



HORNET 20

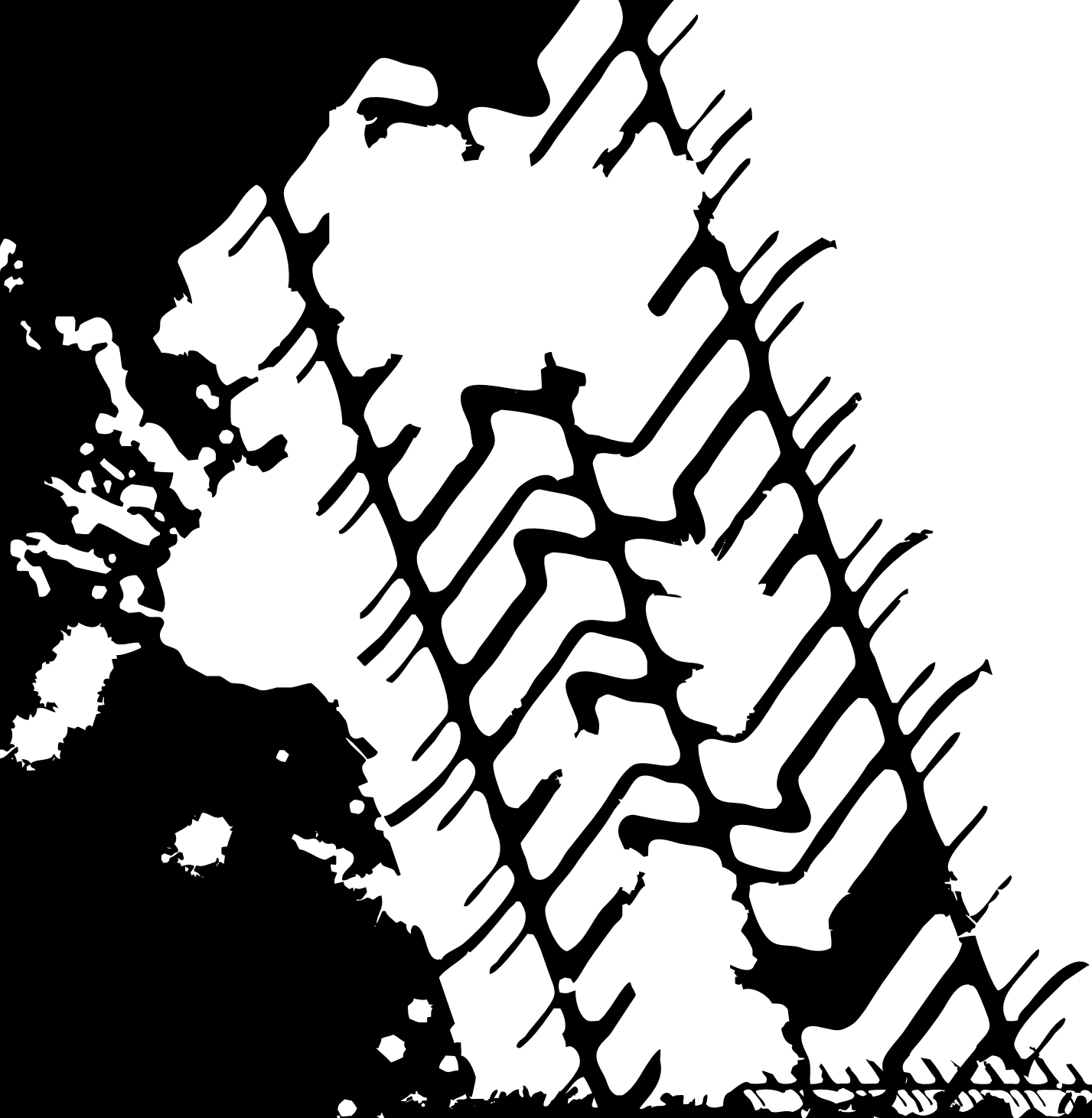
HIGH MOUNT | QUAD MOTOR
THE ULTIMATE COMPETITION WINCH

USER MANUAL



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HORNET 20

HIGH MOUNT | QUAD MOTOR

ULTIMATE COMPETITION ELECTRIC WINCH

- > High Mount (Motor) Competition Winch
- > QUAD Motor
- > 12v dc
- > Air brake fitted on all models
- > Freespool, Air Operated
- > XL Drum length
- > Gearboxes Available: Standard, Overdrive
- > Rated pulls: From 2,200kg - 4,500kg (*model specific*)
- > Ox motor fitted on all options for the ultimate power behind your winching

This 4 MOTOR ultimate competition winch is the flagship RED Winches designed product, whose design has undergone extensive testing, worldwide. The end user can enjoy a professional highly engineered, precision, high performance competition electric winch capable of operating in the most demanding of situations all over the world.

The CNC billet housings combined with its amazing speed and pulling power make it an ideal winch for maximum impact when connected to competition rated power source.



HORNET 2Q

> The Hornet 2 QUAD Winch

The H2Q is the ultimate choice when it comes to the very best competition electric winch for your vehicle. The RED Winch engineers have designed and developed this high-performance QUAD motor electric winch for the 4x4 competition and Motorsport markets.

It has been designed with competition in mind and has many features ideally suited to high-performance Motorsport offroad events.

The winch body is CNC machined from high-grade heat-treated aerospace aluminium from solid billets. We only use the best machine tools and machining processes to ensure stress in the material is kept to a minimum and strength to its maximum. With its air free spool and air brake system, the Hornet offers control and reliability previously unavailable on a winch to the off-road and motorsport sectors.

This H2Q like all our engineered winches has the famous RED Winch air brake system, meaning the winch stops instantly when you take your finger off the winch button.

> RED Winch Air Brake System

Springs apply pressure to a steel disc which then applies pressure to the brake disc and its material when the winch is not in use. This applies the brake and stops the winch drum from moving under load and from spooling out the rope.

An air solenoid for the air brake is fitted next to the motors at the top of the winch. This is fed by an air supply from the vehicle on-board compressor.

When you winch in or out you energise your motor solenoid, this also energises the air solenoid valve for the brake on top of the winch. This then allows air to go into a specially designed chamber that releases the brake instantly.

When you remove your winching finger from the controls the air solenoid dumps the air and the springs apply the brake disc onto the brake pads.

This means compared to normal winching you do not get overrun of excess rope causing snatching and jerking as the vehicle takes up the slack rope that has been spooled out. It also means when spooling the rope back onto the drum and you stop winching, the rope stops and doesn't continue spooling in. A safety feature many find important when looking after the operators hands.

The high power Albright motor solenoid is used to switch direction of the motor and at the same time provide an electrical feed to the air brake air solenoid via its signal terminals.

> Gearbox

The gearbox has been specifically designed for strength, power and ease of service.

The gears are manufactured from chromium molybdenum steel and case hardened to give strengths (Up to 1230 N/mm²) and excellent durability.

The gearbox runs in high load, high temperature grease not oil making it much easier to service in the field.

> Quick Start Guide

- 1 Check winch connections are correctly fitted and are not loose
- 2 Switch winch isolator on
- 3 Switch Compressor on
- 4 Connect Wireless Controller with base unit (if used)
- 5 Winch is now ready to be used



WINCHING SAFETY GUIDELINES

Every winching / recovery situation has the potential for personal injury. In order to minimize that risk, it is important to read this guide carefully before using the winch.

Please familiarize yourself with the operation of your winch before using it and be constantly safety oriented. In this guide we provide important safety information









and instructions on how to install your winch.




SAVE THIS MANUAL and other product literature found in this kit for future reference and review frequently for continuing safe operation.

Instruct all users of this winch product to review this manual before operating the winch.

> Symbol Index for winch

| SYMBOL | EXPLANATION |
|-------------------------------------------------------------------------------------|-------------------------------------------|
|  | Read all product literature |
|  | Always wear leather gloves |
|  | Always wear hearing & eye protection |
|  | Fairlead pinch point |
|  | Always use suitable hook or recovery hoop |
|  | Properly seat load in throat hook |
|  | Never apply load to hook tip or latch |
|  | Never hook back on rope |

| SYMBOL | EXPLANATION |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
|  | Explosion/Bursting Hazard |
|  | Fire and burn hazard |
|  | Never route electrical cables across sharp edges |
|  | Never route electrical cables through or near moving parts |
|  | Avoid installing electrical cables around pinch and wear/abrasion points |
|  | Never use winch as a hoist |
|  | Do not move people |
|  | Wind rope on bottom of drum |

| SYMBOL | EXPLANATION |
|---------------------------------------------------------------------------------------|-------------------------------------------------------------|
|  | Never wind rope over top drum |
|  | Hand piercing/cutting hazard |
|  | Hot surface hazard |
|  | Finger/Fairlead crushing Hazard |
|  | Exposed wiring hazard insulate exposed wiring and terminals |
|  | Clutch disengaged |
|  | Avoid side pulls |
|  | Never hook the wire rope back onto itself |



> Warnings and Cautions

As you read these instructions, you will see **WARNINGS**, **CAUTIONS**, **NOTICES** and **NOTES**.

Each message has a specific Purpose. **WARNINGS** are safety messages that indicate a potentially hazardous situation, which, if not avoided could result in serious injury or death. **CAUTIONS** are safety messages that indicate a potentially hazardous situation, which, if not avoided, could result in minor or moderate injury. A **CAUTION** may also be used to alert against unsafe practice. **CAUTIONS** and **WARNINGS** identify the hazard, indicate how to avoid the hazard, and advise of the probable consequence of not avoiding the hazard. **NOTICES** are messages to avoid property damage. **NOTES** are additional information to help you complete a procedure. **PLEASE WORK SAFELY!**

> EMC Regulation

This device complies EMC regulations. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply. See separate CE certificate. These approvals are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna (if installed)
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

> WARNING



> Moving Parts Entanglement Hazard

Failure to observe these instructions could lead to serious injury or death.

Winching Safety:

- **Always** Know Your Winch. Take time to fully read the Instructions in Order to understand your winch and its operations.
- **Never** exceed winch or winch rope rated capacity. Double line using a snatch block to reduce winch load.
- **Always** wear heavy leather or approved gloves when handling winch rope.
- **Never** use winch or winch rope for towing. Shock loads can damage, overload and break rope.
- **Never** use a winch to secure a load.
- **Never** operate this winch when under the influence of drugs, alcohol or medication
- **Never** operate this winch if you are under 16 years of age.

Installation Safety:

- **Always** choose a mounting location that is sufficiently strong to withstand the maximum pulling capacity of your winch.
- **Always** use class 8.8 metric(grade 5) or better fasteners
- **Never** weld mounting bolts.
- **Always** use factory approved mounting hardware, components, and accessories.
- **Never** use bolts that are too long.
- **Always** confirm required bolt length to ensure proper thread engagement.
- **Always** complete the winch installation and hook attachment before installing the wiring.
- **Always** keep hands clear of winch rope, hook loop, hook and fairlead opening during installation, operation, and when spooling in or out.
- **Always** position fairlead slot so rope does not rub on it during normal straight line recovery operations.
- **Always** pre-stretch rope and freespool under load before use. Tightly wound rope reduces chances of 'binding', which can damage the rope.

> WARNING



> Moving Parts Entanglement Hazard

Failure to observe these instructions could lead to serious injury or death.

General Safety:

- **Always** inspect winch rope, hook, and slings before operating winch. Frayed, kinked or damaged winch rope must be replaced immediately. Damaged components must be replaced before operation. Protect parts from damage.
- **Always** remove any element or obstacle that may interfere with safe operation of the winch.
- **Always** be certain the anchor you select will withstand the load and the strap or chain will not slip.
- **Always** use supplied hook or spliced loop whenever spooling winch rope in or out, during installation and during operation.
- **Always** require operators and bystanders to be aware of vehicle and or load.
- **Always** be aware of stability of vehicle and load during winching, keep others away. Alert all bystanders of an unstable condition.
- **Always** unspool as much winch rope as possible when rigging. Double line or pick distant anchor point.
- **Always** take time to use appropriate rigging techniques for a winch pull.
- **Never** touch winch rope or hook while someone else is at the control switch or during winching operation.
- **Never** engage or disengage freespool lever if winch is under load, the rope line is securing an object, winch rope is in tension or drum is moving.
- **Never** touch winch rope or hook while under tension or under load.
- **Always** stand clear of winch rope and load and keep others away while winching.
- **Never** use vehicle to pull load on winch rope. Combined load or shock load can damage, over load and break rope and winch.
- **Never** wrap winch rope back onto itself. Use a choker chain or tree trunk protector on the anchor.
- **Never** use remote when vehicle is not in line of sight of operator.
- **Never** pair more than one winch and one remote together at the same time.

> WARNING



> Moving Parts Entanglement Hazard

Failure to observe these instructions could lead to serious injury or death.

- **Always** ensure hook latch is closed and not supporting load
- **Never** apply load to hook tip or latch. Apply load only to the centre of hook.
- **Never** use a hook whose throat opening has increased, or whose tip is bent or twisted.
- **Always** use a hook with a latch.
- **Always** ensure the operator and bystanders are aware of the stability of the vehicle and/or load. Never hook back on rope.

> WARNING



> Chemical And Fire Hazard

Failure to observe these instructions could lead to serious injury or death.

- **Always** remove loose jewellery and wear eye protection.
- **Never** route electrical cables across sharp edges.
- **Never** route electrical cables near parts that get hot.
- **Never** route electrical cables through or near moving parts.
- **Always** place the supplied terminal boots on wires and terminals as directed by the installation instructions.
- **Never** lean over battery while making connections.
- **Never** route electrical cables over battery terminals. Never short battery terminals with metal objects.
- **Always** consult operator's manual for proper wiring details.
- **Always** insulate and protect all exposed wiring and electrical terminals.
- **Always** connect red(+) power cable ONLY to the positive(+) terminal of the battery.
- **Always** connect black ground(-) power cable ONLY to the negative(-) terminal of the battery.
- **Never** connect red(+) power cable to the negative(-) terminal of the battery.

> WARNING



> Falling Or Crushing Hazard

Failure to observe these instructions could lead to serious injury or death.

- **Always** stand clear, keep hands clear, keep others away.
- **Never** operate winch with less than 6 wraps of synthetic rope around the drum. Rope could come loose from the drum, as the rope attachment to the drum is not designed to hold a load.
- **Never** use winch as a hoist or to suspend a load, its a winch not a hoist.
- **Always** be certain anchor will withstand load, use appropriate rigging and take time to rig correctly.
- **Never** use winch to lift or move people.
- **Never** use excessive effort to free spool winch rope.
- **Always** use proper posture/lifting technique or get lifting assistance while handling and installing product.
- **Always** wind the winch rope on bottom (mount side) of drum.
- **Never** wind rope over top of drum.
- **Always** spool the winch rope onto the drum in the direction specified by the drum rotation labels on the winch and/or in the documentation. This is required for the automatic brake (if so equipped)to function properly.

> WARNING > CAUTION



> Cut And Burn Hazard

Failure to observe these instructions could lead to minor or moderate injury.

- Never let winch rope slip through your hands. Always use recommended gloves / hand protection.

This manual provides instructions on how to install and operate your winch and operating your Wireless Remote Control.

When installing your winch system, read and follow all mounting and safety instructions. Always use caution when working with electricity and remember to verify that no exposed electrical connections can accidentally be touched before energizing your winch circuit. For specifications and performance data, refer to the specification sheets and the RED Winches website.

> CAUTION



> Moving Parts Entanglement Hazard

Failure to observe these instructions could lead to serious injury or death.

To avoid injury to hands and fingers:

- **Never** leave winch remote control where it can be activated during free spooling, rigging, or when the winch is not being used.
- **Never** leave the wireless winch remote control turned on or connected to winch controls when installing, free spooling, rigging or servicing winch, or when the winch is not being used.

> NOTICE



AVOID WINCH AND EQUIPMENT DAMAGE

- **Always** avoid side pulls which can pile up winch rope at one end of the drum, this can damage winch rope or winch.
- **Always** ensure the freespool is fully engaged or disengaged.
- **Always** use care to not damage the vehicle frame when anchoring to a vehicle during a winching operation.
- **Never** submerge winch in water, if not IP68 rated.
- **Always** store the remote control in a protected, clean dry area.

> NOTICE



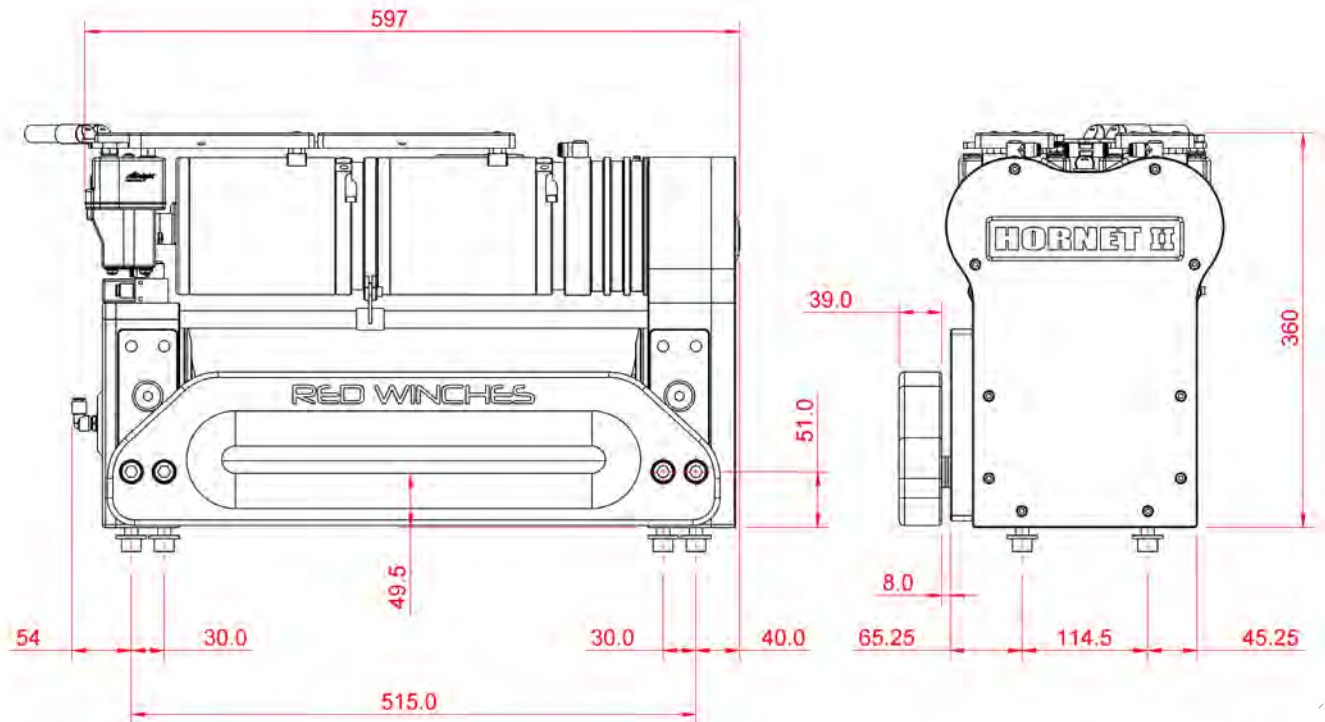
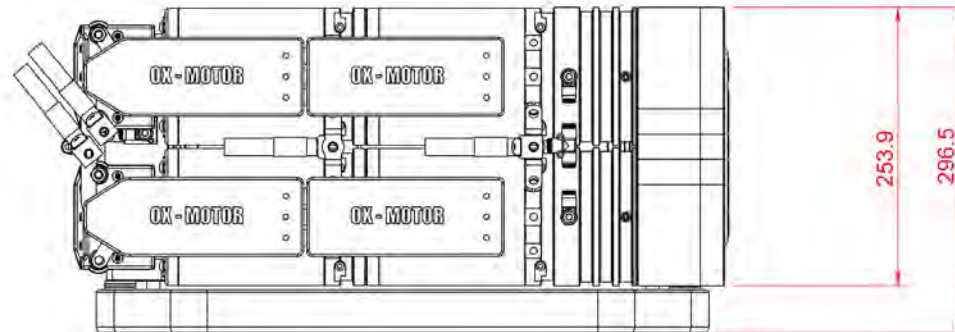
- **Never** hook the synthetic rope back onto itself because you could damage the synthetic rope .Use a strap.
- **Avoid** continuous pulls from extreme angles as this will cause the rope to pile up on one end of the drum. This can jam the rope and cause the rope to dive down through other rope layers.

HORNET 2Q

GENERAL INSTALL DIMENSIONS

WARNING:
MOUNTING PLATE THICKNESS IS IMPORTANT
FOR RELIABLE SAFE OPERATION THE
MOUNTING PLATE THICKNESS SHOULD NOT BE
LESS THAN 8MM (STEEL)
IT MAY DAMAGE WINCH DURING OPERATION
AND VOID ANY WARRANTY IF NOT THE
CORRECT THICKNESS

WINCH WEIGHT: 88KG (NO ROPE OR HOOK)



HORNET 2Q

FEATURES

(+) POWER CONNECTION STUDS M8 THREAD

FOR OPTIMAL PERFORMANCE:
2 x 70MM (SECTIONAL AREA) CABLE
ON CONNECTING BUS BAR
SUPPLIED DIRECT FROM YOUR
BATTERIES

COPPER BUS BARS
FOR THE ULTIMATE
EFFICIENT TRANSFER
OF POWER

(-) POWER CONNECTION M8 FEMALE THREAD

FOR OPTIMAL PERFORMANCE:
70MM (SECTIONAL AREA) CABLE
ON EACH STUD, SUPPLIED DIRECT FROM YOUR
BATTERY

THE ORIGINAL AND BEST RED WINCH
AIR BRAKE SYSTEM. STOPS YOUR
WINCH INSTANTLY. FAIL SAFE AND
RELIABLE

PRECISION ENGINEERED
BILLET MACHINED HOUSINGS
AND DRUM ENDS, THE ULTIMATE
IN STRENGTH AND DESIGN

THE MIGHTY OX MOTOR IS A
VERY POWERFUL MOTOR
PROVIDING HIGH SPEED
AND HIGH TORQUE AND
IS THE POWER BEHIND
YOUR WINCH AND ITS
PERFORMANCE

ENGINEERED DRUM
SUPPORTED BY PRECISION
SEALED BEARINGS
ADDED PROTECTION
FROM 2 x DRUM END SEALS

STAINLESS STEEL
FASTENERS

ENGINEERED BILLET FAIRLEAD
TO GIVE THE SYNTHETIC ROPE THE
BEND RADIUS IT NEEDS AND TO
EXTEND ROPE LIFE

ALBRIGHT SOLENOIDS
AND AIR SOLENOID
FOR AIR BRAKE

AIR BRAKE CONNECTION

6MM AIR PIPE COMING
DIRECTLY FROM YOUR
ON-BOARD VEHICLE AIR
COMPRESSOR

DRUM AIR FREESPOOL
6MM AIR TUBE REQUIRED

COVER CAN BE
REMOVED EASILY
TO SERVICE THE
FREESPOOL ASSEMBLY

HORNET 2Q

WINCH CONNECTIONS



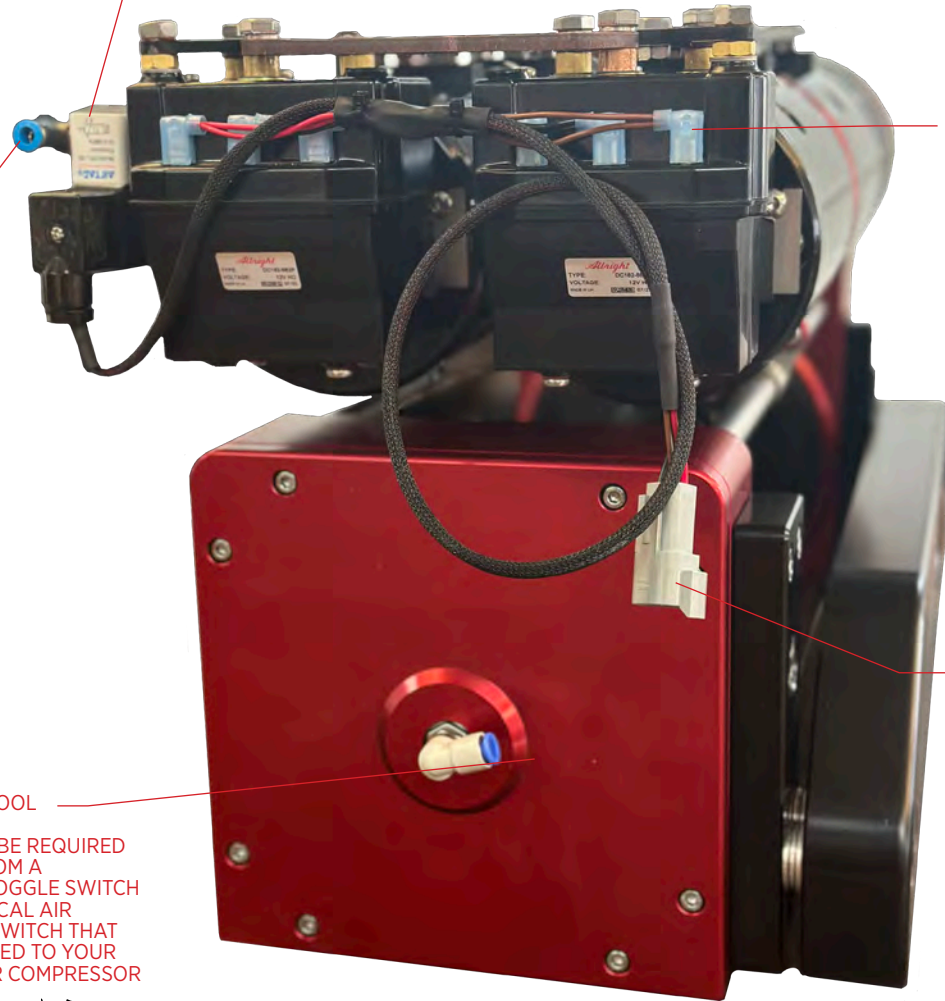
BUS BAR COVERS REMOVED FOR CLARITY OF NOTES

OUR MIGHTY OX MOTORS

(-) POWER CONNECTION M8 FEMALE THREAD IN 2 x POSITIONS FOR OPTIMAL PERFORMANCE: 70MM (SECTIONAL AREA) CABLE ON EACH CONNECTION, SUPPLIED DIRECT FROM

Ø6mm AIRLINE FROM ON-BOARD COMPRESSOR NEEDS TO BE CONNECTED DIRECTLY HERE, MINIMUM AIR PRESSURE: 4.5 BAR (60 PSI)

AIR BRAKE SOLENOID (SUPPLIED FITTED)



THIS QUAD WINCH HAS THE ABILITY TO DRAW OVER 1000A 12V DC FROM YOUR VEHICLE BATTERIES WHEN WINCHING HARD, AT NEARLY FULL CAPACITY. MAKE SURE THERE IS ENOUGH POWER AVAILABLE TO SUPPLY IT

+12V SIGNAL WIRES TO YOUR VEHICLE. WINCH IN & OUT SWITCH

+12V SIGNAL TO RED WIRE: WINCH IN, +12V TO BROWN WIRE: WINCH OUT.

BLACK IS EARTH / NEGATIVE

(+) POWER CONNECTION BUS BAR M8 THREADS FOR 2 x CONNECTIONS

FOR OPTIMAL PERFORMANCE: 70MM (SECTIONAL AREA) CABLE ON EACH POSITION, SUPPLIED DIRECT FROM YOUR BATTERIES

WARNING
ENSURE POSITIVE CABLE CONNECTION AND LUG USED IS INSULATED FROM ACCIDENTAL TOUCHING AND DOES NOT TOUCH ANY SURROUNDING PARTS OR MOTOR BUZZ BARS

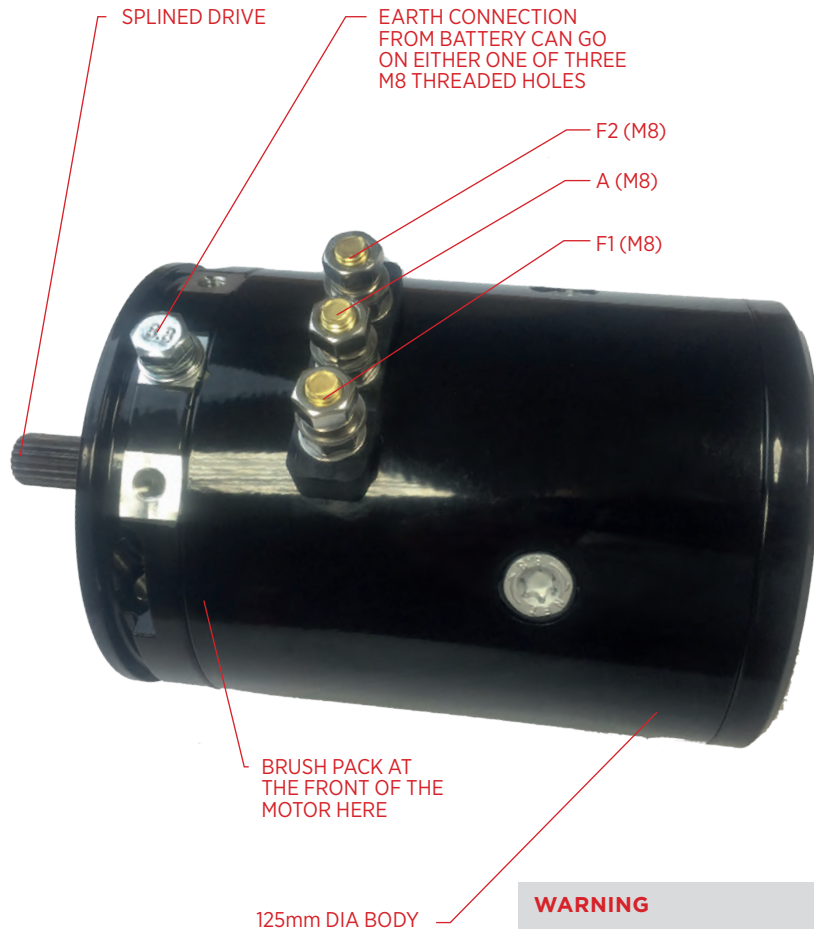
AIR FREESPOOL
6MM AIR TUBE REQUIRED COMING FROM A CONTROL TOGGLE SWITCH OR ELECTRICAL AIR SOLENOID SWITCH THAT IS CONNECTED TO YOUR VEHICLE AIR COMPRESSOR

WINCH IN & OUT SWITCH CONNECTOR

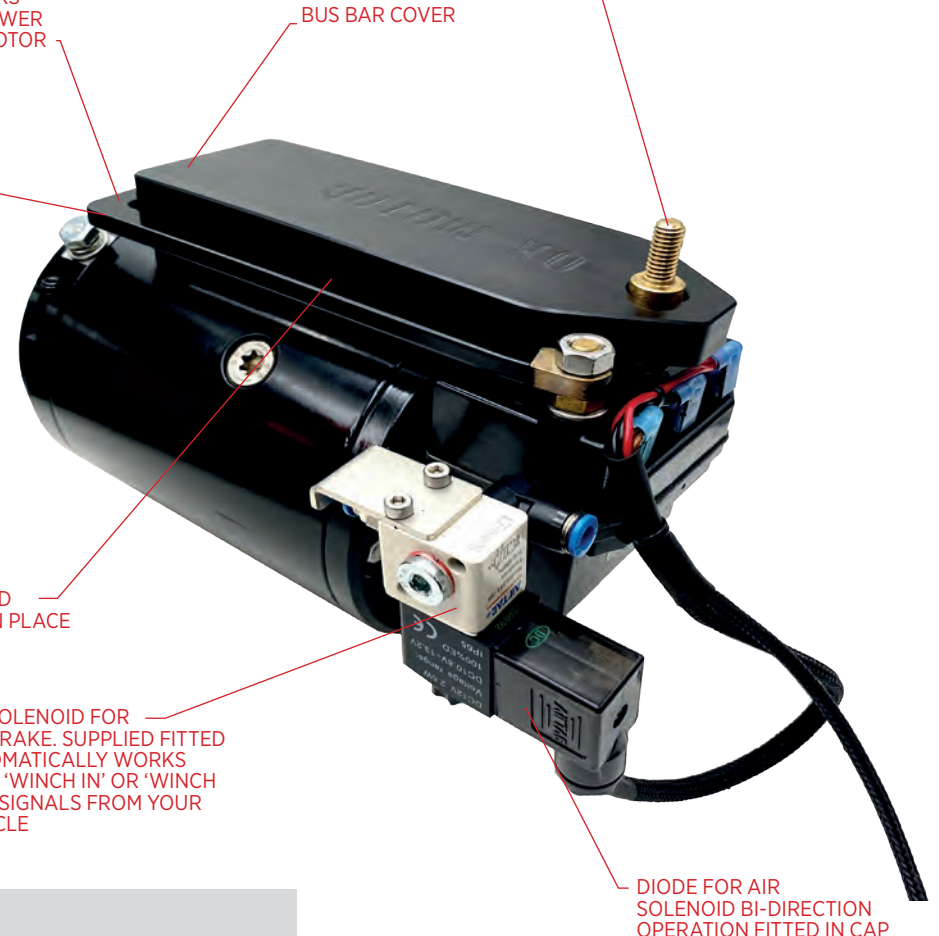
SUPPLIED WITH FLYING LEAD TO WIRE TO A ROCKER SWITCH IN YOUR VEHICLE

HORNET 2Q

OX MOTOR OVERVIEW GENERIC FEATURES



SOLID COPPER BUS BARS TRANSFER ALL THE POWER EFFICIENTLY TO THE MOTOR



WARNING

**OVERVOLTING (NOT UNDER WARRANTY)
(24v POWER ONTO A 12v RATED MOTOR)**

NEVER ALLOW THE OX MOTOR TO 'OVER SPEED' OR RUN WHEN THE WINCH IS NOT UNDER LOAD OR HAVE TENSION / WEIGHT IN THE WINCH LINE. THIS SITUATION CAN DAMAGE THE ARMATURE AND CAUSE THE MOTOR TO FAIL - THIS IS NOT COVERED UNDER WARRANTY

AIR SOLENOID POSITION VARIES BETWEEN WINCHES (SHOWN FOR ILLUSTRATION)

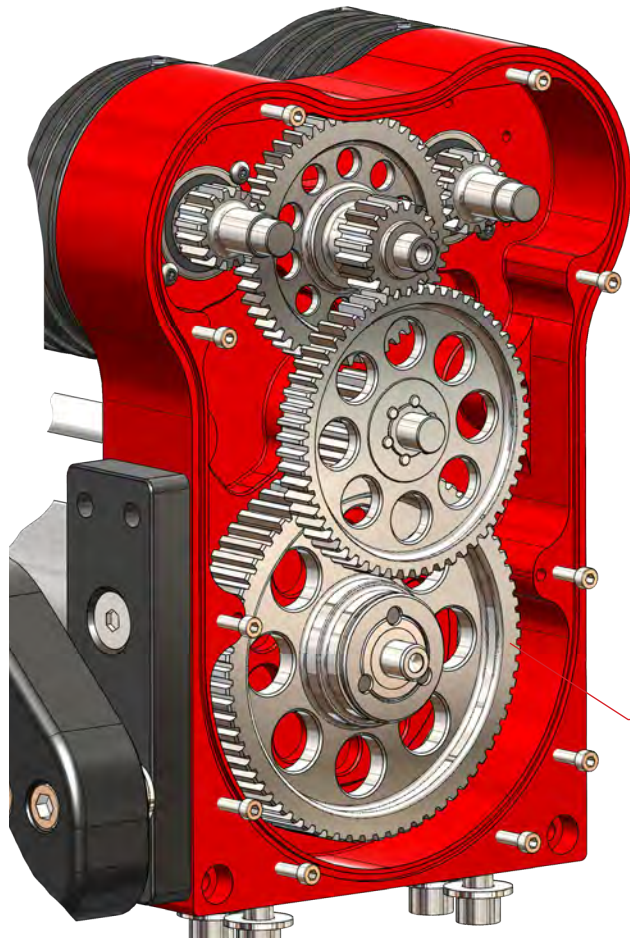
HORNET 2Q

WINCH GEARBOX

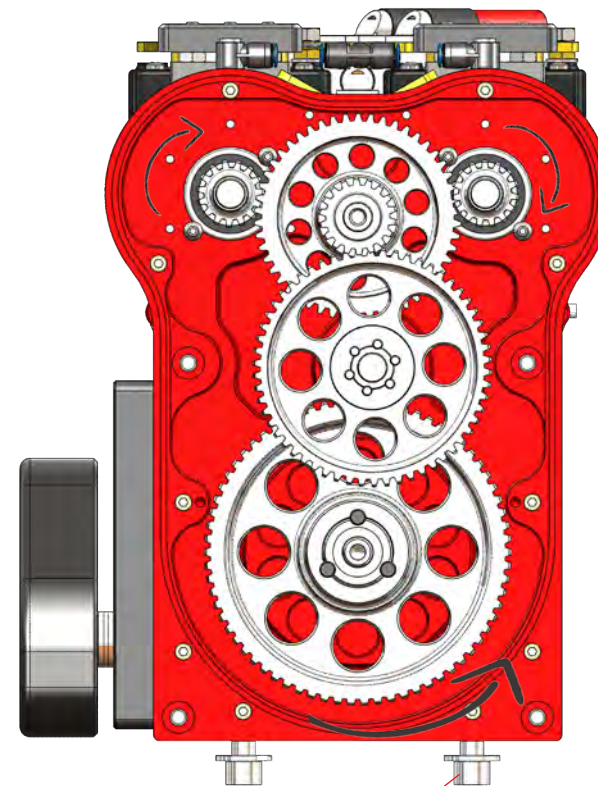
GREASE SPECIFICATION

CASTROL SPHEROL L-EP2

BP ENERGREASE LS-EP2



WINCH IN
→



WINCH IN
MOTOR DIRECTION

WINCH IN
DRUM DIRECTION

GREASE APPLIED TO ALL GEARS AND THEIR TEETH. CASE DOES NOT NEED TO BE FILLED WITH GREASE.

ANY RESIDUE FOUND IN THE BOTTOM OF THE CASE CAN BE REMOVED. REPLACE WITH FRESH GREASE AS REQUIRED

MOUNTING BOLTS

M12 X 12 CAP HEADS ARE FITTED FOR OUR ASSY PROCESS ONLY.

THESE BOLTS ARE TO BE REMOVED PRIOR TO INSTALLATION

FASTENERS

ENSURE ALL FASTENERS ARE TORQUED TO THE CORRECT VALUES. LOCTITE 234 (THREADLOCK) TO BE APPLIED ON ALL FASTENERS

| UNLESS SPECIFIED | |
|------------------|--------|
| FASTENER | TORQUE |
| M6 | 10 Nm |
| M8 | 24 Nm |
| M10 | 45 Nm |
| M12 | 80 Nm |
| M16 | 160 Nm |
| M20 | 200 Nm |

HORNET 2Q

GEARSETS

GREASE SPECIFICATION

CASTROL SPHEROL L-EP2

BP ENERGREASE LS-EP2

HORNET2-MD-21
INTERMEDIATE GEAR
(50 TOOTH - STD)

HORNET2-MD-26
INTERMEDIATE GEAR
(48 TOOTH - OD)

HORNET2-MD-20
MOTOR GEAR
(15 TOOTH - STD)

HORNET2-MD-25
MOTOR GEAR
(17 TOOTH - OD)

DRIVE GEAR

SHAFT GEAR

HORNET 2 - STANDARD GEARS (STD)
RATIO: 45:1

HORNET 2 - OVERDRIVE GEARS (OD)
RATIO: 38:1

| GEARBOX | RATED PULLING CAPACITY |
|-----------|------------------------|
| Overdrive | 2,200kg (4,000 lbs) |
| Standard | 4,500kg (10,000 lbs) |

| UNLESS SPECIFIED | |
|------------------|--------|
| FASTENER | TORQUE |
| M6 | 10 Nm |
| M8 | 24 Nm |
| M10 | 45 Nm |
| M12 | 80 Nm |
| M16 | 160 Nm |
| M20 | 200 Nm |



STD GEARSET SHOWN



HORNET 20

DRIVE SHAFT & FREESPOOL SYSTEM

GREASE SPECIFICATION

CASTROL SPHEROL L-EP2

BP ENERGREASE LS-EP2

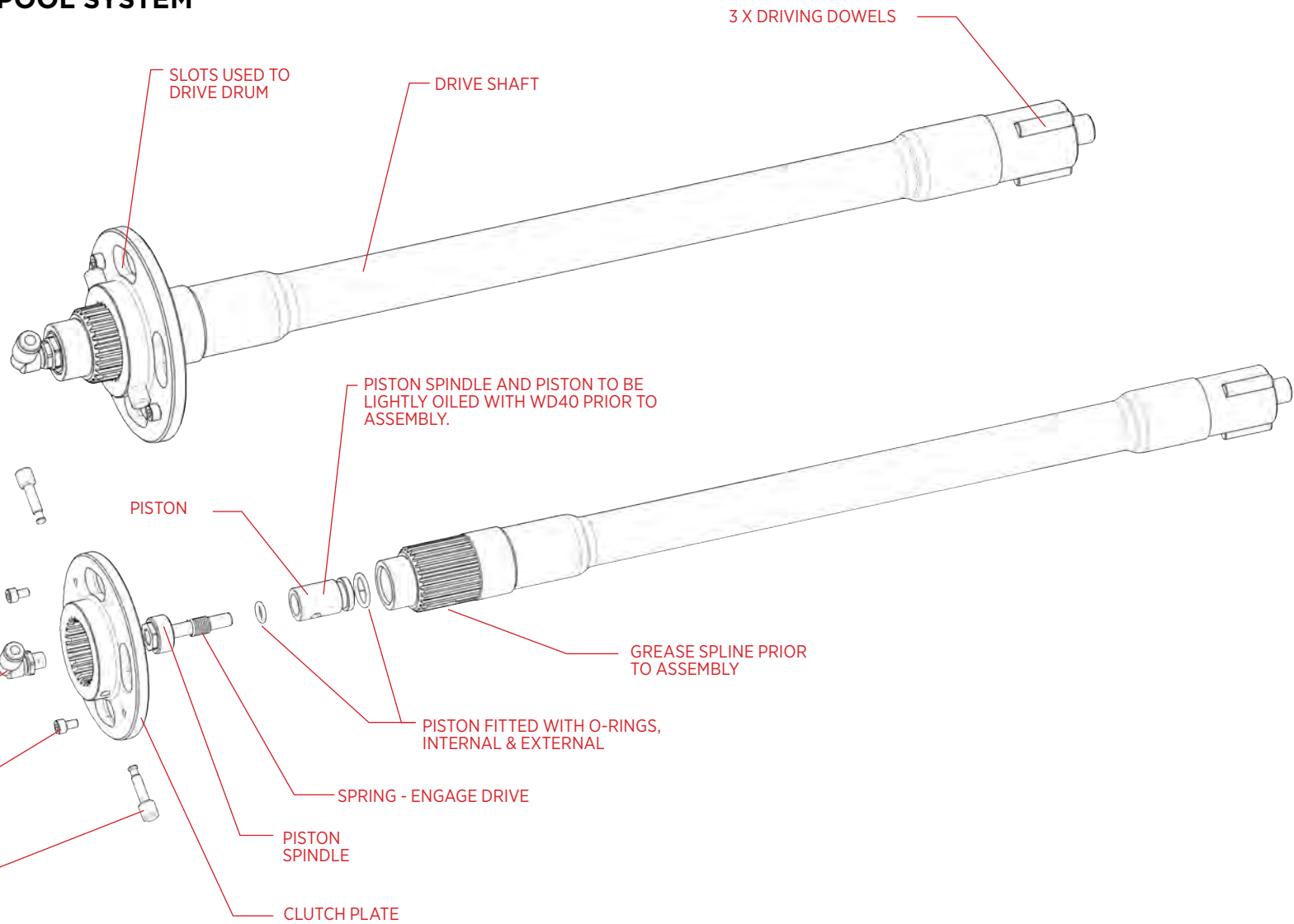
| UNLESS SPECIFIED | |
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| FASTENER | TORQUE |
| M6 | 10 Nm |
| M8 | 24 Nm |
| M10 | 45 Nm |
| M12 | 80 Nm |
| M16 | 160 Nm |
| M20 | 200 Nm |

LOCTITE 234
(THREADLOCKER
TO BE USED ON ALL
FASTENERS)

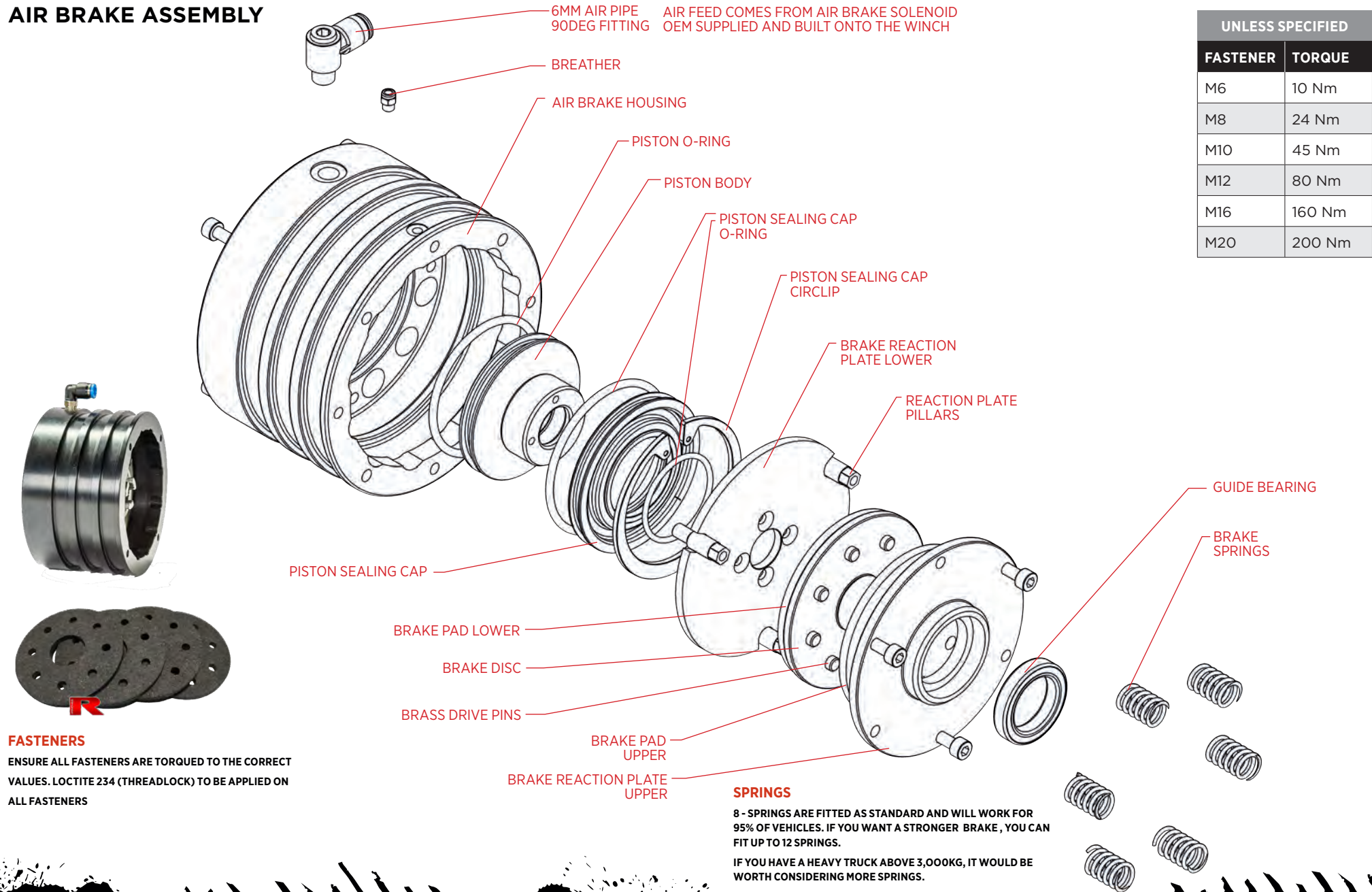
SWIVEL 90DEG
AIR FEED FITTING

TO REMOVE PINS
REMOVE FASTENERS

TO REMOVE CLUTCH
PLATE, FIRST REMOVE
THESE PINS



AIR BRAKE ASSEMBLY



FASTENERS

ENSURE ALL FASTENERS ARE TORQUED TO THE CORRECT VALUES. LOCTITE 234 (THREADLOCK) TO BE APPLIED ON ALL FASTENERS

SPRINGS

8 - SPRINGS ARE FITTED AS STANDARD AND WILL WORK FOR 95% OF VEHICLES. IF YOU WANT A STRONGER BRAKE, YOU CAN FIT UP TO 12 SPRINGS.

IF YOU HAVE A HEAVY TRUCK ABOVE 3,000KG, IT WOULD BE WORTH CONSIDERING MORE SPRINGS.

GENERAL WINCH MAINTENANCE

> General Maintenance

- Check the battery regularly. Ensure that it is in good condition and is fully charged.
- Check that all of the connections are clean and tight. Corrosion on the battery connections can affect the performance of the winch. Ensure that the battery connections are tight.
- The winch is protected from water and rain, but avoid submerging the winch for a prolonged time, particularly if the winch casing is warm / hot.
- If it does become submerged, once clear, run the winch in and out for about 10 meters of rope to generate heat inside the winch to help dry the inside of the casing.
- Only clean your winch with soap and water, then rinse. DO NOT PRESSURE WASH THE WINCH. This can force water past the seals and gaskets.
- If you were not the last person to use the winch, always inspect the full length of the winch rope before applying any load to it.
- Have the winch serviced regularly at an authorised RED Winch centre / Partner / Distributor.

> Basic Trouble Shooting

Powers in only one direction

- Faulty Solenoid, damaged remote control or remote control cable. Check remote control plug pins for damage. Check remote correctly connected.

Completely Dead

- Burned motor, poor earth, discharged battery, faulty isolator switch, damaged earth wire, damaged remote control cable or switch. Check remote control pins for damage. Check isolator switch is on. Check power is getting to the winch.

Low Power

- Check the condition of the battery and if the alternator is charging correctly, check the voltage to the battery. Are the battery terminals corroded or the cables damaged?
- Turn off any electrical items in the vehicle; Radio, lights, heated seats etc.

Winch Will Not Free Spool

- Warped mount plate, winch rope bound up on one side of the drum, bent drum flange or gear damage inside the winch.
- Check freespool air solenoid if fitted.
- Check Air solenoid or Air switch is working
- Check freespool clutch plate is free to move and can be both engaged & disengaged easily.

Winch Motor Gets Hot Very Quickly

- Overloaded or stalled during winching operation, Poor earth to battery, worn motor, water or mud in motor. Check the load is not heavier than the rated load. Check all connections and cables.
- Connecting power cables are too small.

Winch Brake Will Not Hold

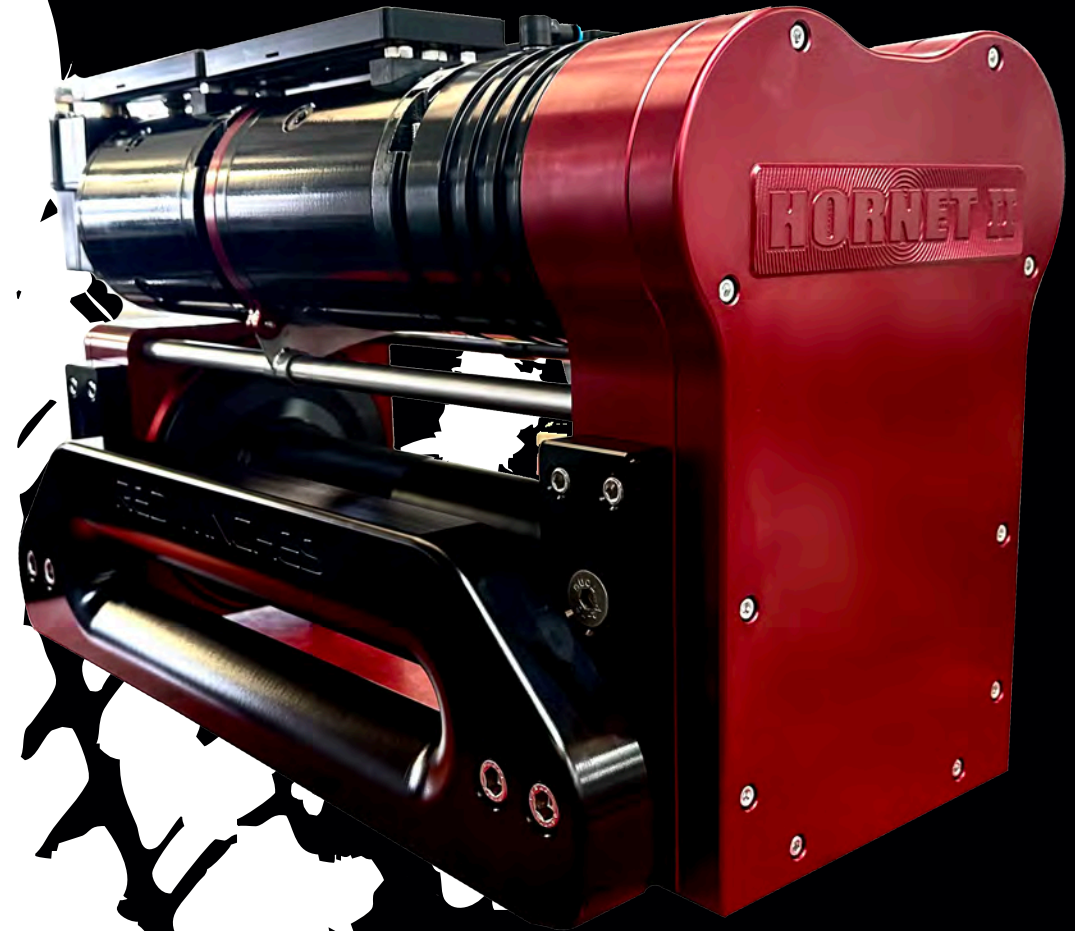
- Worn friction material or brake overheated from extended period of powering out.
- Air solenoid controlling air brake can not exhaust (holding brake off).





USING YOUR H2Q WINCH

A REFERENCE GUIDE
TO WINCHING



WINCH HANDLING

> Estimating Winch Loads

Before attempting to move a rolling load with a winch, an estimate of the load should be made to ensure that the safe working load limits of the winch and any supporting equipment is not exceeded.

If there is a solid resistance that prevents the load from moving, the winch must not be allowed to operate in a situation where it is overloaded; the forces and electrical loading on the vehicle this creates may become excessive. The load to be recovered must be able to move as freely as possible. Before winching it might be necessary to dig out a trapped wheel or dig away any part of the terrain upon which is resting any part of the load apart from its wheels.

There are two factors which should be added together to arrive at a total load:

The maximum inclination of the ground, even if it is only a short section; for instance a pot hole or a tree root.

On sloping ground a factor has to be allowed for the gradient as follows:

Divide the gradient angle in degrees by 60, and multiply that by the load being pulled. Therefore ascending a 30° gradient with a vehicle weighing 2,250 kg would be:

$$30^\circ / 60 = 0.5 \times 2250 = 1125 \text{ kg}$$

The pull required to move a vehicle varies depending upon the type of ground upon which it stands.

The required pull as a percentage of its weight is as follows;

| | |
|-----------------------------------------|--------|
| Hard Surface | 5% |
| Grass | 15% |
| Wet Sand | 15-20% |
| Soft Dry Sand | 25-30% |
| Shallow Mud | 35% |
| Bog/Marsh where chassis is not grounded | 50% |

A 2250kg Vehicle in shallow mud would be:

$$2250 / 100 \times 35 = 788\text{kg}$$

Therefore to calculate the true load when pulling up an incline, add the previous calculation for the gradient to the calculation for the ground condition:

Gradient 1125Kg + Ground 788kg = Total estimated load 1913Kg



THE HORNET2Q WINCH

LOADING AND ELECTRICAL SUPPLY

> Operating Capacity

The maximum operating capacity of the winch is affected by the number of wraps of rope around the drum, and consequently whenever operating a winch recovery, as much winch rope should be removed from the drum as possible to maximise mechanical advantage prior to applying the recovery load.

The pull rating of the winch is based on the rope being on bottom layer, or 1st layer of wrap around the drum.

Please note maximum drum loads cannot be achieved for long periods on most electric winches.

For operations requiring periods of prolonged use, the load needs to be considerably below the winch rated pulling figure on bottom layer.

This helps when deciding when to use a pulley system (RED Winch Snatch Ring or Pulley Blocks) to improve the mechanical advantage of the winch.

Other types of winch e.g. mechanical or hydraulic are able to sustain maximum rated load for longer durations.

> Vehicle Electrical System

It is important to understand how much power is being drawn from the battery by the winch.

It is important whatever winch you install, you find out what the draw is from your winch and the maximum draw the vehicle systems can deliver.

Always use the correct sized electrical power cable, using cable too small will result in the winch motors being starved of current, increased resistance and potential motor failure.

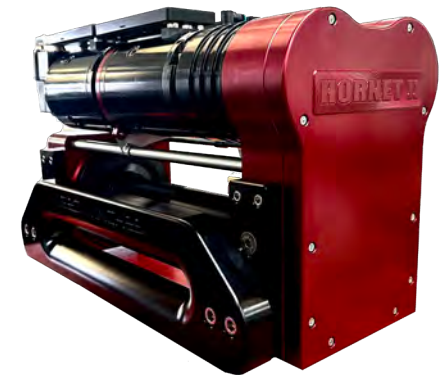
Make sure your Earth / negative connections to the winch are the same size as the positive connections.

A battery cannot recharge as quickly as it is discharged.

Increasing the engine revs while winching, and consider increasing the revs between winches will help to maintain the charge.

On most vehicles, maximum alternator output is achieved at approximately 1800 rpm.

Winching without the engine running will discharge the battery rapidly and is not recommended as you will end up with a battery that can no longer start your vehicle



WINCH ROPE CARE AND INSPECTION GUIDELINES - SYNTHETIC

The life of a synthetic rope can be increased through good working practices and care. Synthetic ropes must be regularly inspected for damage. RED Winches recommend that winch ropes are always checked before use.

Under PUWER (Provision and Use of Work Equipment Regulations - UK only), work equipment should be inspected every 6 months.

Always refer to the Manufacturers Guidelines.

> Handling Guidelines

- Do not over load or shock load the rope. This can cause damage which is not visible, but could cause the rope to break later. (A shock load is a load that is 10 % greater than the recommended load, applied suddenly.)
- Do not bend the rope through an angle that is less than 6 times its diameter. (9mm x 6 = 54mm)
- Rope life can be prolonged by keeping it clean and dry.
- Do not clean ropes using a pressurised hose. (This can force abrasive material in to the fibres.) Remove rope and wash in a container of cold water. Allow the rope to dry before loading it back onto the drum.

- Synthetic ropes can be damaged by direct contact with chemicals and in some instances, the fumes from them.
- When the rope is not in use, protect it from UV light by using a winch cover.
- Synthetic rope can be weakened if exposed to heat. (Usually an overheated drum).
- Do not winch out under load if using an electric winch that has an over run brake enclosed within the winch drum.
- Where possible, do not allow the rope to come in to contact with the ground. Do not tread on the rope. This can lead to the ingress of abrasive material.
- Ropes should be marked with a unique number. A history of rope use should be kept. This should include inspection dates.

RED Winches recommends you inspect a winch rope before using it.

In all commercial applications ropes must be inspected under PUWER every 6 months. Always refer to the Manufacturers Guidelines.

- Inspect the entire length of the rope. The outer fibres of the rope will become fluffy during normal use.
- Look for areas of inconsistency. These include lumps, bumps or flat areas. These can be the result of shock loading and the rope should be destroyed.
- Damaged ropes should always be destroyed to prevent subsequent use.
- Generally if 25% or more of the fibres are broken, the rope should be destroyed.
- 12 strand ropes should be destroyed if 2 or more adjacent strands are cut.
- Rope can be damaged by direct heat, from the drum for example, or from heat caused by excessive friction. High temperatures can invisibly, reduce the strength of the rope.
- Chemical contamination can cause areas of discolouration, as can UV light. Determine the cause of the discolouration and destroy the rope if it is brittle or stiff in these areas.



> **Image 1** Rope prior to use



> **Image 2** Rope displaying 25% reduction from abrasion



> **Image 3** Full volume Rope Strand



> **Image 4** Strand reduced by 25% abrasion



> **Image 5**
Rope displays two adjacent cut strands.

This rope should be destroyed.

In an emergency, the damaged section can be removed and the rope re-spliced.

However, this should be seen as a temporary repair.

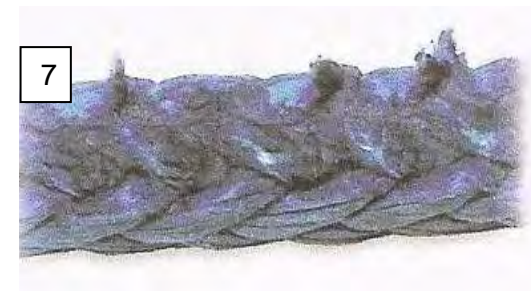
The rope should then be destroyed as soon as possible.



> **Image 6**
This rope is showing signs of compression.

If the rope is manipulated, it should return to its original state.

This should not be confused with a rope affected by heat.



> **Image 7**
This rope has been exposed to extreme heat.

Unlike the compressed rope, it will not return to its original state if manipulated.

This rope should be destroyed.

In an emergency, the damaged section can be removed and the rope re-spliced.

However, this should be seen as a temporary repair.

The rope should then be destroyed as soon as possible.

- Winches and winch equipment that are also used with wire rope should be checked for any rough or sharp areas. If any areas of this nature are found, they should be removed by sanding lightly to prevent damage to the synthetic rope.
- Assess the internal fibres of the rope, by opening it out slightly. Powdered fibre is a sign of internal wear.
- Damage to the rope can be invisible. Always keep a log of the rope's history. If you are ever in doubt about a rope's integrity, destroy it.
- Synthetic rope can be spliced together. In an emergency, it is possible to cut out a damaged area and re-splice the rope. This should only be viewed as a temporary repair, the rope should be destroyed.

WINCH ROPE CHARACTERISTICS

| | Wire 8mm | Wire 9mm | Synthetic Plasma 11mm |
|-------------------------|----------|----------|-----------------------|
| Estimated Breaking Load | 4110Kg | 5753Kg | 9525Kg |
| Factor of Safety | 2:1 | 2:1 | 2:1 |
| Safe Working Load | 2055Kg | 2876Kg | 4762Kg |

> Advantages/Disadvantages

| Wire Rope | Synthetic Rope |
|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Not affected by heat | Critical temperature 65° C Melting Point 140° C |
| Wire rope is heavy and can be difficult to handle | Easy to handle, lightweight, reduces sprung mass over vulnerable area over front axel |
| Difficult to load, if tension is released wire will “birds nest” on drum | Easy to load. Does not “birds nest”. |
| Low priced | Expensive |
| Sustains little damage from abrasion | Easily affected by abrasion |
| Will recoil if breaks under tension | Lower level of stored energy than wire, but may still recoil violently in the event of tree strap failure while under tension. |
| Not affected by most solvents or chemicals | Can be affected by some solvents and chemicals |
| Impossible to repair successfully at full strength reducing kinks | Easy to repair by splicing (In emergency only) |
| Wires can splinter and cause snags Does not splinter and causes snags | Does not splinter and cause snags |
| Wire rope must not be cross layered | Provided that no shock loads are introduced, rope can be cross layered over itself without causing damage |
| More resistant to mishandling | Mishandling may cause damage |

A GUIDE TO WINCH LOADINGS

ON A TYPICAL 4X4 VEHICLE

> Rolling Resistance Table

| | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 | 4.5 | 5.0 | 5.5 | 6.0 | 6.5 | 7.0 | 7.5 |
|------------------|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|
| Road | 40 | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 260 | 280 | 300 |
| Grass Dry Ground | 143 | 214 | 286 | 357 | 429 | 500 | 571 | 643 | 714 | 786 | 857 | 929 | 1000 | 1071 |
| Grass Wet Ground | 250 | 375 | 500 | 625 | 750 | 875 | 1000 | 1125 | 1250 | 1375 | 1500 | 1625 | 1750 | 1875 |
| Gravel | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 |
| Shingle | 500 | 750 | 1000 | 1250 | 1500 | 1750 | 2000 | 2250 | 2500 | 2750 | 3000 | 3250 | 3500 | 3750 |
| Mud | 333 | 500 | 667 | 833 | 1000 | 1167 | 1333 | 1500 | 1667 | 1833 | 2000 | 2167 | 2333 | 2500 |
| Wet Sticky Mud | 500 | 750 | 1000 | 1250 | 1500 | 1750 | 2000 | 2250 | 2500 | 2750 | 3000 | 3250 | 3500 | 3750 |

> Vehicles Bogged Down In Mud To Casualty weight in tons 1 ton = 1000kg

| | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 | 4.5 | 5.0 | 5.5 | 6.0 | 6.5 | 7.0 | 7.5 |
|------------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Axle | 1000 | 1500 | 2000 | 2500 | 3000 | 3500 | 4000 | 4500 | 5000 | 5500 | 6000 | 6500 | 7000 | 7500 |
| Wheel Tops | 2000 | 3000 | 4000 | 5000 | 6000 | 7000 | 8000 | 9000 | 10000 | 11000 | 12000 | 13000 | 14000 | 15000 |
| Bonnet | 3000 | 4500 | 6000 | 7500 | 9000 | 10500 | 12000 | 13500 | 15000 | 16500 | 18000 | 19500 | 21000 | 22500 |

> Damage Resistance Table *This Table Is For Vehicles With Four Wheels.* Casualty Weight In Tons 1 Ton = 1000kg

| No. Of Damaged Wheels | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 | 4.5 | 5.0 | 5.5 | 6.0 | 6.5 | 7.0 | 7.5 |
|-----------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1 | 250 | 375 | 500 | 625 | 750 | 875 | 1000 | 1125 | 1250 | 1375 | 1500 | 1625 | 1750 | 1875 |
| 2 | 500 | 750 | 1000 | 1250 | 1500 | 1750 | 2000 | 2250 | 2500 | 2750 | 3000 | 3250 | 3500 | 3750 |
| 3 | 750 | 1125 | 1500 | 1875 | 2250 | 2625 | 3000 | 3375 | 3750 | 4125 | 4500 | 4875 | 5250 | 5625 |
| 4 | 1000 | 1500 | 2000 | 2500 | 3000 | 3500 | 4000 | 4500 | 5000 | 5500 | 6000 | 6500 | 7000 | 7500 |

> Gradient Resistance Table Casualty weight in tons 1 ton = 1000kg

| Slope Degrees | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 | 4.5 | 5.0 | 5.5 | 6.0 | 6.5 | 7.0 | 7.5 |
|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 10 | 167 | 250 | 333 | 417 | 500 | 583 | 667 | 750 | 833 | 917 | 1000 | 1083 | 1167 | 1250 |
| 20 | 333 | 500 | 667 | 833 | 1000 | 1167 | 1333 | 1500 | 1667 | 1833 | 2000 | 2167 | 2333 | 2500 |
| 30 | 500 | 750 | 1000 | 1250 | 1500 | 1750 | 2000 | 2250 | 2500 | 2750 | 3000 | 3250 | 3500 | 3750 |
| 40 | 667 | 1000 | 1333 | 1667 | 2000 | 2333 | 2667 | 3000 | 3333 | 3667 | 4000 | 4333 | 4667 | 5000 |
| 45 | 750 | 1125 | 1500 | 1875 | 2250 | 2625 | 3000 | 3375 | 3750 | 4125 | 4500 | 4875 | 5250 | 5625 |
| 50 | 833 | 1250 | 1667 | 2083 | 2500 | 2917 | 3333 | 3750 | 4167 | 4583 | 5000 | 5417 | 5833 | 6250 |
| 60 | 1000 | 1500 | 2000 | 2500 | 3000 | 3500 | 4000 | 4500 | 5000 | 5500 | 6000 | 6500 | 7000 | 7500 |

HORNET 2Q - NOTES



HORNET 2 SERVICING

> Service 1

Date Of Service _____

Serial No. _____

Type of Winch _____

Signed _____

Print Name _____

> Service 2

Date Of Service _____

Serial No. _____

Type of Winch _____

Signed _____

Print Name _____

> Service 3

Date Of Service _____

Serial No. _____

Type of Winch _____

Signed _____

Print Name _____

> Service 4

Date Of Service _____

Serial No. _____

Type of Winch _____

Signed _____

Print Name _____

> Service 5

Date Of Service _____

Serial No. _____

Type of Winch _____

Signed _____

Print Name _____

> Service 6

Date Of Service _____

Serial No. _____

Type of Winch _____

Signed _____

Print Name _____



ENGINEERED TO BE BETTER



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