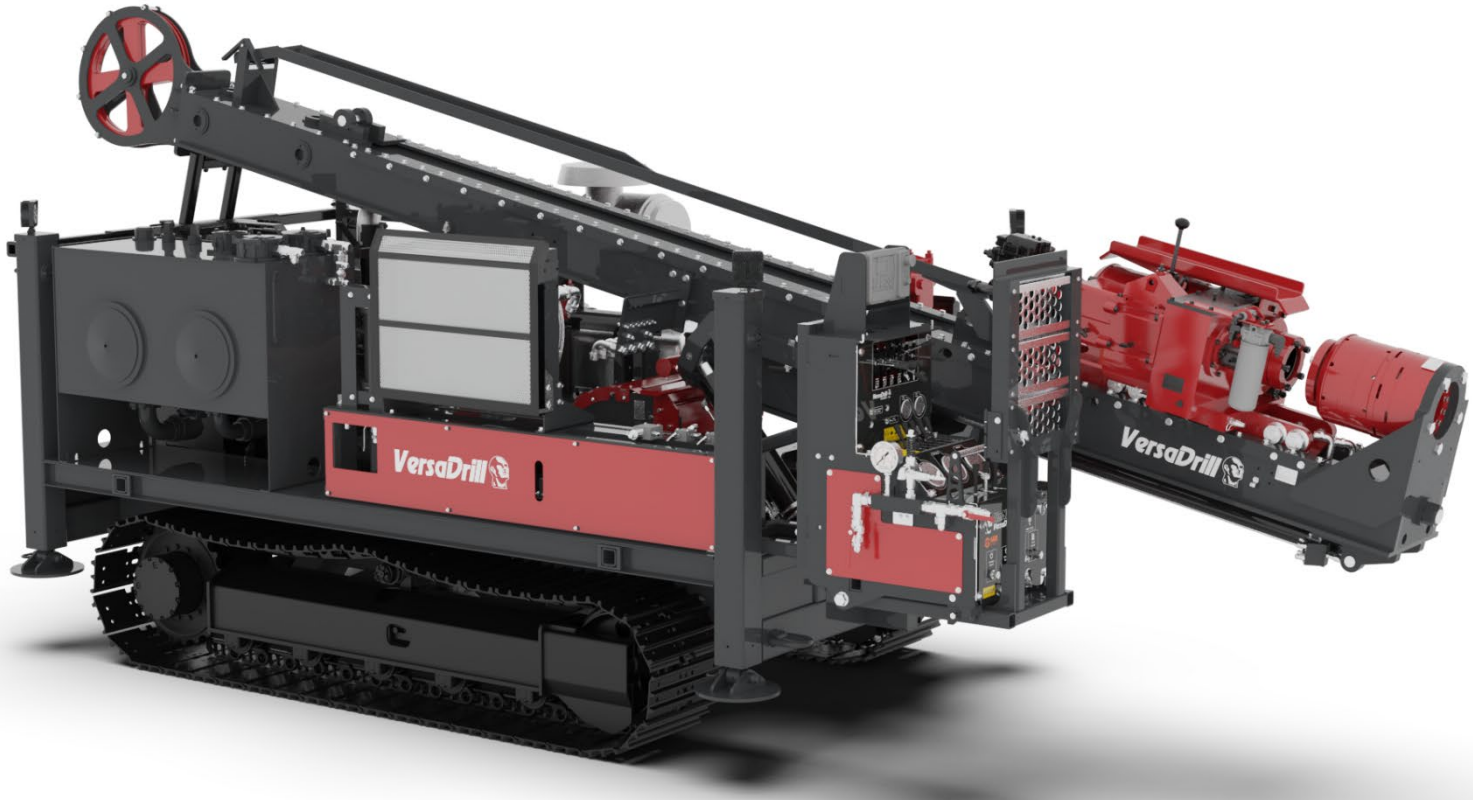
VersaDrill CANADA

MBI GLOBAL



KMN1.4SM

Revision 00
May 2022

General information

Thank you for choosing VersaDrill Canada.

Please familiarize yourself with the index to help you locate any item you may need to look up. To facilitate reading, all references to “drilling equipment VersaDrill Inc.” Or “VersaDrill Canada” will be summarized by “VersaDrill.”

VersaDrill is a pioneer in the construction of different types of surface and underground drilling machines by its design, technique and materials used. The company is actively engaged in engineering and in the improvement of manufacturing techniques for the development and testing of new ideas and products for the future, to help you reduce your costs of drilling.

For all your drilling needs, contact us.

VersaDrill Drilling Equipment Inc.
240 rue Gilbert Bossé
Val-d’Or, Quebec
J9P 0H4, Canada

Phone: (001) 819-874-4404
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Courriel: versadrill@versadrillcanada.com

1. ***DECLARATION OF CONFORMITY***

(IN ACCORDANCE WITH MACHINERY DIRECTIVE 2006/42/EC, ANNEX II, PART A)
WE, **Versadrill Drilling Equipment Inc.**
240, Gilbert-Bossé road
Val-d'Or, Quebec
J9P 0H4, Canada.
HEREBY DECLARE THAT THE PARTLY COMPLETED MACHINERY IDENTIFIED AS:

EQUIPMENT: Drill Rig

MODEL NUMBER: # KmN 1.4SM

SERIAL NUMBER: #

YEAR OF CONSTRUCTION:

WE HEREBY DECLARE THAT THE MODEL COMPLIES WITH THE ESSENTIAL REQUIREMENTS OF THE FOLLOWING EUROPEAN DIRECTIVES:

MACHINERY DIRECTIVE 2006/42/EU AND CONFORM TO THE FOLLOWING PRODUCT STANDARDS:

EN ISO 12100:2010 SAFETY OF MACHINERY. GENERAL PRINCIPLES FOR DESIGN. RISK ASSESSMENT AND RISK REDUCTION.

ISO 4413: 2010 HYDRAULIC FLUID POWER – GENERAL RULES AND SAFETY REQUIREMENTS FOR SYSTEMS AND THEIR COMPONENTS

EMC DIRECTIVE 2014/30/EU: COMPLIANCE BASED ON ARTICLE 6, ANNEX I FOR FIXED INSTALLATIONS FOLLOWING "GOOD ENGINEERING PRACTICES"

AND, THE TECHNICAL DOCUMENTATION IS COMPILED IN ACCORDANCE WITH ANNEX VII (B) OF THE MACHINERY DIRECTIVE.
WE UNDERTAKE TO TRANSMIT DOCUMENTATION ELECTRONICALLY IN RESPONSE TO A REASONED REQUEST BY THE APPROPRIATE NATIONAL AUTHORITIES, RELEVANT INFORMATION ON THE PARTLY COMPLETED MACHINERY IDENTIFIED ABOVE.
THE TECHNICAL CONSTRUCTION FILE REQUIRED BY THIS DIRECTIVE IS MAINTAINED AT THE CORPORATE HEADQUARTERS OF VERSADRILL CANADA INC. 240 GILBERT BOSSÉ STREET, VAL D'OR, QUEBEC, CANADA.

SIGNED IN: Val-d'Or, Quebec
ON THE DAY OF 2019, BY:
NAME:
TITLE:

2. ***WARRANTY***

Category	Model(s)	Period (Vehicle, OEM accessories, OEM tracks)
Drill rig	KmN series	6 Months or 1000 hr, whichever comes first

2.1 Period

VersaDrill Canada warrants from the date of first sale, demo or rental to the user / owner of every drill rig (see above chart) sold or rented as new and unused by an authorized *VersaDrill Canada* office or dealer for the above stated period of time (excluding specific components mentioned in paragraph 15).

2.2 Condition for warranty application

The application of the limited warranty is conditional upon the following:

A. The authorized *VersaDrill Canada* office or dealer must provide a copy by fax to the *VersaDrill Canada* Warranty Department of the vehicle delivery inspection form filled out at the time of vehicle delivery to the end user.

   NOTE: *In instances where there are discrepancies relating to the date of purchase, VersaDrill Canada reserves the right to deny and / or charge back any warranty costs incurred beyond the original warranty period.*

B. Provide proof (upon demand) that operational and maintenance guidelines specified in *VersaDrill Canada* technical publications were and are being followed.

C. Failure repair and / or parts replacement must be performed by an authorized *VersaDrill Canada* office or dealer, a trained *VersaDrill Canada* mechanic or a mechanic that has successfully completed the most recent *VersaDrill Canada* Vehicle Service training.

D. If requested, users and/or owner are responsible for returning all defective components related to warranty work to their authorized *VersaDrill Canada* office or dealer. In order to receive consideration, the warranty claim and part(s) must be returned within **30 days** from date replacement spare part(s) are shipped from an authorized *VersaDrill Canada* office or dealer. No return will be accepted without a properly filled out warranty tag.

2.3 What VersaDrill Canada will do

VersaDrill Canada will repair or replace, at its discretion, components found to be defective without charge for spare parts and labour through any authorized *VersaDrill Canada* office or dealer. *VersaDrill Canada* reserves the right to periodically visit end users to evaluate drill rigs, the work performed and the usage of OEM spare parts.

2.4 Warranty transfer

The warranty described here cannot be transferred to a subsequent owner(s).

2.5 Exclusions – not covered by warranty

A. Normal wear on all components (such as bearing, seals, sprockets, wipers, cylinder packing).

B. The excluded parts are: seals, fuel, oil and lubricants.

C. Replacement spare parts and/or accessories that are not genuine *VersaDrill Canada* spare parts and/or accessories.

D. Damage resulting from the installation of spare parts other than genuine *VersaDrill Canada* spare parts.

E. Damage caused by failure to provide proper maintenance as detailed in *VersaDrill Canada* technical publications.

F. Costs of regular maintenance services including, but not limited to: tune-ups, adjustments, spare parts and lubricants.

G. All optional accessories (as well as damages caused by optional accessories) installed on the drill rig by the customer, a dealer or a private contractor.

H. Damage resulting from, but not limited to: accidents, water intrusion, fire, misuse, abuse or neglect (as stipulated in the drill rig Operator's Guide).

I. Damage resulting from, but not limited to: operation of the drill rig in conditions incompatible with drill rig design as defined in the drill rig Operator's Guide or Operator's/Service Guide.

J. Damage resulting from a modification to the vehicle not approved in writing by *VersaDrill Canada*.

K. Damage caused by failure of a specific component mentioned in paragraph 15.

L. Indirect or consequential losses incurred by the vehicle owner including, but not limited to: lodging, travel time and mileage required to service a *VersaDrill Canada* product, transportation, towing or test drive, telephone/cellular calls as well as telegrams and electronic communications, taxis, rental of substitute vehicle, cost of service visits or any other incidental or consequential damages.

M. Damage or breakdown resulting from the improper or inadequate storage by the dealer or owner.

N. Drill rig delivery inspections.

O. All labour and freight charges.

2.6 Specific component warranty

A. The battery is covered by a limited warranty of ***3 consecutive months*** for spare parts; beginning on the date the vehicle first leaves an authorized *VersaDrill Canada* facility.

2.7 Express or implied warranties

This warranty is expressly given and accepted in lieu of any and all other warranties, expressed or implied, including without limitations any warranty of merchantability or fitness for a particular purpose. To the extent that they cannot be disclaimed, the implied warranties are limited in duration to the life of the express warranty. Incidental and consequential damages are excluded from coverage under this warranty.

Only authorized *VersaDrill Canada* officers can make affirmations, representations and warranties other than those contained in this warranty.

VersaDrill Canada reserves the right to modify this warranty policy at any time, being understood that such modification will not alter the warranty conditions applicable to drill rigs sold while this warranty is in effect.

2.8 Limited warranty, Replacement Parts & Accessories

Reference chart

Category	**Drill rigs model(s)**	**Period**
Spare parts & Accessories	All	3 Months

2.9 Period

VersaDrill Canada warrants from the date of first sale of the part to the user / owner (see above chart) sold as new and unused by an authorized *VersaDrill Canada* office or dealer for the above stated period of time (excluding specific components mentioned in paragraph 7).

2.10 Conditions for warranty application

The application of the limited warranty is conditional upon the following:

A. Provide *VersaDrill Canada* with a proof of purchase, more specifically the original Bill of Sale of part(s) and/or accessory. ***NOTE:*** *In instances where there are discrepancies relating to the date of purchase, VersaDrill Canada reserves the right to deny and / or charge back any warranty costs incurred beyond the original warranty period.*

B. Failure repair and / or parts replacement must be performed by an authorized *VersaDrill Canada* office or dealer, a trained *VersaDrill Canada* mechanic or a mechanic that has successfully completed the most recent *VersaDrill Canada* Drill Rigs Service training.

C. User and / or owner is responsible for returning all defective components related to warranty work to their authorized *VersaDrill Canada* office or dealer. In order to receive consideration, the warranty claim and part(s) must be returned within 30 days from date replacement spare part(s) are shipped from an authorized *VersaDrill Canada* office or dealer. No return will be accepted without a properly filled out warranty tag, and unless the appropriate procedure prescribed herein have been followed.

2.11 What VersaDrill Canada will do?

VersaDrill Canada will repair or replace, at its discretion, components found to be defective without charge for spare parts through any authorized *VersaDrill Canada* office or dealer. *VersaDrill Canada* reserves the right to periodically visit end users to evaluate the usage of **OEM** (Original Equipment Manufacturer) spare parts.

2.12 Exclusions – not covered by warranty:

1. Normal wear on all components.
2. The excluded parts are: seals, wipers, fuel, oil and lubricants.
3. Replacement spare parts and / or accessories that are not genuine *VersaDrill Canada* spare parts and / or accessories.
4. Damage resulting from the installation of spare parts other than genuine *VersaDrill Canada* parts.
5. Damage caused by failure to provide proper maintenance as detailed in *VersaDrill Canada* technical publications.
6. The costs of regular maintenance services including, but not limited to: tune-ups, adjustments, spare parts and lubricants.
7. All optional accessories (as well as damages caused by optional accessories) installed on the rig by the
   customer, a dealer or a private contractor.
8. Damage resulting from, but not limited to: operation of the drill rigs in conditions incompatible with drill design.
9. Damage resulting from a modification to the drill rigs not approved in writing by *VersaDrill Canada.*

10. Indirect or consequential losses incurred by the drill rig owner including, but not limited to: travel time and mileage required to service a *VersaDrill Canada* product, transportation, lodging of technician, telephone / cellular calls, as well as telegrams and electronic communications, taxis, rental of substitute drill rigs, cost of service visits or any other incidental or consequential damages.

11. Damage or breakdown resulting from the improper or inadequate storage by the dealer or owner.

12. All labor and freight charges.

2.13 Damage during transit

Every precaution is taken to ensure that new products leave the factory in good condition. However, a product may be received with evidence of damage incurred during transit. If this is the case, the carrier is insured and has the ***responsibility*** of his load (shipment) from its departure point to its destination. **Therefore:**

- Damage caused during transit is not covered by *VersaDrill Canada*.
- Loads must be inspected in the presence of the carrier.
- When damage to a package is noticed and / or concealed damage was discovered during unpacking, a formal claim should be made to the carrier and packaging should be kept for a thorough inspection.
- In such instances, the carrier's bill must be marked with the following:
  "Temporarily accepted, subject to further inspection."
- Damages and discrepancies will be reported within the time limitations appearing on the bill of lading.
- The dealer or end customer must refer to the carrier warranty terms and conditions.

2.14 Specific component warranty

The engines and undercarriage are covered by related **OEM** warranties (applicable to all models).

2.15 Express or implied warranty

This warranty is expressly given and accepted in lieu of any and all other warranties, expressed or implied, including without limitations any warranty of merchantability or fitness for a particular purpose. To the extent that they cannot be disclaimed, the implied warranties are limited in duration to the life of the express warranty. Incidental and consequential damages are excluded from coverage under this warranty.

Only authorized *VersaDrill Canada* officers can make affirmations, representations and warranties other than those contained in this warranty.*VersaDrill Canada* reserves the right to modify this warranty policy at any time, being understood that such modification will not alter the warranty conditions applicable to drill rigs sold while this warranty is in effect

3. ***FOREWORD***

3.1 First quality material and components.

VersaDrill Canada/ VersaDrill Canada manufactures its drills so that they are efficient, resistant and adapted for the work that need to be done. To do this, we always use first quality materials to give increased durability to your acquisition and superior strength to carry out your drilling contracts.

3.2 Standard consumable parts.

To allow easier maintenance when working in remote locations, all our consumable parts such as ball bearing, O-Rings, seal, bolts & nuts, etc. have their specific catalogue numbers from their manufacturer, allowing you to buy them from a provider near you in order to reduce the machine's downtimes and facilitate their acquisition.

3.3 Security & peace of mind.

Our staff is constantly attentive to the evolution in the field of health and safety at work, and to do this, is in constant search to improve and make drills as safe as possible so that your staff can provide you with superior performance while working safely. The security devices are installed according to the standards and requirements of the customers.

3.4 Easy to maintain & efficient.

Our drills are manufactured so that maintenance or repairs can be done as easily and with as little tooling as possible. In this way drillers can perform most maintenance without the help of a mechanic on site at any time.

3.5 Customer service.

Our staff is dedicated and qualified to provide unequalled customer service. We can answer all your questions and help you find solutions to any problem that may be related to your machine. Our expert team is ready to move on the ground at any time to help you and solve any problem. Contact us!

4. ***DESCRIPTION***

Diesel engine specifications:

- xxx hp	xxxx rpm

This diamond core drill is intended for surface core drilling from 45 degrees up to 90 degrees down (depending on chosen options) and for the rod sizes from A to P. The depth capacities for vertical down holes as stated in the technical specification. The diamond core drill is to be operated by trained drillers and helpers (two-man operations) with all factories supplied guards in place while is in operation.

The KmN 1.4* is one of the most innovated surface drills available in the diamond drilling industry, and like all other heavy equipment, it requires knowledgeable people to operate and maintain. Proper maintenance will protect your investment and provide many years of trouble-free operation. Knowledgeable operators will produce the results required for quick and profitable payback.

4.1 Power pack

The power unit contains a diesel engine, hydraulic oil reservoir, oil filters, oil cooler and electric motor starter panel supplied by the factor. The power pack is the main source of fluid power for all hydraulic functions all of the drill.

The hydraulic system is set at the factory and should not be altered or adjusted, unless by a qualified hydraulic technician or with approval by the factory.

4.2 Drill head and feed system

The drill head and feed mechanism receive its power in the form of oil flow under high pressure, through a series of hydraulic hoses from the power pack. Care must be taken to connect the hoses to the correct locations as indicated on the caps of each hose, and all the time must be kept clean and free of dirt. Although the hydraulic system is fitted with excellent quality high pressure filters to clean oil impurities, they will require replacement on a regular maintenance schedule as indicated in the service manual.

The drill headgears and bearings are lubricated by a self-supporting lubricating pump and will require regular attention to oil level, oil type and periodic oil and filter changes as indicated in the parts manual. Fittings are provided on all other moving parts that require grease lubrication. Frequency of lubrication is clearly stated in the service manual. This unit is supported by a skid base and must be adequately secured at all times while drilling.

4.3 Operating console

The console allows the operator to activate all hydraulic functions necessary for drilling and normal operation of the KmN 1.4. The console consists of valves, gauges and manifold blocks that direct the hydraulic oil flow to the various operational functions.

4.4 Feed frame

The drilling section/feed frame is normally set up on the drill platform, adequate to support the drill and provide the foundation for a solid plank floor. The rod clamp must be located as close to the working face as possible and allow rods to be moved freely to and from the drill head.

4.5 Back legs

Before drilling the feed, the frame has to be supported with the two stiff legs to support the mast and upgrade the stability.

4.6 Water pump

The hydraulic power source for the water pump comes from the drill power pack and the controls are located within the operator's console.
The fresh water must be piped into the drill rig and routed through the water type cooler locatedbeside the air cooler. The water is then piped into an open tank with sufficient capacity to maintain a reservoir of water to supply the pump and flush the cuttings from the drill hole during a complete drilling cycle.
A relief valve must be located on the outlet side of the water pump to avoid damaging the pump and exceeding the pressure ratings of downstream components.
A high-pressure hose with the adequate flow capacity must be connected to the pressure port of the water pump and have adequate length to enable the opposite hose and to be connected to the water swivel and travel with a ten-foot drill rod without obstruction. Routing of the water swivel hose must be in an area that will allow full travel of a 11 ft (3.4 m) drill rod without obstruction.

It is always good practice to connect the water swivel to the drill rod and flush with clean water before adding the rod to the drill string. Small pieces of rock may have entered the drill rod during moving within the mine and must be flushed clean to avoid unnecessary problems during the drilling cycle.

In-hole tools

The size of the hole and core size may vary in choice from mine to mine and will most often be arranged prior to the drill being set up. The North American standard for wireline core drilling has been established around the “Q” system, and the size of tools, including the chuck jaws and bushings in the drill will refer to “Q” or “O” depending upon the manufacturer. This wireline system is designed to permit each rod of the next smaller size to nest within the larger rod, and act like an outer casing or allow the hole to be reduced in size. This action enables a hole to be completed to a greater depth when rods have become stuck or if the drill has reached its maximum capacity with the larger size rod.

5. ***INTRODUCTION***

This operator's manual is an integrated part of our KmN 1.4 drill rig. It provides basic information about the characteristics and operation of the drilling unit and contains maintenance instructions to keep your machine in perfect working order. However, it must not substitute for in-depth training for the operator and his assistants.

Before performing any type of work, make sure that all personnel assigned to this drill have the necessary training for its operation, service and maintenance. Staff members should have sufficient time to understand and assimilate the contents of this manual. A copy of it must be always kept with the drilling unit to serve as a reference for operators.

This manual describes the utilization, how to maintain the equipment in proper working order and suggested services. This manual is good for our KmN1.4 surface drill rig only. The information contains in this manual was up to date when printed and may be subject to modifications without notice. We recommend that all working personal be familiarized with this manual and understand the explanations it contains. This step will ensure that all the recommended procedures will be followed and will keep your equipment working at its peak capacity.

This equipment has been designed for core drilling works exclusively and within range of with capacities described in the specifications section of this manual. For this reason, structural or performance changes not approved by the manufacturer could affect the certification, security & void the warranty of the drilling equipment.

6. ***OPERATION AND MAINTENANCE BASIC RULES***

1- In addition to this manual you should also have a good knowledge of generally recognized safety and accident prevention regulations. If you follow the regulations, you stand a better chance of accomplishing your task without harm to either the personnel or equipment.

2- Prior to starting up for the first time, familiarize yourself with the drill features, controls, and their functions. Refer to “operating instruction” for further information.

3- Various safety devices are built into the system of the drill for your personal safety. These devices must be checked at least once at the beginning of each shift to ensure that they are in full working order. The equipment should not be used unless safety and maintenance checks have been carried out according to the schedule.

4- Operators and helpers should wear hard hats, ear protection, safety glasses, safety foot wear, gloves and suitable clothing. Loose-fitting clothing, long hair, and jewellery can be caught in the moving parts of the machinery, causing serious injury or even death.

5- Always check the surroundings. During drilling and the moving of equipment, no unauthorized person should be allowed near the drill. Make sure visibility is good. Check the travel route if you are unsure of the safety of the ground.

6- Set control levers to their neutral positions prior to the start-up, otherwise the drill could start uncontrollably. Some of the levers are spring-centred so that the operation will stop once released. This is part of the safety system. Never lock these levers into the operating position. The unit should always be started from the control panel with the power unit command.

7- Hydraulic oils are poisonous if ingested. Use eye protection when handling. Hydraulic oils must be treated in compliance with safety and environmental regulations.

8- Prior to carrying out any repair or service to the drill hydraulic system make sure the motor is stopped and the system is depressurized. Always do the tag out/lock out procedure before doing any kind of maintenance and repair on the drill.

9- Be extremely careful while tracing leaks in the pressurized system. Hydraulic oils could penetrate under skin and cause complicated injuries or infection. If this happens, consult a doctor at once.

10- Dispose of hydraulic oils, filters, and grease in a safe manner, in accordance with environmental protection regulations.

11- Avoid the use of cleaning agents containing solvents like carbon tetrachloride. There are environmentally friendly alternatives now available on the market.

12- Use only authorized parts (Versadrill Canada). Any damage caused by the use of unauthorized parts is not covered by warranty.

6.1 Preventive measures

The KmN 1.4 drill unit should **only be operated by personnel who have received theoretical and practical training on this type of equipment**. Particular emphasis should be placed on security measures.

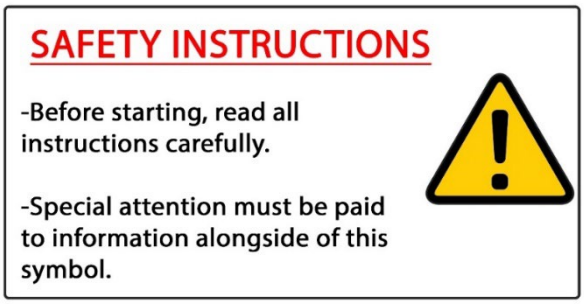
Keep this instruction manual with drilling equipment at all times. A downloadable copy of this manual can be sent if requested **(with your drill rig serial number provided).**

-Always wear your personal protective equipment (PPE) conformed to the exigence of the working site and when using this machinery.

- If, during an operation with the drill, you observe an abnormal action on the safety system or the general operation of the drill unit, immediately stop.

6.2 *This complete instruction manual includes:*

- Safety instructions
- Operator's instructions
- Parts book & maintenance instructions
- Maintenance intervals
- Troubleshooting
- The manual is part of the complete delivery of a KmN 1.4 and its peripheral equipment.



The manual does not replace the necessary training for the KmN1.4 or its peripheral equipment.

6.3 *Prohibited usages*

- ***Do not use the wire line hoist to lift loads other than its intended use and do not use the drill head to lift personnel.***
- ***Do not try to free stuck drill rods by running the drill head against a stop on the drill rods.***
- ***Do not let the drill rods free falls and catch them with the chuck or clamp.***
- ***Do not make unauthorized hydraulic and mechanical changes to the drill.***
- ***The drill kmN 1.4 is not designed for percussion drilling.***
- ***The drill kmN 1.4 is not designed to drill with drill rods smaller than A rods.***
- ***The manufacturer is not liable for any damage caused by unauthorized alterations made to the unit.***

IT IS UNDERSTOOD THAT THIS IS THE OPERATOR RESPONSIBILITY TO READ THOROUGHLY AND UNDERSTAND THIS MANUAL IN ITS TOTALITY

Approve by: _____

DATE : _____

SIGNATURE : _____

7. ***SAFETY***

7.1 Uses of this equipment

Before putting your new equipment to use, we would like to direct your attention to the safety aspects. Drilling can be a hazard to you and your environment. Good order, training and well-maintained equipment are the key factors to safe operation. This instruction book is no replacement for a thorough training, but will, as a training aid and reference book, help you maintain a safe working environment and keep the rig in good operational condition.

This diamond core drill is intended for surface core drilling from 45 degrees up to 90 degrees down (depending of chosen options) and for the rod sizes from A to P. The depth capacities for vertical down holes as stated in the technical specification. The diamond core drill is to be operated by trained drillers and helpers (two-man operations) with all factory supplied guards in place while is in operation.

- The diamond core drill should be operated in well-lit conditions.

- The diamond core drill should be in well maintained mechanical conditions without any hydraulic or mechanical modifications that were not authorized by the factory. All the pressure settings should be set as specified in hydraulic schematic.

- Any use going beyond this shall be considered “not intended use,” and the manufacturer’s standard warranty will not apply. Unintentional use shall be at the owner’s risk. Proper use also includes observing information in operation, service, and maintenance books as stipulated by the manufacturer.

- The drill should be run, serviced and repaired by personnel properly trained for their task. These personnel must have sound knowledge about hazards in their respective profession.

- General safety regulations must be observed. Personnel should be aware of dangers resulting from abuse of drugs and alcohol, as well as effects of medicines legally prescribed, or a mixture of any of them.

7.2 Security

Before doing maintenance on this equipment, you must focus on safety issues. The key factors for safe operation are good equipment maintenance & qualifications of the workers.

This manual does not replace the qualification or detailed knowledge of your company safety procedures. This manual should be used in addition to the qualification and competences of the staff to help maintain a safe working.

-Never tamper with or modify the components of the drill unit, especially the safety system, as this could have dangerous consequences.

-You must inform the manufacturer of any modifications made to the geotechnical drill, power unit & console for their approvals.

-Most accidents related to the operation, maintenance or repair of the product are caused by non-compliance with basic safety rules, company procedures or lack of precautions.

-Often, an accident can be avoided if potentially dangerous situations are recognized before the accident occurs. "The manufacturer" cannot foresee all the possible circumstances or that could cause a possible danger. Therefore, the warnings in this manual do not include all risks. If a tool, procedure, work method or operating technique not specifically recommended by the manufacturer is used, make sure that it is safe for everyone.

-The safety recommendations included in this operator manual have been written to the best of our knowledge and in accordance with safe working practices and were generally decided at the time of writing this manual. It is important to know all of your company's safety regulations and all applicable safety laws and practices at your workplace. When ignoring these risk warnings, it can result in serious injury, even death.

- Before starting the machine for the first time, take the time to familiarize yourself with all the features, controls and functions of the equipment. You will have all the information for the console functions in the section 6 of this manual: there may be differences depending of the options that were chosen when the drill was ordered. In that case, look up in the part book section of this manual; it will be customized for your particular drill rig.

-.Operators and helpers must be wearing protective glasses, capped working boots, gloves and coveralls. They must also wear their hard hat, ear plugs when necessary. Loose clothes and jewelry could cause devastating corporal damage and must not be worn near a working this machinery.
- Check the area near the equipment. When drilling and moving the drill, no unauthorized persons should be around the equipment. Request the assistance of a supervisor to move the drilling equipment into potentially dangerous terrain. Check the route you will have to go with the equipment (if truck mounted) to ensure its safety.

- **Before starting the drill, make sure the controls levers and switches are in their neutral positions. Otherwise, the equipment could start up uncontrollably**.

Some levers have springs so that the levers will relax when the machine is shut down. This is part of the security system. Never force these levers to hold their positions with rope, stick or anything similar. The geotechnical drill must always be started from the control panel.

- Stop the drill when adding fuel. Fuels must be handled with care and kept away from sources of heat, sparks and electrical systems. You cannot smoke within 10 metres of the fuel. Do not fill the tank in a confined space without ensuring adequate ventilation. The gases are very toxic. Get rid of spilled fuel in accordance with the applicable safety and environmental rules you are in. (Never use absorbent, collect contaminated soil and transport it to an approved depot). Do not overload the fuel tank; if you refill the tank during the morning, the fuel dilation due to the warmer temperature during the day, could cause spills of the fuel tank.

- Never leave the drill unattended with a running engine. The operator should have the key of the machine with him when he is not in operation.

- Hydraulic oils are toxic. Wear safety glasses and gloves. Hydraulic oils, just like fuels, must be used in compliance with safety and environmental standards.

- Before any repairs or maintenance of the hydraulic system or the water system of the equipment, make sure that the engine is stopped and the system is depressurized.

- Take extra care when trying to locate leaks in the pressurized system. Hydraulic oil, water or pressurized air can cause serious damage or infections. If this occurs, consult a doctor immediately.

- Hydraulic oils, fuels, filters and acids must be disposed of safely and in accordance with the environmental protection codes of the place where you are.

- Avoid using non-ecological cleaning products that contain solvents such as carbon tetrachloride. There are no alternatives to these products on the market.

7.3 Underground Hazards

In a modern community, several public services are buried; electric cables, natural gas lines, water lines, drains, hoses for industrial chemicals in liquid or gas, storage tanks, fiber-optic communications lines and standard communications.

These facilities can be dangerous and must be located and identified before drilling begins. Breaking one of these service lines could cause serious harm to the person; resulting from an explosion, electrocution, fire, explosions of hazardous materials or laser leakage from an optical cable (lights used in fibre-optic cables can cause permanent damage to vision NEVER looked at the end of an optical fibre cable).

You are personally liable for any property damage or personal injury that may have been caused as a result of the drilling if you have not taken the necessary preventive measures. You must understand the local regulations on excavation and digging. You must define the responsibilities between the customers, the owners, the contractors, the operator or any other third parties. Responsible parties should use knowledgeable and experienced people to identify hazards in the workplace. This includes informing all utilities that are underground facilities on the periphery of the drilling site. These companies must locate and mark the location of their facilities with a minimum of 10 metres on each side of the planned drill path.

For additional security, inspect the premises to locate any neglected facility.

Check for signs that may indicate buried services. Search cubic metres of gas, oil, water, etc. Access logs, junction boxes and streetlights indicate some kind of underground lines. Use a metal detector if you have suspicions that you might find barrels or tanks containing unmarked contaminated waste. Observe also colour changes and soil levels, indicating that there may be subsequent excavations.

Use the safety equipment correctly and appropriately according to the condition of the equipment found.

Before beginning drilling work around a previously identified facility that could constitute a hazard, expose it manually all along the path you will have to do with the drill. Closely watch the progress, carefully guide the drill around dangerous objects and keep a safe distance at all times. Electric cables and gas lines must be deact5ivated before drilling. Once the drilling work is finished, those installations must be inspected and approved before putting them back in operations.

Electricity does not essentially take the path with least resistance. It will take all paths that can lead to the ground. Drilling rods are an excellent conductor and will conduct electricity in drilling equipment and everything in contact with it.

People have already had severe accidents resulting in death by drilling through power lines. The most frequent cause of job-related deaths in the drilling industry is electrocution caused by contacting overhead power lines with the mast or the drill rig. Drilling can safely be conducted in areas where three are overhead power lines but certain precautions must be taken;

- Assume that all wires are live and dangerous.
- Always keep adequate clearance from electric wires in accordance with state and local regulations as well as manufacturer guidelines.
- At least 10 feet of clearance must be allowed.

The following gives you a general idea of the minimum distances that must be maintained from overhead electrical lines:

- 10 ft (3.04 m) at 50 kV
- 10 ft (3.04 m) plus 0.4 in (1 cm) for each kilovolt above 50 kV
- Twice the length of the line insulator
- Never less than 10 ft (3.04 m)
- -Never drill under or near overhead wires.
- -Contact the power lines company to determine the kV in an electrical line.
- -Insulate all handles that are used to operate the rig.
- -Rig driver should always jump clear when exiting the cab and not swing from it.
- -Remember – the operator in the cab is generally unaware that an overhead wire has been contacted.

If the drill wire does contact overhead wires, follow these safety guide lines:

- Keep everyone away from the rig. Do not touch any part of the equipment or attempt to enter or leave the cab.
- Have someone call the power company and the fire department immediately to request assistance.
- Do not touch anyone who may be in contact with the current unless life is threatened.
- If a rescue is attempted, use a dry, clean non-conductive material such as a polypropylene rope to remove the victim, keep as far away as possible. Only touch the victim when well away.
- WARNING: use of a manila rope or wooden pole may conduct electricity. Under certain circumstances even generally non-conductive materials may conduct electricity.

If the victim is unconscious when removed, consider administering first aid and CPR if you have been properly trained and assigned.
If you inadvertently touch an electrical line, indicated by a fault in the current around the place where you work, smoke, explosion, electric arc or safety device is triggered:

- Do not leave the protective mat. If you have your feet directly on the ground, stand up and do not touch the equipment.
- Alert people who are in the area, order them to leave the immediate area without touching anything.
- If the incident occurs during perforation, do not remove the drill bit or soil rods in any case.
- Call the supervisor who is in contact with the utility to stop the power in the system.

7.4 Priority basic rules

It is very important to be well informed about;

- Company procedures.

- Always use personal protective equipment as required under the circumstances or regulations (PPE).
- Complete safety kit, clean and well visible to all workers.
- Keep the drill clean; maintain the drill and its surrounding area in a clean and orderly manner without external surplus material such as waste, oil, tools, etc.
- Safely guard all safety and maintenance items.
- Use all cleaning solutions with care.
- Do not allow unauthorized personnel access the drill or to stay in the work space.
- Have emergency procedures in hand and make sure everyone knows them.
- Make sure the drill is safe and in good working order. Make sure it is placed the right way.
- Make sure the cables and hoses are exempt of defect and do not have wearing signs.
- -Remember that drills are operating with a lot of hydraulic pressure.
- -Make sure your equipment and hand tools are properly positioned and have been properly restrained.
- -Carry out regularly pre-operational instructions and especially to notify of any obvious defect or any suspicion of defect.
- -All work area including job sites must be kept clean and orderly.
- -Floor and work surfaces must be kept dry and slip resistant, any spills should be cleaned up as quickly as possible.
- -Dust and other combustible materials should be removed as soon as possible to reduce the risk of fire.
- -Bins and other waste receptacles should be covered, particularly those with oily rags.
- -All walkways and aisles must be kept clear and unobstructed.
- -Electric cords should not cross walkways where they could be a tripping hazard.

- -Changes in floor height must be plainly marked.

7.5 Risk evaluations

In general, the risk assessment includes the desired use, the foreseeable misuses, including the conditions of maintenance and control process. The manufacturer has made every effort to reduce any unsafe conditions that could cause personal injury or damage to the equipment during normal use of the drilling equipment. However, the operator must always take precautions when handling/using any part of the drill with which he is less familiar or which may present possible risks.

7.6 Fires prevention

-Accumulation of waste materials, scrap, cardboard and packing material should be limited and discarded as soon as possible.

Extra care should be taken when disposing of rags and cloths contaminated with oils and solvents. Storing these materials may cause spontaneous ignition.

-One or more fire extinguishers must be placed near the drill as recommended by the company. It must be tagged, serviced and maintained every year. They must be placed where they are readily accessible and should not be moved unless they are in use. All site employees should know how it works and how to use it as recommended by the manufacturer, the company or local safety regulations.

Before each drill uses, ALL fire extinguisher MUST be inspected.

- -Management must be notified of any damage to fire protection equipment.
- -Employees must report fire, smoke or potential fire hazard to the fire department immediately.
- -Every employee must play a part in minimizing the possibility of fire such as keeping combustible separated from ignition sources, following no-smoking rules and avoiding needless accumulation of combustible materials.
- -Containers must be clearly labelled as to their contents.

7.7 Welding, cutting & brazing

- **VERY IMPORTANT** before performing welding work to repair or modify the drilling unit, always be sure to disconnect the power directly to the source (battery) to prevent breakage in the electrical system or inside the hydraulic components.

WELDING, CUTTING OR BRAZING EQUIPMENT MAY BE USED ONLY BY AUTHORIZED AND TRAINED EMPLOYEES.

- Equipment must be checked regularly to ensure that it is in good condition and free from defects.
- Cylinders valves, couplings, hoses, regulators **MUST BE KEPT FREE OF GREASE AND OIL.**
- Hoses are colour coded- red for acetylene, green for oxygen and black for inert gas and air.
- When arc welding, the welders must not wrap the electrode cable around their body.
- All used tanks, drums and other containers must be thoroughly cleaned to remove any contaminants before welding or cutting commences.
- All appropriate personal protective equipment must be used when welding or cutting.
- Extra precautions are required for any welding or cutting in confined spaces.

7.8 Environment directives

As part of our commitment to a better environment, we want to inform you, the customer, how you can minimize the impact on the environment. These instructions are simple but important and aim to preserve the environment.

7.9 Exploitation, storage & elimination (if applicable)

Oil leak: hydraulic and lubricating oils pose a threat to the environment. Changing lubricating oils, hydraulic hoses, hydraulic filter element. Collect any excess oil and waste (such as oil filters elements contaminated with oil). Delete in accordance with national regulations. Use biodegradable hydraulic oils when possible.

Motor: Engine emissions are toxic and pose a threat to the environment. Always provide fresh air when the engine is running. A well-maintained air filters help keep emissions low.

Fuel :(gas, diesel gas) the release of fuel poses a threat to the environment. Collect all wastes and fuel spills and dispose of them in accordance with national regulations.

Grease: Lubricating grease is a threat to the environment. Collect all waste and spills and dispose of them in accordance with national regulations.

Batteries: They contain acids and heavy metals. Batteries can be a threat to the environment and your health. Avoid contact with acids and dispose of the batteries in accordance with national regulations.

Chemicals: Eliminate chemicals such as drilling additive other additives, glycol, etc., according o the manufacturer's instructions. Avoid using cleaner containing solvent such as carbon tetrachloride. That product6 is a threat to your health and to the environment. There are now better alternatives available on the market. Observe national regulations handling and disposal of waste.

Metals: (Steel, aluminum, etc.) These products are recyclable and must be treated in accordance with local regulations.

Components of electrical parts (cables, electronics, etc.) must be treated in accordance with national regulations.

7.10 First aid

First aid is vitally important due to the often-remote locations of many drill sites. Often the only person available to offer first aid will be a co-worker.

- -At least one member of the drill crew must be trained in first aid and CPR. Particular emphasis should be given to training in the recognition and treatment of electric shock, heart attack, stroke, broken bones and snake bites. Teaching should be on a person-to-person basis and cannot just be reading manuals.

- -Well-stocked first aid kits must be with each drill rig. It is the responsibility of the driller or supervisor to ensure that the first-aid kit is properly maintained and fully stocked. If the kit is not fully stocked contact your supervisor to obtain replacements of first aid supply.

- -Emergency numbers and address of the nearest hospital should also be readily available.

- -If there is a risk to employees' eyes or body exposed to harmful chemicals or other materials, an eye wash station or shower facilities should be provided.

7.11 Guards on the machine (if applicable)

The purpose of security guards is to prevent contact with any dangerous parts of machinery. Guards are needed on a drilling unit where injury is possible from rotating parts, nip points, cutting, moving, shearing, forming and punching mechanisms. Types of guars that may be included on your machine can be a barrier guards enclosing the auger, interlocked devices, moving barriers, two-handed control devices and sensing devices.

THESE DEVICES SHALL NOT BE DISENGAGED OR TEMPERED WITH.

7.12 Important knowledge

All employees must be properly trained before operating any machinery. The supervisors or drillers must ensure that machinery is operated safely.

Before attempting to work with this drill, the operating personnel must have read this Maintenance Manual in whole. The personnel must use the PPE according to the type of work to be done. They must also familiarize themselves with all controls, indicators, levers and accessories and be knowledgeable on the purpose of each and any of these elements, their use, their control and the safety operating procedures that govern them.
At all times, follow the safety procedures and the company instructions as described in this Manual and focus in particular on all warnings and hazard notices. It is mandatory for all personnel to have the qualifications, the skills and tools necessary to accomplish these procedures properly. Also, all personnel involved in the maintenance of this equipment must be knowledgeable or aware of all possible risks.
It is important for you and all your colleagues to wear the appropriate personal protection equipment before starting the work. The operation of this equipment, the use of its safety features, the lubrication, the inappropriate maintenance or servicing of the product may be hazardous and cause injuries or death.

For this reason, it is of the utmost importance to be well informed of the following:

- Company's procedures.
- Personal protection equipment (PPE); always wear the personal protection equipment as required under the circumstances or as per regulation.
- Complete first aid kit; clean and in a conspicuous place, accessible by all.

- Clean drilling rig: maintain the machine and its surroundings in a clean and orderly state, without piling up material, such as refuse, oil, tools, etc.
- Use a safekeeping system. Keep in a secure place all safety and maintenance components.
- Use with care all cleaning products
- Personal protection equipment (PPE); always wear the personal protection equipment as required under the circumstances or as per regulation.
- Complete first aid kit; clean and in a conspicuous place, accessible by all.
- Clean drilling rig: maintain the machine and its surroundings in a clean and orderly state, without piling up material, such as refuse, oil, tools, etc.
- Use a safekeeping system. Keep in a secure place all safety and maintenance components.
- Use with care all cleaning products.
- Advice must be given of all required repairs.
- Do not allow access to the equipment by any unauthorized person or let any unauthorized person remain on the work site.
- Use with care all cleaning products.

7.13 Personal Protective Equipment (PPE)

When exposure cannot be controlled by engineering or administrative mean, the use of Personal Protective Equipment is mandatory. Wearing PPE is not only a good idea but it is the law. Therefore, supervisors and drillers must ensure the proper PPE is used. Personal Protective Equipment includes but it's not limited to eye protection, foot protection, respiratory protection, hearing protection, head protection, gloves and special clothing.

Employees will be advised of the personal protective equipment needed. However, on occasion, you may be confronted with a situation where PPE is needed but not identified thus, the employee may need to use their own judgment in determining when another type of PPE is needed.

Symbol	Specific requirement
	Approved by site hard hat
	Approved by site clear safety glasses
	Approved by site ear plugs or other protection
	Approved by site steel capped safety boots
	Site approved gloves

7.13.1 Other Personal Protective Equipment

For certain drilling operations, additional personal protective equipment may be required. When drilling close to a highway, reflective clothing will be required. If drilling is being conducted in ground contaminated with chemicals or radiation special protective clothing and equipment will be needed. Management and the client will determine the level of specialized protective personal equipment needed for the job.

7.14 Lockout tag out

This is also known as the Control of Hazardous Energy, its purpose is to ensure that machinery and equipment is locked out before any maintenance or repair work is carried out on it. This will prevent employees from being injured by an unexpected energizing, start up or other release of energy that could occur and cause injuries.
All equipment and machinery is required to be locked out to prevent employee from operating it accidentally or inadvertently while it is being serviced or repaired by another employee. Any stored energy such as hydraulic, pneumatic or mechanical must be releases before the equipment is locked out. Appropriate employees will have keyed safety locks to use for

locking out. Employees should never attempt to operate machinery or equipment that has been locked out.
The locking out must apply to all energy sources including electrical, mechanical, hydraulic & pneumatic. The energy that must be disconnected, drained or otherwise controlled before the equipment can be locked out.
After the equipment has been locked out, it must be tested to ensure that it de-energized and cannot be started.
Except in management authorized circumstances only the person locking out a machine may remove the lock and re-energized it.
Good standard procedure (suggested; always follow your company's procedures for lockout);

1- Evaluate the source of energy that need to be shut down and lock up:

-Potential energy
-Electric energy
-Hydraulic energy
-Pneumatic energy

2- Eliminate all sources if possible, of potential energy related to the gravitational force.

3- Stop the power supply (turn OFF main switch).

4- Drain the residual pressures (drain air out the hydraulic tank)

5- Fill in a padlock label (if possible).

6- Install a hasp on each lockout point and install a single-key personal padlock, equipped with a lockout tag, on each hasp. Lock the padlocks. Put the key (s) in your pocket.

7- Perform a startup test. Nothing should start or move. If something starts or moves, you have to solve the problem and start the procedure again.

8- When you have finished the job, you remove the locks that are identified in your name and bring all the lockout material on the board

8. ***BASIC DRILLING SAFETY***

This part will cover the control of safety hazards on and around the drill site. Hazards encountered when travelling to or from the drill site and hazards involved in maintaining geotechnical drilling equipment.

Each drill crew must have a designated safety supervisor, usually the driller and all other employees must follow the driller's instructions.

8.1 Keeping of the drilling area

Tools, equipment, and supplies must be kept stored in a suitable location at the drill site so they can be safely handled and will not fall on a crew member of the public.
Auger, casings, rods and pipes must be stacked on racks or sills to prevent rolling or sliding.
All work areas, platforms and walkways clear of all obstructions, ice and grease or mud that could cause a trip or a fall.

8.2 When doing maintenance

When performing maintenance on the drill rig and/or other equipment follow these guide lines;

- Always wear safety glasses.
- Before adjusting, lubricating or repairing the rig or fittings, shut down the drill rig engine. Prevent accidental starting by removing the ignition key. Lock out procedure must also be followed.
- Before beginning the maintenance or repairs on the hydraulic equipment, release all pressure from the system. Use caution when opening drain plugs and radiator caps; they may be under pressure.
- Never climb the mast and if maintenance is necessary on it, it should be lowered and the engine stopped.
- Never use gasoline for cleaning around the drill rig.
- Never cut or weld near a fuel tank.If there are guards, covers or caps have been removed for maintenance, ensure that they are replaced.

8.3 Preparing the work area

Before drilling, the work area should be as clear & level as possible, drilling should not begin if there are obstructions, trees or if the ground is unstable.

8.4 Start Up

(Please, refer to section **13** of this present manual for the detailed instructions)
Before starting the engine ensure that the brakes are set, gear boxes are in neutral position, hoist control is disengaged and all those other controls are in correct positions.

8.5 Drilling

The following recommendations and guide lines are the best practices when doing any kind of drilling work;

- Never drive with the drill rig mast raised (if applicable).
- Before raising the mast, always check for overhead obstructions.
- Everyone except the driller should be clear of the drill rig while it is in operation.
- The operator must shift the transmission controlling the rotary drive and the feed lever to neutral before leaving the control area. Before leaving the drill area, the drill must be shut down.
- Tools must never be thrown or dropped.
- If drilling in an enclosed area, ensures that exhaust fumes will not accumulate (if applicable).
- Keep boots free of mud and grease; when standing on the drill platform make use of hand holds.
- In freezing weather does not touch metal with bare hands.
- Cover and protect unattended boreholes to prevent falls.
- During an electrical storm, stop drilling and move to a safe area away from the drill rig.

8.6 Rotary & core drilling

When doing core drilling, you should follow the following guide lines;

- When removing rods from the hole do not clean with the hands, use rubber wipers to remove drilling fluids.
- If it is necessary to stand on a portable drilling fluid (mud) pit, ensure that non-slip cover panels are used, do not stand on the narrow sides.
- Do not lean drill rods against the mast, they must be secured vertically or stored horizontally.
- Drill rods shall not be extended higher than one section of drill rod (or break) above the top of the mast.
- If a string of drill rods falls into the hole, never attempt to stop with it the hands.
- If there is a blockage or plugged bit, pressure should be relieved between the pump and the obstruction before breaking the first joint.

8.7 Site security

Here are some key points to provide assistance to eliminate theft of tools and/or equipment on a job site. Those are generals; always prioritize your company's procedure:

- Maintain an ongoing inventory of all tools and equipment on site.
- Mark tools and equipment with ID number. The company name should be present also on any equipment and tools that will be used on the job site.
- Keep tools and equipment securely locked in the trucks when not in use. If left at the job site overnight, secure all equipment and tools locked in a storage box.
- Always keep trucks locked when unattended.
- Park equipment (that will be left overnight) centrally in a well-lighted and secure area of the job site.
- Disable equipment that must be stored in an unsecured area.

- Keep any storage of valuable equipment to a minimum at all sites. Remove any equipment that must be stored in an unsecured area.
- Remove any equipment or tools from the job site when no longer needed.

- Any theft or vandalism should be reported immediately to the supervisor and follow-up with a police report.

8.8 Warning labels found on the equipment.

(If applicable)

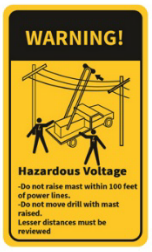
Part #AC-008

warning sign

-Danger of rotating parts.

-Could cause severe injuries

-Keep out of the hazardous area during operation.



Part #AC-016-AN

warning sign

-Hazardous voltage danger.
-Could cause severe injuries even death.
-Do not raise mast within 100 fet of power lines and lesser distances must be reviewed.

Part #AC-009

warning sign

-Danger of pinching point.

-Could cause severe injuries

-Keep out of the hazardous area during operation.

Part #AC-018

warning sign

-Rotating tool hazard.
-Could cause severe injuries even death.
-Keep yourslef out of the hazardous area during operation.

Part #AC-017

warning sign

-Crushing hazards.

-Could cause severe injuries even death.

-Keep yourself out of the hazardous area during operation.

Part #AC-019

warning sign

-Danger of pinching in rotating parts.

-Could cause severe injuries .

-Keep out of the hazardous area during operation.

Part #AC-WL-01-2021

warning sign

-Never use the wire line to lift or moving things or a person.

-Wire rope can break without warning. keep distances & do proper maintenance.

-The last 5 wraps of rope must be left on the drum to assist holding the load. operation.

Part #AC-015

warning sign

-Crushing hazards.

-Could cause severe injuries

-Keep out of the hazardous area during operation.

8.9 General warning labels

(If applicable)

Part #AC-020

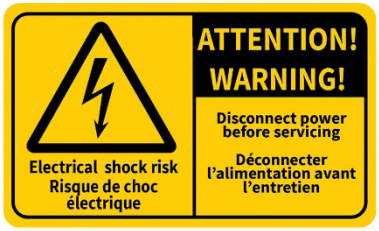
PPE
(Personal Protective Equipment)
Mandatory

warning sign

-Burn hazards

-Contact may cause burn.
-Allow time to cool before servicing.

Part #AC-021



warning sign

-Hazardous voltage danger.
-Could cause severe injuries even death.
-Disconnect all power sources before servicing.

Part #AC-023

Lifting points.

You can use lifting equipment where indicated.

8.10 Serial number

It can be found on the frame, on the mast, on the drill head and on the console.

We offer a great customizability of our drill rig. When ordering a part, inquiring information about a rig or if you need another copy of this manual, please, give us the serial number of your particular drill rig. This will ensure that we will give you the information for your drill rig.

9. ***SAFETY RECAP***

PLEASE READ AND HEED THE FOLLOWING IMPORTANT SAFETY NOTICES BEFORE PLACING MACHINE IN SERVICE.

******WARNING******

HYDRAULIC COMPONENTS, INCLUDING, BUT NOT LIMITED TO VALVES, FITTINGS, HOSES, CLAMP AND TRANSMISSION MAY BE HOT. TO PREVENT INJURY LET THE HYDRAULIC COMPONENTS COOL BEFORE SERVICING THE EQUIPMENT.

BEFORE MAKING A REPAIR OR MAINTENANCE ON THE HYDRAULIC SYSTEM, MAKE SURE THE SYSTEM IS DEPRESSURIZED.

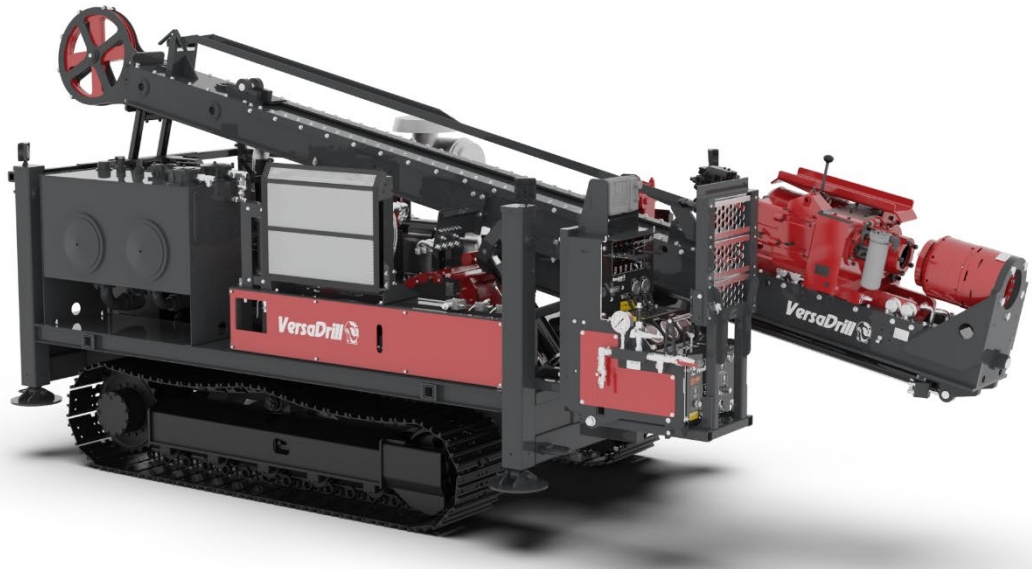
DISMANTLING AND ASSEMBLING OF COMPONENTS THAT COULD MOVE OR FALL DOWN MUST BE SECURELY SUPPORTED OR STRAPPED IN PLACE.

REPAIRS TO WELDS SHOULD BE MADE BY A LICENSED WELDER ONLY. PARTICULAR ATTENTION SHOULD BE GIVEN TO COMPONENTS THAT CAN CAUSE INJURY OR SERIOUS DAMAGE.

******NOTICE******

PROPER PERSONAL PROTECTIVE EQUIPMENT MUST BE WORN WHEN OPERATING AND MAINTAINING THIS EQUIPMENT. LOOSE FITTING CLOTHING, LONG HAIR AND JEWELRY CAN GET CAUGHT IN MACHINERY AND CAUSE SERIOUS INJURY OR EVEN DEATH.

10. ***KMN 1.4SM GENERAL SPECIFICATIONS***



FEATURES AND BENEFITS:

- KmN1.4 Surface drill rig version
- Made of steel
- Depth capacity: 1 400m (4 600 ft) N size
- Total weight 22,500 lb (10,209 kg)

10.1 Specifications:

Rotary head and chuck	
Holding capacity	38 000 lb (17236 kg)
Spindle interior dimension	5” (127 mm) PWL Rod
Chuck operation	Spring closed and hydraulically opened
Final drive	HV 80-3 chain in an oil bath
Hydraulic motor	160 cc variable

Transmission	4-Speeds mechanic
Rotary head Ratio	1:2.33
Lubrication	Pump pressurized, filter and cooler
Speed	0 to 1 250 rpm

Filtration
3 x 25 µm impregnated paper
2 x pump return line
1 pump & motor case drain

Hydraulic module	
Floating rotary head N Torque limit on rotary head	
Hydraulic pumps (3)	227 l/m (60 US gal/min) @ 2 000 rpm (max. 4 100 psi (283 bar)
	163 l/m (43 US gal/min) @ 2 000 rpm (max. 4 500 psi (310 bar)
System drive	Open loop, load-sensing circuit
Hydraulic tank	85 US gal (321 l)
Oil heat exchanger	Air cooling & water cooling systems

	Drilling capacity	
*Recommended size for maximum performance	*B 2 3/16" (55.6 mm)	6 230 ft (1 900 m)
	*N 2 3/4" (69.9mm)	4 600 ft (1 400 m)
	*H 3 1/2" (88.9 mm)	2 625 ft (800 m)
	*P 4 5/8" (117.5 mm)	1 610 ft (500 m)

Feed frame	
Head stroke	11 ft (3.35m)
Raising speed	120 ft/min (37 m/min)
Lowering speed	245 ft/min (75 m/min)
Pull capacity	38 500 lb (11 800 kg) @ 4 000 psi
Push capacity	18 850 lb (11 800 kg) @ 4 000 psi
Possible angles	0 to 90 degrees

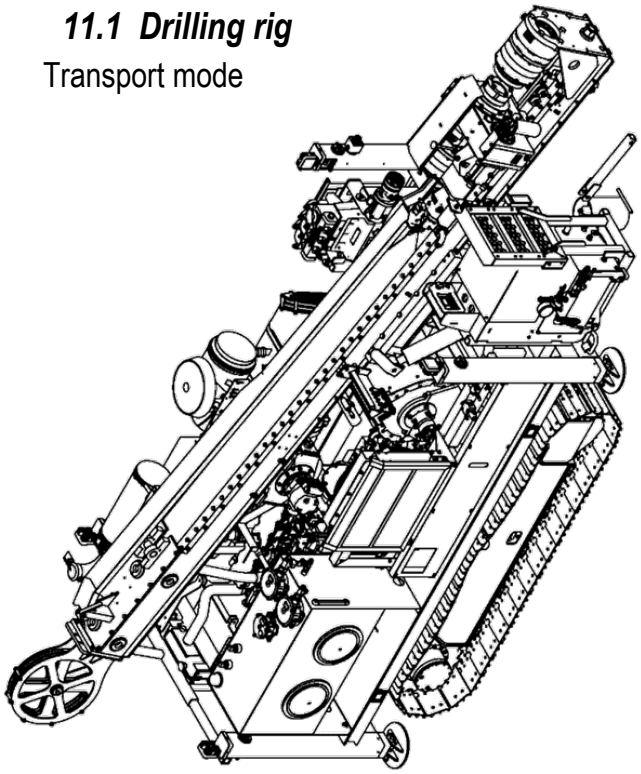
Funk transmission serie 2300D HMD model #23155			
Speed	**Ratio**	**rpm**	**Maximum torque**
1	6.63:1	0-189	8 037 lb*ft (10 898 N*m) @ 90 rpm
2	3.17:1	0-394	3 829 lb*ft (5 191 N*m) @ 189 rpm
3	1.72 :1	0-727	2 078 lb*ft (2 817 N*m) @ 349 rpm
4	1 :1	0-1250	1 208 lb*ft (1 638N*m) @ 600 rpm

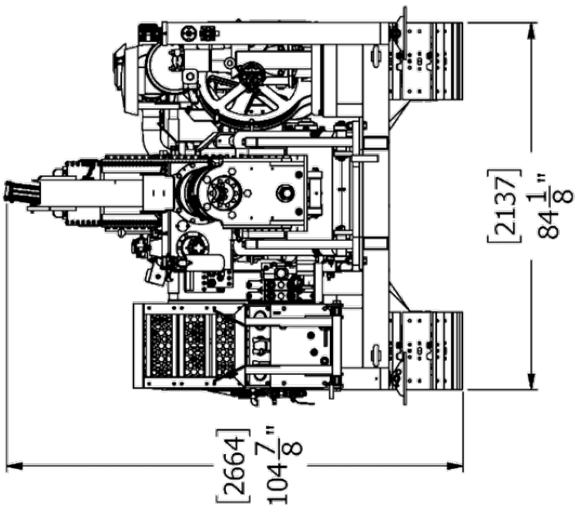
Hoist wireline	
Cable capacity (3/16 – 4.8 mm)	4 600 ft (1 400 km)
Empty pull capacity	2 000 lb (907 kg)
Full pull capacity	650 lb (295 kg)
Variable speed as needed	

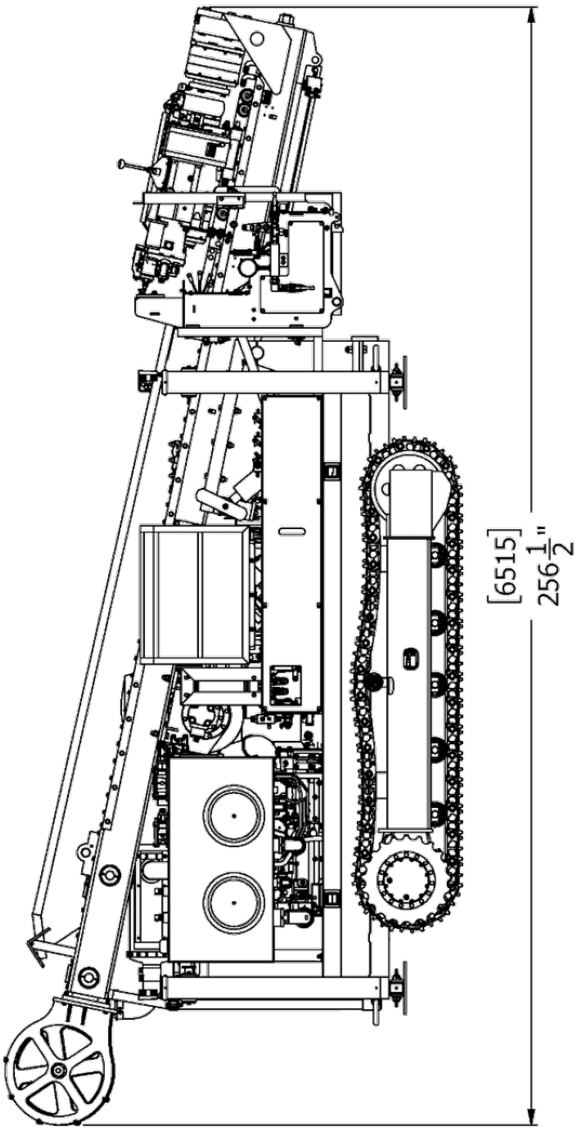
11. ***OVERALL DIMENSIONS***

11.1 Drilling rig

Transport mode

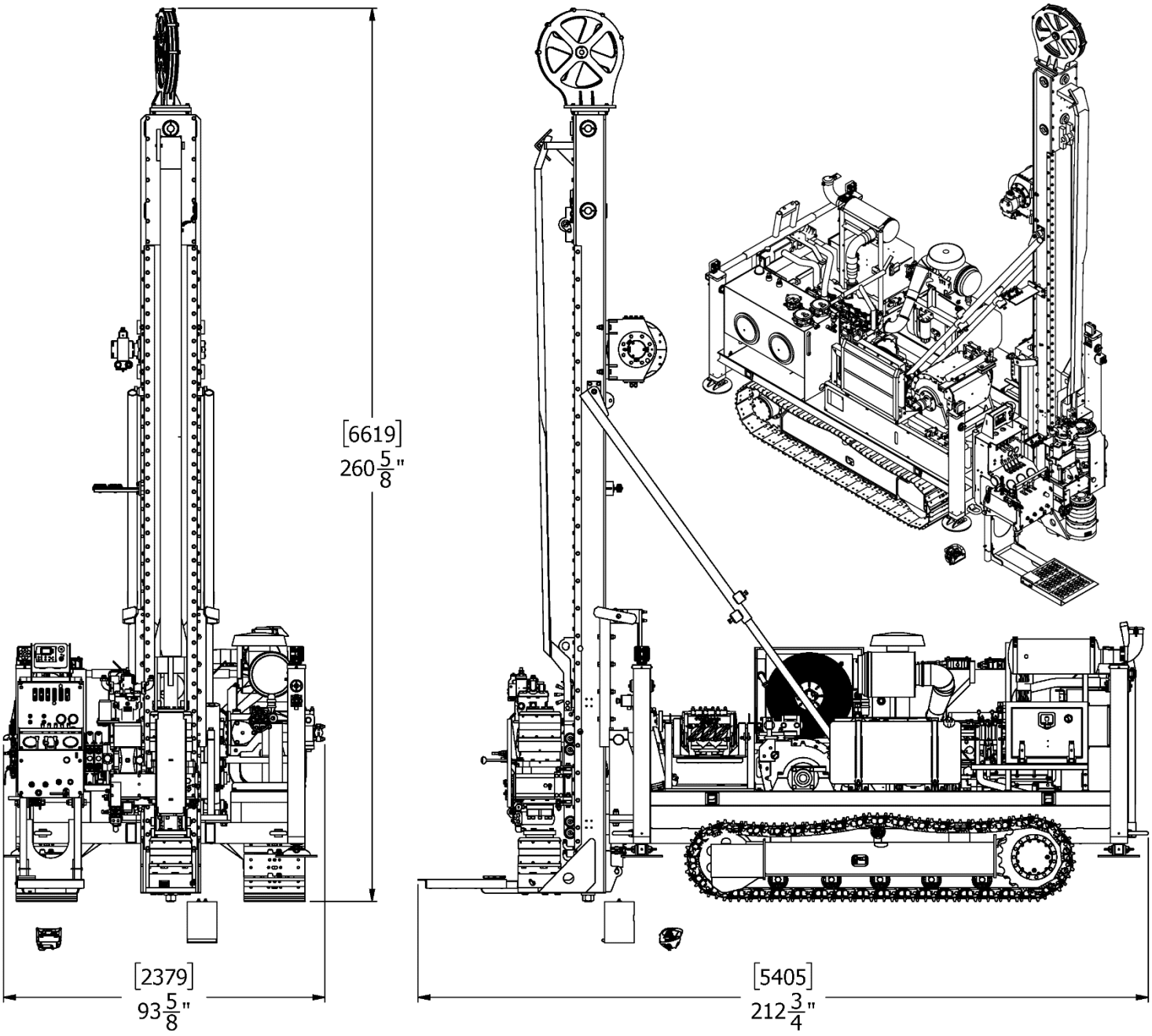






11.2 Drilling mode

90 degrees



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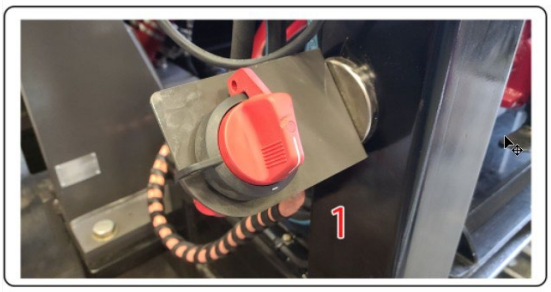
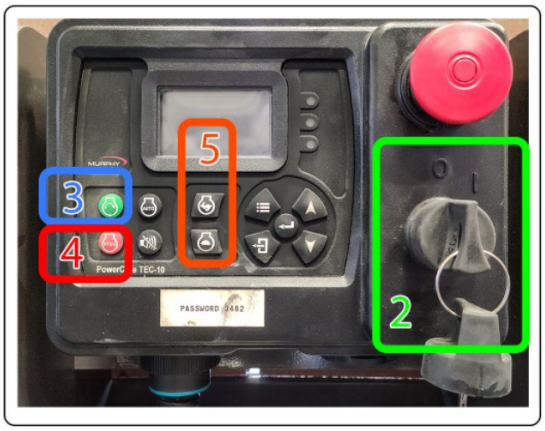
12. ***INSTALLATION INSTRUCTIONS***

12.1 Start up



1- Activating the drill rigg

-Take the Transport Master Switch prior to start up the engine. (1)
-Turn the Transport Master Switch ON



2-Starting the drill motor

-Turn the starter key on the motor's control box. (2)
-Push the green button afterward. (3)
-Adjust the rpm as desired (5).
-Push the red button to turn off the motor. (4)
-Adjust the rpm as desired. (5)

3-Remote control synchronization

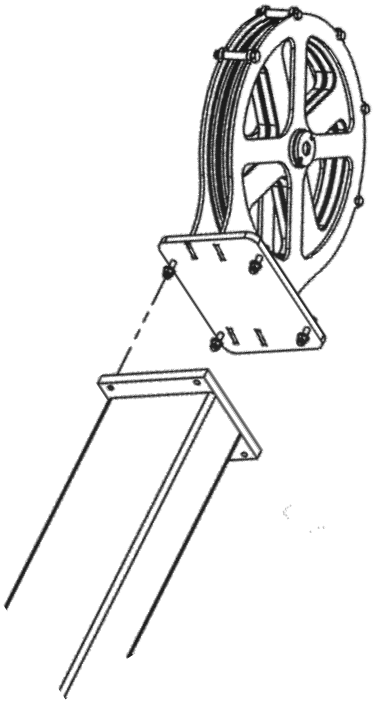
-Turn on the remote control (6).
-Press on the E-Stop (7) than pull it up afterwards. The remote control's lights will flash green 1 time.
-Push on the ''START'' button (8); the remote control's lights will turn solid green & the backup alarm will be audible.
-When you are ready to move the drill, set the rpm at 1200 (5).

4-Turning off the drill rig

- Decrease the rpm to the minimum and then press "STOP" (4).
-Turn the ignition key to off (2).
-Turn the transport master Switch to the ''OFF'' position (1).

12.2 Configuration at the moment of reception

1. The pulleys must be placed on the mast:



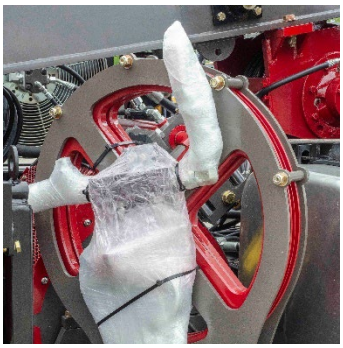


Figure 1 Pulley for shipping.

Figure 2 Position on the mast for the pulley assembly.

2. Remove the remote master switch:

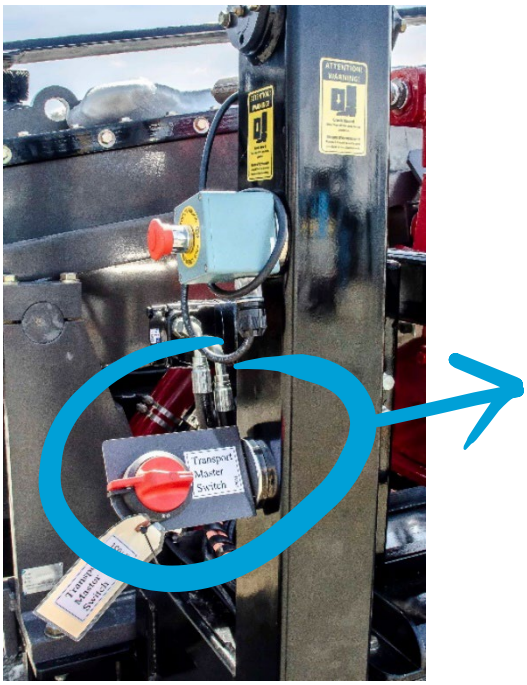


Figure 3 Tansport master switch.

Figure 4 Transport master switch.

3. Install the second battery in the charger:

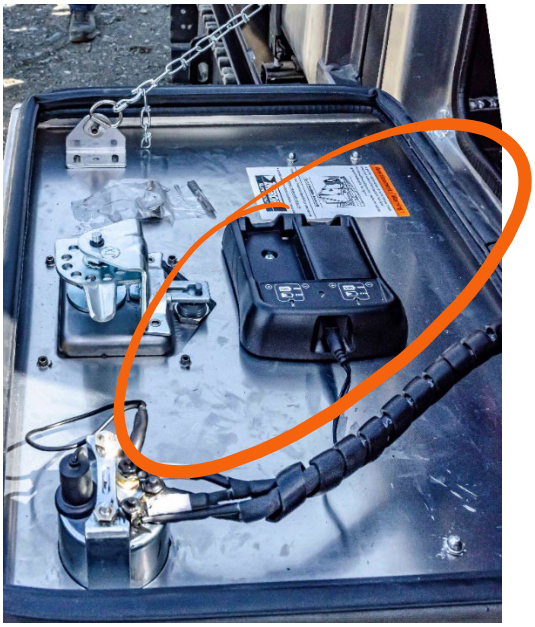


Figure 5 Battery charger in battery box on the side of the drill.

4. Configuring the water pump; take out the Bolt that retain the water pump in place Make it ivoted 90 degrees. Replace the Bolt to secure the water pump in place:

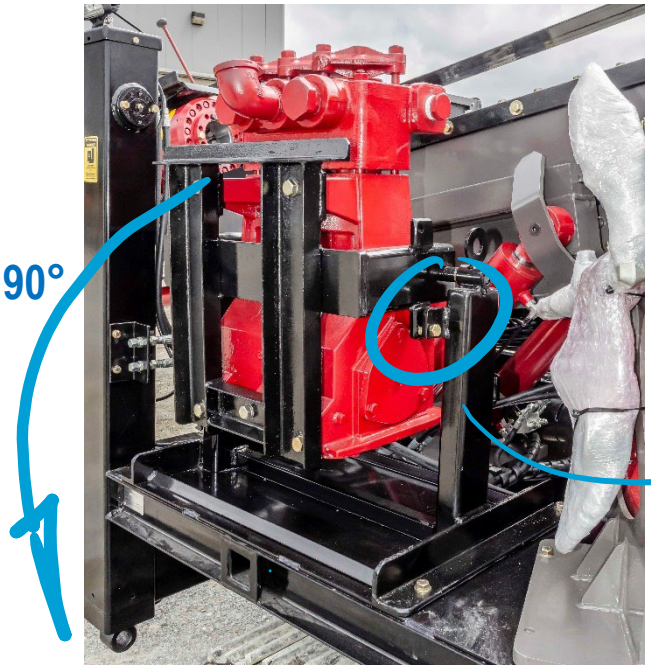


Figure 6 Pump in the transport position.

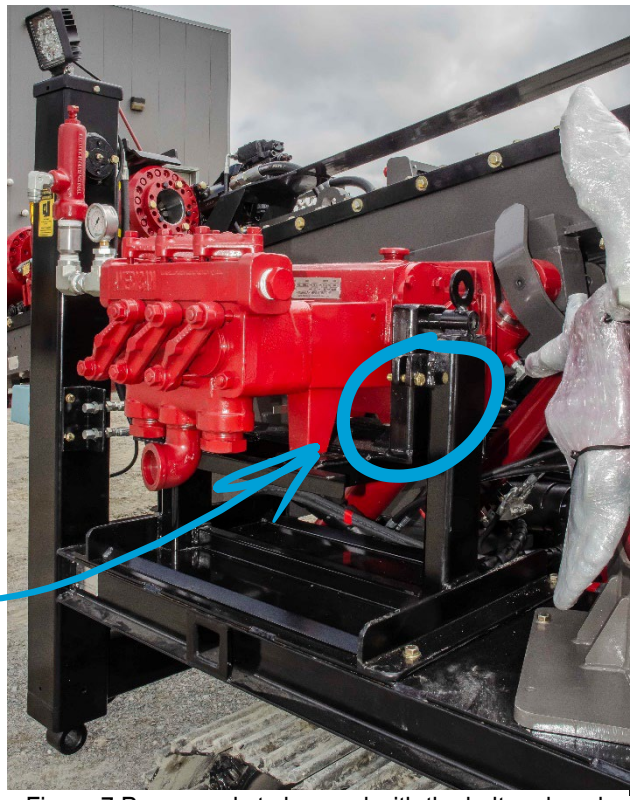


Figure 7 Pump ready to be used with the bolt replaced.

5. Fill the hydraulic oil tank:

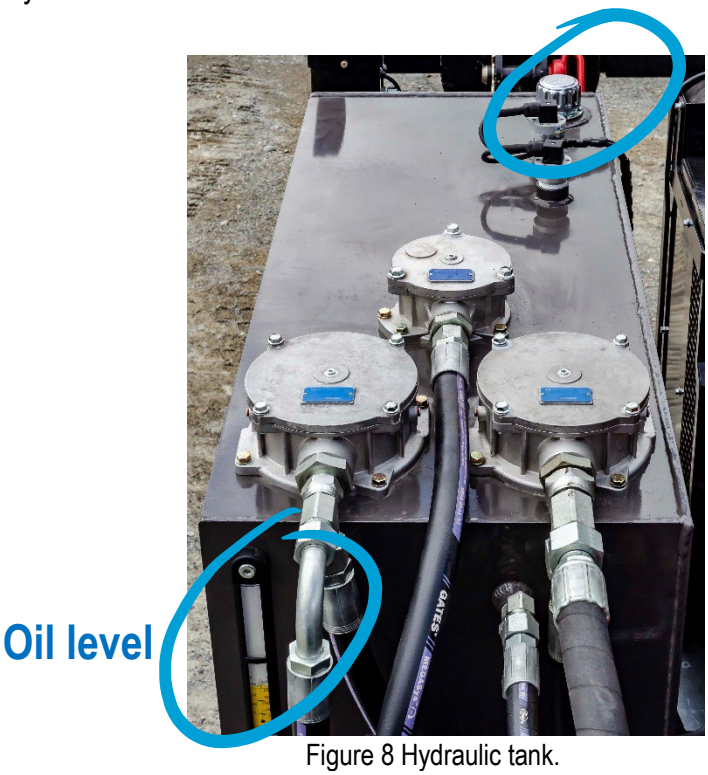


Figure 8 Hydraulic tank.

6. Level the head and its transmission:

Figure 9 head and transmission.

7. Installation of the water flow valve on the side of the console.

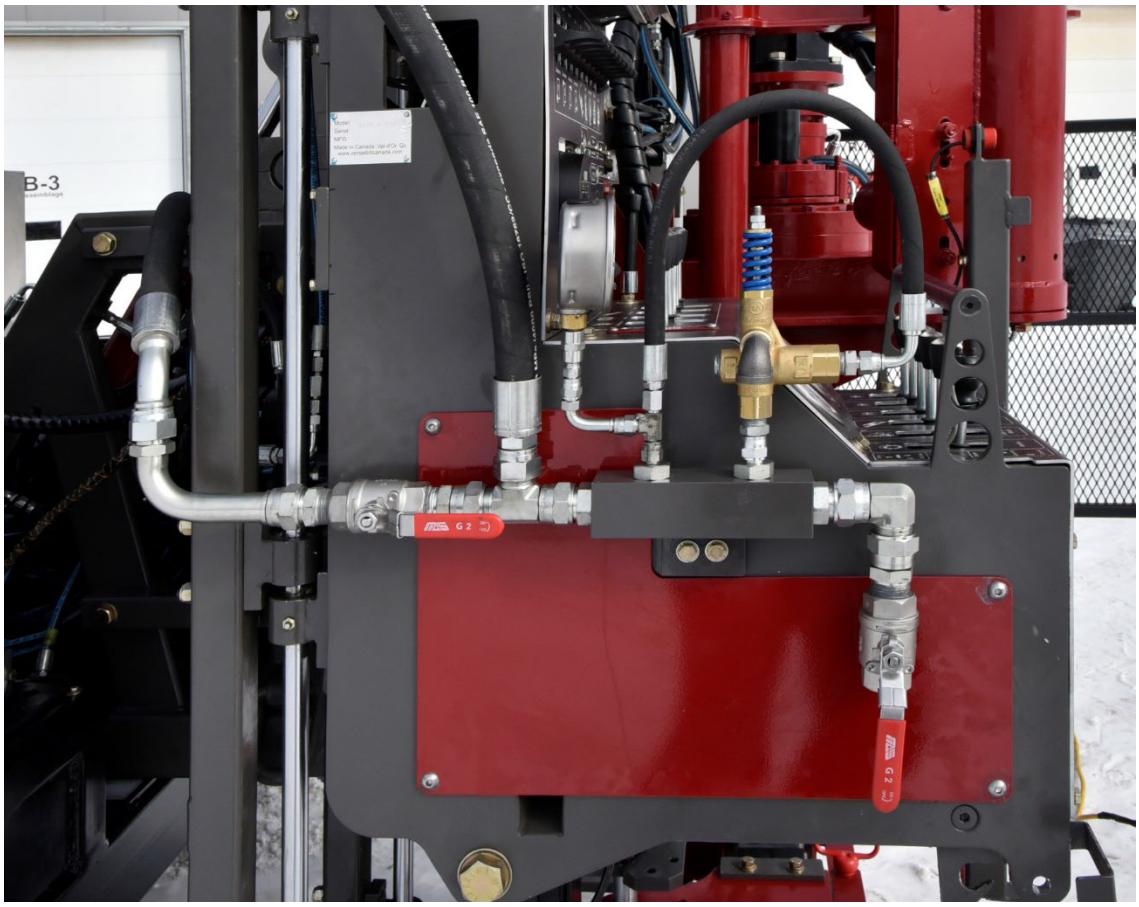


Figure 10 Water flow valve one installed on the console.

12.3 Drilling configuration

1. Install the leveling pad under the jack legs:

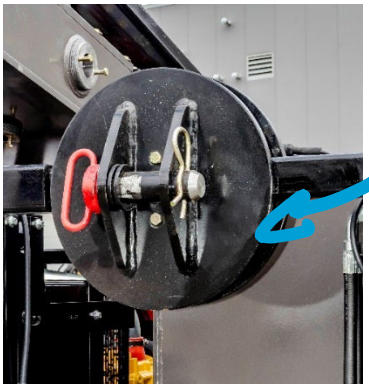


Figure 11 Levelling pad in transport position.

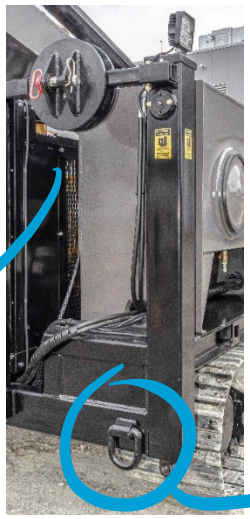


Figure 12 Jack legs.

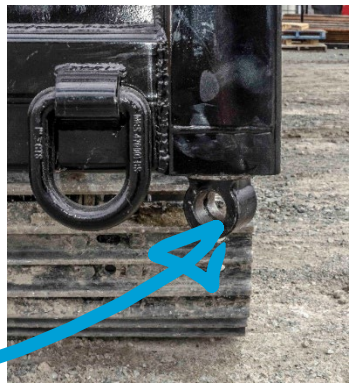


Figure 13 Pinning point on jack leg.

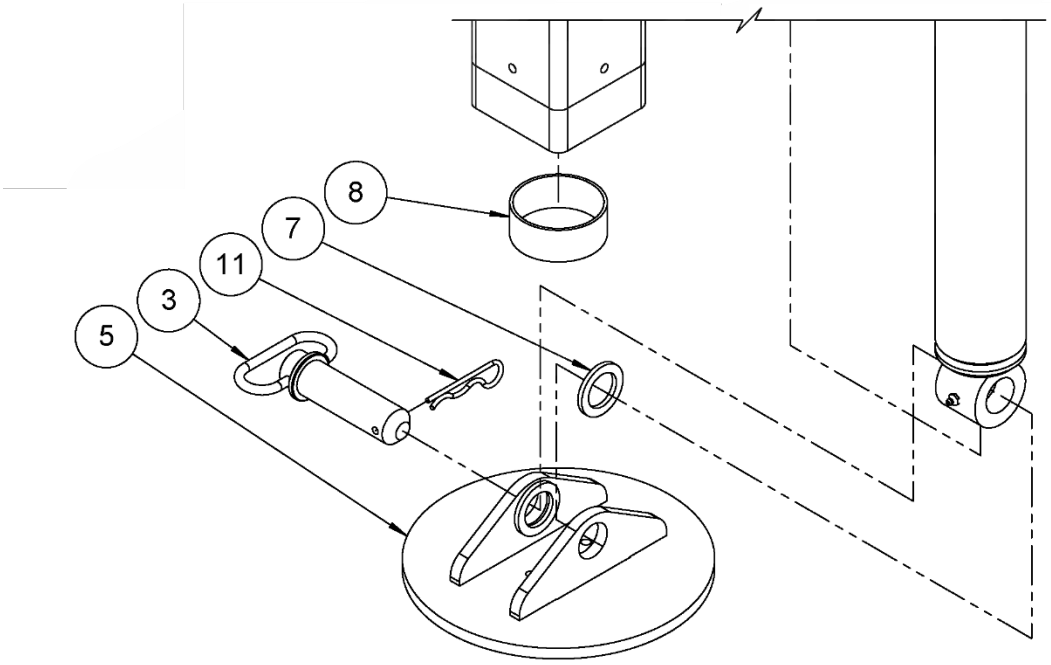


Figure 14 Levelling pads parts order when reassembled.

2. Lower the jacklegs to stabilize the drill.

3. Set the mast between 45° - 90° to install the stiff legs.

Figure 15 Drill with mast at 45 degrees.

4. Always keep the base of the mast perfectly flush with the ground. Use the mast dump to position the mast accurately according to the angle.

Figure 16 Mast completely flush with the ground.

12.4 Configuration for moving the drill

1. Tilt the mast to approximately 45°
2. Remove the stiff legs.
3. Make sure that the mast is fully down (Mast dump full down).
4. Tilt the mast until it rests on the mast support.
5. Lift the jack legs.

6. Activate the remote control and synchronize it (wait for the back-up alarm to come on).

Figure 17 remote control.

3-Remote control synchronization

-Turn on the remote control (6).

-Press on the E-Stop (7) than pull it up afterwards. The remote control's lights will flash green 1 time.

-Push on the ''START'' button (8); the remote control's lights will turn solid green & the backup alarm will be audible.

-When you are ready to move the drill, set the rpm at 1200 (5).

7. -The drill can now be moved

13. ***START-UP PROCEDURE***

NOTE: Be sure to follow the daily check-up as described in Table 1 at page 76 of this manual

1. make sure all valves under the hydraulic tank are opened.

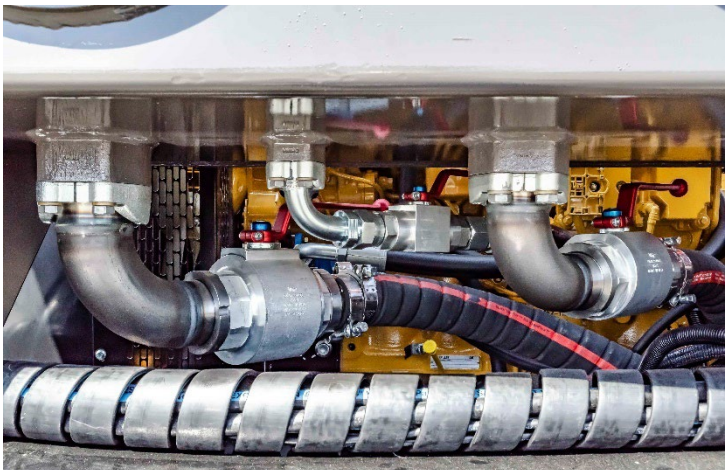


Figure 19 valves under hydraulic tank.

Figure 18 Oil level indicator.

2. make sure the hydraulic tank is full of oil.

Note: Low level light should no longer be ON.
Note II: We recommande the use of the same type of oil used when shipping the equipement. Type used: Shell Tellus S2 vx 68

3. Fill up the drain of the 2 pumps.

4. Adjust the oil level in the drill head. (The look up port is located on the side of the drill head).

Figure 20 Oil level view port the drill head.

5. Adjust the oil level in the transmission. (The look up port is located on the side of the drill head).
    i. Note: We recommand using Shell Tellus S2 gx 100
    ii. Note II: Because a circulating pump is used to lubricate bearing and transmission, during start-up procedure check frequently oil level to make sure all components are properly lubricated. A flow indicator is installed on the operator console to make confirm the functionality of the pump.

Figure 21 Oil level view port on the transmission.

Figure 22 Transmission.

6. Make sure the hydraulic hoses are well connected.

7. Look at the hydraulic hose's connections to make sure they are correctly positioned.

8. Make sure everything is in good working order.

9. Start up the drill using the motor's controls on top of the console.

Figure 23 Motor's controls.

10. Check up the emergency buttons functionality. (On a movable electric switch box & on the console).

Figure 24 Emergency stop.

Figure 25 Console emergency stop.

11. Check the hydraulic tank oil level. If, needed, stop the equipment and fill up the tank to the proper level.

12. Working pressure specifications:

Main pump	4100 psi
Main pump flow	60 gp
Note: With the transmission in the 4 th gear, + rotation motor speed adjusted to minimum. You should read around 600 rpm at the drilling head spindle.	
Auxiliary pump	4500 psi
Auxiliary pump LS	400-500 psi
Water pump	3000 psi
Auxiliary	3000 psi
Wireline	3000 psi
Slow feed	3000 psi
Chuck opening	1800 psi
Chuck closing	700 psi
Rod clamp opening	1800 psi

13. Adjust the relieve pressure (HDC-20) to 4500 psi. See Figure 14.

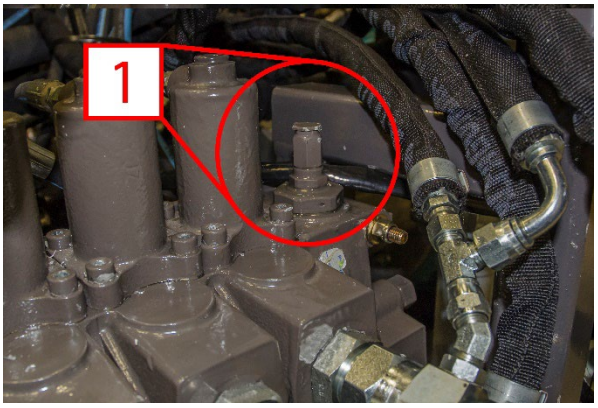


Figure 26 Relief pressure

14. psi. For Danfoss series 45 pump, to adjust the compensator, unscrew the set screw (1) and adjust the pump (2) at 4100 psi. Otherwise, look at manufacturer technical documentation to set the pressure. See Figure 15.

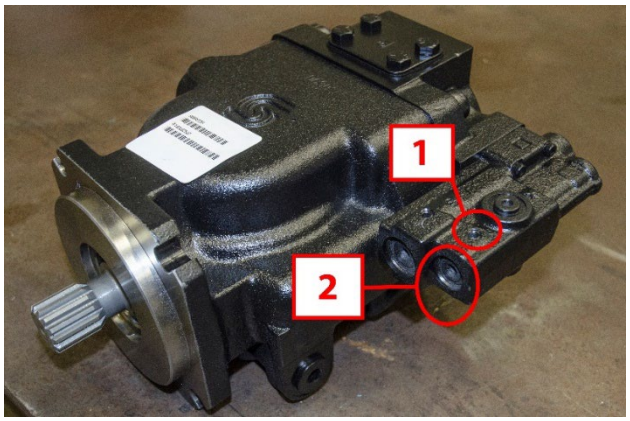


Figure 27 Danfoss series 45 pump compensator adjustments.

15. Adjust the pump compensator to 4000 psi. For Danfoss series 45 pump, to adjust the compensator, unscrew the set screw (1) and adjust the pump (2) at 4100 psi. Otherwise, look at manufacturer technical documentation to set the pressure. See Figure 15.

16. Adjust the relieve valve pressure (PVG-32) to 4000 psi.

17. Adjust the compensator of the second pump to 3500 psi.

18. If adjustment is needed, look at manufacturer technical documentation to set the pressure.

19. Adjust the LS (Load Sense) to 400-500 psi. For Danfoss series 45 pump, to adjust the compensator, unscrew the set screw (1) and adjust the pump (2) at 3500 psi. Otherwise, look at manufacturer technical documentation to set the LS pressure. See Figure 16.

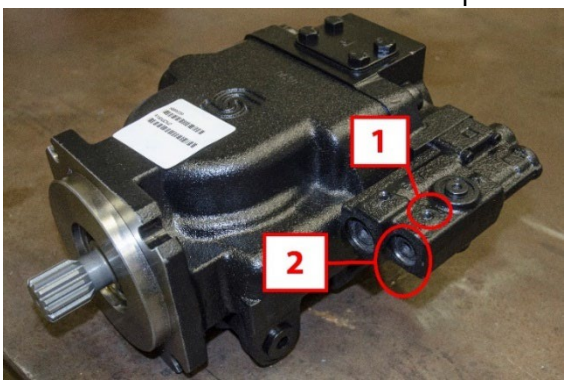


Figure 28 Danfoss series 45 load sense adjustments.

20. Adjust the water pump pressure to 3000 psi.

21. Adjust the auxiliary pressure to 3000 psi.

22. Adjust the wireline pressure to 3000 psi.

23. Adjust the feed pressure to 3000 psi.

24. Adjust the pressure of the down feed cylinder to 3000 psi.

25. Adjust the rod holder to 1800 psi

26. Adjust the drill head opening pressure to 1800 psi.

27. Adjust the closing pressure of the drill head at 700 psi. See Figure 17.

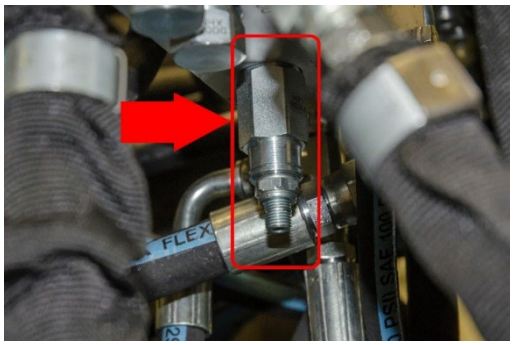


Figure 29 closing pressure adjustments.

28. Adjust the speed of the cable guide for 28-30 seconds. The speed of the cable guide is for one-way only. See Figure 18.

Figure 30 Speed adjustement.

29. Adjust the speed of the rotation motor at 1250 rpm with screw B. The transmission needs to be set in High gear and rotation control set at max rpm (thread in). See Figure 19 & Figure 20.

Figure 31 Screw B.

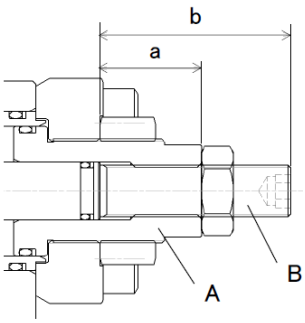


Figure 32 Screw B shown in drawing

30. Look up at the torque control. Engage the rotation at full speed then, unscrew the rotations torque function and look up at the manometer that indicates the rotation; there should be a reduction of pressure.

14. DESIGNATION OF FUNCTIONS OF CONTROL UNIT

14.1 Sticker #AC-515P049-KmN1.4SM

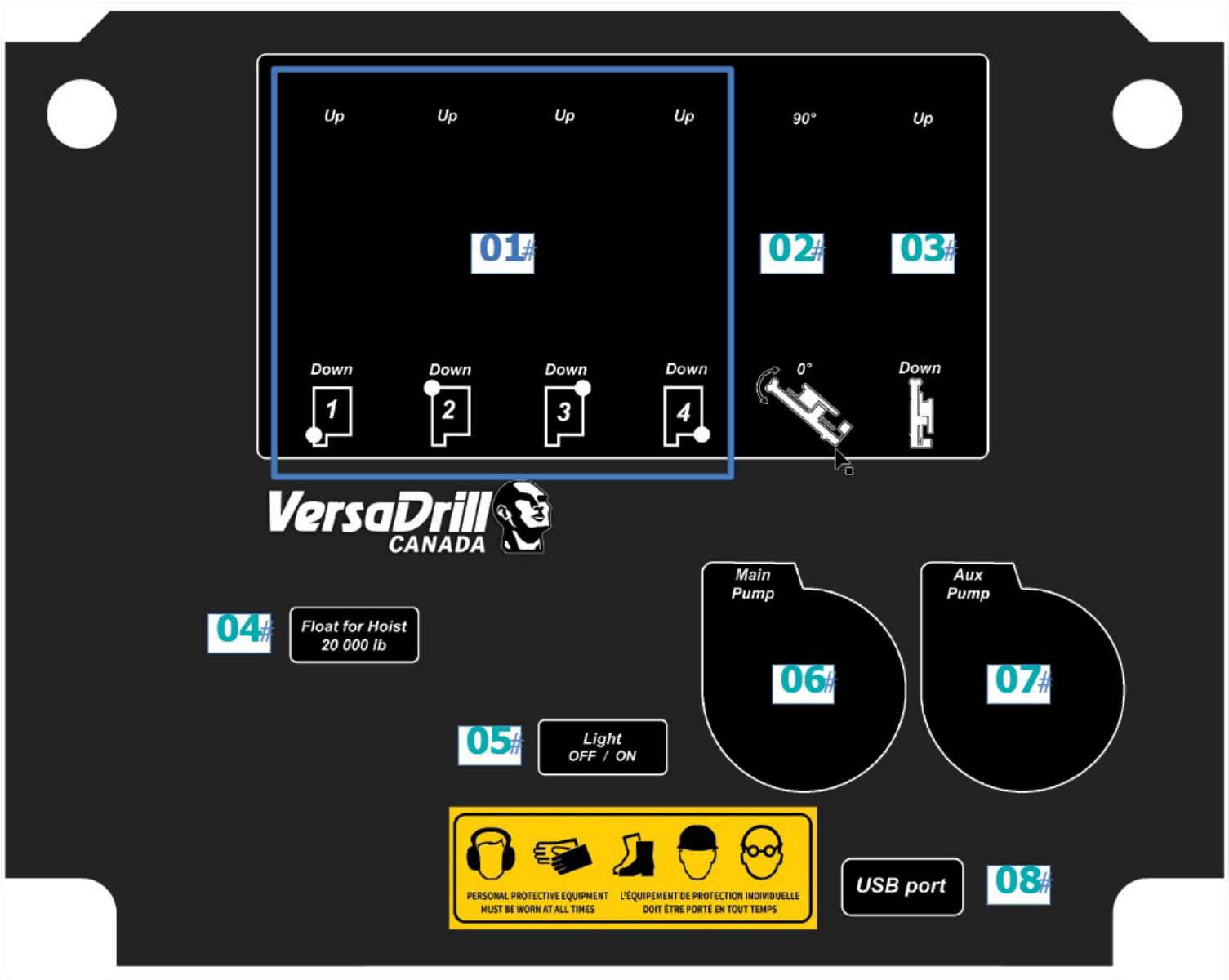


Figure 33 #AC-515P049-KmN1.4SM

14.2 Sticker #AC-515P048-KmN1.4SM

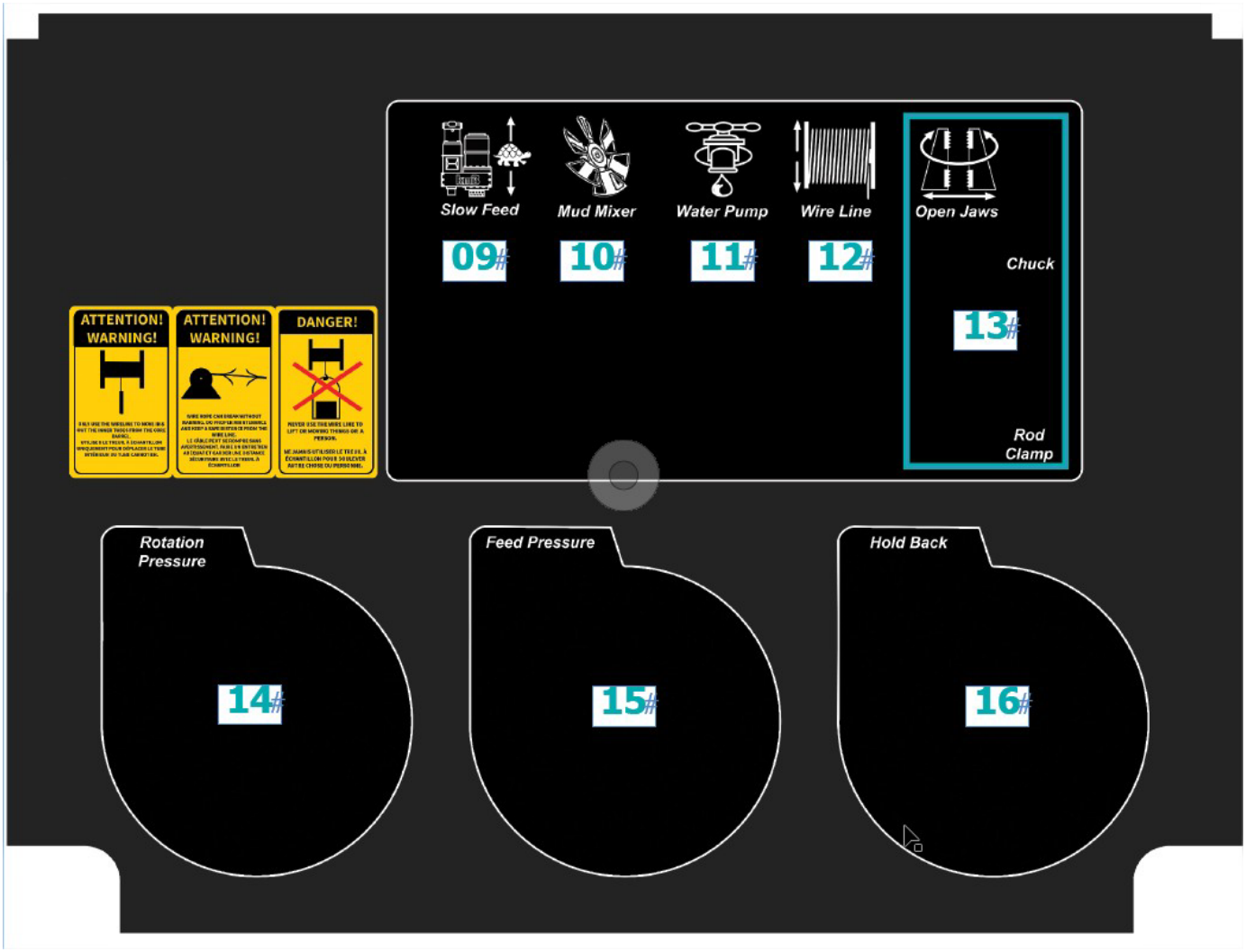


Figure 34 #AC-515P048-KmN1.4SM

14.3 Sticker #AC-515P047-KmN1.4SM

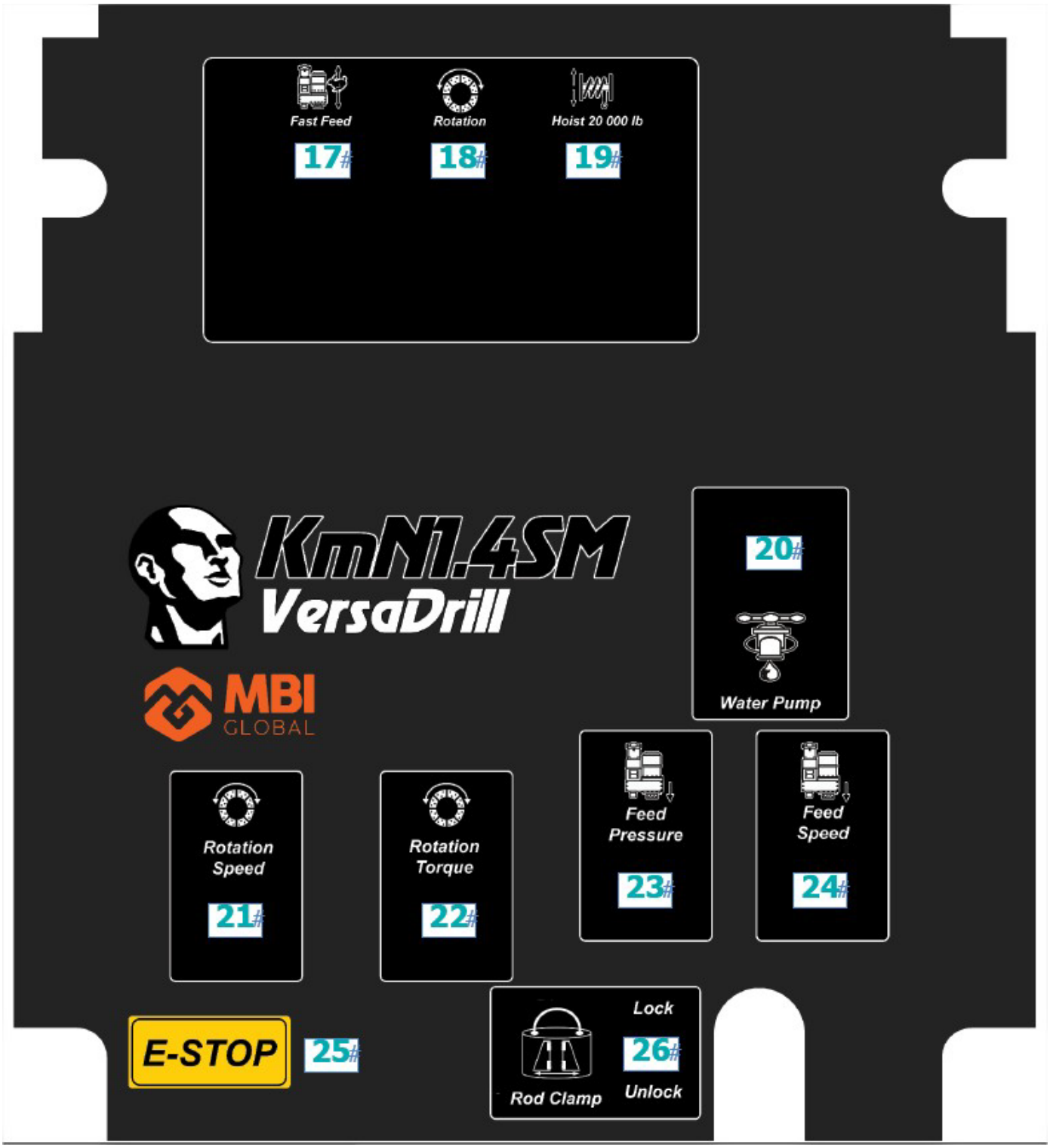


Figure 35 #AC-515P047-MAPA

Descriptions

ITEM.	FONCTION FUNCTION	DESCRIPTION
01	**Pattes stabilisatrices de la plateforme** **Jack legs**	**Mise au niveau de la plateforme / Outriggers** Ces quatre leviers permettent d'ajuster la hauteur des pattes stabilisatrices pour mettre au niveau et stabiliser la plateforme de forage. These four hand levers allow adjustment of the height of the four outriggers in or-der to level and steady the drill platform.
02	**Inclinaison vers le haut/vers le bas du mât** **Mast tilt up / tilt down**	**Déplacement angulaire de la base du mât** **Mast base angular displacement** Cette manette permet de contrôler l'inclinaison du mât. This hand lever control the angular tilt of the mast.
03	**Déplacement vertical du mât** **Vertical displacement of the mast**	**Déplacement vertical du mât / Vertical displacement of the mast** Ce levier permet d'ajuster le déplacement vers le haut et vers le bas du mât. This lever is used to adjust the up and down movement of the mast.
04	**Treuil 20 000 lb** **Hoist 20 000 lb**	**Contrôle de flottaison du treuil 20 000 lb ouvert - fermé** **Hoist 20 000 lb float control on-off** Ce levier permet le contrôle du treuil de 20 000 lb. This level control the 20 000 lb hoist.
05	**Lumières (12V)** **Light (12V)**	**Interrupteur pour ouvrir & fermer les lumières / Light switch** Ce sélecteur permet d'ouvrir et de fermer les lumières de la foreuse. This selector switch turns on and off the LED lights on the drill.
06	**Pompe hydraulique principale** **Primary hydraulic pump**	**Jauge de pression de la pompe hydraulique principale** **Main hydraulic pump pressure gauge** Ce manomètre indique la pression d'huile hydraulique (PSI) fournie par la pompe principale. This gauge indicates the hydraulic pressure (PSI) supplied by the main pump.

Descriptions

ITEM.	FONCTION FUNCTION	DESCRIPTION
07	**Pompe hydraulique secondaire** **Secondary hydraulic pump**	**Jauge de pression de la pompe hydraulique secondaire / Secondary hydraulic pump pressure gauge** Ce manomètre indique la pression d'huile hydraulique (PSI) fournie par la pompe principale. This gauge indicates the hydraulic pressure (PSI) supplied by the main pump.
08	**Port USB** **USB port**	**Port USB / USB port** Permet d'effectuer la recharge d'appareils électronique à partir d'un connecteur USB. Allows to recharge electronic devices from a USB connector.
09	**Alimentation lente** **Slow feed**	**Activation-désactivation / Activation-deactivation** Active ou désactive l'alimentation lente de la foreuse. Activates or deactivates the slow feeding of the drill.
10	**Mélangeur à boue** **Mud Mixer**	**Activation-désactivation et ajustement / Activation-deactivation & adjustments** Active ou désactive le mélangeur à boue de la foreuse en plus de pouvoir modifier son ajustement. Activates or deactivates the drill's mud mixer and can modify its adjustment.
11	**Contrôle de la pompe à eau** **Water pump control**	**Contrôle de la pompe à eau gpm / Water pump control** Ce contrôle permet de déclencher la pompe à eau. This control triggers the water pump.
12	**Treuil à échantillons** **Hoist wireline**	**Contrôle du treuil à échantillons / Hoist wireline control** Ce levier permet d'ouvrir ou de fermer le contrôle permettant un glissement libre du câble This level opens or shuts off the hoist float control.

Descriptions

ITEM.	FONCTION FUNCTION	DESCRIPTION
13	**Contrôle du mandrin fixe** **Rod holder control**	**Valve de contrôle du mandrin fixe / Rod holder control valve** La fonction du haut "CLOSE ROD HOLDER " sert à fermer les mâchoires du mandrin fixe. La fonction du bas "OPEN ROD HOLDER" ouvre les mâchoires du mandrin fixe. En position neutre, les mâchoires des deux mandrins sont fermées. The upper control "CLOSE ROD HOLDER" is used to close the jaws of the rod holder. The lower control "OPEN ROD HOLDER" is used to open the jaws of the rod holder. In neutral position the jaws on both chucks are closed.
14	**Pression de la rotation** **Pressure Rotation**	**Cadran de pression du mandrin rotatif / Rotating chuck pressure gauge** Ce manomètre indique la pression hydraulique de la rotation du mandrin rotatif. This gauge indicates the hydraulic pressure of the rotation of the rotating chuck.
15	**Pression d'alimentation** **Feed pressure**	**Pression d'alimentation / Feed pressure** Ce contrôle permet d'ajuster la pression d'alimentation du cylindre d'alimentation de la tête de forage. This control is used to adjust the feed pressure of the drill head feed cylinder.
16	**Pression de retenue** **Pressure Holdback**	**Manomètre de la pression de retenue / Holdback pressure gauge** Ce manomètre indique la pression hydraulique fournie au cylindre d'alimentation donc, la pression (PSI) exercée sur le trépan. This gauge indicates the hydraulic pressure supplied to the feed cylinder therefore by consequence the pressure (PSI) applied on the bit.
17	**Alimentation rapide** **Fast Feed**	**Fast feed cylinder control / contrôle du mouvement rapide du cylindre d'alimentation** Cette manette permet d'ajuster le débit hydraulique du cylindre d'alimentation lors de l'extraction ou de l'insertion des tiges. This hand lever allows adjustment of the hydraulic flow on the feed cylinder during rod extraction or insertion.

Descriptions

ITEM.	FONCTION FUNCTION	DESCRIPTION
18	**Contrôle de la rotation du mandrin rotatif** **Rotation chuck control**	**Contrôle de la rotation du mandrin rotatif / Rotation chuck control** Cette manette contrôle permet d'ajuster le débit hydraulique du moteur de rotation. This hand lever allows adjustment to the hydraulic flow of the rotation motor.
19	**Treuil 20 000 lb** **Hoist 20 000 lb**	**Contrôle de flottaison du treuil 20 000 lb ouvert - fermé** **Hoist 20 000 lb float control on-off** Ce levier permet le contrôle du treuil de 20 000 lb. This level control the 000 lb hoist.
20	**Débit de la pompe à eau** **Water pump output**	**Contrôle du débit la pompe à eau gpm / Water pump gpm control** Ce contrôle permet d'activer le débit hydraulique au moteur de la pompe à eau en gpm. T this control activates the hydraulic flow to the water pump motor in gpm
21	**Vitesse de rotation** **Rotation speed**	**Ajustement de la vitesse de rotation / Rotation speed adjustment** Ce contrôle permet d'ajuster la vitesse du moteur de rotation. This control allows adjustment to the rotating motor speed.
22	**Couple de la rotation** **Rotation torque**	**Ajustement de la force de couple de rotation / Rotation torque adjustment** Ce contrôle permet d'ajuster la pression d'alimentation du moteur de rotation. This control is used to adjust the supply pressure of the rotation motor.
23	**Pression d'alimentation** **Feed pressure**	**Pression d'alimentation / Feed pressure** Ce contrôle permet d'ajuster la pression d'alimentation du cylindre d'alimentation de la tête de forage. This control is used to adjust the feed pressure of the drill head feed cylinder.

Descriptions

ITEM.	FONCTION FUNCTION	DESCRIPTION
24	**Vitesse d'alimentation** **Feed Speed**	**Ajustement de la vitesse du cylindre d'alimentation** **Feed speed cylinder adjustment** Ce contrôle permet d'ajuster la vitesse du cylindre d'alimentation de la tête de forage. This control allows speed adjustment to the feed cylinder on the drill head.
25	**Arrêt d'urgence** **Emergency stops**	**Bouton pousser-tiré d'arrêt d'urgence / Emergency STOP push/pull button** Ce bouton ARRÊTE les moteurs hydrauliques et le moteur diesel. This button STOP turns off all the hydraulic motors and the diesel engine.
26	**Verrouillage et déverrouillage des mâchoires** **Locking/Unlocking jaws**	**Barrure des mâchoires du mandrin fixe / Jaw lock for the rod clamp** Permet de verrouiller ou de déverrouiller les mâchoires du mandrin fixe en position. Allows to locks or unlocks the jaws of the rod clamp in position.

15. ***DRILL FUNCTIONS***

15.1 Expanding the mast

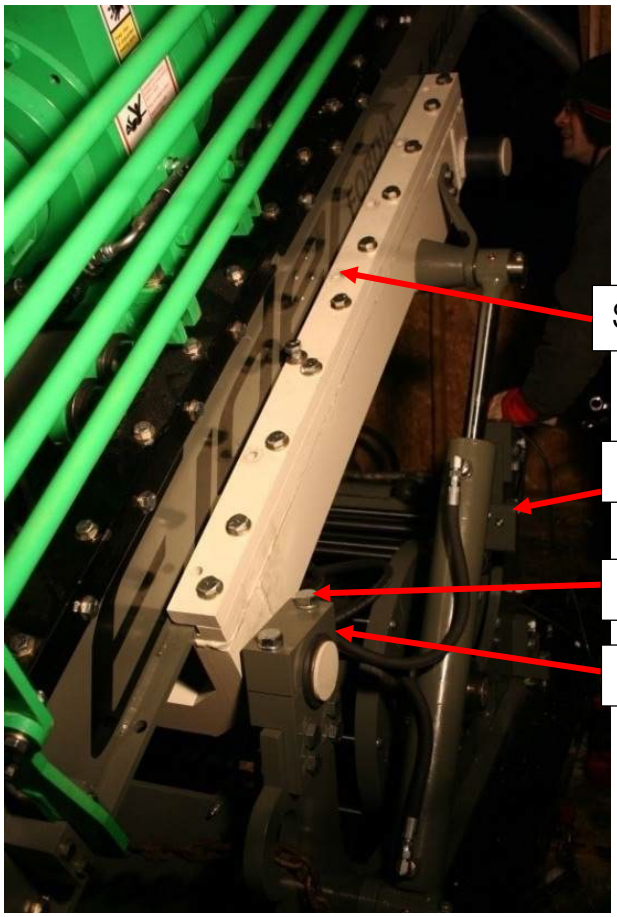


Figure 36 Mast pivot plates and shipping bolts

15.1.1 To raise the mast, first remove the 7 inner bolts (shipping bolts) on the feed frame to allow it to slide back and forth with the hydraulic system. See Figure 28.

Figure 37 Mast angle

15.1.2 Remove the two bolts on either the backside or front side mast anchor plates to allow lowering or lifting of the mast. In this photo, the backside anchor plates have been removed to allow drilling downwards into the ground (usually 70 degrees). See Figure 29.

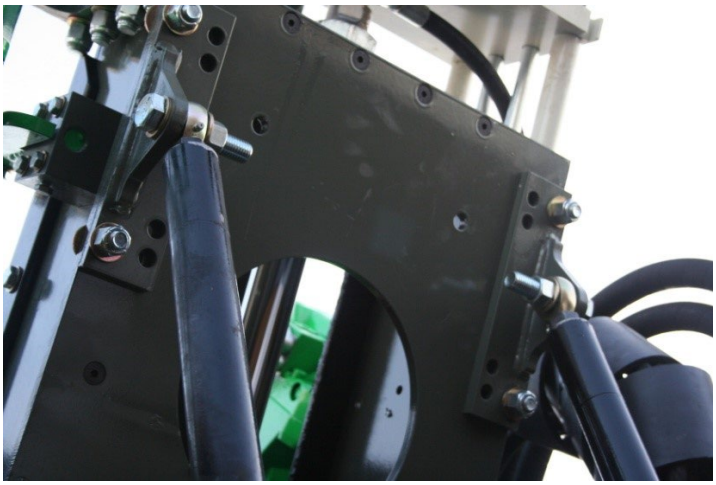


Figure 38 Poles bolted to the mast.

15.1.3 After lifting mast to the angle desired, insert the support poles into place.

First slide bolts into place on the top of the mast. Bolt through the bushings and tighten. See Figure 30.

Figure 39 Poles bolted to the base.

15.1.4 Place the other end of the support pole to the base bolt. Slide the bushing onto the bolt and insert a cotter pin to secure. See Figure 31.

Figure 40 Adjustment bolts on the poles.

15.1.5 After securing anchor poles, tighten the adjustment bolts on the poles to secure the proper length needed to secure drill head in appropriate position to drill. See Figure 32.

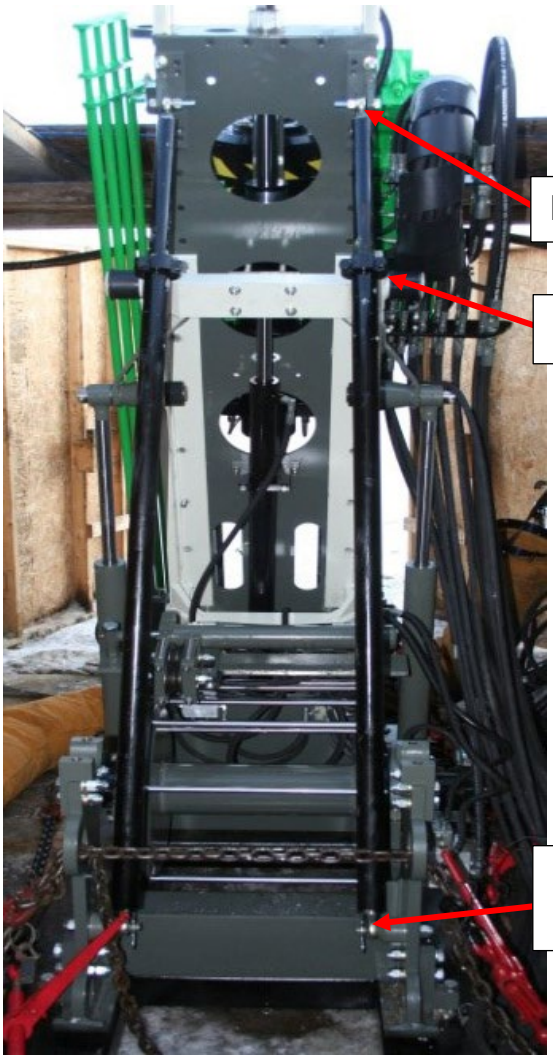


Figure 41 Lifted mast

15.1.6 After mast is lifted into proper drilling position, and anchor poles are secured, the drill is ready to set the drill string into place. See Figure 33.

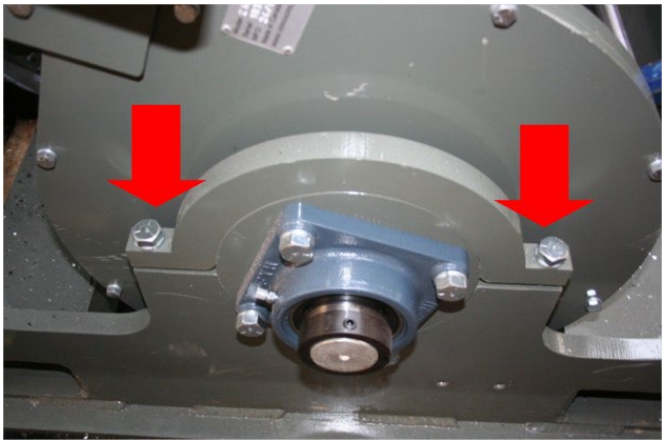


Figure 42 anchor block on wire line

15.1.7 Remove the two bolts on the wire line anchor block on both sides of the wire line. See Figure 34.

Figure 43 rotation of the wireline

15.1.8 After removing the anchor blocks, use a bar and rotate the Osborne roller to allow the wire line guide to be in an upwards position as pictured. See Figure 35.

Figure 44 Anchor bolt aligns with the mast.

15.1.9 It will be correctly positioned when it will be aligned with the mast as shown by the green arrow. When completed, bolt the anchors blocks back in place on both sides of the wireline. See Figure 36.

15.2 Lowering the mast

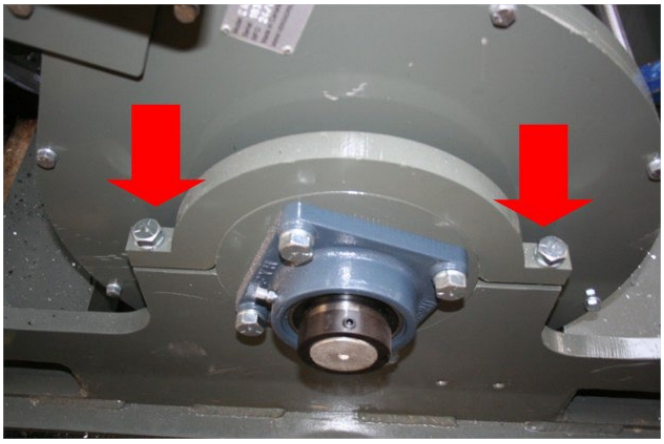


Figure 45 Bolts & anchor plates

15.2.1 Remove the two bolts on each side of the wire line anchor blocks to allow the Osborne roller to rotate. See Figure 37.

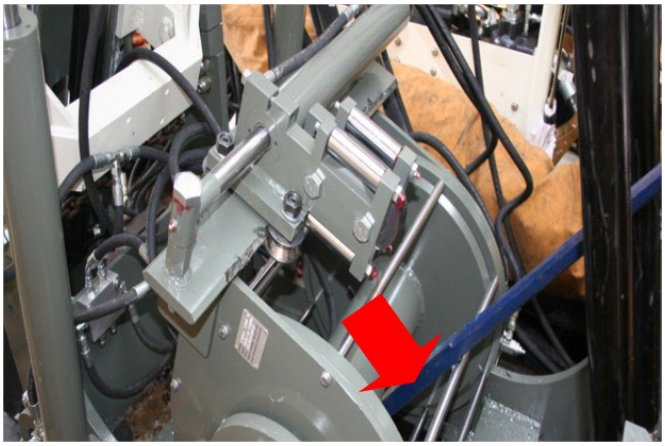


Figure 46 Rotation of the wire line

15.2.2 After removing the anchor blocks, use a bar and rotate the Osborne roller to allow the wire line guide to be folded down towards the back of the drill. See Figure 38.

The wire line must be folded to allow the mast to set flat for transportation.

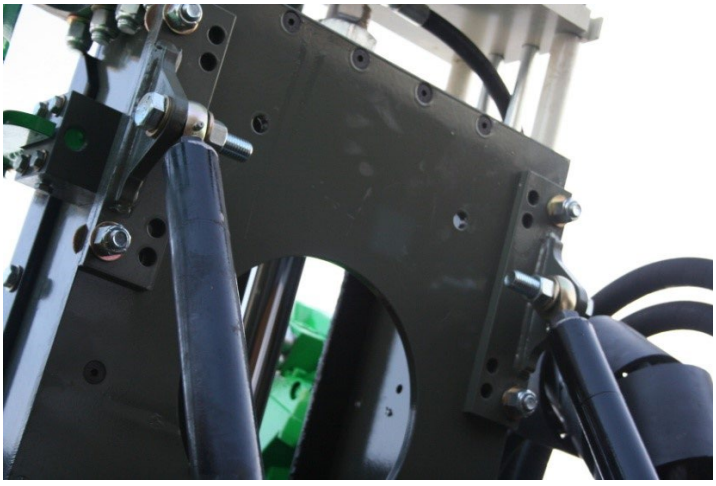
After this is completed, bolt the wire line anchor blocks back into place.

Figure 47 Adjustment bolts on poles

15.2.3 Loosen the adjustment bolts on the support poles to allow easy removal of the poles. See Figure 39.

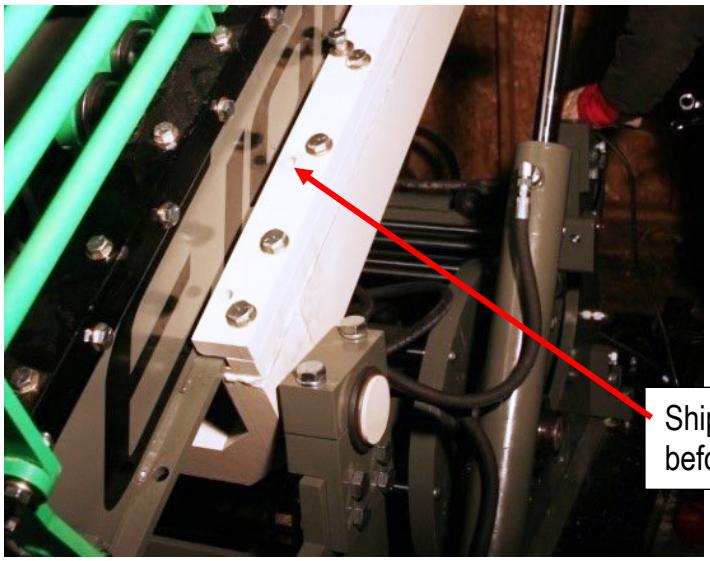
15.2.4 Remove the cotter pin on the bottom of each support pole. See Figure 40.

Figure 48 Bolted poles on the base



15.2.5 Remove the top bolt from the support poles and remove from the base bolt. See Figure 41.

Figure 49 poles bolted to the mast



15.2.6 Lower the mast using the hydraulics on the base of the drill. See Figure 42.

NOTE: If transporting the drill, insert the 7 shipping bolts on the feed frame that were removed while setting the drill up.

Figure 50 shipping bolt holes

Figure 51 mast pivot plate

15.2.7 Reinstall the mast pivot plates with 2 3/4 bolts and washer securing each plate. See Figure 43

15.3 Table rollers adjustment

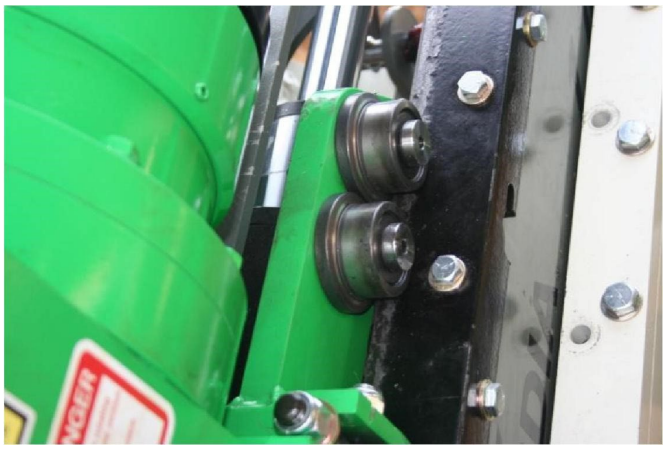


Figure 52 table rollers

15.3.1 Check the table rollers every shift for adjustment. Inspect the rollers on the top and bottom of the feed frame. If there is any play between the rollers and the frame, maintenance needs to be completed to ensure proper movement of the drill head. See Figure 44

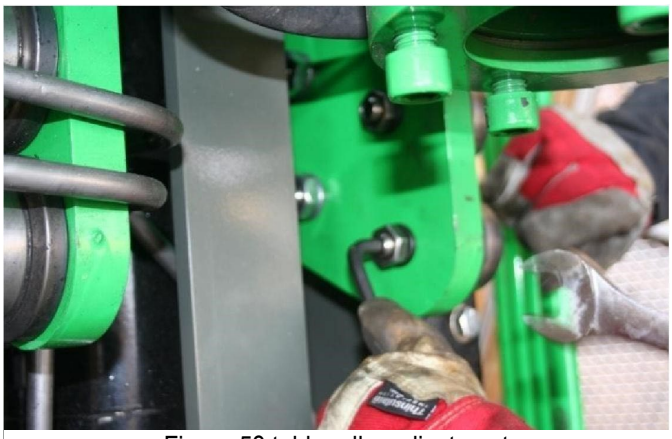
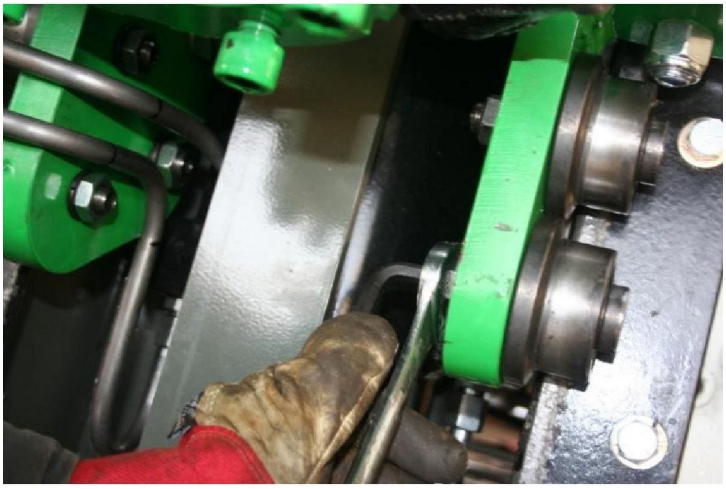


Figure 53 table roller adjustment

15.3.2 Insert an Allen key in the top rollers to hold the bolt and loosen the nut with a combination wrench. When the nut is loose, eliminate the play between the roller and the angle plate by tighten the end of the bolt using the Allen key. This bolt is eccentric and acts like a cam shaft. Do not over tighten (20 to 50 ft./pounds). See Figure 45.



15.3.3 After the eccentric bolt is tightened, use the combination wrench and tighten the nut back into place. See Figure 46.

NOTE: only adjust the rollers on the top of the feed frame. The bottom rollers are not eccentric.

Figure 54 tightening the bolt in place.

16. ***CHECK UP AND MAINTENANCE***

16.1 Daily checkup BEFORE starting the drill

Verify that the tools are in good condition	
Plans are in good condition	
Verify all guards are in place and in working condition	
Check the state of the hydraulic hoses	
Check the oil level in the drill head	
Grease drill head bearings	
Grease Jaws in drill head and rod clamp	
Check for sheared bolt on the drill head and rod clamp	
Check the hydraulic oil level	
Grease all the pulleys	
Visual inspection to make sure no seal are leaking on the drill head and rod clamp	
Make sure the drill is properly anchored	
Verify that the stop button works	
Make sure the power supply cables are intact	
Verify the support poles are in place and well anchored	
Check the water pump oil level	
Check the diesel motor oil level (Surface model only)	

Table 1 Daily check-up BEFORE starting the drill

Note: for more detailed procedures for the drill head and rod clamp maintenance, looks for those specific components instruction manual in the annexes section 22.

16.2 Inspection after starting up the drill

Check entire work area for oil leakage	
Make sure hydraulic control is in working order	
Does the hydraulic pump make any strange noises	
Does the drill head make any strange noises	
Does the motor make any strange noises	
Make sure water pump is in working order	
Check the floater in the water reservoir	
Make sure there is a functioning fire extinguisher on the premises	

16.3 When in continuous drilling mode

- Always be on the lookout for suspicious noises
- Always be on the lookout for suspicious vibrations
- Make point to check regularly the oil's temperature. NEVER go over 90 degrees C (195 degrees F)

16.4 Weekly driller mechanical checklist

COMPONENT	MAINTENANCE PROCEDURE	COMMENTS
LUBRICATING POINTS	Grease all lubrication points	
HOSES	Check all hoses for leaks and wear	
HYDRAULIC OIL LEAKS	Check for leaks	

MAST BASE		
POSITIONNING CYLINDER	Inspect for leaks and wear	
TILT CYLINDER	Inspect for leaks and wear	
DRILL MAST		
FEEDCYLINDER	Inspect for leaks and wear	
GEARBOX	Check oil level	
GEARBOX BREATHER	Clean	
TRANSMISSION	Check oil level	
TRANSMISSION BREATHER	Clean	
PULLEYS SYSTEM		
PULLEYS	Check for wear from cables	
ROD CLAMP		
CLAMP CYLINDER	Inspect for leaks and wear	
JAWS	Clean and inspect for wear	
WIRELINE		
WIRELINE CYLINDER	Inspect for leaks and wear	
Water pump		
WATER PUMP	Inspect for leaks and wear	

16.5 Each 15 days drill head maintenance

(See drill head complete part book in section 16 for detailed instructions)

DRILL HEAD		
Change oil	**Inspect for oil color, odor and if there's metal flakes**	
Clean metal residues of the magnetic plug	**Inspect and clean**	
Grease the bearings	**Inspect and grease**	

16.6 Monthly driller mechanical checklist

NOTE: **MACHINE TO BE THROUGHLY WASHED PRIOR TO SERVICE BY OPERATOR**

COMPONENT	MAINTENANCE PROCEDURE	COMMENTS
LUBRICATING POINTS	Grease all lubrication points	
HOSES	Check all hoses for leaks and wear	
HYDRAULIC OIL LEAKS	Check for leaks	
RETAINING PINS	Check all pins are fitted and secure	
MAST BASE		
RAIL HOLD DOWN BOLTS	Check for tension and crush on rail bed	
MAST RAIL	Inspect for wear	
POSITIONNING CYLINDER	Inspect for leaks and wear	
TILT CYLINDER	Inspect for leaks and wear	
DRILL MAST		
FEED CYLINDER	Inspect for leaks and wear	
GEARBOX	Check oil level and top up if necessary	
GEARBOX BREATHER	Clean	
GEARBOX SIDE RAIL	Inspect for wear	
TRANSMISSION	Check oil level and top up if necessary	
TRANSMISSION BREATHER	Clean	
CARRIAGE SIDE RAILS	Check bolts for security and record wear of side rail slide	
CARRIAGE BEARING WHEELS	Inspect for wear and adjust accordingly	

COMPONENT	MAINTENANCE PROCEDURE	COMMENTS
CARRIAGE ADJUST	Adjusting the carriage per GtechDrill Service Manual Section	
CARRIAGE MOUNTING	Check all mounting bolts tension	
CONTROL CONSOLE		
OPERATORS CONSOLE	Check all levers for wear and leaks.	
GAUGES	Inspect all gauges for correct operation and damages	
LEVER LABELING	Inspect condition and that they are fitted correctly, replace if required	
OPERATORS PLATFORM	Inspect for wear and trip hazards.	
FLOAT PEDAL	Inspect for leaks and wear	
OPERATORS FLOAT PEDAL	Inspect pedal for correct operation and test that it move freely	
VALVE BANK	Inspect for leaks	
PULLEYS SYSTEM		
PULLEYS	Check for wear from cables	

WIRELINE		
SPOOLING DEVICE	Grease rollers change if required and lubricate shafts	
CABLE	Check if in good condition (not frayed or kinked)	
GUARDS	Secure and in good condition	
ALIGNMENT	Check wireline is aligned to sheave wheel	
MONTHLY HYDRAULIC SERVICE		
HYDRAULIC RETURN FILTER	Replace hydraulic return filter and clean out housing	
DRILL HEAD		
SCREWS ON DRIVE TUBE	**Inspect for sheared bolts**	
CHUCK SPRINGS	**Inspect for wear and tear**	
GEARS	**Inspect the state of the teeth**	
CHAIN	**Measure chain elongation**	
ROD CLAMP		
JAW COVER	**Inspect for wear and tear on the edge**	
ROD HOLDER SPRINGS	**Inspect for wear and tear**	
JAW GUIDE	**Inspection**	

16.1 Greasing points on the drilling unit

Figure 55 Top of the hydraulic piston that raises the mast on each sided of the base.

Figure 56 Bottom of the hydraulic piston that raises the mast on each sides of the base.

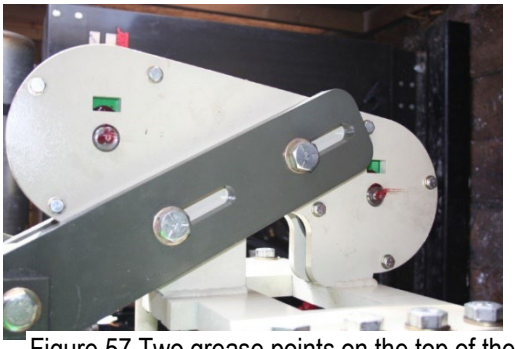


Figure 57 Two grease points on the top of the wire line guide.

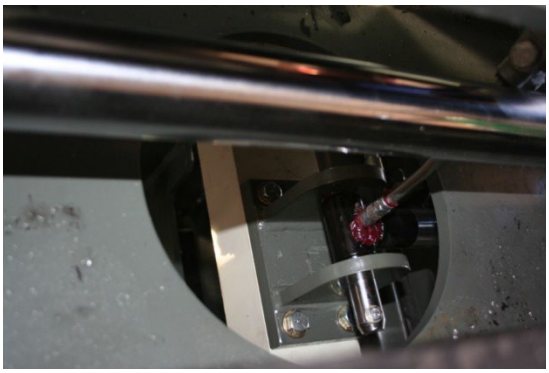


Figure 58 Underneath the mast, in the middle of the base on the end of the hydraulic mount.

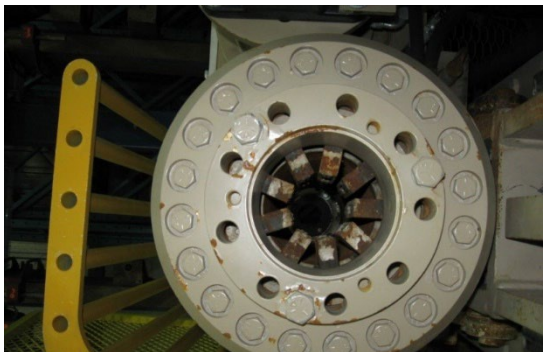


Figure 59 Nine grease points on the top the of the drill head chuck.

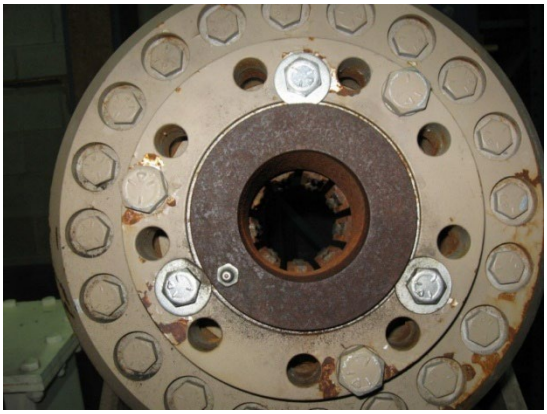


Figure 60 Nine grease points on the top of the rod holder for the jaws.

Figure 61 Grease the eye bolt on the tip of the support pole (2 total).

17. ***PARTS BOOK***

17.1 Overview and uses

This section of the KmN 1.4 instruction manual contain all the solo parts book of each assembly that constitute the drill rig you are using. Some of those assemblies have their maintenance section integrated (drill head and rod clamp). They are an integrated part of this manual. Each part book is unique and personalized with each KmN 1.4 ordered.

This section is updated with each drill therefore, it is extremely important that a copy be available at the work site and at the driller disposition. The title of this document is based on the serial No. of your KmN drill rig.

Keep in mind that you will need to give the serial number of your rig to reorder any parts. You can find the information for finding the serial number of your rig in section 8.10 of this. manual.

18. ***ANNEXES***

(On the electronic copy only)

-AX-005-E (Series 45 Axial piston open circuit pumps, # #ERR147 & FRR074

-AX-033-E (PVG 32 valve maintenance procedures (by manufacturer)

-AX-034-E (Parts Manual Proportional Valves PVG32)

-AX-071-E (FMC Technology # 160-04, Water pump Bean 435)

-AX-118-E (Swash Plate Type Axial Piston Motor M7V / M7X Series)

-AX-121-E (Braden H20R Recovery Winch manual)

-AX-132-E (funk hdm 23000 transmission Specifications)

-AX-133-E (Funk hdm 23000 transmission Component technical manual)

-AX-134-E (General drill head maintenance)

-AX-135-E (Rod clamp #104A001-B maintenance procedures)

-AX-136-E (Jaws listing)

-AX-143-E (LEBH0030-01 DEF System Supplement C7.1 TPD1835 (Diesel Exhaust Fluid (DEF)system supplement)

-AX-144-E ("LEBH0031-01 C4.4_C7.1 Mechanical A&I guide (Application & Installation Guide Cat® C4.4 ACERT™ and C7.1 ACERT U.S. EPA Tier 4 Final/ EU Stage IV Engines)"

-AX-145-E (LEBH0034-01 C4.4_C7.1 IOPU (Cat® C4.4 ACERT™ and C7.1 ACERT U.S. EPA Tier 4 Final/ EU Stage IV Engines)

-FIGURES TABLE

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