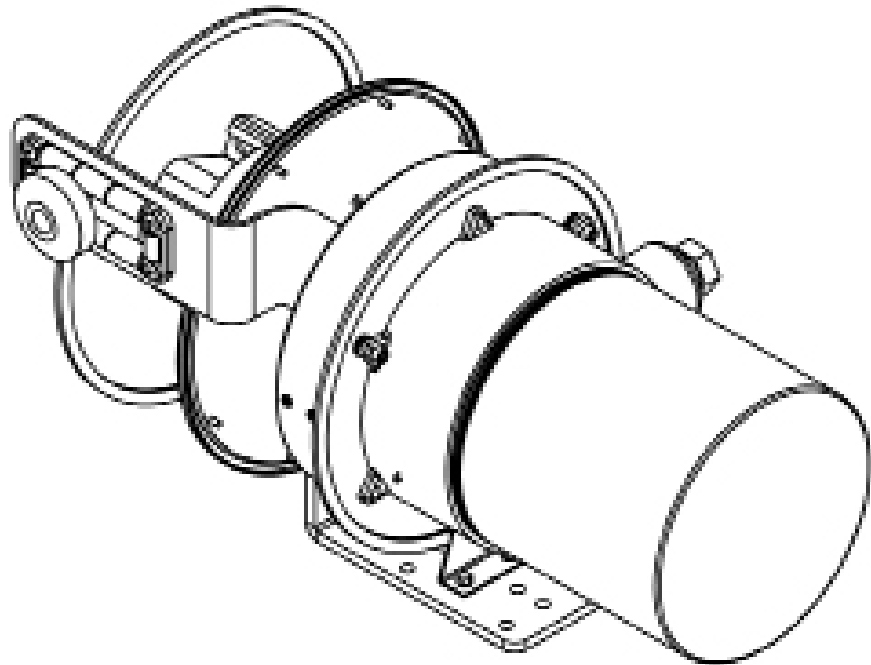




ReelTuff™ RTS Series

Hazardous Duty Cable Reel Manual

Includes all models beginning in the KH's ORS and RTS
Retractable Power Cord Reel Series - for Hazardous Locations.



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1. **TERMS AND CONDITIONS OF CONTRACT.** Except where otherwise provided in a written agreement duly executed by an authorized signatory of KH Industries, Inc. ("KH"), all goods and services supplied by KH pursuant to the Confirmation of Order overleaf and these terms and conditions (the "Goods") are provided subject to the details set out in the said Confirmation of Order and to the terms and conditions set forth herein. KH's ACCEPTANCE OF AN ORDER IS EXPRESSLY CONDITIONED UPON BUYER'S ASSENT TO THESE TERMS AND CONDITIONS, AND BUYER'S ACCEPTANCE OF GOODS HEREUNDER SHALL BE DEEMED AN ACCEPTANCE OF THESE TERMS AND CONDITIONS. KH specifically rejects any terms and conditions in Buyer's order or in any other document from Buyer that in any way conflict with, reduce or affect these terms and conditions.

2. **PRICES.** Unless otherwise agreed in writing, all prices are quoted F.O.B. at KH's premises in Hamburg, New York, USA. All price quotes by KH will remain valid for thirty (30) days. Thereafter, prices are subject to change without notice to Buyer. Typographic, clerical and manifest errors in any form are subject to correction by KH at any time. The minimum billing per order is \$100 plus freight charges, orders that do not meet this minimum will be subject to a \$25 service charge.

3. **PAYMENT TERMS.** Payment for all Goods shall be made prior to shipment (either by cash, banker's draft, cashier's check, check drawn on good funds, telegraphic transfer or approved credit card) or, at the sole discretion of KH, C.O.D., unless Buyer has applied for and been granted a line of credit by KH, in which case purchases can be made up to approved credit limits with payment therefore due net 30 days. Late payments shall be charged interest at the rate of 1.5% per month. KH is entitled hereunder to delay shipment until payment monies have cleared (e.g. check has become final; credit card charge has been authorized). Credit terms are subject to change or withdrawal at any time at KH's sole discretion, regardless of prior credit arrangements. KH reserves the right to require current financial information from any buyer with an open account as a condition of the continued extension of credit. Buyer shall promptly reimburse KH in respect of KH's costs, including reasonable attorneys' fees, incurred in the collection of any monies owed to KH by Buyer. For orders invoiced or shipped outside the United States, KH will require a confirmed, irrevocable letter of credit, payable at sight in United States funds, advised and payable on an acceptable US bank. Buyer shall be solely responsible for procuring any and all necessary export, import and/or other permits. Buyer's order shall constitute a representation that Buyer is solvent, and KH is relying upon such representation. If KH at any time reasonably believes that the Buyer is insolvent or that the Buyer's credit is impaired, Buyer shall be in material breach thereof and hereof and KH may, without liability to Buyer, withhold performance hereunder, change the payment terms and/or repossess Goods delivered.

4. **ADDITIONAL COSTS & TAXES.** All prices and quotations are exclusive of sales, use, excise, duty, VAT and all similar taxes and levies. All such charges shall be for the account of Buyer and, if not included in an original invoice, may be invoiced or added to Buyer's credit card payment, if any, by KH at a later date.

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6. **SHIPPING.** Title in Goods and risk of loss or damage thereto shall pass to Buyer upon delivery thereof by KH to the carrier at FOB point. Goods shall be shipped in accordance with the information set out in the Confirmation of Order overleaf. Unless instructed otherwise by Buyer, KH may ship by any reasonable manner and routing. All shipping costs shall be for the account of Buyer. All shipments shall be insured for

their full replacement value and all such insurance shall be for the account of Buyer. [All orders are subject to KH's current shipping and handling charges.] KH shall not be liable or otherwise responsible for defaults or delays in delivery by carrier. Shipping dates set out on the Confirmation of Order are approximations only, subject to, inter alia, factory schedules and inventory. If any shipment of Goods is delayed due to any act or omission of Buyer, KH may charge Buyer reasonable storage fees in relation thereto, including without limitation, storage costs, insurance costs and cost of money. Unless otherwise agreed by KH in writing, KH, in its sole discretion, may make partial shipments of any order, for which pro rata payments shall be due and payable as indicated on the invoice issued pursuant thereto. KH reserves the right not to ship to Buyer if Buyer's account is overdue.

7. **ACCEPTANCE OF GOODS.** Buyer acknowledges that it has a duty to inspect Goods immediately upon receipt. Goods will be deemed accepted by Buyer unless notice of lawful rejection has been delivered in writing to KH within ten (10) business days after receipt thereof. Any notice of shortage must be delivered in writing to KH within three (3) business days after receipt thereof by Buyer. Any notice of damage to Goods must be delivered in writing to KH and the relevant carrier within three (3) business days after receipt thereof by Buyer. Authorization from KH must be received by Buyer in writing prior to the return of any Goods by Buyer hereunder, and Buyer shall be solely responsible for adequate packing and pre-payment of freight with respect thereto. For the avoidance of doubt, KH shall not be obligated to accept any unauthorized return of Goods, any Goods inadequately packed or Goods for which freight has not been fully pre-paid by Buyer.

8. **RETURNED GOODS.** KH may, at its sole option, agree to accept unused and merchantable Goods from Buyer, subject always to a re-stocking charge of 20%. Buyer agrees that it shall not return any Goods prior to receiving written authorization from KH so to do. Any and all returned Goods shall be shipped freight pre-paid and risk of damage or loss shall remain vested in Buyer until the relevant Goods are received, inspected and accepted by KH. For the avoidance of doubt, KH is not obligated to accept any returned Goods pursuant to this paragraph. Custom manufactured Goods are non-cancelable/non-returnable.

9. **RE-CONDITION & REPAIR.** Before shipping any Goods to KH for such repair, Buyer shall contact KH for Return Merchandise Authorization (RMA), and shipping instructions. With respect to any repairs by KH, Buyer shall be solely responsible for payment of freight charges, replacement parts, and labor costs at KH's then current prices. Any repairs to any of the Goods performed by Buyer or by third parties [pre-approved by KH] shall be carried out in strict accordance with the applicable repair manual(s), if any, published by KH from time to time.

10. **LIMITED WARRANTY; EXCLUSION OF OTHER WARRANTIES; LIMITATION OF REMEDIES; INDEMNITY.**

KH warrants the Goods to be free from defects of materials or workmanship, under normal and proper use and service, for a warranty period of one (1) year from the date of shipment. If any of the Goods proves to be defective in material or workmanship within said warranty period, such Good(s) shall be promptly returned to KH, shipping charges prepaid, and if the same is determined by KH to be defective in material or workmanship, it will be replaced or repaired, at the exclusive election of KH, free of charge, F.O.B. KH's factory. If Buyer discovers that the Goods, or any of them, do not conform to the warranty specified hereinabove, Buyer shall immediately [cease using such Good(s) and] notify Seller in writing of such non-conformity, specifying in reasonable detail the nature thereof.

THIS WARRANTY IS MADE AND ACCEPTED IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, WHETHER OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE OR OTHERWISE, AS BUYER'S EXCLUSIVE REMEDY FOR ANY DEFECTS IN THE GOODS, AND ALL OTHER REMEDIES ARE EXPRESSLY DISCLAIMED.

No warranty is made by Seller for consumables or for normal wear and tear, or for Goods which have been set up, operated and/or installed other than in strict accordance with KH's

written instructions; or which have been subjected to improper installation, misuse, negligence or accident; or which have been serviced, repaired or altered improperly or by anyone other than Seller [or Buyer or third party approved by Seller, in strict accordance with the applicable repair manual(s), if any, published by KH from time to time]; or which have been used in a manner or for a purpose for which the Goods were not designed. No warranty is made with respect to any defects in the Goods due to plans or instructions supplied to Seller by or for Buyer. All other obligations and liabilities of Seller, whether directly or by way of indemnity, for special, incidental, consequential or other damages, whether based on breach of contract, warranty, tort (including negligence), strict products liability, patent or trademark infringement, or any other theory in connection with the purchase or use of the Goods, are expressly EXCLUDED. In no event will Seller be liable on any claim that Goods are defective for an amount in excess of the price paid by Buyer for the Goods. Buyer hereby expressly assumes all risk as to the suitability, performance quality and compatibility of the Goods, and in this respect the product is being provided on an "AS IS" basis. [Buyer acknowledges that some of the Goods might used in inherently dangerous activities and, accordingly, expressly bears the risk of injury, damages and other harm to itself and to third parties arising out of use of any of the Goods in such inherently dangerous activity(ies). Furthermore, Buyer agrees to indemnify, hold harmless and keep indemnified KH for any claims, awards, damages or other costs incurred by KH, including reasonable attorneys' fees, arising out of the use of any Good(s) in inherently dangerous activities.] While KH uses reasonable endeavors to ensure the accuracy and quality of its publications, sales literature and other printed materials, from time to time errors might occur in that regard. KH therefore does not guarantee the accuracy or completeness of any publication or other informational materials.

11. **INTELLECTUAL PROPERTY.** The purchase by Buyer of any Goods hereunder does not grant to, convey or confer upon Buyer or Buyer's customers, or upon anyone claiming under Buyer, a license or any other legal interest, express or implied, under any patent right, trademark, copyright or other intellectual property right, whether registered or not and whether pending or not, in any jurisdiction, of KH covering or relating to any of the Goods or any combination or process in which any of the Goods might be or are used.

Buyer understands and agrees that KH does not warrant that the Goods are free of claims of patent, trademark, trade secret or copyright infringement by a third party. KH hereby disclaims any such warranties or indemnification for such infringement(s) or intellectual property rights.

Any rights not expressly granted herein are reserved by KH.

12. **FORCE MAJEURE.** KH shall not be liable for any failure to perform under the Confirmation of Order or these terms and conditions if it is unable to obtain parts or supplies at reasonable prices or through usual and regular sources on a timely basis, or due to any interruption of transportation, government regulation, labor disputes, strikes, riots, war, civil commotion, fire, flood, accident, storm, or act of God, or other cause beyond KH's reasonable control that renders it impractical for KH to perform.

13. **GENERAL.** This Agreement will be governed by and construed in accordance with the laws of the State of New York. The application of the United Nations Convention for the International Sale of Goods, if it would otherwise apply, is hereby expressly excluded. These terms and conditions and the Confirmation of Order overleaf set out the entire agreement between KH and Buyer relating to the Goods and supersede any prior agreement, arrangement, purchase order, correspondence, communication, advertising or representation concerning the Goods. This Agreement may not be modified or amended except by a written instrument duly executed by authorized signatories of the parties. If any provision of this Agreement is held to be invalid or unenforceable, that provision is to be given effect to the maximum extent permissible and the remaining provisions of this Agreement will remain in full force and effect. Notices hereunder shall be delivered in writing by registered mail to the addresses of the parties overleaf, or as notified to the other party from time to time.

1.0 Safety Instructions

- 1.1 Electrical Warnings
- 1.2 Operational Warnings
- 1.3 Maintenance Warnings
- 1.4 Electrical Ratings
- 1.5 Labels

2.0 Installation

- 2.1 Application Types
- 2.2 Mounting (w/ or w/o pivot base)
- 2.3 Roller Guide
- 2.4 Ratchet
- 2.5 Cable Installation
- 2.6 Spring Tension Adjustment
- 2.7 Power Connections

3.0 Operation

4.0 Maintenance

- 4.1 Maintenance Warning
- 4.2 Lubrication
- 4.3 Inspections
- 4.4 Slip Ring Replacement
- 4.5 Cable Replacement
- 4.6 Spring Motor Replacement

5.0 Troubleshooting

RECORD

The catalog number of the reel and the serial number of the reel are required when ordering replacement parts or discussing the reel with the factory. Please record this information now in the spaces provided below.

CATALOG NO. OF REEL _____

DESCRIPTION NO. OF REEL _____

SERIAL NO. _____

DATE INSTALLED _____

1.1 Electrical Warnings

- 1.1.1 Properly ground equipment before use in accordance with both the National Electric Code and local electrical codes and ordinances.
- 1.1.2 Disconnect electrical power from the cable reel before any service functions are performed.
- 1.1.3 Do not use this cable reel for loads greater than the current rating listed on the label and voltage greater than the slip ring rating. The ampacity (current) rating of the cable must be in accordance with the National Electric Code.
- 1.1.4 Electrical wiring on the reel must be done by a qualified electrician.

1.2 Operational Warnings

- 1.2.1 Exercise care when handling the cable reel during normal operation. This cable reel has a rotating spool powered by springs under tension.
- 1.2.2 Do not disassemble the spring motor for any reason. Serious personal injury could result. This cable reel is equipped with springs under tension. Contact the factory for assistance:

Call: 716-312-0088 - www.khindustries.com

1.3 Maintenance Warnings

- 1.3.1 Do not use cable different from that for which the reel is intended. Changes in diameter, weight per foot, length of cable or flexibility will affect the operation of the reel.
- 1.3.2 Mounting hardware and fasteners should be installed to maintain tightness under vibration and checked periodically to assure tightness.
- 1.3.3 Overhead installation mountings should be such that the reel is not suspended by bolts in tension. A safety chain or cable is strongly recommended to minimize damage and/or possible injury in the event of mounting failure.
- 1.3.4 **WARNING:** Modification of this equipment may cause excessive wear and will void the warranty. Contact the manufacturer regarding changes or modifications of equipment which could affect reliability or safety.

1.0 Safety

1.4 Electrical Rating

1.4.1 All Reels equipped with cable installed/tested from the factory.

1.4.2 Reels equipped with cable are rated based on the installed cable.

SOW-A (90°C) or SOOW-A (105°C)			
Cable: AWG / # of Cond.	Ampacity	Cable: AWG / # of Cond.	Ampacity
16/2	10	12/2	20
16/3	10	12/3	20
16/4	8	12/4	16
16/5	8	12/5	16
16/6	8	12/6	16
16/7	7	12/7	14
16/8	7	12/8	14
16/10	5	10/2	25
16/12	5	10/3	25
14/2	15	10/4	20
14/3	15	10/5	20
14/4	12	10/6	20
14/5	12	--	--
14/6	12	--	--
14/7	10	-	--
14/8	10	--	--
14/10	7	--	--
14/12	7	--	--

1.5 Markings

1.5.1 Every cable reel is marked with a label on the entrance ring which includes the KH Industries name and logo, the product catalog number, the individual product serial number.

1.5.2 UL Hazardous Location Listings E193373 (3 and 4 Conductor models with cable installed only):

- Class I, Division 1, Groups C & D (flammable gases or vapors)
- Class II, Division 1, Groups E, F, & G (combustible dusts)
- Class III, Division 1 (easily-ignitable fibers or flyings)
- Class I, Zone 1, AEx d IIB, Ex d IIB

Reels Conform to NEMA 4 standards for applications in wet and dry locations as indicated in the catalog.

1.5.3 The two requirements that follow for UL/cUL listed PowerReel products:

1.5.3.1 Listed cable reels are intended for commercial/industrial use and are provided with permanent mounting means. They must be wired by a qualified electrician. These cable reels are provided with a 6' feeder cord.

1.5.3.2 UL listed type SOW-A or SOOW-A, 600V, rated 90°C or 105°C must be used for the supply cable (if flexible cable is used) and for the load end cable (active cable).

1.5.4 The maximum amperage and voltage rating for every cable reel is stamped on the label.

2.0 Installation

2.1 Application Types

2.1.1 Stretch Applications



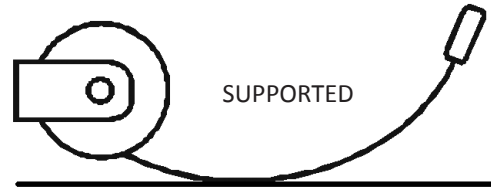
2.1.1.1 The cable is suspended without any intermediate support. Stretch reels generally require a line pull equal to two times the weight of the cable, which allows approximately 10% sag at full extension. On long applications where sag cannot be tolerated, it is sometimes desirable to put supports at intervals of 5 to 10 feet.



2.1.2 Lift Applications

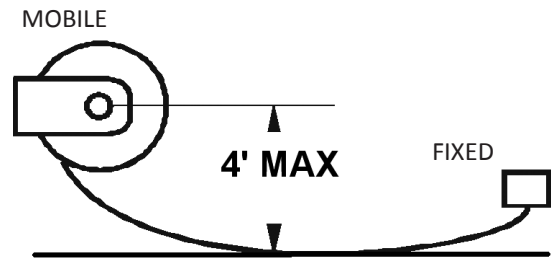
2.1.2.1 The cable is lifted vertically in lift applications. The reel is normally designed to handle only the total weight of the cable. Some lift applications may require a ball stop and ratchet to control the length of cable to be retracted.

2.1.3 Drag Applications



2.1.3.1 The reel is mounted on a stationary object and is required to drag the cable over the surface to the reel. The cable is supported by the ground or some type of cable tray.

2.1.4 Retrieve Applications



2.1.4.1 The reel is mounted on the moving object and winds up or pays out the cable as the machine approaches or moves away from the fixed end. Retrieve applications can be elevated up to 4 feet from the cable support surface.

2.2 Mounting

2.2.1 Standard Mounting

2.2.1.1 The reel may be mounted by bolting the base to any flat surface which is structurally sound enough to support it and the forces of winding and unwinding the cable.

2.2.1.2 The spool drum must rotate on a level horizontal axis.

2.2.1.3 Position the guide arm so that cable payout is perpendicular to the face of cable roller guide. The total cable deflection should not exceed 15° to either side of the centerline of the spool.

2.2.1.4 If deflection is constant to either side of the reel and operation is impaired, re-mount the reel.

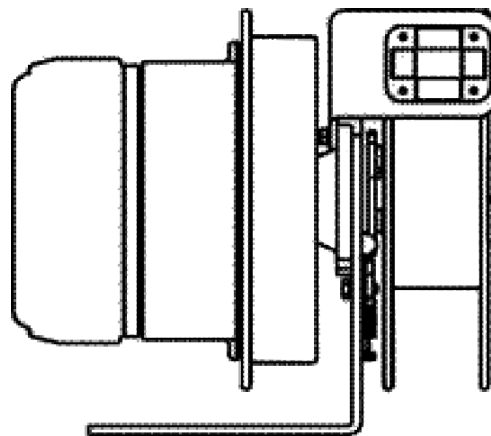


Fig. 2.2 Cable Deflection with Roller

2.2.1.5 If the angle of deflection exceeds 30° a Pivot Base should be used, otherwise excessive cable wear and unreliable operation will result.

2.2.1.6 A safety chain is recommended for all overhead installations. Attach the safety chain using the 0.39 hole provided in the base. (See Figure 2.4.)

2.0 Installation

2.2.2 Pivot Base Mounting

2.2.2.1 All RTS Series Cable Reels can be furnished with a spark proof pivot base to allow the reel to rotate and keep the extended cable perpendicular to the application.

2.2.2.2 The XPVB Pivot Base has the ability to rotate up to 340°. This Pivot Base is not suitable for applications requiring continuous rotation.

2.2.2.3 A pivot base is required in carousel or loop-track applications.

2.2.2.4 When a pivot base is used, the reel must be mounted horizontally ("ceiling" or "floor" mounted).

2.2.2.5 The Roller Guide should be mounted so the cable will travel perpendicular to the axis of rotation. This will guard against the cable twisting and ensure effective swivel action from the pivot base.

2.2.2.6 Selection of mounting holes should be such that the spool center is in line with the center point of the pivot base.

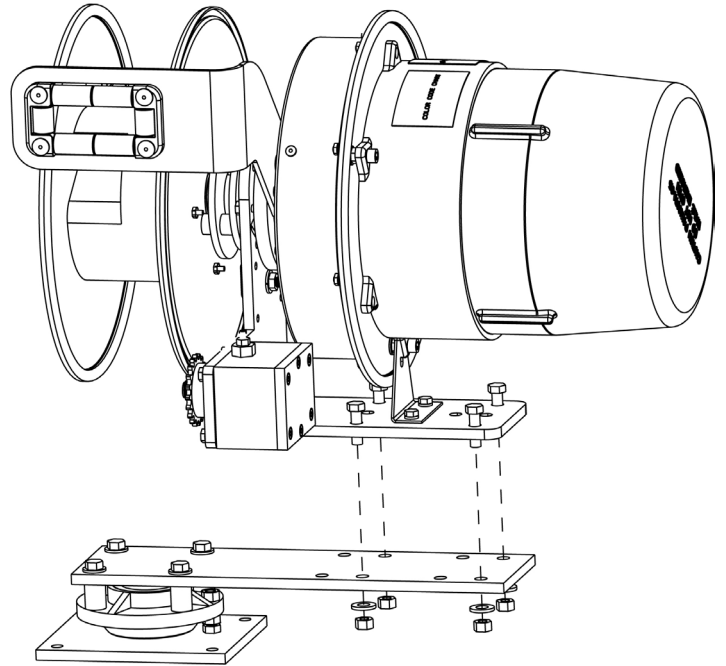


Fig 2.3 Reel with Pivot Base

2.3 Roller Guide

2.3.1 All RTS Series units are equipped with a roller guide arm. The function of the guide is to center the cable on the spool and to help the reel wrap cable more evenly.

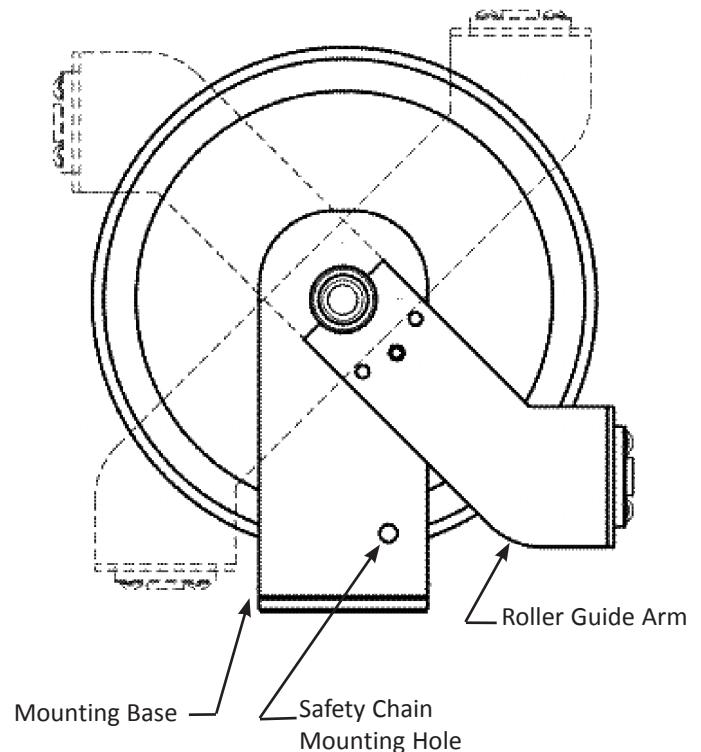
2.3.2 The cable should not pile against either end of the spool during winding as this will tend to inhibit level winding of the cable.

2.3.3 The guide should be secured at the best of twelve possible positions so that a minimum change of direction occurs at the guide; otherwise, cable life will be reduced.

2.3.4 The guide is shipped installed on the reel. The guide must be aligned per application and secured prior to making any electrical connections.

2.3.4.1 Mount the roller guide to the reel over the entrance coupling on the frame. Secure using the provided 3/8-16 hex head cap screw, including the split lock washer. Tighten this to 15 ft-lbs.

Fig 2.4 Roller Guide Locations
(4 of 12 possible positions shown)



2.0 Installation

2.4 Ratchet

2.4.1 Ratchet Lock

2.4.1.1 The ratchet lock can be activated or deactivated, depending upon the application.

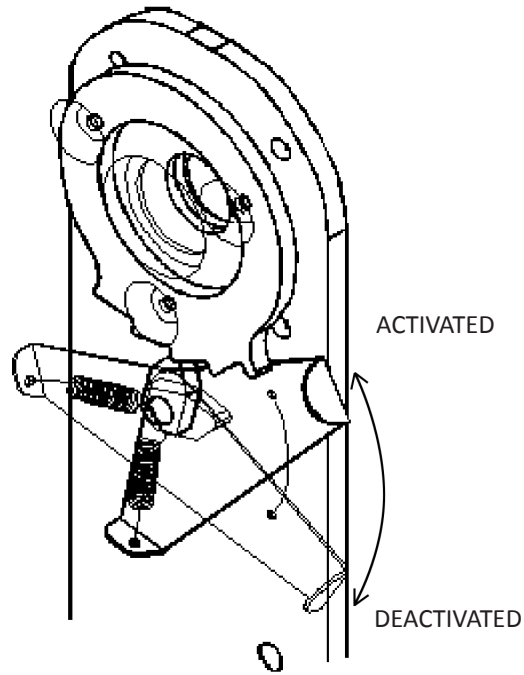
2.4.2 Operation with Ratchet

2.4.2.1 The ratchet on the RTS Series Cable Reel is spring loaded. It is designed to function in all acceptable mounting configurations.

2.4.3 Operation without Ratchet

2.4.3.1 Deactivate the ratchet by pivoting the lock-out bar to the lower position. This will remove the ratchet pawl from the path of the ratchet plate. Locate the dimple on the lock out bar in the hole provided.

2.4.3.2 **WARNING:** Do not activate the ratchet abruptly. Sudden activation may cause excessive shock loads to the ratchet pawl which may cause lock-up and/or breakage.



2.5 Cable Installation

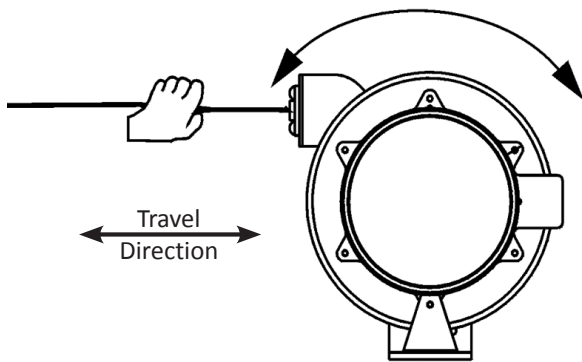
Cable is factory installed and sealed. Consult factory for changes.

Color Code Chart					
Cond. No.	Base Color	Tracer Color	Cond. No.	Base Color	Tracer Color
1	Green	--	7	White	Black
2	Black	--	8	Red	Black
3	White	--	9	Green	Black
4	Red	--	10	Orange	Black
5	Orange	--	11	Blue	Black
6	Blue	--	12	Black	White

2.6 Spring Tension Adjustment

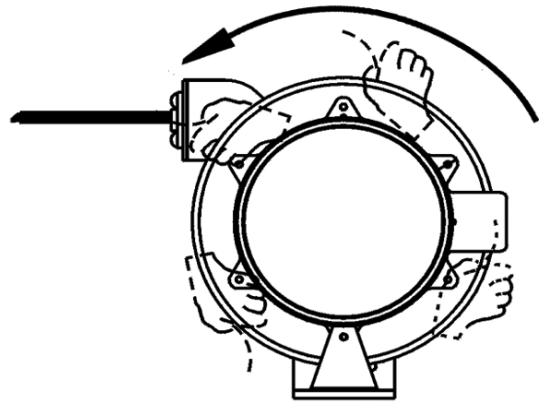
- 2.6.1 **WARNING:** Do not allow cable to retract without restraining the retraction speed. Walk the cable back to the reel during the spring tension adjusting process. Always maintain two full cable wraps on drum at maximum cable extension, size cable accordingly.
- 2.6.2 RTS Series reels come with pre-tension from the factory. Some adjustment may be required to meet specific application requirements.
- 2.6.3 To assure that the cable will retract properly and operate under the correct tension for intended application; the reel should be tested. Securely mount reel before testing with cable installed on drum and end of spool cable not connected, proceed with steps in section 2.6.4
- 2.6.4 Pull the cable out the intended travel distance and allow it to rewind. This procedure should be repeated five (5) to ten (10) times in order to set the spring. Walk the cable back to the reel during the spring tension adjusting process.

Rotate Spool While Holding Cable to Test the Spring Tension



- 2.6.5 With all the cable wound on the reel, grasp the end of the cable and rotate the drum and cable together in the direction of pay out in order to pre-tension the spring. The number of pre-tension turns is determined by cable size and footage. Usually, four to sixteen turns is sufficient, but additional turns may be used if testing indicates that the cable will not fully retract as desired with just four turns (See Note 2.6.6).

Adding Spring Tension

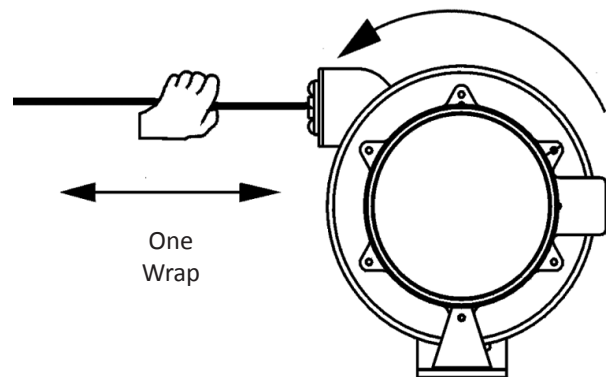


- 2.6.6 Feed the end of the cable through the cable guide and pull the cable out the required length. Note: Total number of spool revolutions including the pre-tension turns, must not exceed the limits in the following table:

Spring model designation stated in reel description on ID tag invoice and packing slip.					
Models w/#	Available Turns	Set up Turns	Models w/#	Available Turns	Set up Turns
J	23	4	K	29	8
JP	23	4	KP	29	8
JS	46	8	KS	58	16
Consult factory with any questions.					

- 2.6.7 Repeat step 2.6.3 to 2.6.5, if necessary, to add tension. To decrease tension, rotate drum and cable counter-clockwise.

Adding Spring Tension



2.0 Installation

2.7 Power Connections

- 2.7.1 Provide power source with over-current protection to prevent overheating of the reel and cable.
- 2.7.2 Reels are supplied with 6 foot feeder cords. Those cords are the same cable as is supplied on the spool. They are factory sealed with explosion proof potting compound and supplied with a watertight strain relief. If a conduit connection is required, the strain relief must be removed and conduit connections made.

3.0 Operation

- 3.1 Do not exceed the voltage or amperage rating of the cable. Overheating, fire, damage to equipment or personal injury could result.
- 3.2 Do not allow cable to retract without restraining the retraction speed.
- 3.3 Operate the reel within the cable size and length and spring tensioning limits for which it was intended.
- 3.4 Keep two wraps of cable on the reel at maximum extension to avoid excessive tension on the cable and to prevent pullout of cable from entrance watertight.

4.0 Maintenance

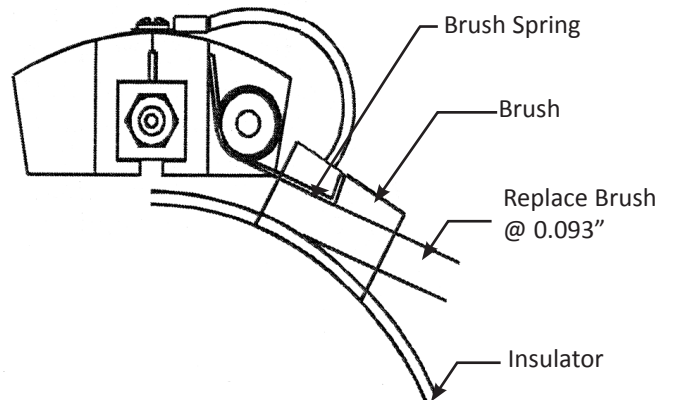
4.1 **WARNING:** Be sure all power is off for all maintenance.

4.2 Lubrication

- 4.2.1 All components requiring lubrication are lubricated for life at the factory. Additional lubrication is not be required.
- 4.2.2 Do not apply any lubricants or solvent cleaning agents to slip ring, brush or insulator surfaces.

4.3 Inspections

- 4.3.1 Periodically check the reel for any loose or missing fasteners. Tighten or replace as necessary.
- 4.3.2 The slip ring assembly should be checked periodically as follows:
 - 4.3.2.1 Clean to remove dust and dirt from the slip ring housing area and all slip ring assembly and brush surfaces.
 - 4.3.2.2 Brushes should be centered on slip rings and brush springs should be seated in terminal post grooves. Terminal screw connections should be tight. Check for excessive brush wear. Replace brushes as necessary.
- 4.3.3 Inspect cable for damage or wear which would make it unsafe to use.



4.0 Maintenance

4.4 Slip Ring Replacement

4.4.1 NOTE: The slip ring assembly should be replaced, not rebuilt, if it becomes damaged.

4.4.2 Due to factory sealing of explosion proof unit, slip ring replacement should only be done by the factory.

4.5 Cable Replacement

4.5.1 Cable replacement should only be attempted by the factory. This is due to the cable being epoxy sealed into the entrance ring.

4.6 Spring Motor Replacement

4.6.1 CAUTION: Do not open the spring motor or personal injury may result.

4.6.2 Due to spool cable being sealed in the shaft, spring motors can only be factory rebuilt, and replaced.

5.0 Troubleshooting

PROBLEM	POSSIBLE CAUSE	SOLUTION
Reel will not retract cable but has some tension.	<ol style="list-style-type: none"> 1) Improper pretension. 2) Incorrect reel for application (lift vs. stretch). 3) Cable guide adjustment 	<ol style="list-style-type: none"> 1) See Sec 2.6 Spring Tension Adjustment 2) Quantify application vs. reel selection. 3) Check guide alignment (see Sec 2.2 and 2.3)
Reel does not have any spring tension.	<ol style="list-style-type: none"> 1) Broken spring. "Quantify application to prevent recurrence. 	<ol style="list-style-type: none"> 1) Factory rebuild (See Sec 4.6)
Ratchet will not activate.	<ol style="list-style-type: none"> 1) Broken ratchet pawl spring. 2) Lock-out option arm deactivated. 	<ol style="list-style-type: none"> 1) Replace ratchet pawl spring. 2) Activate lock-out arm (See Sec 2.4)
Ratchet will not deactivate	<ol style="list-style-type: none"> 1) Over-extension of reel. 	<ol style="list-style-type: none"> 1) Manually rotate reel spool to deactivate ratchet. Do not over-extend. (Guide adjustment may prevent lock-up when over-extended.)
Cable wraps improperly (uneven wrapping, wraps above or jumps flange).	<ol style="list-style-type: none"> 1) Reel mounting no level. 2) Cable retraction rate too high. 3) Cable guide out of adjustment. 	<ol style="list-style-type: none"> 1) Mount reel on level surface 2) Maintain steady retraction rate. 3) Properly adjust cable guide (see Sec. 2.2 and 2.3).
Cable twisting and knotting.	<ol style="list-style-type: none"> 1) Improperly installed cable 2) Cable rubbing on or bending around fixed object. 3) Excessive spring tension 4) Inadequate anchoring of cable. 	<ol style="list-style-type: none"> 1) See Sec 2.5 Cable Installation. 2) Check roller guide for function and cable payout path (see Sec 2.3). 3) Quantify application vs. reel selection. Also check pretension. 4) Adjust anchoring method i.e. and strain relief
Open or intermittent circuit.	<ol style="list-style-type: none"> 1) Inadequate connection. 2) Loss of brush contact to slip ring. 3) Cable defective. 	<ol style="list-style-type: none"> 1) Check all termination points. 2) Check brush wear, spring tension & alignment. 3) Perform continuity check on cable termination points.
Circuit trips and/or pitted burned rings or brushes.	<ol style="list-style-type: none"> 1) Inadequate amp rating of reel selection. 	<ol style="list-style-type: none"> 1) Quantify application requirements vs. reel and cable rating (see Sec. 1.5)
Circuit arcing	<ol style="list-style-type: none"> 1) Amp or voltage above rating of reel. 2) Excessive carbon dust accumulation 3) Loss of brush to ring contact. 	<ol style="list-style-type: none"> 1) Quantify application requirements vs. reel and cable rating (see Sec 1.5). 2) Clean dust from inside slip ring. 3) Replace brush and/or brush spring.