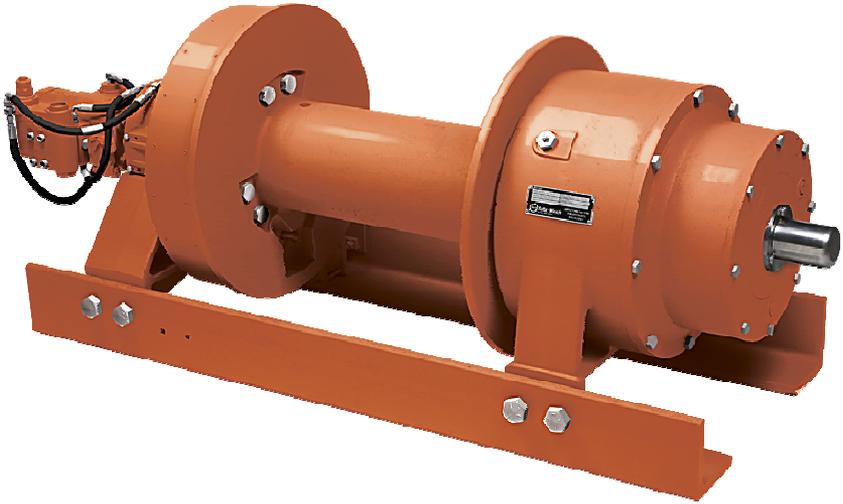




RUFNEK[®]
with *Intelliguard*[™]



**Installation, Operating &
Maintenance Manual**

Planetary Winch



This manual **MUST** be kept with the winch at all times. New winch operators **MUST** read and understand the contents fully.

WARNING

FAILURE TO HEED THE FOLLOWING WARNINGS MAY RESULT IN SERIOUS INJURY OR DEATH!

- Do not use to lift or move people. If your task involves moving or lifting people, you must use the proper equipment, not this winch.
- Winch operators must be trained in the proper, safe operation of the winch.
- Cable anchors on Tulsa Winches are not designed to hold the rated load of the winch. You must keep at least five (5) wraps of cable on the drum to insure that the cable doesn't come loose.
- Stay clear of suspended loads and of cable under tension. A broken cable or dropped load can cause serious injury or death.
- Make sure that all equipment, including the winch and cable, is maintained properly. Pay especially close attention to the clutch, making sure that it fully engages when shifted. Do not attempt to disengage the clutch when a load is on the winch.
- Winches not equipped with automatic worm brakes should never be used to lift loads.
- Avoid shock loads. This type of load imposes a strain on the winch many times the actual weight of the load and can cause failure of the cable or of the winch.

INTRODUCTION

Thank you for purchasing a new Tulsa Winch. We are proud of our products and are certain that they will perform your winch tasks properly. However, we do ask that you take a few minutes to read and thoroughly understand this booklet. Also, if you have new operators assigned to the winch, make sure that they read and understand it. Because of the large number of models we manufacture, we are unable to show parts lists for every model in this booklet. If you want or need parts lists, please write Tulsa Winch, 11135 S. James, Jenks, OK 74037. Or call (918) 298-8300 or fax us at (918) 298-8367. You may also go to our Web site at www.team-twg.com.

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GENERAL OPERATIONS

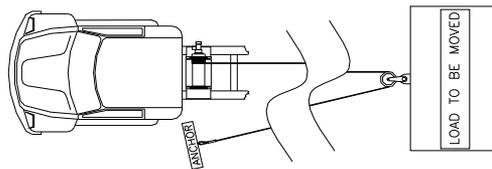
1. Be sure to read all safety instructions thoroughly. It is important that each operator is aware of the consequences of misuse or poor operating practices of this winch.
2. Tulsa Winch products are not to be used to lift, hoist, or move people. If your application requires moving persons, you must use the proper equipment for the task.
3. Cable anchors on Tulsa Winch products are not designed to hold the rated load of the winch. You must keep at least five (5) wraps of cable on the drum to insure that the cable does not come loose.
4. Personnel must stay clear of a suspended load or any line under load. A distance of 1-1/2 times the length of the cable should be maintained while the cable is under tension. Failure to heed this warning may result in serious injury or death.
5. Make sure that all equipment is maintained properly and regular systems checks are performed to insure your winch is working safely. Refer to the maintenance section of this manual for details on these procedures.
6. Avoid shock loads. This type of load imposes a strain on the winch many times the actual weight of the load and can cause failure of the cable or of the winch.
7. Always inspect cable before beginning job. Never allow cable to slide through hands while maintaining tension, use hand-over-hand method to keep cable tension while spooling. Always use leather gloves when handling cable.

THEORY OF OPERATION

1. The Tulsa Planetary Winches are composed of an input from either a high torque, low speed geroler motor or a high-speed gear or piston motor. Input drives through a multiple disc brake that is spring applied and hydraulically released, and then through planet gear sets to the cable drum.
2. During inhaul, the brake is not released since the load is driven through a one-way cam clutch, bypassing the brake. When the load comes to a stop, the cam clutch locks up and the load is prevented from moving by the brake.
3. During payout, a brake valve is used to prevent the load from moving faster than desired. This brake valve partially blocks the main line from the motor back to the directional control valve, allowing only a limited amount of oil through the motor. Also, any time there is sufficient pressure to modulate the brake valve; this same pressure releases the multiple disc brake.

USING A SNATCH BLOCK

By using a snatch block you have effectively cut the load on the winch in half. A snatch block should be used any time you have a concern about the ability of the winch or cable to move a load. The following illustration shows one way to rig such a block.



CABLE CONSIDERATIONS

As the number of layers of cable on a winch increases, the rated capacity of the winch goes down. If you are operating at near the top of the drum flanges, the effective rating of the winch is about half of what it is on the first layer. You should therefore, only keep as much cable on the winch as you need for your job.

Never use larger or smaller cable on your winch than is recommended for it. The use of larger cable will not allow you to pull larger loads and may, in fact, break easier than the proper size cable. The use of smaller cable may overheat the winch due to increased running time with more cable.

The following chart shows the recommended cable sizes for Tulsa Winches:

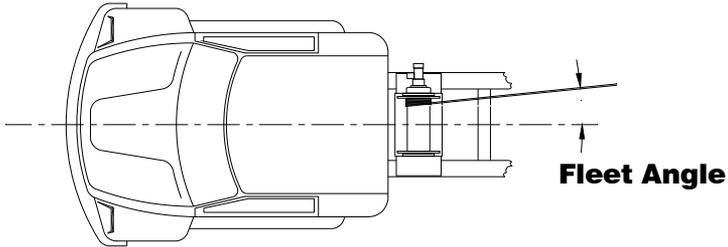
| Winch Model | Cable Size |
|-------------|------------|
| 506W | 7/16" |
| 707W | 1/2" |
| 1200W | 9/16" |
| 1500W | 5/8" |
| 3541RL | 3/4" |
| RN45P | 3/4" |
| RN50P | 3/4" |
| RN60P | 7/8" |
| RN65P | 7/8" |
| RN80P | 1" |
| RN100P | 1" |
| RN125P | 1 1/8" |
| RN130P | 1 1/4" |

Consult your local cable supplier for recommendation on the best type of cable and hardware to use in your specific application.

WARNING: CABLE ANCHORS ON TULSA WINCHES ARE NOT DESIGNED TO HOLD THE RATED LOAD OF THE WINCH. YOU MUST KEEP AT LEAST 5 WRAPS OF CABLE ON THE DRUM TO INSURE THAT THE CABLE DOES NOT COME LOOSE.

THE IMPORTANCE OF A PROPER FLEET ANGLE

Maintaining the proper fleet angle is important to the success of your winching operation, the life of your winch and the life of the cable you are using. The fleet angle can best be described by the following illustration.

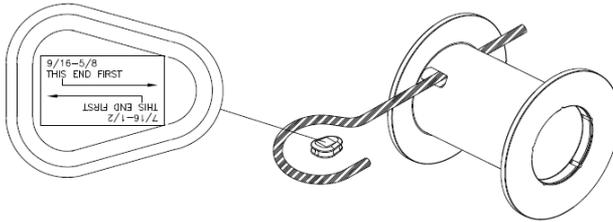


The fleet angle should be kept as small as possible to insure proper spooling and to maximize cable and winch life. To promote even cable spooling, keep the fleet angle below three degrees. Whenever possible, spool through a block at the back of the truck body. Never pull directly against the flange of the winch cable drum as this may cause the cable or the winch to break.

If you are using a front mounted winch for vehicle recovery, use a snatch block to avoid pulling sideways on the winch. If your winch is equipped with a four way roller and you absolutely must pull against a side roller, do so only for as long as is necessary and carefully watch the cable on the drum. It will pile up on one side of the drum and you must insure that it doesn't jump over the drum flange. When you are finished using the winch in a manner where the cable does not spool evenly, disengage the clutch and pay out the uneven cable. Then slowly re-spool the cable, making sure that it lays evenly.

CABLE INSTALLATION

To install the cable wedge anchor, first consult the wire rope manufacturer for recommendations on how to prepare the end of the wire rope. Thread the prepared end of wire rope through the smaller side of the opening of the cable drum wedge pocket. Pull through enough cable to loop it back around and insert the end back into the wedge pocket to about 3/4 depth of the pocket. Install the wedge in the loop then pull the slack out of the loop with the working line. The wedge will slip into the pocket and secure the wire rope into the drum.



To install the u-bolt clamp style of anchor, first prepare the end of the cable as recommended by the wire rope manufacturer. Pass the wire rope through the u-bolt so that the end extends approximately 2x the diameter of the cable. Tighten the clamp evenly until the wire rope begins to deform slightly under the u-bolt and the cable is held securely.

When using the ferrule wedge anchor the cable must be 6 strand. First, make sure the cable end is cut clean and square. Insert the cable through the ferrule and spread the strands to insert the wedge halves over the core of the wire rope. Position individual strands into proper grooves around the wedge halves and tap the wedges until they are flush with the strand ends. Slide the ferrule back over the wedge and drive the wedge into the ferrule with a hammer and short pipe which fits inside the strands and over the core.

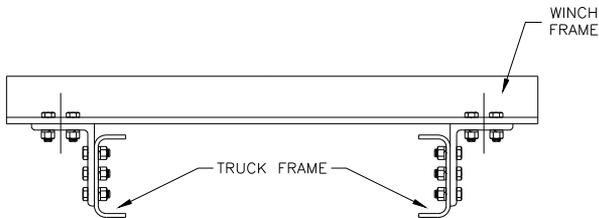
WARNING: CABLE ANCHORS ON TULSA WINCHES ARE NOT DESIGNED TO HOLD THE RATED LOAD OF THE WINCH. YOU MUST KEEP AT LEAST 5 WRAPS OF CABLE ON THE DRUM TO INSURE THAT THE CABLE DOES NOT COME LOOSE.

WINCH MOUNTING

You must make sure that your winch is securely mounted in order for it to function properly and to insure safe operation. The mount must be flat to insure proper alignment between the gearbox side, the drum, and the clutch.

A rule of thumb to use when selecting capscrews to mount the winch is to use the same size and number of capscrews to fasten the winch to its mount as we use to fasten the gearbox and end bracket to the winch frames. Winches must never be fastened directly to the frame of a truck; mounting brackets as shown below should be used. The mounting span of the winch is very important; you should make sure that the mounting span is as close to the values shown in the chart below as possible.

All capscrews used to mount the winch should be Grade 8 or better and should be carefully tightened to the proper torque value for their size. All moving parts used to drive mechanical winches should be secure and guards used, if they are in accessible locations. If the winch being mounted is hydraulically driven, make sure the system is clean and that all components function properly, especially the relief valve.



| Model | No. of Capscrews | Size Capscrews |
|--------|--|----------------|
| 506W | (USE MOUNTING HOLES PROVIDED IN BASE OF WINCH) | |
| 707W | | |
| 1200W | | |
| 1500W | | |
| 3541RL | 10 | 3/4" |
| RN45P | 8 | 7/8" |
| RN60P | 8 | 7/8" |
| RN80P | 8 | 7/8" |
| RN100P | 8 | 1 1/8" |
| RN130P | 8 | 1 1/8" |

WINCH MAINTENANCE

A winch, like any other type of machinery, needs periodic maintenance and inspection to maintain its performance capabilities, give lasting value, and insure safe mechanical workings. Good maintenance consists of three steps.

1. A daily inspection to insure that there are no oil leaks present, that all mounting bolts and other fasteners are tight, and that wire rope is in good condition
2. Periodic servicing of the winch includes changing the oil in both the gearbox and the brake section. Severity of use will determine the need for oil changes but it should be checked at a minimum of every 500 operating hours and changed every 1000 hours of operation. Factors such as extremely dirty conditions or widely varying temperature changes may dictate even more frequent servicing.
3. Complete teardowns and component inspections. Again, severity and frequency of use will determine how often this should be done. If the equipment on which this winch is mounted is subject to inspection standards, then those standards must also apply to the winch and be followed. If oil changes reveal significant metallic particles, then a teardown and inspection must be made to determine the source of wear.

LUBRICATION

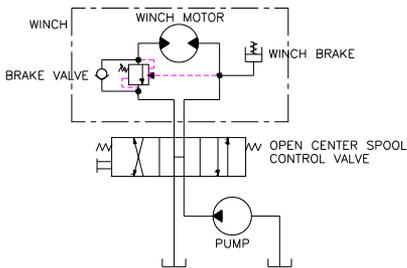
1. Check gearbox oil levels weekly. If the oil level does not show a satisfactory amount, refill oil according to the individual winch manual.
2. Check brake oil level and fill or replace if oil shows significant metallic particles.
3. Lube all bushings equipped with grease zerks with a good quality lithium based chassis lube.
4. Lubricate the cable based on your wire rope supplier's recommendations.

Tulsa planetary winches are shipped from factory with SAE 90 EP gear lube in the gearbox and SAE 20-20W motor oil in the brake section. This oil should be satisfactory for operation in ambient temperatures from -10° F to +110° F. If your work calls for operation in temperatures outside this range, contact Tulsa Winch for recommendations

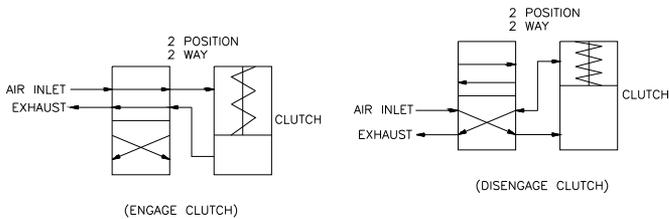
HYDRAULIC SYSTEM

The hydraulic system driving the winch should use only high quality hydraulic oils from reputable suppliers. These oils should contain additives to prevent foaming and oxidation in the system. All winch hydraulic systems should be equipped with a return line filter capable of filtering 10-micron particles from the system

HYDRAULIC SCHEMATIC



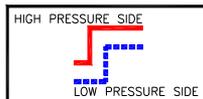
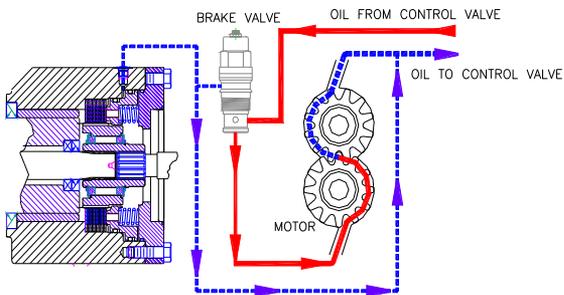
AIR SCHEMATIC



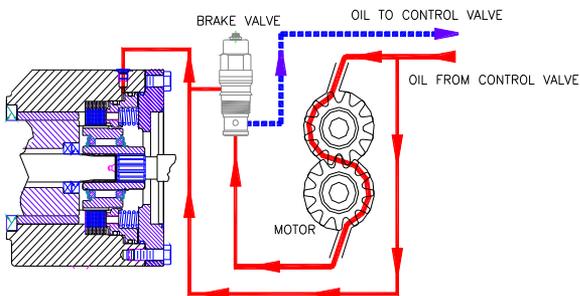
BRAKE SYSTEM

The winch braking system is a multiple disc, spring applied hydraulically released setup that is activated via the port in the brake housing. During pay-in the brake is not released but bypassed through the one-way cam clutch. When the load comes to a stop, the cam clutch locks up and the load is prevented from slipping by the brake.

During payout, a brake valve is used to prevent the load from moving faster than desired. This valve partially blocks the main line from the motor back to the directional control valve, allowing only a limited amount of oil through the motor.

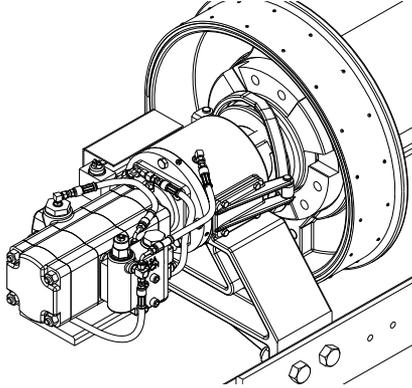


HOIST



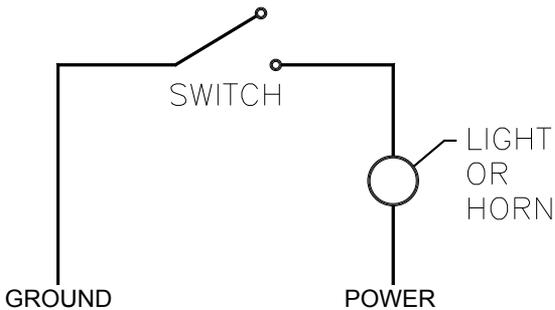
LOWER

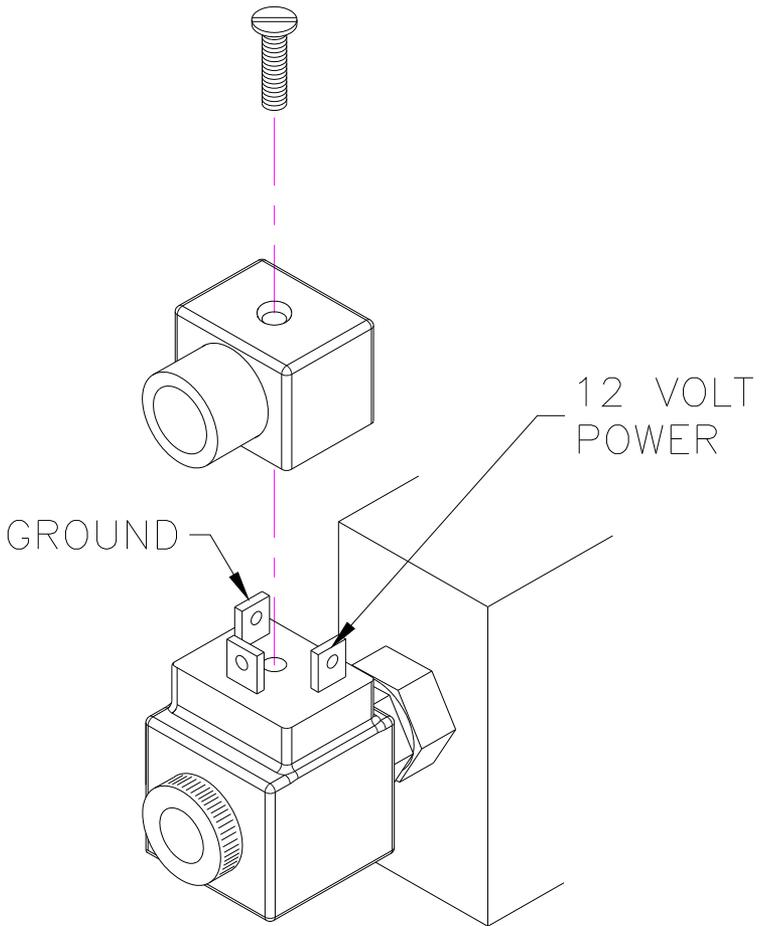
DRUM CLUTCH POSITION INDICATOR



The clutch position indicator (shown above) operates in a normally open position. When properly installed, as pictured in the circuit below in addition to the intelliguard II system, a warning light or horn will indicate when the drum clutch is disengaged.

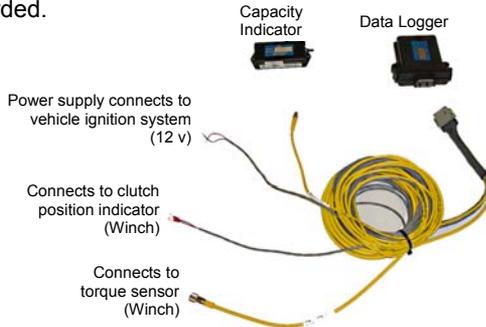
Note: the ground wire must be connected to the same terminal as the black wire running from the intelliguard II unit to the switch



ELECTRIC 2-SPEED SHIFT

INTELLIGUARD

The torque induced within the winch drive train is measured by a torque sensing unit and relayed to the capacity indicator & the data logger as a 'percentage of allowed torque'. The data logger will only record torque instances that are greater than 80% of the rated torque capacity of the winch. System events such as power on, power off, clutch disengage and clutch engage are also recorded.



Installation Steps

1. Ensure you have the data logger, wiring harness and capacity indicator that was calibrated from the factory for the winch you are installing.
2. Recognize the length of the cable to connect to the winch from the data logger and mount the data logger in the cab accordingly.
3. Mount the capacity indicator inside the cab located as to be visible by the operator when operating the winch. Keep in mind the length of the cable when locating the capacity indicator.
4. Route and connect the torque sensor wire from the data logger to the winch being sure not to coil the wire.
5. Connect the two ringed terminals to the clutch position indicator on the winch.
6. Connect the power leads (red +) (black -) to a power source such that the intelliguard system is powered when the PTO is energized or the ignition switch is in the on position. *Note: the time at which the Intelliguard unit is powered on and off is logged and reported on the data log file and the summary report.*



CAUTION

1. Ensure that the data logger, wiring harness, & capacity indicator are kept with winch. The parts are calibrated from the factory for a particular winch and cannot be mixed without re-calibration.
2. Do not use magnets on or around winches with Intelliguard.
3. Before any welding is done disconnect the data logger, capacity indicator and torque sensor.
4. When installing Intelliguard the power supply must be the last thing to connect. Otherwise the system will invoke an error code indicating one of the components is malfunctioning or is disconnected.
5. After the system is fully installed and powered up check to ensure there are no flashing lights on the capacity indicator or brain box. If there are flashing lights contact Tulsa Winch service dep't for guidance.

CAPACITY INDICATOR REALTIME DISPLAY

The Capacity Indicator displays the measured torque value using five LED's as follows.

Table 1 Capacity Indicator Realtime LED Display

| Torque Load (% of rated capacity) | Capacity Indicator LED Display |
|------------------------------------|---|
| $0 \leq \text{Torque} \leq 70\%$ |      Power/Status % Torque (see above) |
| $71\% < \text{Torque} \leq 80\%$ |      |
| $81\% < \text{Torque} \leq 90\%$ |      |
| $91\% < \text{Torque} \leq 100\%$ |      |
| $101\% < \text{Torque} \leq 110\%$ |      |
| $111\% < \text{Torque} \leq 125\%$ |      |

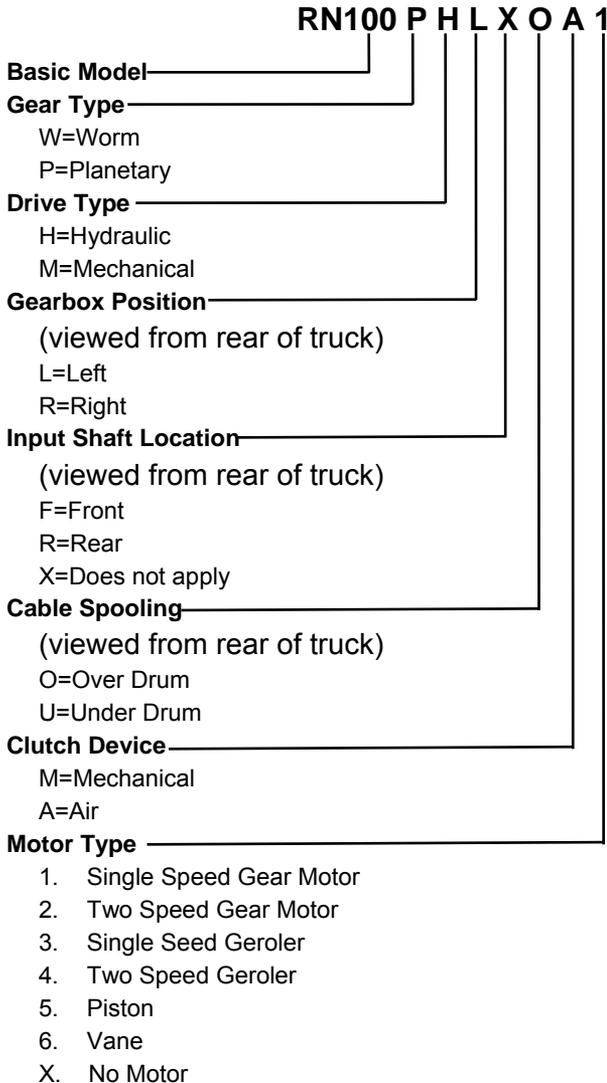
The Capacity Indicator displays its status using the Power LED, which is a dual-color type. The Power LED will appear as a static color (red, green, orange) for normal operation, or will flash when an error occurs in downloading via the USB connection.

Table 2 Capacity Indicator Status Display

| Status | LED Display |
|---|---|
| Power On System Initialization |      Power/Status % Torque (see above) |
| Power On No Torque Recorded |      |
| Power On Torque Records Available |      |
| Power On System Error On USB |   (Flashing)     |
| Power Off |      |

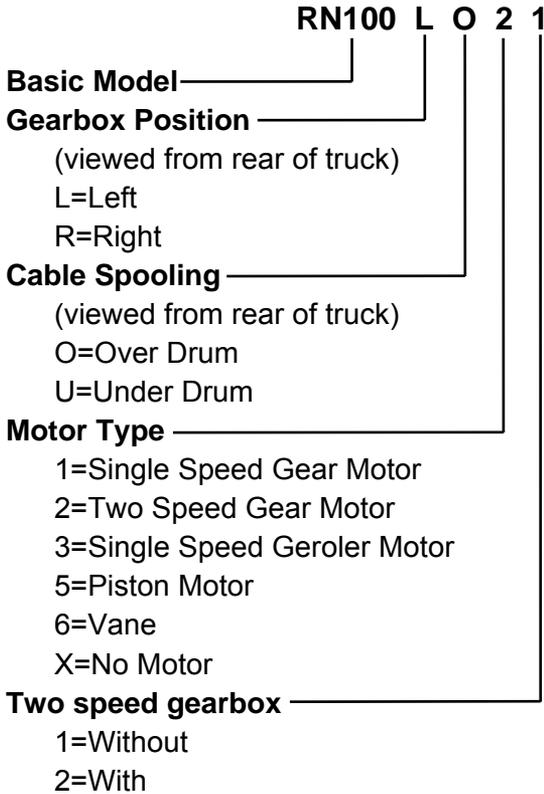
WINCH MODEL CODES

(after 01-01-03)



WINCH MODEL CODES

(prior to 1-1-03)

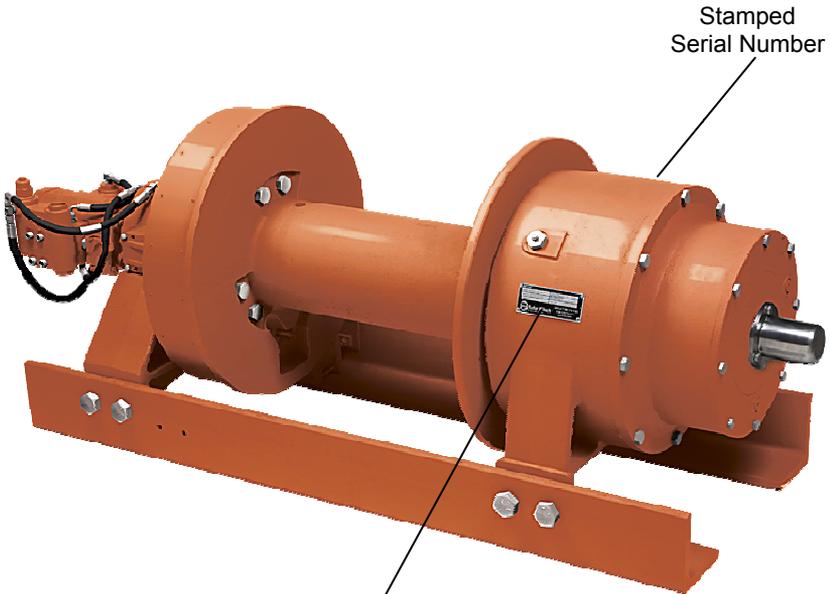


ALL Tulsa Winches have the serial number, and assembly number stamped both on the identification tag and on the housing. Please take a few minutes to record these numbers for future use. The assembly number will be required when ordering parts.

MODEL: _____

SERIAL NO: _____

ASSEMBLY NO: _____



| | |
|---|---------------------------------|
| RUFNEK® | |
| MODEL NO. | FIRST LAYER WORKING CAPACITY |
| ASSY. NO. | FULL LAYER WORKING CAPACITY |
| SERIAL NO. | CABLE SIZE |
|  Tulsa Winch JENKS, OKLAHOMA | |
| CONTACT THE FACTORY FOR CONTINUOUS DUTY RATING | |

TULSA WINCH LIMITED WARRANTY

Effective 1/1/2005
Supersedes All Prior Warranties

Seller warrants that each article sold under this order shall at the time of shipment (i) conform to applicable specifications, and (ii) be free from defects in material and workmanship during normal and ordinary use and service (the "Warranty").

Buyer's exclusive remedy and Seller's sole obligation under this Warranty shall be, at Seller's option, to repair or replace any article or part thereof which has proven to be defective, or to refund the purchase price of such article or part thereof.

This Warranty shall expire one (1) year from the date the article is first shipped by Seller. Notice of claimed breach of this Warranty must be given by Buyer to Seller within the applicable period. Such notice shall include an explanation of the claimed warranty defect and proof of date of purchase of the article or part thereof for which warranty coverage is sought. No allowances shall be made by Seller for any transportation, labor charges, parts, "in and out" costs, adjustments or repairs, or any other work, unless such items are authorized in writing and in advance by Seller. Nor shall Seller have any obligation to repair or replace items which by their nature are expendable.

If an article is claimed to be defective in material or workmanship, or not to conform to the applicable specifications, Seller will either examine the article at Buyer's site or issue shipping instructions for return to Seller. This Warranty shall not extend to any articles or parts thereof which have been installed, used, or serviced otherwise than in conformity with Seller's applicable specifications, manuals, bulletins, or instructions, or which shall have been subjected to improper installation, operation, or usage, misapplication, neglect, overloading, or employment for other than normal and ordinary use and service.

This Warranty shall not apply to any articles or parts thereof furnished by Seller to Buyer's specifications and/or furnished by Buyer or acquired from others at Buyer's request.

SELLER MAKES NO EXPRESS WARRANTIES AND NO IMPLIED WARRANTIES OF ANY KIND, OTHER THAN THE WARRANTY EXPRESSLY SET FORTH ABOVE. SUCH WARRANTY IS EXCLUSIVE AND IS MADE AND ACCEPTED IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

The remedies for this Warranty shall be only those expressly set forth above, to the exclusion of any and all other remedies of whatsoever kind. The limited remedies set forth above shall be deemed exclusive, even though they may fail their essential purpose. No agreement varying or extending the foregoing Warranty, remedies, exclusions, or limitations shall be effective unless in a writing signed by an executive officer of Seller and Buyer. This Warranty is non transferable.

Under no circumstances shall Seller be liable (i) for any damage or loss to any property other than the warranted article or part thereof, or (ii) for any special, indirect, incidental, or consequential damage or loss, even though such expenses, damages, or losses may be foreseeable.

The foregoing limitations on Seller's liability in the event of breach of warranty shall also be the absolute limit of Seller's liability in the event of Seller's negligence in manufacture, installation, or otherwise, with regard to the articles covered by this Warranty, and at the expiration of the Warranty period as above stated, all such liabilities shall terminate.



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