option for any Goods returned by the Customer within the aforesaid period.

The Company shall not be liable for consequential loss or damage by reason of any defect in (or failure to comply with any written estimate of performance of) Goods supplied by the Company whether original or substituted.

The Customer will indemnify the Company against all third party claims made in respect of the Goods.



POWERJACKS

PRECISION ACTUATION

Power Jacks specialises in the design and manufacture of precision linear actuation, positioning and lifting equipment.

Our products are supplied globally across many sectors including Industrial Automation, Energy, Transport, Defence and Civil.

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