



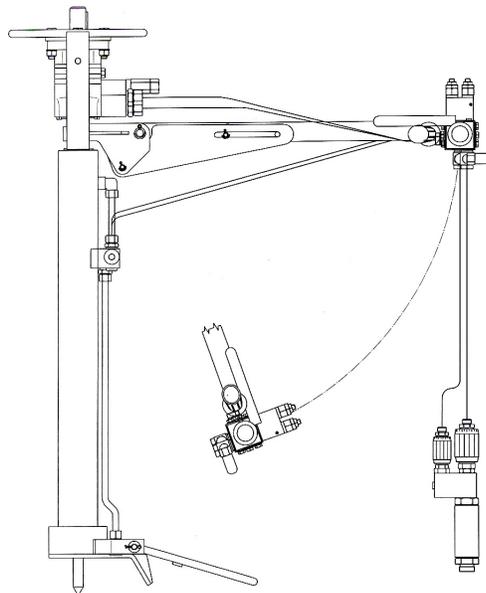
ROOFBOLTER OPERATORS GUIDE

Portable Hydraulic Roofbolters



For All models and heights of the Z Drill® Roofbolter including:
Long Z Drill®,
Short Z Drill®,
Mini Z Drill®,

www.MPISupply.com



Last Revised by MPI Supply, September 2017.

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Read the entire Operators Guide before operating the Z Drill® Roofbolters.

These safety instructions are for the prevention of accidents resulting in bodily harm and damage to the equipment.

Keep bystanders away from equipment in operation.



Always Work UNDER supported roof.



Hearing protection is recommended for prolonged use.

Head protection must be worn.

Eye protection must be worn.

Gloves must be worn.



MPI SUPPLY ROOFBOLTER OPERATORS GUIDE

To obtain optimum and safe performance from the MPI Z Drill® these instructions must be followed at the start of every shift.

INTRODUCTION

The family of portable hydraulic roof bolters includes the following drills:

- Long Z Drill® Oil (HA 16/500 – HFC/Oil) 1360MM
- Short Z Drill® Oil (HA 16/500 – HFC/Oil) 760MM
- Mini Z Drill® Oil (HA 16/500 – HFC/Oil) 650MM
- Long Z Drill® (HA 16/500 – HFA) 1360MM
- Short Z Drill® (HA 16/500 – HFA) 760MM
- Mini Z Drill® (HA 16/500 – HFA) 650MM

MPI Supply roofbolters are used in the mining and tunneling industries and are designed to be used within the scope of industry safety parameters.

Units are able to accommodate standard 1 1/8" wet or dry drilling chucks. 7/8" chuck adaptors are available.

The Operators Guide describes the technical assembly, operation, and the required maintenance of the roofbolters. From this information, the operating personnel should gain the necessary knowledge as to the intended use of the Z Drill® hydraulic roofbolters.

If you have any additional questions, comments or concerns about the Z Drill®, please contact us at anytime via email, info@mpisupply.com or by phone at 412.664.9320.

MPI EMERGENCY/24 HOUR CONTACTS

24/7 Coordinator Line – (412) 664.9320
Jason Weiland – (412) 477.4988
Geoff Popovich – (412) 215.0597



The Operators Guide contains information for the safe and proper operation of the Z Drill®. Your attention to safety and understanding of the information contained within this guide helps to prevent accidents and injuries. It also reduces damages and costs of repairs as well as reducing down time and prolongs the continual performance of the equipment.

Safety First

The instructions in the Operators Guide follow established industry guidelines with regard to accident prevention and the protection of the environment. **The Operators Guide must always be available at the active drilling site.** Mine and tunnel operators must utilize only trained and authorized personnel to operate and maintain the Z Drill®. MPI recommends task training individual operators.

The initial use of the Z Drill® may only be carried out after understanding the Operators Guide. The manual is to be read and utilized by all personnel whose assignments will regularly or occasionally include work with the Z Drill®.

The following are among the tasks dealt with in particular:

- Operations
- Service and maintenance, including the disposal of production waste and waste management from operating fluids and other auxiliary material
- Cleaning
- Troubleshooting and
- Minor maintenance repairs

In addition to information stated in this Operators Guide, the recognized safety standards and regulations for the prevention of accidents in professional work in the country and sometimes state or territory of the location of Z Drill® operations are binding and are to be observed. **This document is meant only to reinforce safe work practices already in place at your facility.**

BASIC SAFETY INSTRUCTIONS

All drills MPI Supply manufactures and distributes are built using state-of-the-art technology with recognized safety standards. Nevertheless, the possibility of injury or death to personnel as well as damages to the equipment and other materials in association with its use does exist. Therefore it is imperative that strict compliance with these safety instructions is observed when working with Z Drill® roofbolters.

Above ground performance checks must be frequently conducted and any resulting maintenance performed. Both of these actions are assumed in the following safety instructions.



Z Drill® roofbolters are designed to be used in upright, vertical applications. MPI does not recommend the units be used for any drilling outside of these parameters. MPI will not be held liable for any damages resulting from such use. **The operator alone carries the risks of operation.** Refrain from any questionable and risky behavior when using the equipment.

Operators of the Z Drill® **MUST** stay alert to any possibility of danger arising with use, not only with the equipment but with surrounding environmental conditions and changing roof strata. Breakdowns or other malfunctions which can compromise safety are to be promptly repaired and corrected. MPI is available **24/7** to assist in maintenance of your equipment. MPI's around the clock service phone number is **412.664.9320**.

Only authorized and qualified personnel will operate and maintain the Z Drill®. The legal minimum age for operating personnel must be followed. Inexperienced miners (green or red hats) are **NOT** to operate the Z Drill®. However, they should be task trained by experienced personnel on the unit when working in close proximity to the machines.

All members of the drilling operation team **MUST** be allowed to refuse any instruction practicing adverse safety measures.

This Operators Guide should be placed in a protective cover at the drilling site and **MUST** always be available.

Before each shift the operating personnel should review the Operators Guide. Supervisors should check that operating personnel are safely using the equipment, aware of potential danger, and using extreme caution.

There may be no changes, attachments, or any remodeling made to the equipment, which could compromise safety. This applies to any and all welding on the Z Drill®.

MPI Supply recommends using only original equipment manufacturer parts for replacement. MPI Supply has a full staff of trained service technicians at our facilities to repair your equipment. Our service technicians are also trained for underground repairs and maintenance. To schedule repair appointments for your Z Drill® please call us at **412.664.9320**.

Should the equipment experience any problems which poses a risk to safety, the equipment should be immediately shut off, locked and tagged out. The malfunction should be reported to the supervisor and corrected before being placed back in service.



PRE-OPERATION INSTRUCTIONS

Before beginning each shift:

- Manually inspect the equipment for visible damages or defects. Any discernable changes in the equipment's appearance **MUST** be immediately reported to the supervisor.
- Familiarize yourself with the work environment of the operation site. Make sure any obstructions or foreign equipment is distanced from the operating range of the equipment. **ALWAYS** check for loose rock above your drilling site.
- Check the stability of the mine floor under the areas you are drilling at.
- Make sure you have sufficient height clearance for the equipment, drill steels and bolt wrench.
- Make sure all supplies are readily accessible at your drilling site, including a roof prop for temporary support in unsupported areas.
- Check the in-line filters on the pressure sides of the equipment.
- Connect all hoses from the drill to the power source. Make certain all hoses are clean of debris and the compression couplings are clean.
- Test the motor rotation. Make sure the chuck is rotating in the proper direction.
- Test the cylinder elevation and dump controls by raising and lowering the leg three times.
- Check all bits and steels.
- Put on your hearing and eye protection and insert drill steel.



ROOFBOLTING SAFETY TIPS

Moving the equipment to the drilling position:

- Check the roof and rib conditions. Pass information on hazards and troubled areas to everyone working near that section.
- Ensure that all hoses are clear of props, machines, etc.
- Using a correct lifting method, place the drill into the drilling position. Get help from a co-worker if needed.
- MPI recommends using a three man drill team, including one operator, one steel/bolt installer and one supply preparation member. If three members are not available, it is recommended that two team members are assigned to the task.

Drilling beside the continuous miner:

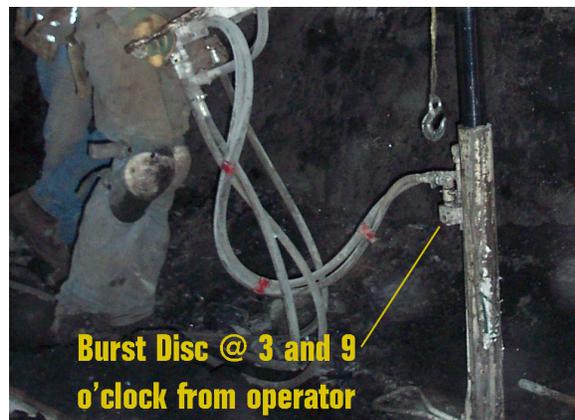
- If rib conditions allow, when working on the left side of the miner, your steel/bolt installer should work on your right with the rib to your left.
- When working on the driver's side of the continuous miner, the steel/bolt installer should be on the rib side and the continuous miner on your left.

Bolting at the face (i.e. on the long wall, withdrawing the continuous miner and bolting in front):

- Erect temporary roof support props or jacks. **NEVER** position yourself or work under unsupported roof.
- Test the roof and ribs. Scale loose and dangerous rock before you begin drilling.
- Bolt only from the last safe head support into the face.

Proper operator stance:

- With the drill in position, stand with your legs shoulder length apart with your left leg braced, so that you have control over the equipment.
- When operating the Z Drill® make sure the valves containing the Burst Discs are facing 3 o'clock and 9 o'clock to your position in the event they rupture from over pressure.





General Information:

- Ensure you are familiar with the type of chemical resin in use, length, set time, etc.
- Loose clothing should not be worn.
- Long sleeves should always be worn.
- Long hair should be tied back.
- Observe roof, ribs, machine and fellow workers AT ALL TIMES when drilling and bolting.
- All safety procedures should be carried out in a swift, professional, workmanlike manner.
- If you have a new worker on your drilling team, task train them on the proper operation of the equipment. MPI does not recommend inexperienced miners run the equipment however, in the event of an emergency the new inexperienced miner must be prepared to lock out and tag out the equipment.
- Never touch a chuck or drill steel that is in motion.
- Be careful when extracting drill steels from completed holes. Never leave any steel unattended while it is in the hole, you must maintain control of all steel sections in the hole.
- Dust must be controlled. MPI Supply offers Dust Collection Systems for use all Z Drill® roofbolters. The Z Drill® is adaptable to drill with water. In the event water or Dust Collection Systems are not used, it is advisable to hang curtain downwind.



DRILLING INSTRUCTIONS

After EVERY Pre-Operation Instruction is completed you may begin drilling.

- Raise the drill slowly until drill bit comes in contact with roof, being careful that the leg pressure **IS NOT COMPLETELY ON**.

FAILURE to raise the cylinder slowly will not only bend/break drill steels but may also cause serious injury.

NOTE: The Leg Thrust on the Z Drill® is approximately **1,200 pounds of force, but may vary and peak at 5,000-9,000 depending on your pumps**

- After the drill steel has reached the roof, slowly open your throttle control.
- The drilling rate may then be regulated but the operator. Controls should always be maintained. **DO NOT** tape or modify any controls that will limit the operator's ability to run the equipment. Once the hole has been started the operator will gain a better understanding of how much pressure is needed on the throttle.
- During dumping (lowering) of the drill, remember to run the rotation to help retain the drill steel.

NOTE: In case of failure, malfunction or decreased drill performance, turn the machine off and troubleshoot the problem.

- Upon completion of drilling operations, check the drill for damages and clean the drill.



GENERAL MAINTENANCE AND REPAIR

There may be no changes, attachments, or any remodeling made to the equipment, which could compromise safety. This applies to any and all welding on the Z Drill®.

Required maintenance and service schedules as prescribed in the Operators Guide must be observed and adhered to. Changes in scheduled maintenance may only be initiated by those specializing in the mechanics of the equipment. The operating personnel is to be informed before initiating any maintenance or repairs on the equipment.

Maintenance and repairs are to be provided as required.

MPI Supply recommends that every drill in service should be scheduled for a maintenance check ***at least once a year*** or as needed.

Existing national regulations are to be observed with all work in tight and narrow spaces.

When handling and using lubrications, greases, and other chemical substances, observe each product's safety instructions and regulations.



DESCRIPTION

Z Drill® is used in the mining and tunneling industries within the scope of intended and safe use. The compact and portable Z Drill® allows for operation in many narrow or otherwise unreachable passages.

Special attributes of the Z Drill® allow for the possibility of operation with different components, for example HFA and HFC liquids as well as hydraulic oils.

MPI manufactures three design models of the Z Drill® at its US facility based outside of Pittsburgh, Pennsylvania:

- **Z Drill® Model HA 16/500 – HFA**

- **HIGH PRESSURE SYSTEM** - The Z Drill® HA 16/500 – HFA unit is designed for use with HFA liquids with an operating pressure of up to 4350 psi and has the capability of direct connection to longwall hydraulic systems without additional reductions in pressure.

The backflow pressure can sustain up to 870 psi.

- **Z Drill® Model: HA 16/500 – Oil/HFC**

- **LOW PRESSURE SYSTEM** - The Z Drill® Model HA 16/500 – Oil/HFC is designed for use with HFC liquids or hydraulic oil with an operating pressure of up to 2000 psi, with the capability of connection to other machines with hydraulic power units, for example scoops, loaders, etc.

The backflow pressure can sustain up to 145 psi.



SPECIAL INSTRUCTIONS

Warning!

Z Drill® operations may only use approved and clean hydraulic fluid or emulsion fluid.

The compression couplings are to be cleaned and the hoses flushed clean before connecting hoses to the Z Drill®.

Before drilling, the Z Drill® and the licensed operator must ensure that activity occurs on a stable and secure platform.

Drilling operations are so to be carried out in a manner that prohibits the collapse of any telescopic cylinder.

End users of the Z Drill® should consult the Operators Guide prior to connecting any Z Drill® units to a power source and understand which power source is needed for the specific machine you are using. If you have any questions please contact MPI Supply at **(412) 664.9320**.



OPERATIONS

The fundamental configuration of a Z Drill® includes a drilling motor, control arm and telescopic cylinder with pedestal.

The controls for the drilling motor (rotation) and the telescopic cylinder (elevation) are on located on the control arm. The flow rate of the hydraulic fluid or emulsion fluid into the Z Drill® is regulated by the throttle. The Z Drill® Model HA 16/500 – HFA High Pressure System has an additional Flow Valve added on the pressure hoses.

There are two versions of the Z Drill® control arm. The first is a complete motorcycle-type twist control for both the rotation and elevation. The second is a hybrid motorcycle-type control, the elevation has the twist valve and the rotation is controlled by a trigger.

There are pressure relief safety valves located on the Z Drill® motor and leg. The outer leg also has built in burst discs for additional pressure protection. The Z Drill® motors have internal pressure reliefs also.

Z Drill® is capable of drilling wet or dry. Both types of 1 1/8” chucks are available. Please advise MPI of your intention when placing sales or service order. MPI recommends that only MPI technicians change Z Drill® chucks.

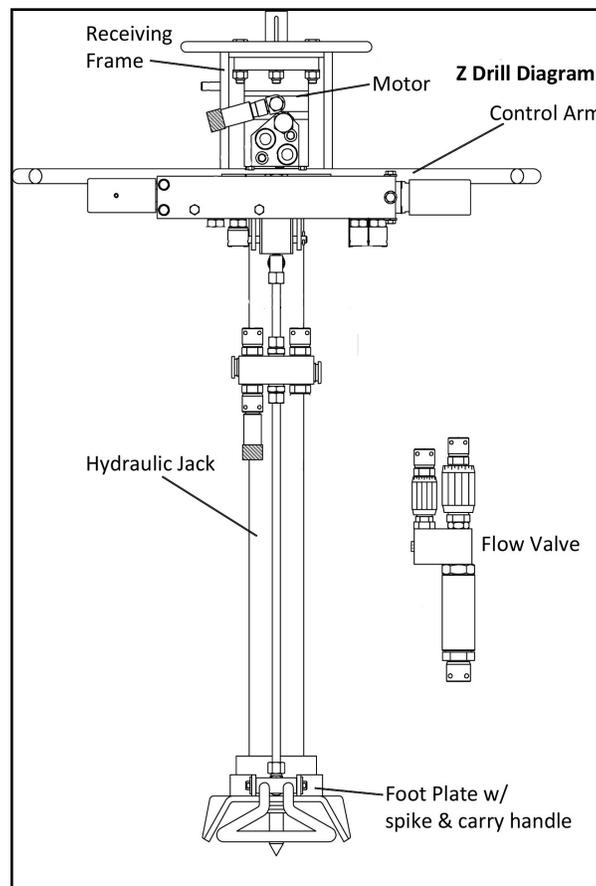


MAINTENANCE

To ensure operator's safety and prolonged performance from Z Drill®, the following maintenance instructions **MUST** be carried out:

- Clean Z Drill® after every use and test all parts and features.
- Check the hydraulic connecting hoses for damages prior to each shift.
- Check for leakage and damages in the hydraulic cylinders.
- Check for leakage in the drilling motor
- MPI does not recommend checking/changing the filters in the rotation block or the elevation block. These control blocks are vital to the safe operation of Z Drill® and should only be manipulated by MPI's trained technicians.

The *below schematic* highlights these areas on Z Drill® in more detail.





LUBRICATION

MPI Supply recommends the following lubricant to be used when applying grease to the Z Drill® **AVIA ALUPLEX 2 EP** or similar friction-type bearing and roller bearing grease.

SERVICE

MPI Supply advises that each Z Drill® be returned to MPI Supply for a routine maintenance check at least **1 time every year** or as needed. MPI Supply recommends all repairs, especially major repairs be done with an authorized MPI Supply technician at an authorized MPI repair facility. The following are a list of common Z Drill® issues:

- The inline filter in the flow valve on the Z Drill® Model HA 16/500 – HFA High Pressure System may be cleaned or changed if needed.
- If the rotation sticks (the chuck will not stop rotating), remove the unit from service immediately. There is a problem with the rotation block. This unit should be locked and tagged out and repaired by MPI Supply technicians **ONLY**.
NOTE: Valve seating (needle with needle seating) in the rotation block **MAY ONLY** be adjusted or changed by MPI Supply technicians to ensure the integrity of the Z Drill®.
- There are pressure relief valves (60 Bar) for operational safety. For deployment, adjust to 60 bar and for retraction adjust to 100 bar. The 100 bar relief valves are only offered on the Z Drill® HA 16/500 HFA. All pressure relief mechanisms are to be manipulated by MPI **ONLY**. One relief valve is located on the motor block and the second is on the outer leg.
- Burst discs are attached to every Z Drill® outer leg and serve as additional safety. With temporary overstressed pressure, they will burst and allow the hydraulic fluid to dump out of the leg. **Make sure the burst discs are facing away from you during operation.**
- Should fluid leak on the shaft or top of the motor, the seals in the bearing case of the motors are blown should be replaced. Often times it is more economical to simply replace the motor.
- Weak drilling pressure may be attributed to leakage in the cylinder. In this case the seals in the cylinder must be changed.
- The shock in the control arm must be replaced when the control arm becomes difficult to operate or if the safely collapse pin is not functioning properly.



TROUBLESHOOTING TIPS

| ISSUE | ACTION TO TAKE |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Loss of Power to Motor | <ul style="list-style-type: none">- Check the main power source- Inspect all hoses for damage or kinks |
| Loss of Leg Thrust | <ul style="list-style-type: none">- Check the main power source- Inspect all hoses for damage or kinks- Check for leaks on leg seals- Inspect leg sections for damage |
| Loss of Fluid Pressure | <ul style="list-style-type: none">- Check the main power source- Inspect all hoses for damage or kinks- Check the filters for blockage |
| Slow Drilling | <ul style="list-style-type: none">- Check your bits and steels- Check the power system pressure |
| <p>NOTE: The greater the number of Z Drill® roofbolters and other equipment on a single power source MAY lower the performance of drilling stations.</p> | |
| Faulty Rotation | <ul style="list-style-type: none">- Check the rotation block- Contact an authorized MPI service technician to assist with this issue. |
| Slow Leg Release | <ul style="list-style-type: none">- Check for leaks on leg seals- Inspect leg for damage |
| Leaking Motor Seals | <ul style="list-style-type: none">- The pressure on these seals is immense and sometimes the motor seals do give way. Even though the Z Drill® will still function, MPI recommends that the unit be removed from service until the seals and/or motor are replaced. |
| Leaking Motor Relief Valve | <ul style="list-style-type: none">- Check that the pressure and return lines are connected properly and are not reversed.- If the hoses are connected properly, the valve will need to be replaced. |

MPI Supply is available to assist you in troubleshooting issues **(412) 664.9320**. If the issue is severe MPI will service your equipment at one of our repair facilities.



Z DRILL® **TECHNICAL INFORMATION**

Z Drill® hydraulic roofbolter model: HA 16/500 – HFA for operations with HFA (water/oil) liquid (High Pressure)

| | |
|---------------------------|-------------------------------------------------------------------------------------------------------------|
| Drill motor: | HBS 80 - fixed onto the drilling bracket |
| Fluid medium: | HFA (ratio 1.5 – 2% lubricant) |
| Operating pressure: | 4350 psi maximum |
| Return/backflow pressure: | 870 psi maximum |
| Performance capacity: | 21 HP |
| Drill torque: | 147 lbf |
| Fluid Consumption: | approximately 13 GPM |
| Rotational speed: | Variable 100 – 600 RPM |
| Drilling bracket: | Three stage telescopic barrel with overstress security relief measures for forward motion and return motion |
| Cylinder thrust: | 1,125 lbs of force normal operation, peak at 5,000 - 9,000 pounds of force |
| Noise level: | 68 dBA |

Long Z Drill® (HA 16/500 – HFA) 1360MM
Installation length: minimum 4.2'
Feeding path: 4.5'
Overall weight (w/o hoses, chuck): approximately 121 lbs.

Short Z Drill® (HA 16/500 – HFA) 760MM
Installation length: minimum 3.2'
Feeding path: 2.5'
Overall weight (w/o hoses, chuck): approximately 110 lbs.

Mini Z Drill® (HA 16/500 – HFA) 650MM – **The Mini Z is equipped with a side mount motor**
Installation length: minimum 2.2'
Feeding path: 2.5'
Overall weight (w/o hoses, chuck): approximately 110 lbs.

The Z Drill® HFA 16/500 series roofbolters are delivered with all high pressure hoses, staple lock fittings and flow valve.

All chucks are sold separately.

The HFA 16/500 series are recommended to run only on HIGH PRESSURE systems



Z DRILL® – OIL **TECHNICAL INFORMATION**

Z Drill® hydraulic roofbolter model: HA 16/500 – Oil/HFC for operations with Oil and HFC liquid (Low Pressure)

| | |
|---------------------------|-------------------------------------------------------------------------------------------------------------|
| Drill motor: | HBS 80 - fixed onto the drilling bracket |
| Fluid medium: | HFC or hydraulic oil ONLY |
| Operating pressure: | 2,900 psi maximum |
| Return/backflow pressure: | 145 psi maximum |
| Performance capacity: | 21 HP |
| Drill torque: | 147 lbf |
| Fluid Consumption: | 13 GPM maximum, 7 GPM average |
| Rotational speed: | Variable 100 – 600 RPM |
| Drilling bracket: | Three stage telescopic barrel with overstress security relief measures for forward motion and return motion |
| Cylinder thrust: | 1,125 psi |
| Noise level: | 68 dBA |

Long Z Drill® (HA 16/500 – HFA) 1360MM
Installation length: minimum 4.2'
Feeding path: 4.5'
Overall weight (w/o hoses, chuck): approximately 121 lbs.

Short Z Drill® (HA 16/500 – HFA) 760MM
Installation length: minimum 3.2'
Feeding path: 2.5'
Overall weight (w/o hoses, chuck): approximately 110 lbs.

Mini Z Drill® (HA 16/500 – HFA) 650MM – **The Mini Z is equipped with a side mount motor**
Installation length: minimum 2.2'
Feeding path: 2.5'
Overall weight (w/o hoses, chuck): approximately 110 lbs.

The Z Drill® HFA 16/500 series roofbolters are delivered with all high pressure hoses, staple lock fittings and flow valve. Additional fittings may be added at MPI to accommodate particular systems (i.e. quick disconnects, NPT, etc.)

All chucks are sold separately.

The HFA 16/500 series are for use on **ONLY LOW PRESSURE** systems



Z DRILL® MANUFACTURERS WARRANTY DOCUMENT

MPI Supply warrants that all of its *New Products* are free from defects in material and workmanship under normal operating conditions for the period of 90 days.

This warranty only applies to *New Products* sold by MPI Supply and or any service agent authorized in writing by MPI Supply will repair or replace any part, which proves defective within the limits of this warranty at no charge to the Buyer for parts or labor.

Failure to fully comply with the Workshop Manual or the operating instructions contained in the Operators Guide supplied with the Product shall render this warranty void.

This warranty does not apply to:

- Any part which has been subjected to misuse, negligence, accidental damage, improper or inadequate maintenance or improper storage.
- Repairs rendered necessary or arising from the use of other than genuine MPI parts.
- Normal maintenance items including, but not limited to, seals, ball bearings and filters and the labor involved in the replacement thereof.
- Deterioration of any item due to normal use, fair wear and exposure unless due to a defect in material or workmanship.
- Any work or adjustment performed by persons other than a service agent duly authorized in writing by MPI or damage resulting there from.

The defective part for which a claim for replacement is made pursuant to this warranty must be returned to MPI Supply or to a service agent duly authorized in writing by MPI Supply for examination and the decision as to whether the replacement of the defective part falls within the provisions of this warranty for replacement free of charge shall be made at the sole discretion of MPI Supply.

DOWN TIME

MPI Supply shall not be liable for any other cost, expense or damages incurred buy the Buyer while the Product is out of service during performance of any warranty work.

SERVICE/MAINTENANCE PROGRAM REQUIRED BY MPI

MPI Supply requires that no later than every 200 hours of operating time or not later then intervals of three months whichever shall occur first in time the Product be removed from the work site to a service area for cleaning, inspection and removal of any external or internal build up of oil, water, dirt or other contaminants and for the inspection and replacement of filters and where necessary, the seals and the checking of the general operation of the Product such service work to be performed only by a service agent authorized in writing by MPI Supply.

Note – MPI Supply Service Exchange and Rental Equipment are covered under MPI's warranty program for a period of 30 days from delivery to customer's site. Normal wear and tear/usage of MPI Service Exchange and Rental Equipment is not covered under warranty.

Failure to comply with the Service/Maintenance Program will render the Warranty void.



MANUFACTURER INFORMATION

All MPI Supply Z Drill® Roofbolters are manufactured by:

MPI Supply
25 Allegheny Square
Glassport, PA 15045
Phone: 412.664.9320
24 Hour Service Number: 412.664.9320
Email: info@mpisupply.com
www.mpisupply.com