HYDRAULIC BREAKER

OPERATOR'S MANUAL - DX SERIES

Forword

This Breaker Operator's Manual is intended as a guide and/or instruction for correct use and maintenance of the breaker, shall be read through very carefully before installation and/or operation of the breaker, or any maintenance work to the breaker. Keep this manual in the carrier cabin so that it is always at hand. Repurchase it if it is lost.

The breaker operator's manual is written to apply for various markets. Therefore, we ask you to disregard the sections which are not applicable to your breakers and/or carriers.

Many hours are spent on design and production to make breakers that are as efficient and safe as possible. The accidents which occur in spite of this, are mostly caused by the human factor. A safety conscious person and well maintained breaker and carrier make a safe, efficient and profitable combination.
Therefore, read the safety instructions and follow them.

We continually strive to improve our products and to make them more efficient through changes to their design. We retain the right to make these changes without committing ourselves to introducing these improvements on products which have already been delivered. We also retain the right to change data and equipment, as well as instructions for service and maintenance measures without prior notice.

Be sure you are thoroughly familiar with the positions and functions of all instruments and controls of the carrier, along with the instructions in the Operator's Manual before using the breaker or before service or maintenance is carried out.

BREAKER OPERATOR'S MANUAL

WARNING!

The symbol above appears at various points in the manual together with a warning text. It means: Warning, be alert! Your safety is involved! It is the obligation of the operator to make sure that all warning decals are in place on the breaker and that they are readable. Accidents may otherwise occur.

WARNING!

Do not operate the breaker and do not carry out any maintenance until you thoroughly study and understand the contents of this Breaker Operator's Manual.

Installation inspection

An installation inspection must be carried out after the breaker has been installed on the carrier. During the installation inspection certain specifications (port relief valve pressure, working pressure, oil flow, etc.) must be checked so that they are within given limits. Contact your authorized dealer.

Spare parts order

When you need parts or some information concerning maintenance of your breaker, contact your local authorized dealer.

Required information:
1. Name of customer and contact person
2. Order number (when available)
3. Delivery address
4. Mode of delivery (air mail, etc.)
5. Required delivery date
6. Invoicing address
7. Model and serial number of breaker
8. Name, number and required amount of spare parts

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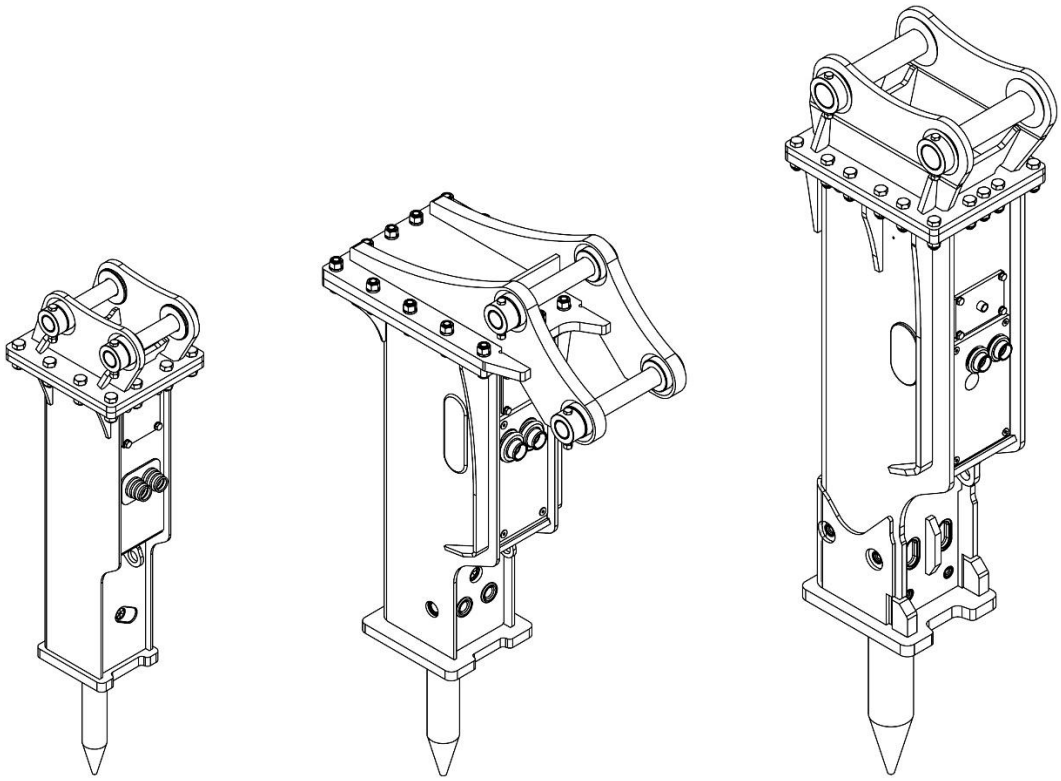
III. Presentation



The breaker is a hydraulically powered breaker. It can be used on any carrier with correct carrier weight, hydraulic flow and necessary mechanical installation requirements.

Breaker works by repeatedly raising a steel piston and driving it down onto the head of a removable breaking chisel/tool.

No additional pressure accumulators are necessary for the carrier since the integrated pressure accumulator absorbs hydraulic pressure peaks. The breaker impact energy is almost constant and independent of the carrier's hydraulic system.

A. Removal from packaging

• Remove all steel belts from the packaging. Open the packaging and remove all plastics
  covering the product. Scrap steel belts and plastics.
• Wooden frames and boxes as well as steel bolts and plastics can be recycled.
• Check if the breaker is in good condition and there is no visible damage.
• Check if all ordered parts and accessories have been enclosed with the breaker.
  Some options may be provided by your local dealer such as installation kits, hoses, breaker bracket, etc.

B. Lifting instructions

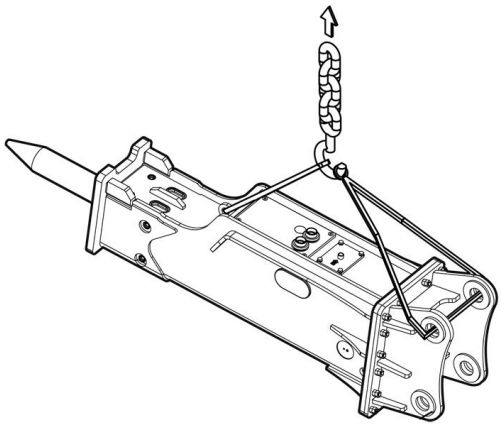
WARNING!

Ensure that no persons are near the breaker when it is lifted.
If the breaker falls down there is a risk of personal injuries.

Use a hoist when lifting breaker or component parts, to avoid back injury.
Make sure all chains, hooks, slings, etc., are in good condition and of correct capacity.
Be sure that hooks are positioned correctly.

Lifting devices must safely carry working weight of the breaker, see section Specifications.
Place chains or slings, as shown in the illustration, prior to lifting breaker.

Always check balance of the breaker by lifting it gradually. If the breaker is well balanced, it may be lifted higher.



C. Lifting eyes and lifting eye bolts

WARNING!

Ensure that lifting eye bolts are fully tightened to the housing before using them for lifting. If any lifting eye bolt is not properly tightened it may break. If the breaker falls down there is a risk of personal injuries.

Lifting eyes on the breaker housing are only intended for handling the breaker.
The breaker or its parts must not be used for lifting other products.

IMPORTANT! Always remove lifting eye bolts and replace them with blanking screws before operating the breaker.

Follow the safety instructions for lifting the breaker, see section Safety.

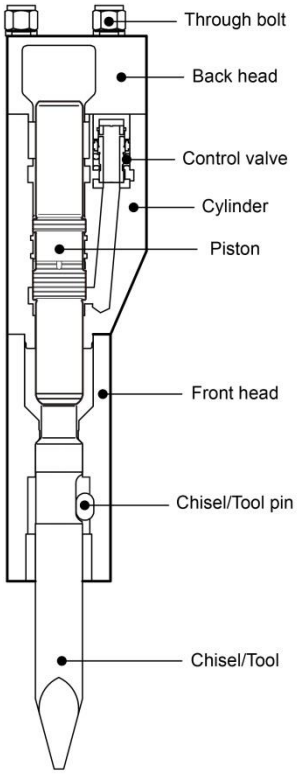
III. Presentation

D. Main structure of hydraulic breaker

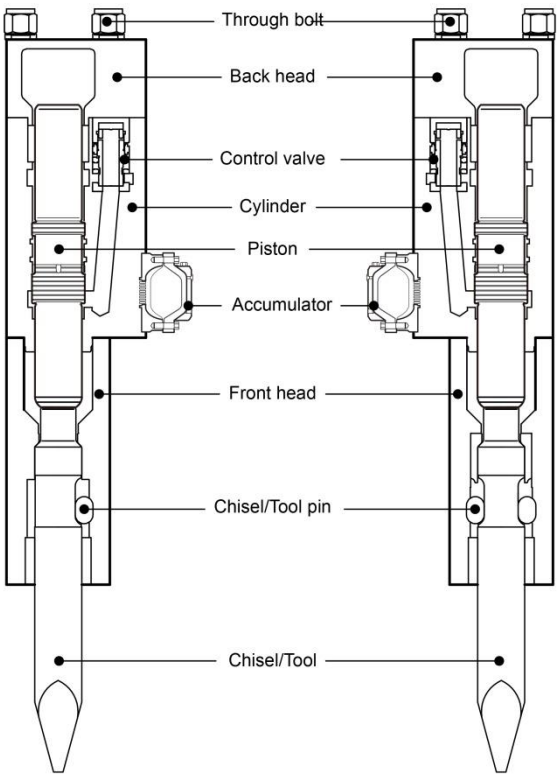
Breaker consists of five main sections such as **Cylinder, Piston, Control valve, Front head and Back head.**

1. Four through bolts are holding cylinder, back head and front head together.
2. Cylinder contains piston, control valve and accumulator where Nitrogen gas is charged.
3. Piston strikes the working chisel/tool by oil & gas pressures.
4. Control valve located inside cylinder determines direction of piston movement.
5. Chisel/Tool pins are located inside front head, limiting chisel/tool stroke distance.
6. Back head has a chamber where Nitrogen gas is charged.

6V ~ 17V



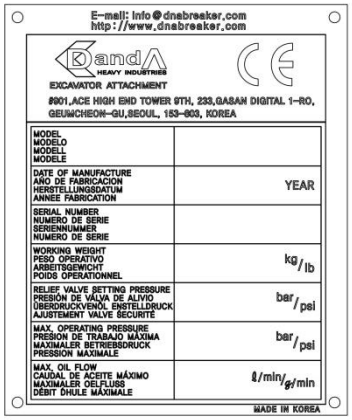
40V



60V ~ 1200DX

E. Name plate

The breaker information including serial number and key technical data is available on the name plate, for your use to identify the product as well as its key specifications. Make note of the serial number and quote it when ordering spare parts or consulting technical enquires to the authorized dealer.



F. Warning decals

Warning decals are on various places of the breaker. The operator should pay attention to the warning decals and ensure use, maintenance and service of the breaker to be carried out accordingly, see reference information below. The warning decals should be cleaned and legible. Any missing, illegible or damaged decals should be replaced by the operator.
When any part where the decal is positioned is replaced the decal must also be replaced by the operator.

Sign	Image Content	Reference
	Head wearing ear protection	Must wear ear protection
	Operator's Manual Service Manual	Consult manual for proper use, maintenance and service procedures.
	Working breaker with diagonal slash	Keep away from breaking area while the breaker is working.
	Grease gun	Inject grease into grease nipple with grease gun periodically.
	Back head	"HIGH PRESSURE" Discharge prior to disassembly.
	Accumulator	"HIGH PRESSURE" Discharge prior to disassembly.
	High temperature	Keep away as the breaker is so "HOT"

IV. Safety

All mechanical equipment can be hazardous if operated without due care or correct maintenance. Most accidents involving breaker operation and maintenance are caused by failing in observing basic safety rules or precautions. The accident can often be avoided by recognizing potentially hazardous situations before it occurs. Since it is impossible to anticipate every possible circumstance that might involve a potential hazard, the warnings in this Operator's Manual and on the breaker are not all inclusive. If any procedure, chisel/tool, working method or operating technique not specifically recommended by the manufacturer is used, you must make sure that it is safe for yourself and others, also ensure that the breaker will not be damaged or handled unsafe by your selected method of operation or maintenance procedures. Safety is not just a matter of responding to the warnings. When working with the breaker, always pay attention to what hazards there might be and how to avoid them. Do not work with the breaker until you are sure that you can control it. Do not start any job until you are sure that you and those around you will be safe.

WARNING!

Read the following warning messages carefully which explain various hazards and how to avoid them. If you do not take proper precautions, you and/or others could be seriously injured.

Operator's manual

- Read and understand the Operator's Manual.
- The operator must be thoroughly familiar with how to operate and maintain the breaker and should undergo required training on the breaker.
- The operator must follow the rules and recommendations given in this Operator's Manual and the Carrier Operator's Manual, also pay attention to any statutory and national regulations or specific requirements or risks that apply to the work site.
- If anything is unclear or not understandable on the Operator's Manual or requires additional explanation, contact your authorized dealer.

Care and alertness

- When working with the breaker, always be careful and stay alert for hazard. The risks of serious or even fatal accident increase when you are intoxicated or under the influence of alcohol or drugs.

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Clothing

- Suitable clothing for safe handling should be worn.
- Use a hard hat, safety glasses, protective shoes and gloves and an approved respirator (dust mask), also other protective items when required.

Training

- You and others can be injured or even killed if you perform unfamiliar operations without practicing them first. Practice away from the work site, in a clear area.
- Keep other persons away. Do not perform any new operations until you are sure you can do them safely.

Communication

- Bad communication can cause accidents. Keep people around you informed of what you will be doing.
- Work sites can be noisy. Do not rely only on spoken commands. If you intend to work with other persons, make sure they understand all hand signals you will be using.

Work site

- Work site can be hazardous. Inspect the site before working on it.
- Check for potholes, weak ground, hidden rocks, etc. Check for utilities (electric cables, , gas water pipes, etc.). Mark positions of the underground utilities prior to breaking the ground.

Banks and trenches

- Banked material and trenches can collapse. Do not work too close to banks and trenches where there is a danger of collapse.

Safety barriers

- Unguarded breaker and carrier in public places can be dangerous. Place barriers around the breaker and carrier to keep people away.

Flying chips of rock

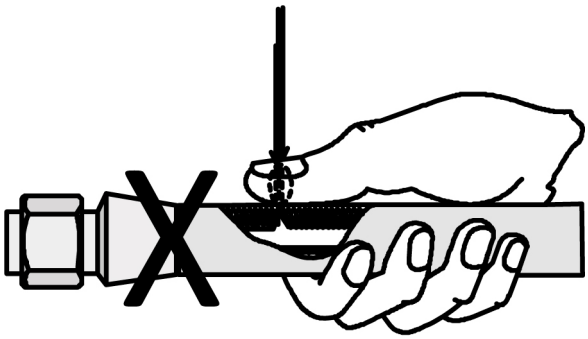
- Protect yourself and your neighborhood against flying chips of rock. Do not operate the breaker if someone is too close.
- Operating the breaker from canopy can be dangerous to the operator. Operate the breaker only with a carrier where closed type cabin is mounted, only when its windows and its doors are in fully closed condition.
- Fitting a screen structure on the carrier cabin window is highly recommended. No screen can be led to damage to the cabin and its window and also injury or even fatal accident to the operator.

Equipment limits

- Operating the breaker beyond its design limits can cause damage. Always operate the breaker within its specification, shown at the Specification Section of this Operator's Manual.
- Do not try to enhance the breaker performance with any modification not approved by the manufacturer or beyond the breaker specifications.

Oil at high pressure

- Hydraulic oil at system pressure can be dangerous. Before disconnecting or connecting hydraulic hoses, turn off the engine, operate the controls to release pressure trapped in the hoses and wait 10 minutes. While operating, keep persons away from the hydraulic hoses.
- Fine jets of hydraulic oil at high pressure can penetrate the skin. Do not use your fingers to check for hydraulic oil leaks. Do not put your face close to suspected leaks. Hold a piece of cardboard close to suspected leaks and then inspect the cardboard for signs of hydraulic oil. If hydraulic oil has penetrated your skin, seek medical treatment immediately.



Never use your hand when checking leaks since oil at high pressure may penetrate your skin.

- There might be pressurized oil trapped inside the breaker even if it is disconnected from the carrier. Be aware of possible blank firing while greasing or removing/installing working chisel/tool.

Pressure accumulator

- The breaker incorporates pressure accumulator. The accumulator is pressurized even after hydraulic pressure has been released from the breaker.
  Attempting to remove or dismantle the accumulator without first releasing the pressure can cause severe injury or death. Do not try to dismantle pressure accumulator, contact your authorized dealer.

Lifting equipment

- You can be injured if you use faulty lifting equipment. Make sure that lifting equipment is in good condition. Make sure that lifting tackle complies with all local regulations and is suitable for the job. Make sure that lifting equipment is strong enough for the job and you know how to use it.
- Do not use the breaker or any of its parts for lifting other material. Contact your authorized dealer and find out how to do lifting work in proper way.
- Never leave the breaker in lifted condition, with any other lifted load and/or unattended.
- See section Lifting instructions.

Spare parts

- Use only genuine spare parts including working chisel/tools of the breaker manufacturer.
- The use of non-genuine/counterfeit parts or chisel/tools may damage the breaker and will void warranty for the breaker.

Breaker and/or Carrier condition

- Defective breaker and/or carrier can cause severe injuries to you and others. Do not operate the breaker which has defective or missing parts.
- Make sure the maintenance procedures in this manual are completed before using the breaker.

Repair and maintenance

- Do not try to do any repair or maintenance work you do not understand.

Modification and welding

- Non approved modifications can cause injury and/or damage. Consult with your authorized dealer before modifying the breaker. Do not attempt to weld the breaker.
  If in doubt, contact your authorized dealer. Note that welding of breaker chisel/tools will render them useless and void the warranty.

Metal splinters

- You can be injured by flying splinters during maintenance and/or repair of the breaker.
- Always wear safety glasses.

V. Operating instructions

A. Recommended application & breaker selection

The breaker is designed to be used for breaking hard and soft rock, concrete, road surface or asphalt, hard or frozen ground. It is suitable for applications such as primary rock breaking, secondary rock breaking, hard and soft rock removal, trenching, benching, ground compacting, etc.

Breaker selection

Description	6V	7V	8V	17V	40V	60V	70DX	80DX
Primary breaking								
Secondary breaking								
Hard rock removal								
Soft material and rock removal	●	●	●	●	●	●	●	●
Demolition					●	●	●	●

Description	100DX	130DX	150DX	180DX	200DX	220DX	250DX
Primary breaking							
Secondary breaking					●	●	●
Hard rock removal		●	●	●	●	●	●
Soft material and rock removal	●	●	●	●			
Demolition	●	●	●	●	●	●	●

Description	300DX	360DX	450DX	550DX	650DX	700DX	750DX	1200DX
Primary breaking	●	●	●	●	●	●	●	●
Secondary breaking	●	●	●	●	●			
Hard rock removal	●	●	●	●	●			
Soft material and rock removal								
Demolition								

Note : Above breaker selection guideline was made upon global breaker use. It may not match with local specific requirement of your market. Therefore consult with your authorized dealer before selecting breaker.

B. Principle of installation

The breaker is installed on the carrier in a similar manner as installing a bucket or other attachments.

The breaker is connected to the hydraulic system of the carrier through a breaker circuit.
If the carrier is already equipped with such a circuit, only suitable hoses and fittings are required. If the carrier does not have a suitable circuit for running the breaker, the circuit must be ordered from a D&A authorized dealer. This may require more complex installation, including new piping and additional valves such as directional valve and pressure relief valve.

C. Operating oil temperature

Breaker operating oil temperature range is 40°C to 80°C (104°F to 176°F). If oil temperature is below the range, ensure that the carrier oil is warmed up to minimum of operating oil temperature range prior to any operations. Ensure that the oil will have to remain warm during operation. If oil temperature is above the range, ensure that the carrier is equipped with additional oil cooling system so that the temperature can stay within the range.

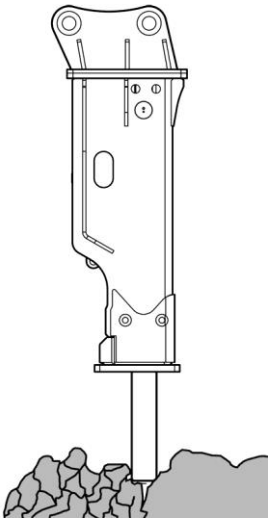
NOTE! The temperature of the hydraulic oil must be monitored periodically. Ensure that the combination of oil grade and oil temperature will guarantee correct oil viscosity.

D. Principles of breaking

To increase breaker working life, pay special attention to use correct working methods and to choose correct chisel/tool for the job. There are essentially two ways of breaking with a hydraulic breaker.

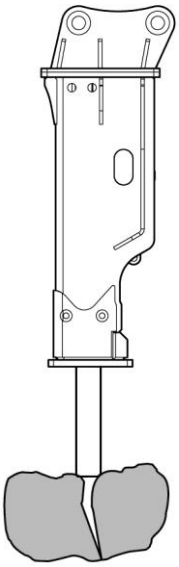
a) Penetrative breaking (or cutting)

In this form of breaking, a chisel/tool such as moil point or chisel point is forced into the material. This method is very effective in soft, layered or plastic, low abrasive materials.



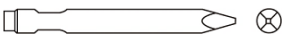
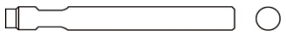
b) Impact breaking

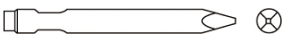
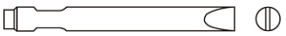
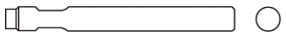
With impact breaking, the material is broken by transferring very strong mechanical stress waves from the chisel/tool into the material. The best possible energy transfer between the chisel/tool and the object is achieved with blunt. Impact breaking is very effective in hard, brittle and very abrasive materials. The use of moil point or chisel point in impact breaking hard material will cause too fast wearing on the sharp edge.

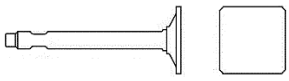
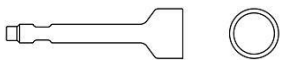
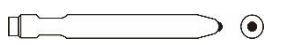


E. Chisel/Tool selection

A range of standard and special chisel/tools is available to suit various application requirements.
Selection of proper chisel/tool types will let you achieve an optimum mix of high productivity and chisel/tool longevity. Selection of optimum chisel/tool type for an application may require some testing. Available chisel/tool types vary from one breaker model to another. Contact your authorized dealer for more information prior to choosing chisel/tools.

Conventional working chisel/tool		Application type				
		Primary breaking	Secondary breaking	Hard rock removal	Soft material & rock removal	Demolition
	Pyramid moil point	●		●	●	●
	Chisel point	○		○	●	●
	Blunt		●			○

Conventional working chisel/tool		Rock type					
		Asphalt	Concrete	Limestone	Sand-stone	Granite	Basalt
	Pyramid moil point	●	●	●	●	●	●
	Chisel point	●	○	●	○	○	○
	Blunt					●	●

Special working chisel/tool		Application type			
		Asphalt removal	Compacting	Post driving	Severe duty rock removal
	Asphalt cutter	●			
	Tamping tool		●		
	Post driver			●	
	Core moil point				●

Note : ● Highly recommended
○ Selectively applicable

F. Work mode selection

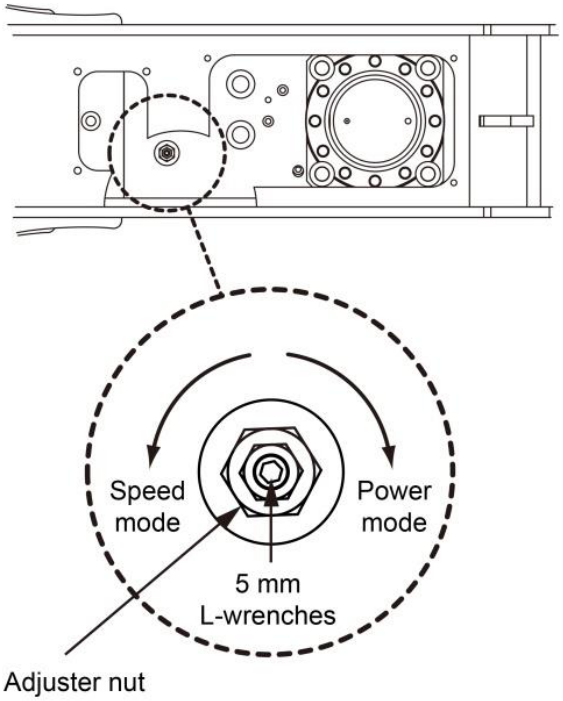
Breaker work mode (Power mode or Speed mode) is selectable at the models of D&A 70DX and above.

Mode recommendation

- Speed mode
  - Applications that require productivity from high speed breaking
  - Soft material breaking such as light/medium duty limestone, soft duty granite, concrete structure, asphalt, etc.
- Power mode
  - Applications that require productivity from power breaking
  - Hard material breaking such as heavy duty limestone, granite, basalt, andesite, iron ore, etc.

Power mode or speed mode can be selected by following procedure.

1. Remove MC Cover.
2. Loosen adjuster valve nut until you can start to turn adjuster valve.
3. Turn adjuster valve with 5 mm L-wrench (available in tool box).
   - Power mode: turn to the right (to maximum till fully tightened)
   - Speed mode: turn to the left by 2 turns.



4. After setting, tighten adjuster valve nut completely.

NOTE! Power mode is pre-set when the breaker comes off the factory.

G. Breaker use in special applications

If the breaker is to be used in the special applications such as,
– tunnel application
– foundry cleaning application
– underwater application
– extremely low or high temperature application
– use of special hydraulic oils
– other special conditions
it may require modifications, special operating techniques, increased maintenance and/or special wear items. You must contact your authorized dealer for proper instructions.

IMPORTANT! The breaker must not be used under water unless proper preparation kit is equipped with. If water enter the percussion chamber, strong pressure waves are generated and damaging the breaker. Operating breaker at the special applications must be carried out with a proper preparation kit and/or special wear parts under full responsibility of the operator, will not be supported by the warranty of breaker manufacturer.

H. Operating guideline and safety

a) Safety first

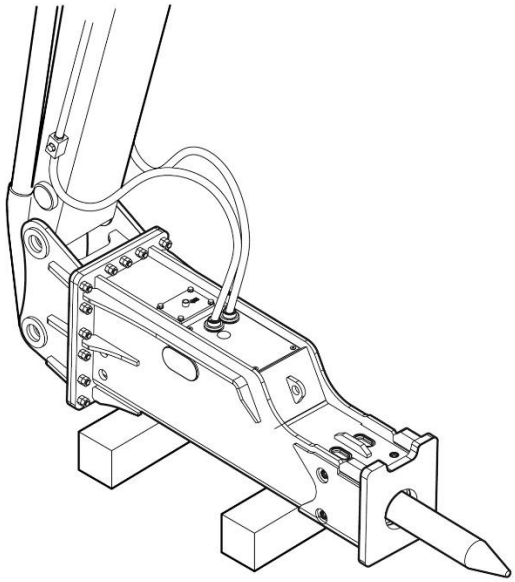
• When leaving the carrier, lower the breaker to the ground and turn engine off.
• Never attach any cable or sling to the breaker to hoist a load. Extremely dangerous!
• Remove working chisel/tool prior to transporting the breaker.
• Keep all the people and equipment away from the breaker when operating.
  Rock chips flying from the breaker can cause serious injury and accident.
• A safety screen is recommended to protect the operator from flying chips of rock.
  Keep windows and doors closed before operating.
  Only carriers with closed cabin equipped should be used for breaker operation.
  Carriers with open canopy should not be used with breaker.
• Do not use the breaker to sweep rock borders and debris on the ground.
  It can cause damage to the breaker and excessive wearing of the housing.

b) Inspection prior to operating the breaker

• Check if the breaker is filled with a sufficient amount of hydraulic oil.
• Check if hydraulic oil is kept away from contamination.
• Check if all hoses and fasteners are securely fitted and tightened.
• Apply a sufficient amount of grease on the shank area of working chisel/tool.

c) Assemble and disassemble the breaker to/from the carrier

- When installing or removing the breaker, the assistant is required. The assistant must be instructed by the operator. All directions, signals etc. must be agreed on beforehand between the operator and the assistant.
- The breaker should only be installed to the carrier of sufficient load capacity. Too light carrier can become unstable and fall over.
- Do not touch any part of the breaker as well as the carrier when the carrier is moving such as boom, arm, etc.
- Check the port relief valve setting pressure of the carrier.
- Check if breaker pipe lines are correctly connected from the carrier to the breaker.
- Do not install any breaker pipe lines and hoses that are not approved. Contact your authorized dealer, if required.
- Never touch the breaker when operating. The breaker hydraulic oil can become very hot.
- Never use your fingers to check bore alignment.
- If the breaker is connected to a quick coupler (or attachment bracket), the operator must take special care to ensure that the quick coupler (or attachment bracket) does not sustain any damage and/or accident.



d) Working chisel/tool fitting/removal

- Always wear protective glasses and helmet when fitting or removing the working chisel/tool.
- The chisel/tool shank must be well lubricated during operation. Periodic visual inspections during operation are highly recommended. Greasing interval varies by breaker model and working condition. See section Service and maintenance for correct chisel/tool fitting/removal and greasing.

e) Equipment limits

- Keep the people away from risk zone when operating the breaker.
  The operator is responsible to determine the risk zone. The operator must ensure the people to stay outside the risk zone.
- If the noise level exceeds 90 dB(A), all workers including the operator in the immediate area must wear ear protection.
- Stop breaking immediately if any one moves into the risk zone, which is much larger for breaker operation than excavator operation due to the risk of flying rock splinters.
- Only approved hydraulic oil should be used.
- Do not operate the breaker with carrier's hydraulic cylinders fully extended or fully retracted. Damage may occur to the carrier.
- When operating the breaker, make sure it does not interfere with the carrier or the hydraulic hoses.
- Do not push the breaker with too much or too little force.
  Too much: Carrier stabilizer leg feet or tracks are completely lifted from the ground.
  Too little: Chisel/Tool does not stay firmly against the material to be broken and carrier starts to shake.
- Keep the chisel/tool perpendicular to the material at all times. If the material moves or its surface breaks, adjust the angle immediately.
- Do not let the chisel/tool move outwards from the breaker without resistance when it penetrates the material. Keep the carrier pushing force on the breaker steady and aligned with the chisel/tool while breaking.
- Do not continuously strike for more than 15 seconds.
- Do not break a same spot of the material for more than 30 seconds. If the material is not broken or the chisel/tool does not penetrate the material, stop breaking and change the position of breaking. Working too long in one spot will make debris and dust piled under the chisel/tool, causing working chisel/tool to be heated and debris and dust to dampen striking impact energy.
- When the material is fully broken, stop breaking immediately. Do not allow the breaker to blank-fire. Frequent idle strokes (blank fire) will damage the breaker.
- To use the breaker most efficiently, concentrate on small steps from the outer edge of the material and move towards the center of the material.
- When breaking hard or frozen ground, use benching method. Start with clearing a small area from the edge, then continue to break the material towards the open area.
- When breaking the material never do leverage with chisel/tool. The chisel/tool may crack.

I. Operating

When operating, the operator should pay attention to the following points.

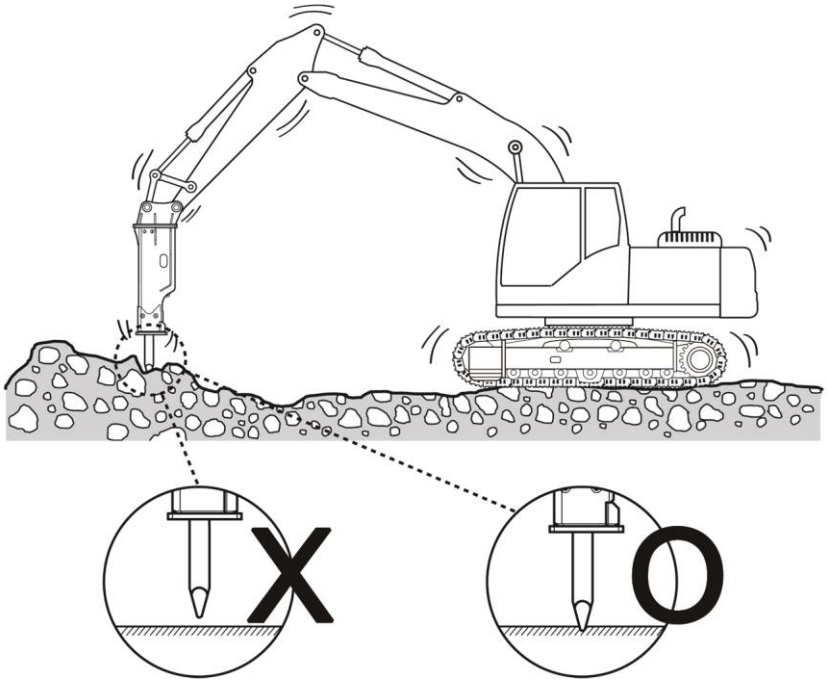
First of all, precautionary measures should be taken to rule out the risks of accident.

- Operate the breaker only from the cabin inside the carrier.
- Close the cabin front screen or splinter guard to avoid injury from flying rock splinters.
- Wear ear protection to prevent hearing ability impairment. Anyone in the immediate vicinity of breaker operations should also wear ear protection.
- Switch breaker off immediately if any one moves into the risk zone.

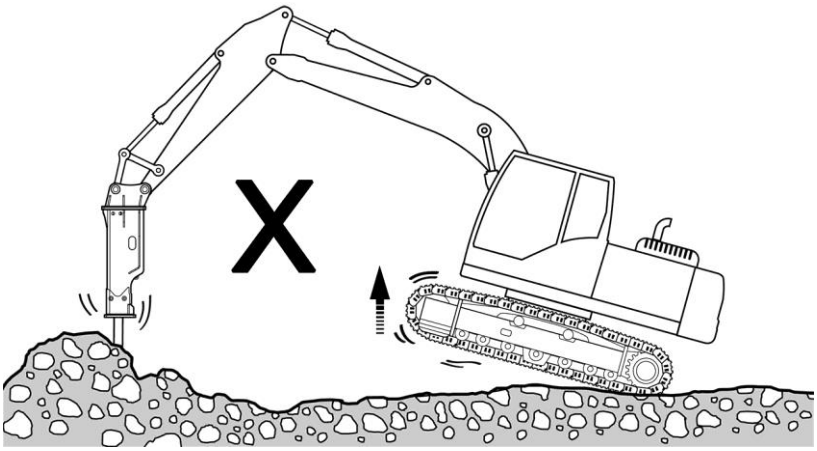
a) Proper way of operation

Proper thrust

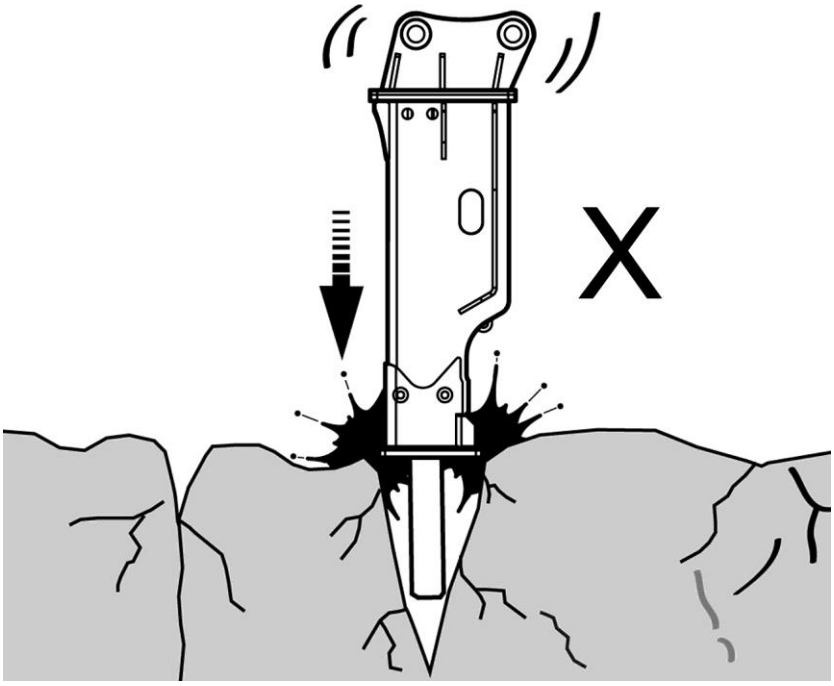
To break effectively, a proper thrust force has to be applied to the breaker.
If a thrust is insufficient, breaker impact energy may not be sufficient enough for breaking material. Then the breaking force may be transferred to breaker body, arm and boom of the carrier, etc. and cause damage to those parts.



On the contrary, if a thrust is excessive or if breaking is performed with carrier's tracks completely lifted, the carrier may suddenly tilt toward the movement.
When the material is broken, the breaker body may violently hit against material and cause damage on the breaker.

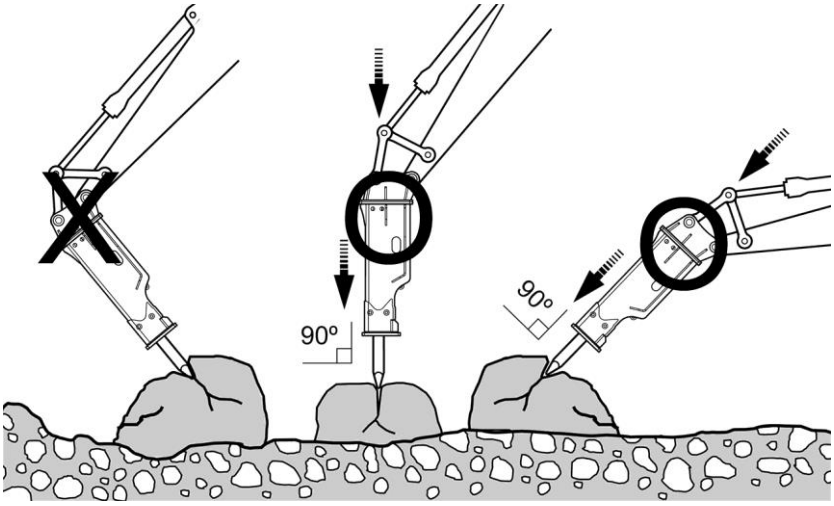


If breaker operation is carried out under such a condition, vibrations may also be transferred to the carrier. Therefore breaking in such a manner should be avoided for protection of the carrier as well. Therefore during breaking, always ensure to apply a proper level of thrust to the breaker. Do not break without properly applied thrust.



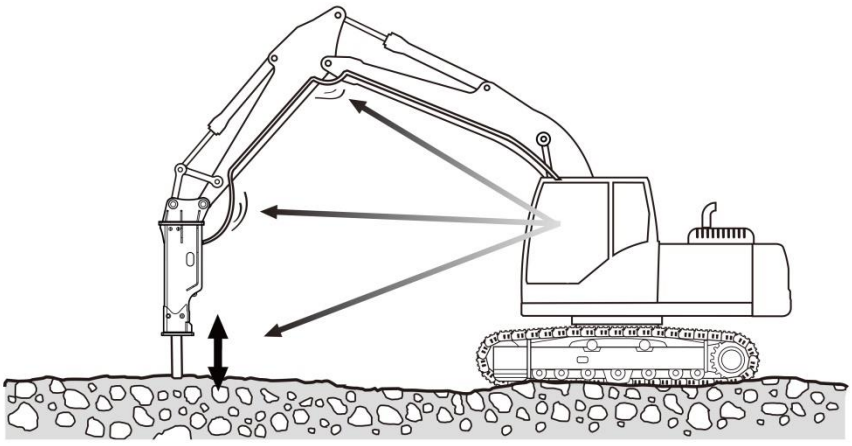
Direction of thrust

Apply thrust in a straight line with the chisel/tool. Place the chisel/tool on the material with a position as vertical as possible. If the breaker stands on the material with an oblique position, the chisel/tool may slip over the material and cause chisel/tool and/or piston crack or seizing. When breaking, select a point of the material where the breaker can be operated with the chisel/tool stably staying on the material.



b) Stop breaker operation as soon as the hoses vibrate excessively

Check if high and low pressure hoses vibrate excessively. If that, accumulator may not be working properly. Contact your authorized dealer and get it repaired.
Check hose fitting points. If oil leaks, retighten or if necessary replace them.
Check if chisel/tool is moving up and down during operation as illustrated below.
If not, chisel/tool may be seized. Disassemble front head and repair or if necessary replace defective parts.

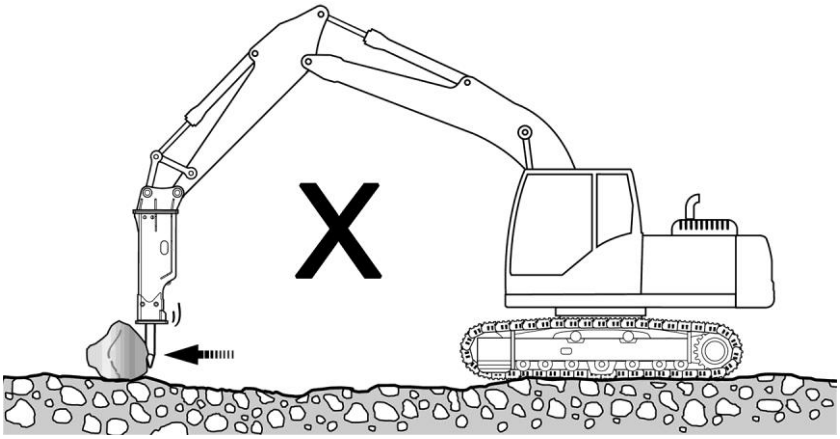


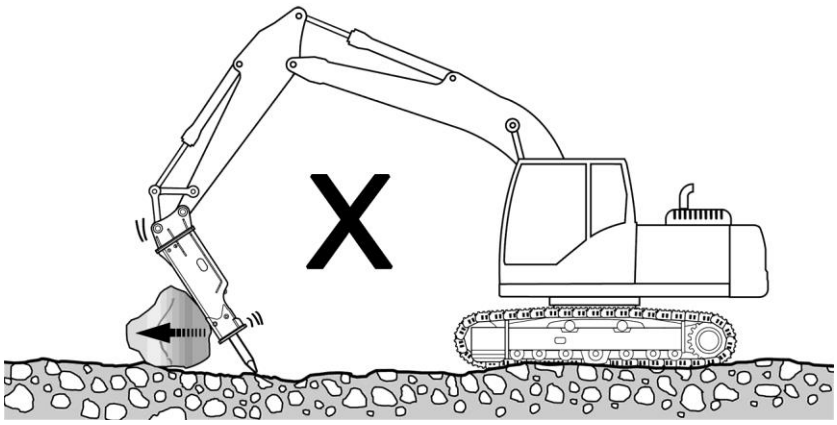
c) Stop when the material is broken (avoid idle breaking to the utmost)

As soon as material is broken, stop breaking and prevent idle breaking. If idle breaking continues, it can cause accumulator damage and bolt loosening or crack. It also can affect the carrier adversely.
When a proper thrust is not applied or the chisel/tool is used like a lever during the operation, idle breaking will occur. In idle breaking, breaker striking generates abnormal sound like metal to metal hitting.

d) Never use to move the material

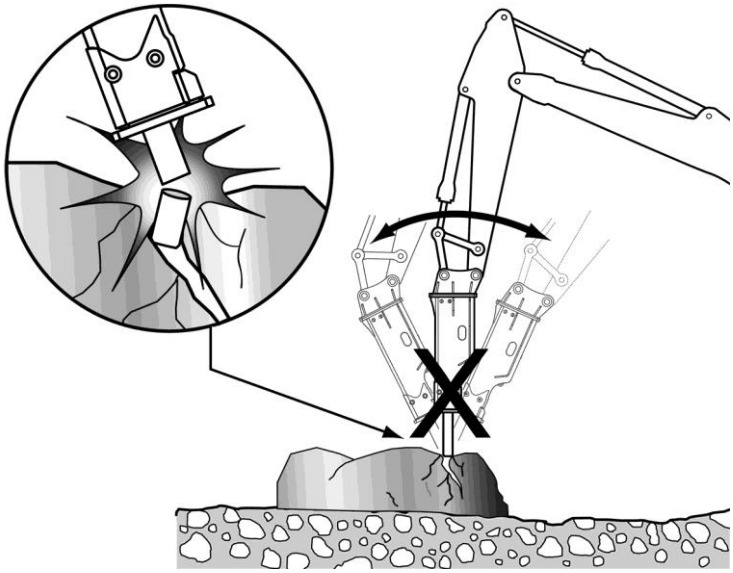
As shown on below picture, do not roll or throw in and out any material with chisel/tool or housing. It can cause damage such as crack, deformation, abnormal wearing, etc. on bolt, housing and chisel/tool crack (or scuffed). It can also damage carrier boom & arm.
Never move the material with breaker. Particularly never let the carrier travel with chisel/tool inside the material.





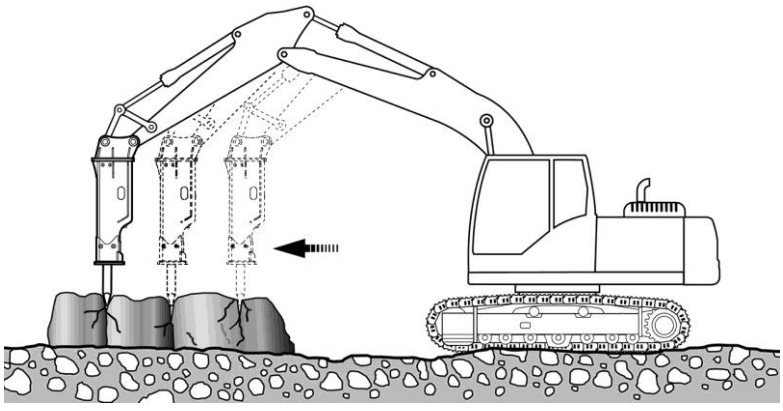
e) Never lever with the breaker

Never attempt to use the breaker like a crowbar. It will cause chisel/tool crack.



f) No breaking longer than 15 seconds continuously
Never break a same spot for longer than 30 seconds

When rocks are hardened, each breaking requires a longer time. However do not break a same spot for longer than 30 seconds. Change the breaking spot.
If not, oil temperature can increase, causing accumulator damage and excessive chisel/tool wearing.

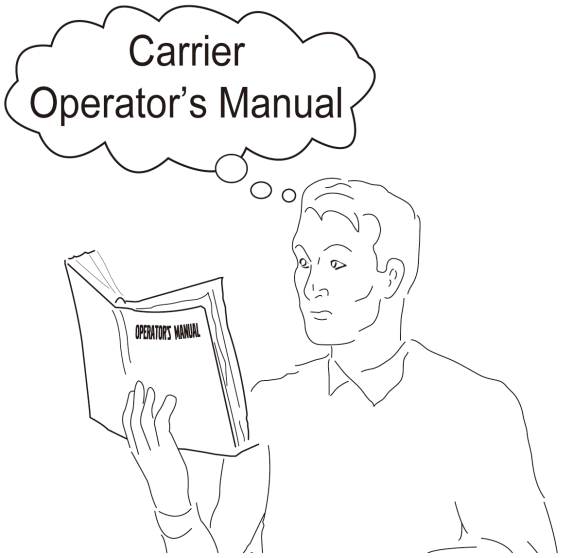


g) Start at an edge in case of hard and large size rock

Start of breaking at a crack or edge area will enable hard and large size rock to be easily broken. Advancing by small step is more effective than large step.

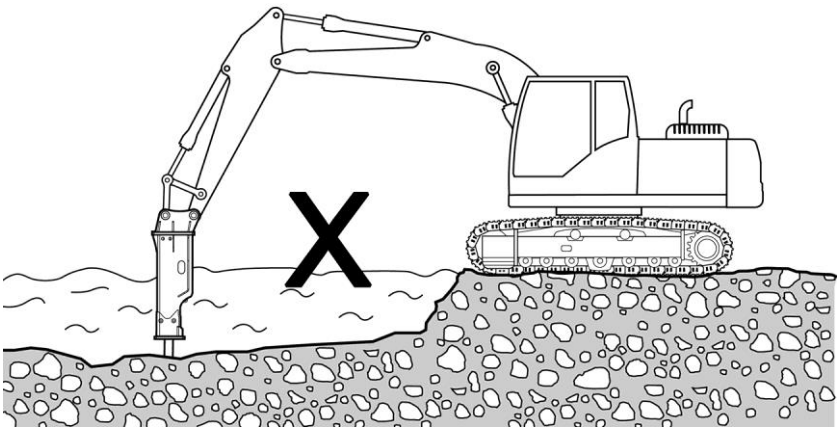
h) Use of proper engine speed

Breaker works at the specified engine speed. Raising engine speed to the highest rpm levels does not increase breaking force but raises oil temperature that can cause breaker internal component failures. To run the breaker at proper engine speed, please
refer to carrier Operator's Manual.



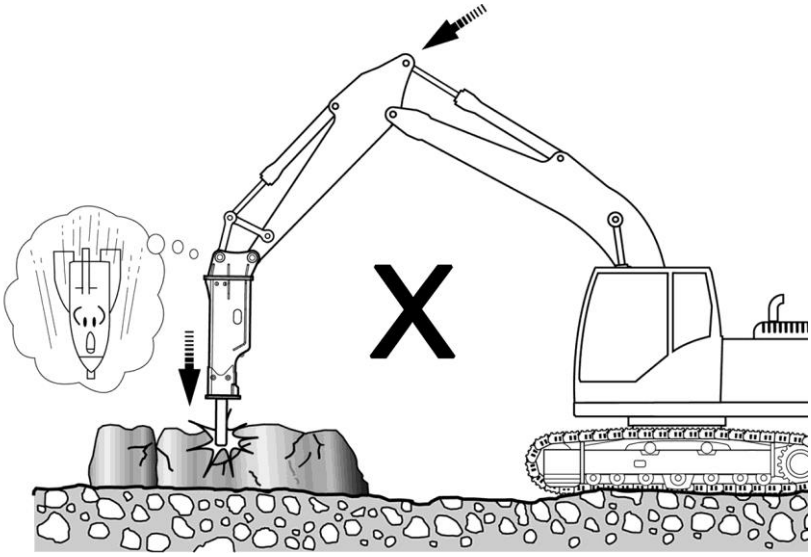
i) Never use at underwater or muddy applications without prior conversion

If water enter the percussion chamber, breaker blows may generate pressure waves that may cause irreparable damage to cylinder, piston and front head of the breaker. In addition lower percussion piston zone may get rust. Water could also get into carrier hydraulic system. In order to avoid damage to the breaker, contact your authorized dealer
and use a kit dedicated for underwater application.



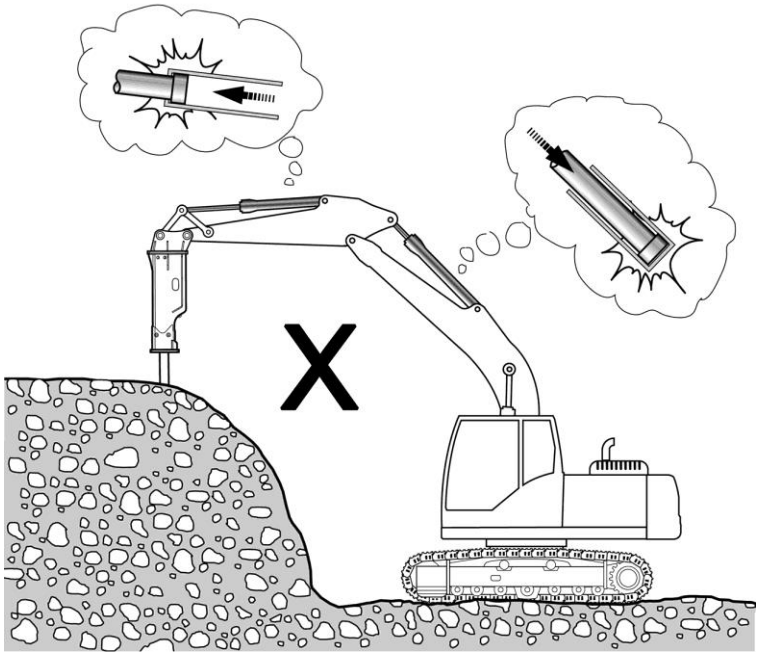
j) Never use breaker like a sledge

Before starting up, rest the breaker on the ground. Never attempt to use the breaker and the carrier boom like a sledge when breaking the material. It will damage parts of the carrier.



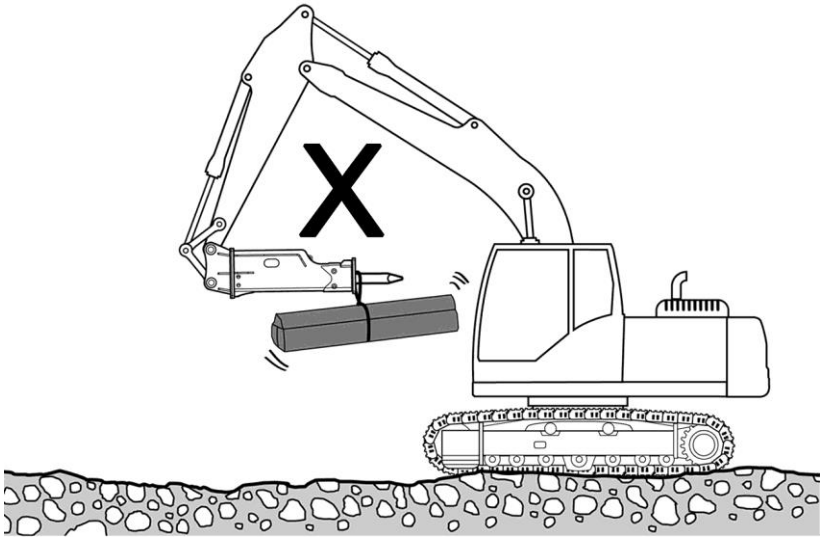
k) Never break with the cylinders at fully extended position

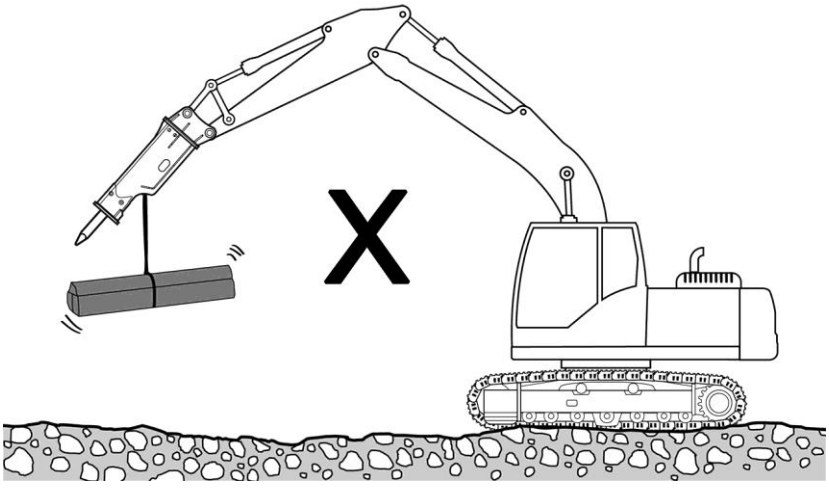
The carrier cylinders may be easily damaged when the breaker works with their fully stretched position to the end.



l) Never use for transport or lifting purpose

The breaker is not designed for lifting or transporting work. It can be easily damaged if used for lifting or transporting material purpose. Furthermore it is very dangerous, incurring serious accidents.

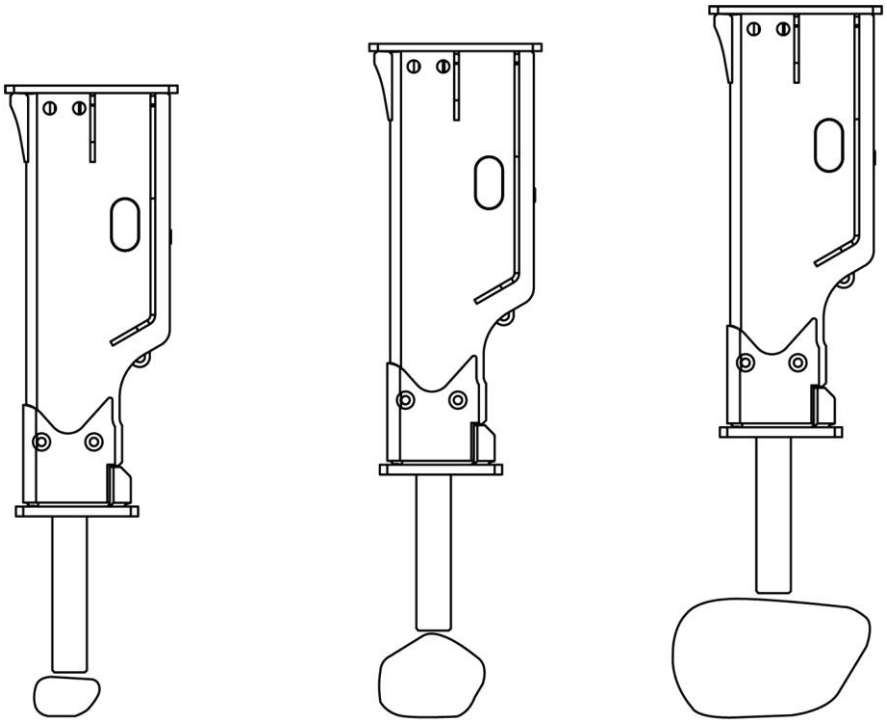




m) How to operate breaker in secondary rock breaking applications

Chisel/Tool pins can be easily cracked or damaged in secondary rock breaking quarry applications. Typical root cause is that chisel/tool hits chisel/tool pin repeatedly during the breaker operation. Follow below instruction for correct breaker operation.

Regulate operating pedal or switch to limit number of blows per breaking.
This is important!

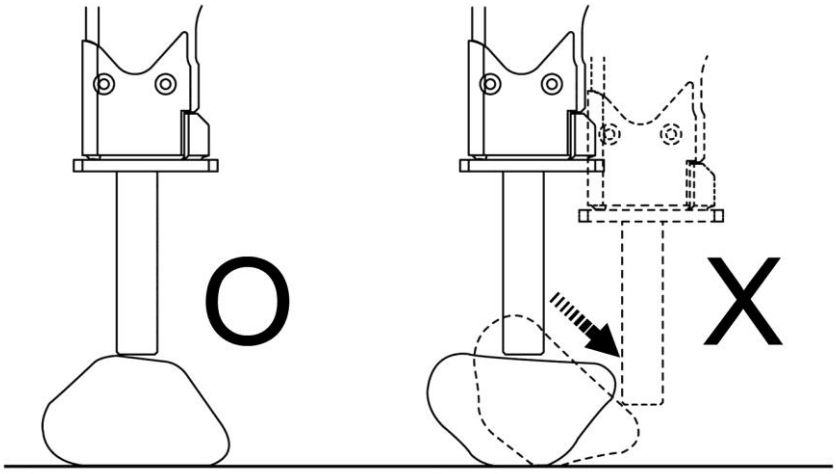


Rock 30 cm (0.98 ft)
1 blow

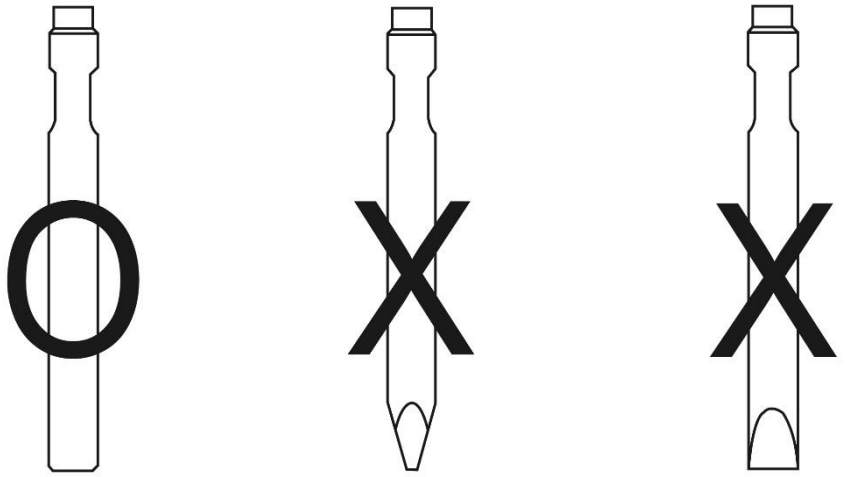
Rock 50 cm (1.64 ft)
2 blows

Rock 100 cm (3.28 ft)
3~5 blows

In case the rock is unstable or slippery, blank firing can occur (chisel/tool hits chisel/tool pin with high impact power when the breaker slips down off the rock). Ensure that you avoid blank firing by proper positioning of the breaker.

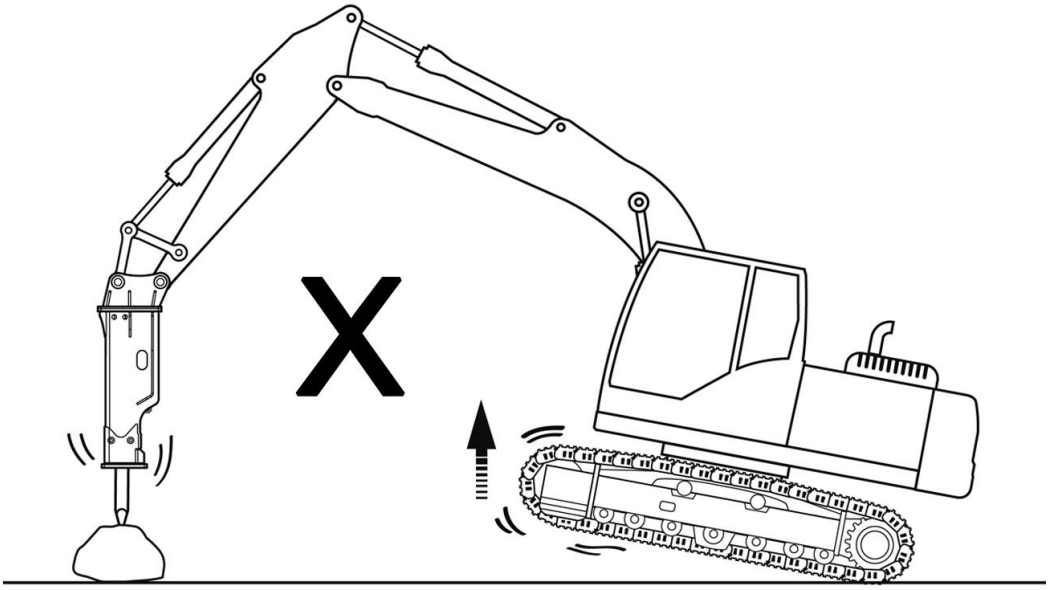


Use blunt (flat end point) chisel/tool.



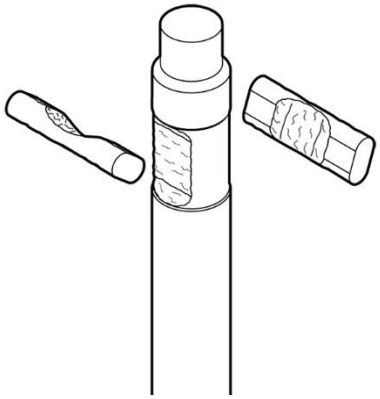
<Blunt> <Pyramid moil point> <Chisel point>

Do not lift up carrier tracks.

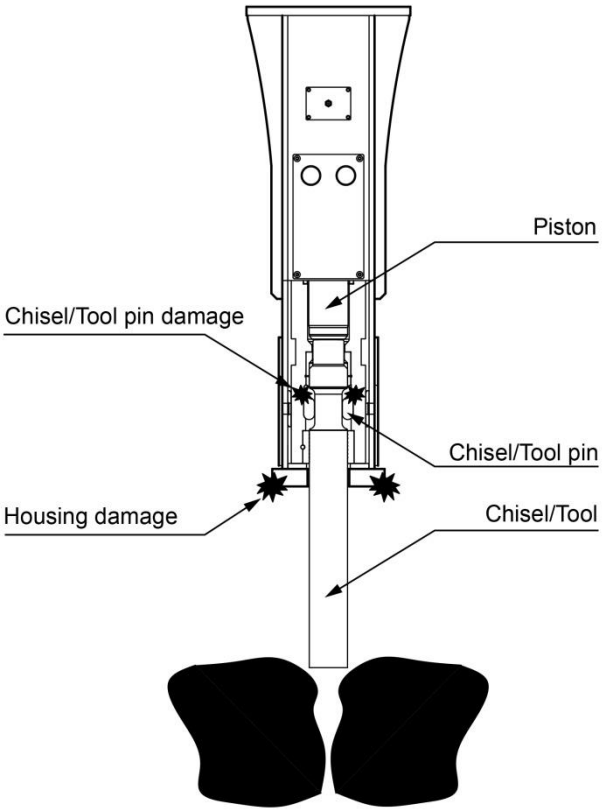


Slow down breaker BPM (striking frequency) to 70% of conventional application BPM.

In case you follow the aforesaid instruction, you will achieve a longer chisel/tool pin life as the risks of chisel/tool pin crack and excessive wearing can be reduced drastically. It will also increase housing service life by slowing down housing bottom area wearing.



However 5~10 blows per breaking may also be required when breaking large size rock boulders (larger than 1 m (3.28 ft)).



NOTE!
Lack of respect to the aforesaid instructions can cause failure to chisel/tool pin and also consequential failure to front head at relatively early hours, which will not be supported by manufacturer's warranty.

n) Anti blank firing (Auto-Stop)

Blank firing occurs when the operator keeps pressing breaker pedal switch even after breaking material is completely broken. Then 3~5 times of surplus hitting by accumulated oil flow is conveyed directly to through bolts, chisel/tool pin and other parts where damage can occur.

Anti blank firing system was designed to stop breaker operation after only one extra blow if the material is fully broken, has proved its efficiency as well as durability and liability in actual operations at the job sites.

However in case of secondary rock breaking application where the material sizes are small, the materials are broken by 1~2 blows and then the breaker fires blanks. Therefore operator has to be extremely careful and follow below instructions to prevent premature and unnecessary chisel/tool failure.
• Use blunt chisel
• Operator must stop striking immediately after the material is broken.

o) Working in high temperature conditions

Hydraulic oil temperature must not exceed 80ºC. Check the oil temperature in the oil tank constantly. If it is higher than 80ºC, carrier oil cooling function must be enhanced enough to lower it under 80ºC. Use hydraulic oils of sufficient viscosity only. In summer and tropical climates, hydraulic oil type ISO VG 68 HV is the minimum requirement. (Refer to page 40)

p) Working in low temperature conditions

Prior to breaker operation, increase oil temperature above 40ºC by carrier engine warming up, boom/arm moving, swing, traveling, etc.

NOTE! The breaker is not running to full capacity until the oil temperature has reached 60ºC at least.

WARNING!

Under the cold climate condition like winter if the breaker operates with low oil temperature, seals as well as piston and diaphragm can be damaged.

q) Key points when using chisel/tools

Follow below instructions. Lack of respect to these instructions will be led to crack or other failures of chisel/tools and holding bushes.

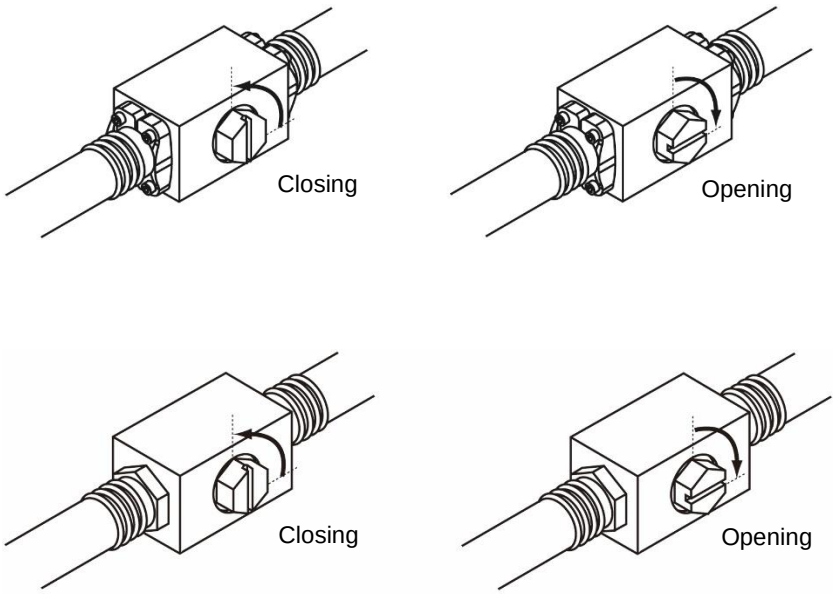
- Do not lift, twist or hit.
- Do not leave in the rain or other wet conditions.
- Do not leave the chisel/tool heated.
- Do not leave the chisel/tool un-greased.

WARNING!

Pay attention for your body not to be hit by the chisel/tool.
Pay attention for your body not to be squeezed between the chisel/tool and other material.

r) Breaker removal/reinstallation

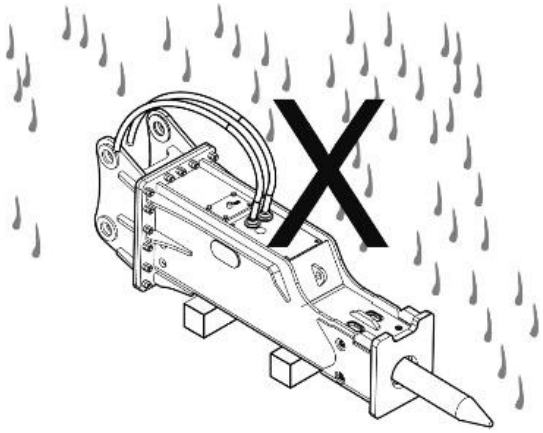
Close off carrier piping stop valve.
Remove hydraulic hoses from the breaker and carrier piping stop valve.
Seal hoses and stop valve with plugs.
Take the breaker & breaker bracket off the carrier.
When reinstalling the breaker, follow the order backwards.



Stop valve opening and closing

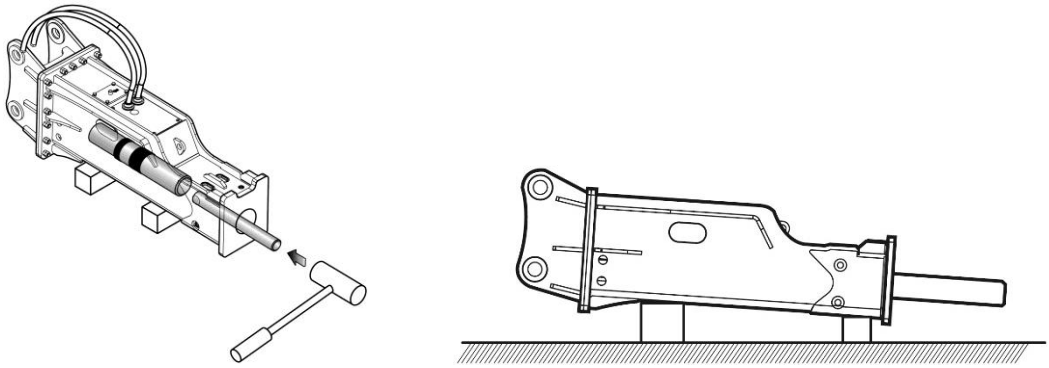
s) Long term storage

Ensure breaker hose sealing with plug. Apply grease on the chisel/tool sufficiently. Keep the breaker covered with appropriate material like plastic or vinyl packing, tied with band, stored indoor as much as possible. Leaving the breaker in the rain or under the wet climate conditions can be led to rust on the breaker parts.



In case of long term storage, prevent breaker corrosion referring to following instructions.

- The storage area must be dry.
- The storage area temperature must not be lower than -20ºC (-4°F).
- Remove chisel/tool and chisel/tool pins from the breaker.
- Discharge nitrogen gas completely from back head.
- Push piston up to maximum position, using steel bar and hammer as illustrated below.
- Apply grease on chisel/tool shank (or grooves), chisel/tool pins and bush inner surface.
- Reassemble chisel/tool and chisel/tool pins to the breaker.
- Prevent oil leakage and contamination by keeping all hoses, ports and holes sealed with clean plugs.
- Keep the breaker covered with appropriate material like plastic or vinyl packing, tied with band, stored indoor as much as possible.
- Store the breaker in horizontal position.



NOTE! If piston has not been pushed to maximum position, piston bottom area will be exposed to the air and have a high probability to be rust. In case the breaker is stored in a vertical position, piston will gradually drop down by gravity and be exposed to the risk of corrosion.

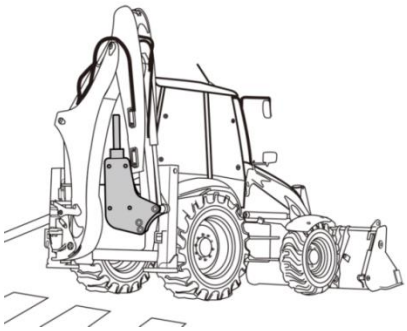
t) Operating breaker after long term storage

In case of the breaker has been stored for more than 2 years, seals must be replaced with brand new ones prior to start of breaker operation.

NOTE! No replacement of seals will void warranty of the breaker manufacturer.

u) Travelling position

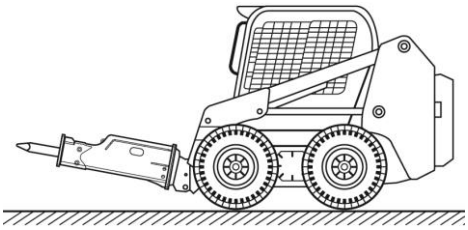
The travelling positions are shown below. Ensure that the breaker is not too close to carrier backhoe boom/arm, when travelling with tracked loader backhoe (or backhoe loader).



Breaker in travelling position

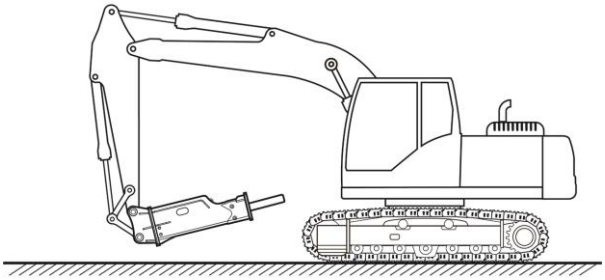
NOTE!
Breaker positioning between boom and arm (illustrated on the left picture) is achieved, depending on carrier model & boom/arm specification.

When travelling with skid steer loader, lower carrier boom and tilt the breaker fully backwards.



Breaker in travelling position

When travelling with excavator, ensure the breaker not to be too close to the cabin.



Breaker in travelling position

VI. Service and maintenance

The breaker is a hydraulic product precisely made. Therefore all hydraulic components of the breaker require your handling of great care and cleanliness. Dirt is the worst enemy to all hydraulic parts of the breaker.

Ensure that all hydraulic parts are clean and covered by clean lint-free cloth.
Do not use any materials other than designed for cleaning hydraulic part purpose.
Never use water or carbon tetrachloride.

A. Maintenance interval

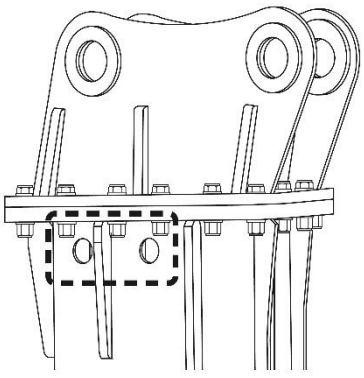
NOTE! Hours are carrier hours while the breaker is mounted/used on/by the carrier, including installation, breaking operation, repositioning on the rocks, etc. whether breaker piston is striking or not.

Every 2 hours

1. Apply grease on chisel/tool, chisel/tool pins and bushes till grease is visible on the chisel/tool underneath housing.
2. Check breaker paste or grease residual volume in the cartridge if ALS is mounted.
3. Tighten loose fittings and connections if necessary.
4. Check if breaker impact is efficient enough and if breaker is striking at constant speed.

Every 10 hours or once a week, whichever comes first

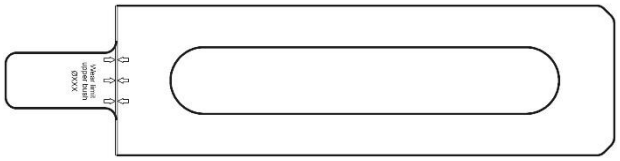
1. Remove chisel/tool and chisel/tool pins, then check their wearing shape and amount.
2. Replace or repair chisel/tool and chisel/tool pins upon wear limit and repair instruction if necessary. See section Chisel/Tool Pin Replacement or Repair.
3. Check if chisel/tool and lower bush are sufficiently greased. If not, apply grease more frequently.
4. Check through bolt & nut condition by hitting them with steel bar via Service Window 2 holes on each side on the housing.



Every 50 hours or once a month, whichever comes first

1. Check wearing amount of chisel/tool pin, chisel/tool shank and bushes. Replace them if they have reached wear limit. See Wear Limit on page 55~65.

NOTE! Upper bush must be replaced when it has reached wear limit or at every second replacement of lower bush, whichever comes first. Upper bush wearing can be measured with the jig, illustrated below. The jig is supplied with breaker as option accessary.



2. Check back head gas pressure and, if necessary, adjust the pressure to suit the specification.
3. Check hydraulic and grease hoses and replace them if necessary.

Every 500/600 hours
Replace consumable and wear parts upon the maintenance interval.

B. Maintenance interval of consumable and wear parts

Consumable parts should be replaced upon below maintenance interval.

D&A 6V ~ 150DX

Part	600 hours or 6 months	1,200 hours or 12 months	1,800 hours or 18 months	2,400 hours or 24 months
Seals	●	●	●	●
Hydraulic hose*		●		●
Diaphragm	●	●	●	●
Accumulator body bolt			●	
O-ring of gas valve set			●	
Through bolt set			●	
Chisel/Tool pin	Replace upon wear limit guide. See page 55 ~ 65.			
Bottom damper				
Lower bush				
Stopper pin				
Shell pad				
Upper damper				
Upper bush				
Dust seal	Dust seal shall be replaced whenever chisel/tool is replaced.			

NOTE!
1. Hours or months on above table should be applicable, whichever comes first.
2. * : Check hose condition and replace if necessary.
3. Hours : Hours are carrier hours while the breaker is mounted/used on/by the carrier, including installation, breaking operation, repositioning on the rocks, etc. whether breaker piston is striking or not.

D&A 180DX ~ 1200DX

Part	500 hours or 6 months	1,000 hours or 12 months	1,500 hours or 18 months	2,000 hours or 24 months
Seals	●	●	●	●
Hydraulic hose*		●		●
Diaphragm	●	●	●	●
Accumulator body bolt			●	
O-ring of gas valve set			●	
Through bolt set			●	
Chisel/Tool pin	Replace upon wear limit guide. See page 55 ~ 65.			
Bottom damper				
Lower bush				
Stopper pin				
Shell pad				
Upper damper				
Upper bush				
Dust seal	Dust seal shall be replaced whenever chisel/tool is replaced.			

NOTE!

1. Hours or months on above table should be applicable, whichever comes first.
2. * : Check hose condition and replace if necessary.
3. Hours : Hours are carrier hours while the breaker is mounted/used on/by the carrier, including installation, breaking operation, repositioning on the rocks, etc. whether breaker piston is striking or not.

The end users are highly recommended to keep fast moving spare parts in stock close to the breaker such as chisel/tool, chisel/tool pin, stopper pin, rubber plug/cover, through bolt and hoses.

The above maintenance interval should be respected by the end users and/or the operators. Lack of respect can void the warranty of breaker.

NOTE! Consumption of spare and wear parts varies upon the condition of breaker and/or carrier, operator's skill, work material, job site condition, etc. Therefore, if necessary, the parts should be replaced more frequently than the interval stated on above table.

C. Maintenance interval of special application breaker

Breaker maintenance requirements to the special application are much higher than the conventional applications. Therefore breaker maintenance interval at the special applications including but not limited to underground, tunneling, foundry cleaning, underwater, extremely low or high temperature, etc. is much shorter than the conventional. Consult with your authorized dealer.

D. Washing breaker

The dirt on the breaker can make disassembly and assembly difficult.
Highly recommended to remove the dirt before sending it to the workshop.

IMPORTANT! Ensure pressure and return line ports and hoses are firmly plugged before washing the breaker to prevent dirt coming into breaker component.

E. Oil & lubrication

Breaker requires hydraulic oil and grease of proper viscosity upon ambient temperature.

<table>
<tr><th colspan="2">Hydraulic oil</th><th colspan="2">Grease</th><th>Breaker paste</th></tr>
<tr><td rowspan="2">High ambient temperature (0°C ~ 50°C)</td><td rowspan="2">Low ambient temperature (-10°C ~ 30°C)</td><td>Manual greasing</td><td>Vibrating ALS</td><td>Hydraulic ALS</td></tr>
<tr><td rowspan="2">NLGi No. 2 (minimum 100 cst)</td><td rowspan="2">NLGi No. 2 (minimum 100 cst maximum 250 cst)</td><td rowspan="2">NLGi No. 2 (350 cst)</td></tr>
<tr><td>ISO VG 68 HV</td><td>ISO VG 46 HV</td></tr>
</table>

NOTE! Lubricate all areas of working chisel/tool, chisel/tool pins and bushes where they are contacting each other. Incorrect viscosity grease or breaker paste may cause inefficiency or lack of lubrication.

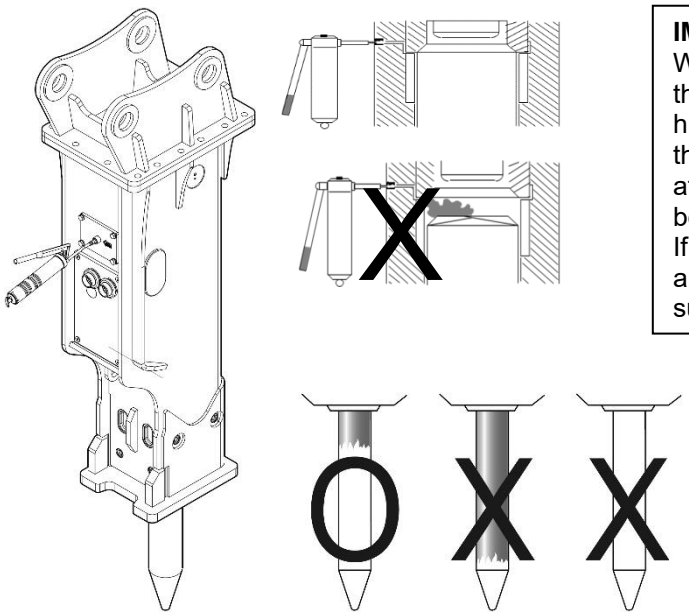
Problems from incorrect viscosity hydraulic oil

Oil too thick
- Difficult to start up
- Stiff operation
- Slow breaker striking
- Cavitation in the breaker
- Sticky valves

Oil too thin
- Lost of efficiency (internal leakage)
- Damage to seals
- Decrease of lubricating efficiency, excessive wearing of parts
- Irregular and slow breaker striking
- Cavitation in the breaker

F. Correct manual greasing

When greasing, ensure that the breaker stands upright and the chisel/tool is pushed to highest position. Turn off the engine and wait for 10 minutes so that breaker oil pressure can drop and the grease can penetrate downwards between chisel/tool and bushes.



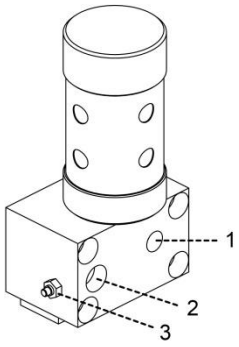
IMPORTANT!
While greasing, make sure that the chisel/tool is kept to the highest position inside housing, so that you can prevent grease piling at the percussion chamber between piston and chisel/tool. If not, breaker may lose power and seal failure may occur, subsequently causing oil leakage.

IMPORTANT!
Greasing must be done until the grease is clearly visible on the chisel/tool underneath housing as illustrated on the left.

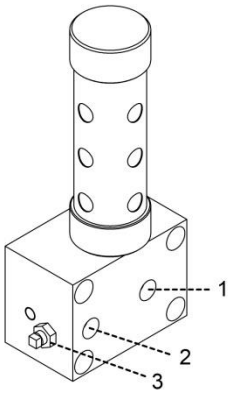
G. Auto lubrication system (ALS)

Auto lubrication system is available as option upon request.
Contact your authorized dealer.

a) Vibrating type ALS

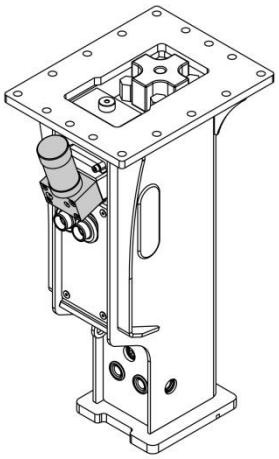


60V ~ 180DX

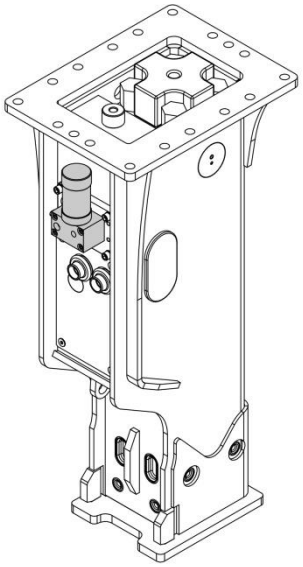


200DX ~ 1200DX

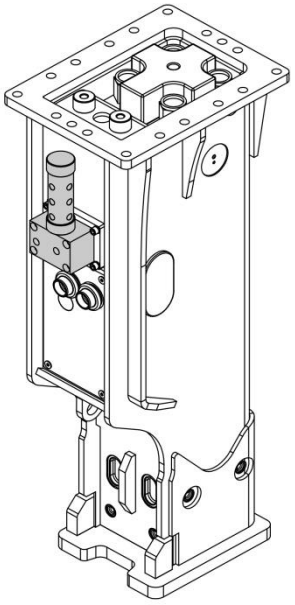
1. Grease refill port
2. Manual greasing port
3. Grease output regulator



60V ~ 80DX



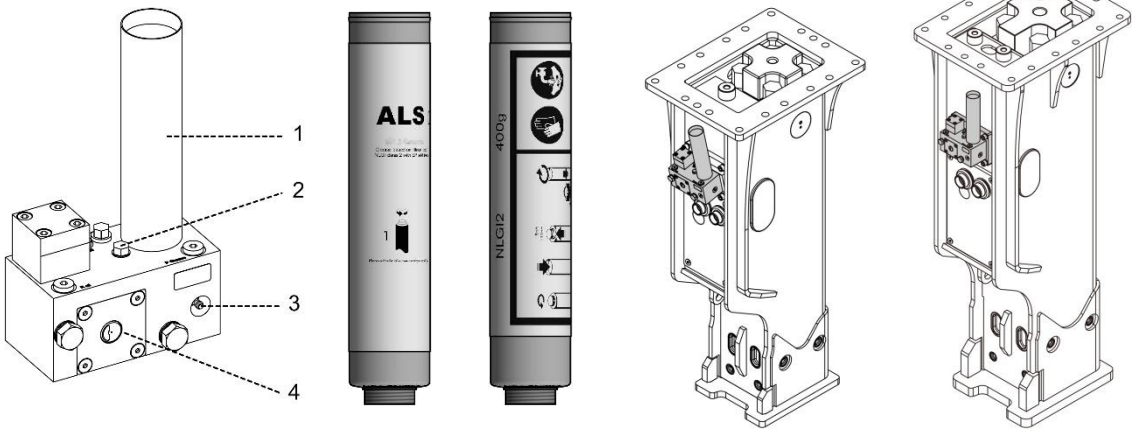
100DX ~ 180DX



200DX ~ 1200DX

- ALS is operated by vibration of the breaker during operation. Grease output can vary on the breaker working condition.
- Grease output can be adjusted with regulator.
- In case greasing by vibrating ALS is not sufficient despite of setting regulator to maximum output, apply manual greasing until the breaker has been fully lubricated.

b) Hydraulic motor type ALS



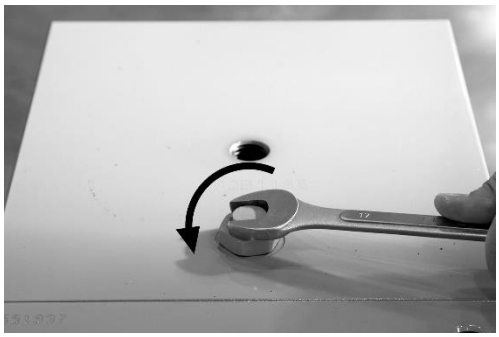
100DX ~ 180DX 200DX ~ 1200DX

1. Breaker paste cartridge
2. Breaker paste output regulator
3. Manual greasing port
4. Visible indicator

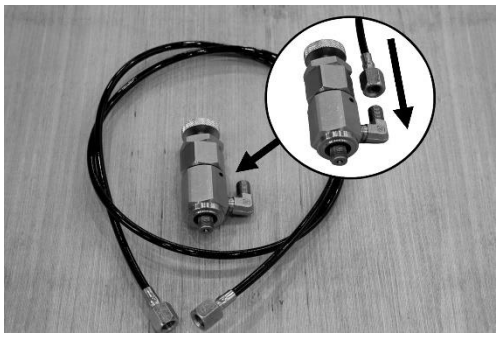
- ALS is operated by oil pressure inside the breaker while the breaker is in operation.
- Only genuine cartridges should be used. If the operator uses non-genuine one, ALS will not be performing as much as it has to be and also may cause failure on ALS pump internal parts.
- If hydraulic hose or grease hose is connected incorrectly, breaker paste will not be discharged and oil leaks.
- Breaker paste output can be adjusted with regulator.
- In case greasing from ALS is not sufficient despite of setting regulator to maximum output, apply manual greasing until the breaker has been fully lubricated.
- Visible indicator (croissant shape in red) spins as long as ALS motor is working. If the visible indicator doesn't spin, apply manual greasing and contact your authorized dealer.

H. How to charge nitrogen gas into back head and accumulator

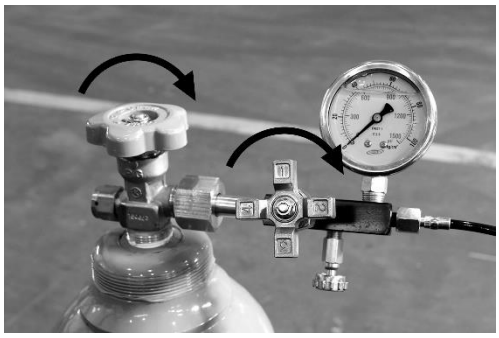
a) Gas charging to back head



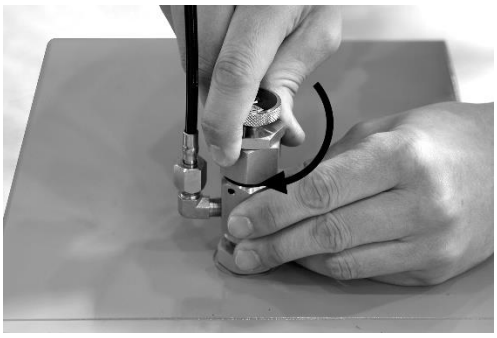
1. Open valve cap.



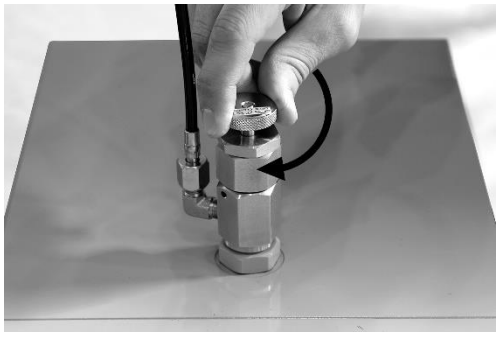
2. Connect hose to adapter.



3. Close gas cylinder valve, connect gas charging kit to gas cylinder, close 3-way valve and drain cock.



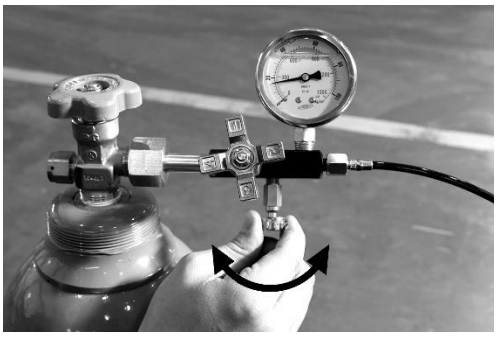
4. Fit adapter on the inlet port by tightening middle section of adapter.



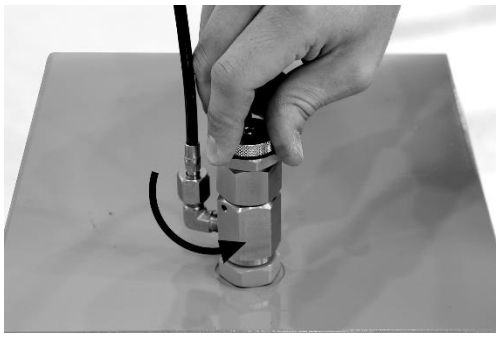
5. Tighten top section of adapter.

6. Open gas bottle valve SLOWLY. Quick valve opening may cause damage on the gauge.

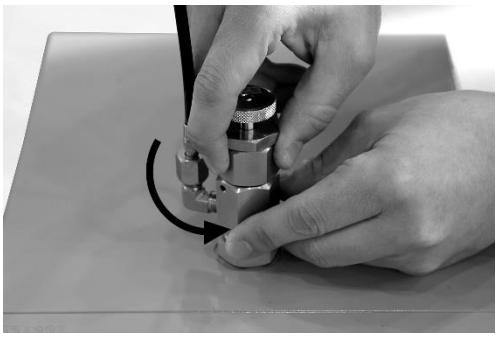
7. Open 3-way valve slowly, charge N2 gas up to 20 kg/cm², close the valve.



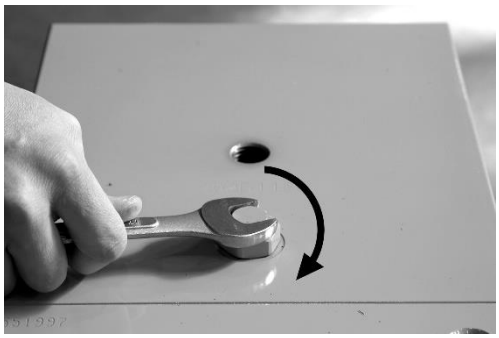
8. Drain the gas to 16~18 kg/cm² upon ambient temperature of job site.



9. Close inlet port by loosening top section of adapter.

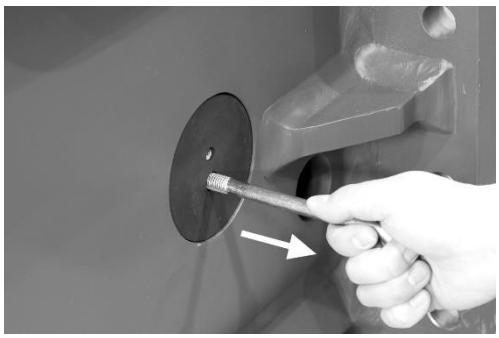


10. Disassemble adapter from the inlet port by loosening middle section of adapter.



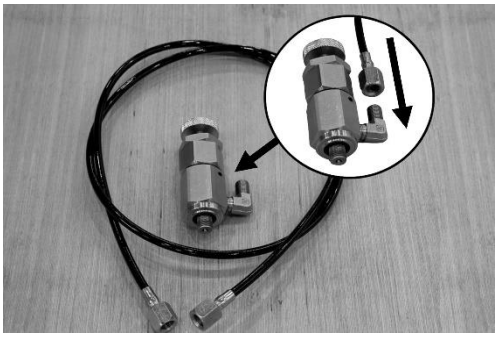
11. Assemble valve cap to the inlet port.

b) Gas charging to back head via side gas charging hole

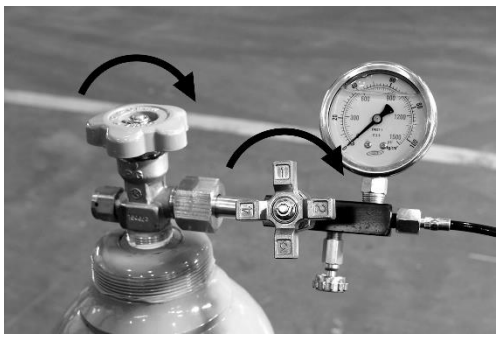


1. Remove rubber plug.

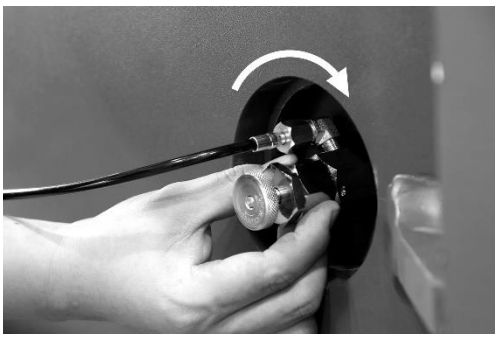
2. Open valve cap.



3. Connect hose to adapter.



4. Close gas cylinder valve, connect gas charging kit to gas cylinder, close 3-way valve and drain cock.

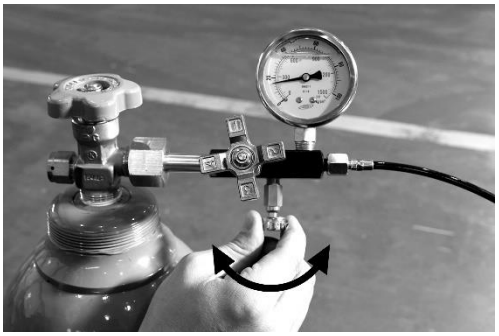


5. Fit adapter on the inlet port by tightening middle section of adapter.

6. Tighten top section of adapter.

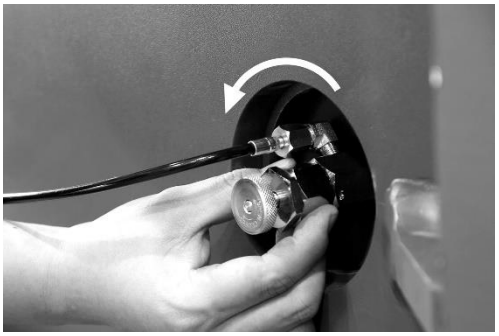
7. Open gas bottle valve SLOWLY. Quick valve opening may cause damage on the gauge.

8. Open 3-way valve slowly, charge N2 gas up to 20 kg/cm², close the valve.



9. Drain the gas properly for each model upon ambient temperature of job site.

10. Close inlet port by loosening top section of adapter.

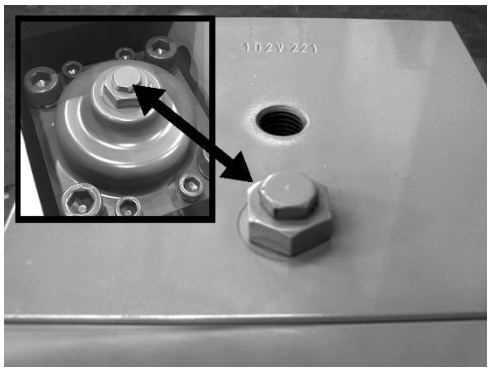


11. Disassemble adapter from the inlet port by loosening middle section of adapter.

12. Assemble valve cap to the inlet port.

13. Assemble rubber plug.

c) Gas charging to accumulator

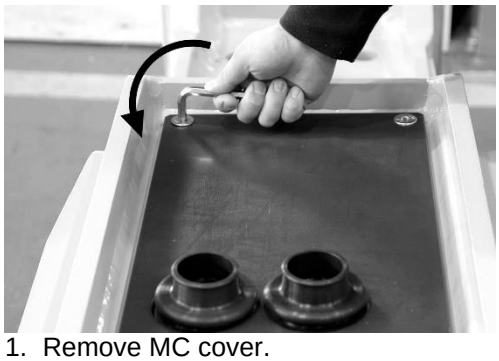


Accumulator gas charging valve is same as back head gas charging valve. Charging accumulator gas can be done in the same way as illustrated earlier for back head.

NOTE! Carry out gas charging only after the breaker has been sufficiently cooled down. Ensure that the breaker is lying on the floor and work chisel/tool shall not be pushed into power cell.

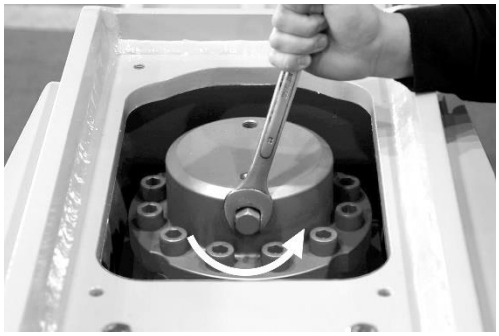
NOTE! When storing gas bottle, ensure the bottle is not exposed to the sun and its valve is always closed.

d) Gas charging to accumulator (needle valve type)

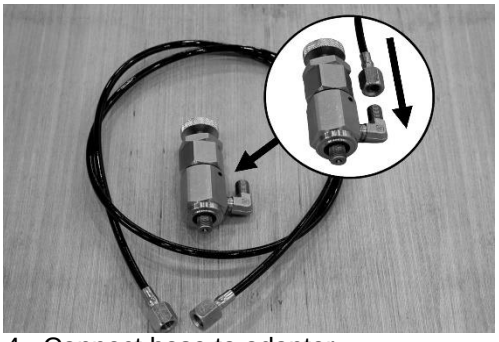


1. Remove MC cover.

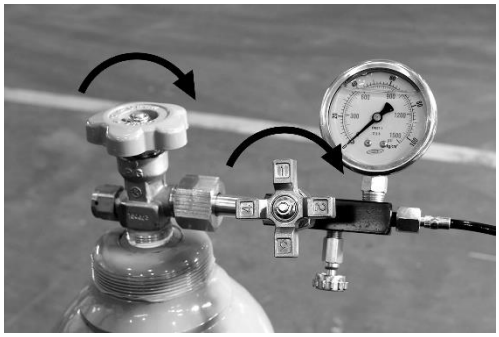
2. Remove valve cap.



3. Remove needle valve cap.



4. Connect hose to adapter.



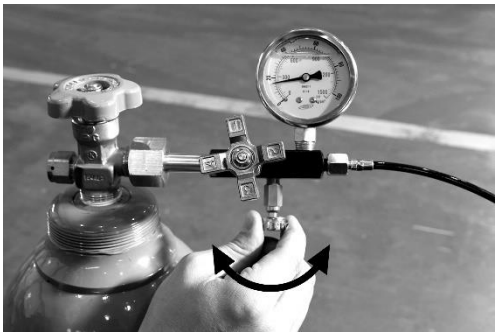
5. Close gas cylinder valve, connect gas charging kit to gas cylinder, close 3-way valve and drain cock.

6. Connect adapter to inlet port.

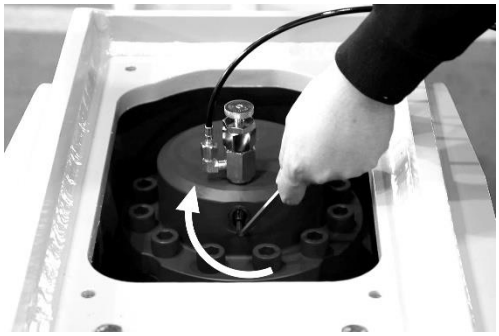
7. Open needle valve with 5mm L-wrench.

8. Open gas bottle valve SLOWLY. Quick valve opening may cause damage on the gauge.

9. Open 3-way valve slowly, charge N2 gas up to 65 kg/cm², close the valve.

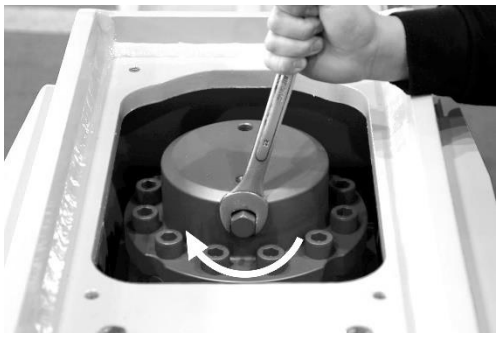


10. Drain the gas to 55~60 kg/cm² upon ambient temperature of job site.



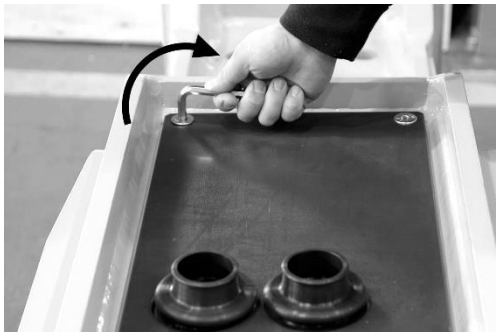
11. Close needle valve.

12. Remove gas charging adapter.



13. Assemble needle valve cap.

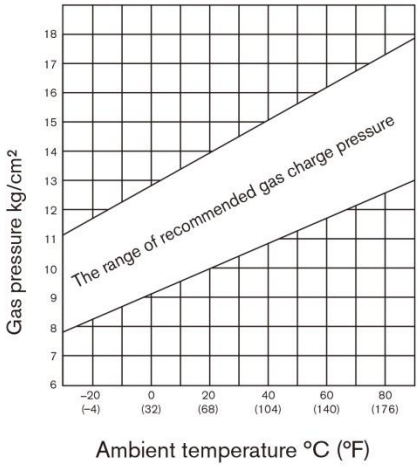
14. Assemble valve cap.



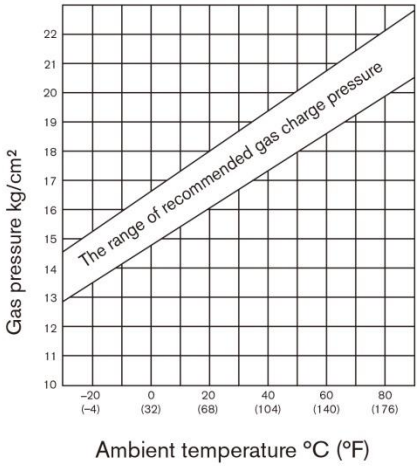
15. Assemble MC cover.

I. Conversion table for back head gas pressure

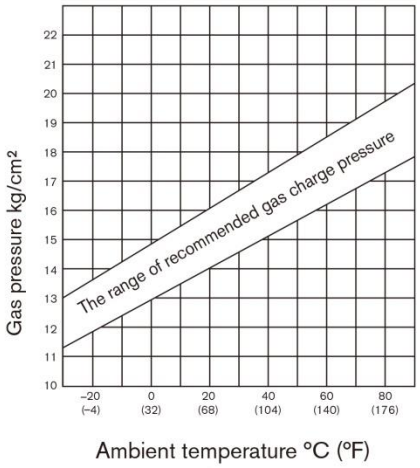
6V, 7V, 8V, 40V, 70DX, 80DX, 100DX, 130DX, 450DX



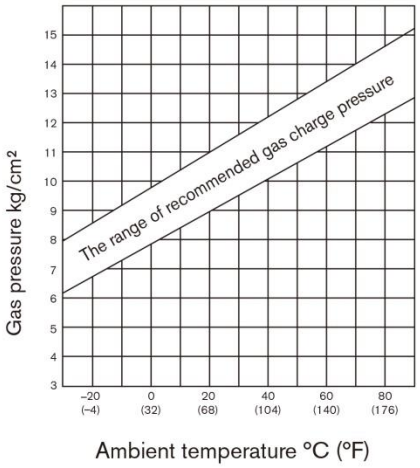
60V



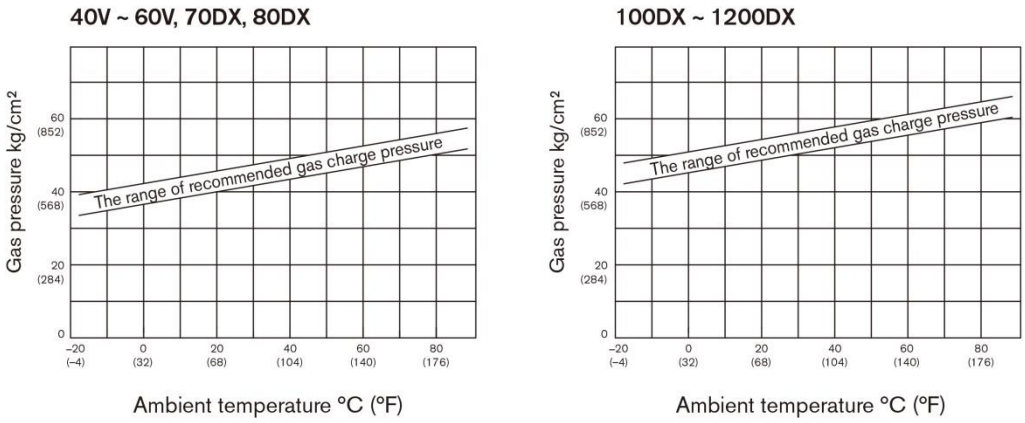
17V, 150DX, 180DX, 200DX, 220DX, 250DX, 300DX, 360DX, 550DX, 650DX, 700DX, 750DX

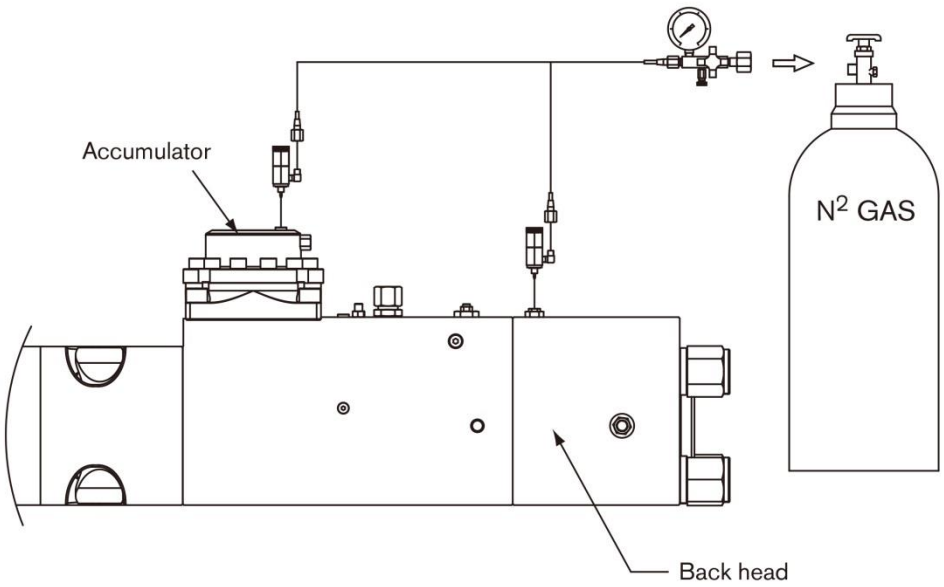


1200DX



J. Conversion table for accumulator gas pressure





K. Chisel/Tool replacement

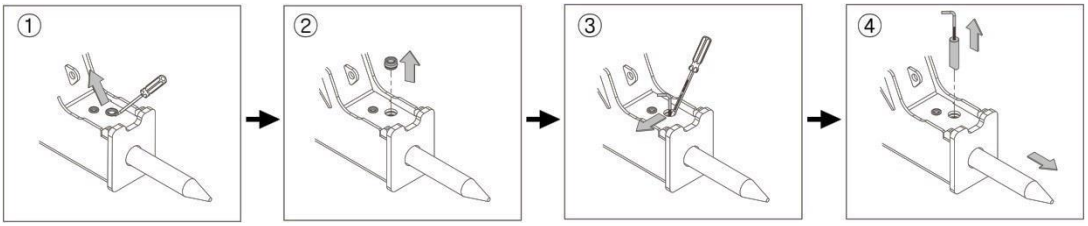
WARNING!

For safety reason, the carrier must be switched off before chisel/tool replacement work starts. Always wear protective glasses and helmet when fitting or removing working chisel/tool as metal splinters may chip off while you are breaking chisel/tool pin into pieces for removal purpose. Never use your fingers to check alignment of chisel/tool grooves and chisel/tool pin holes.

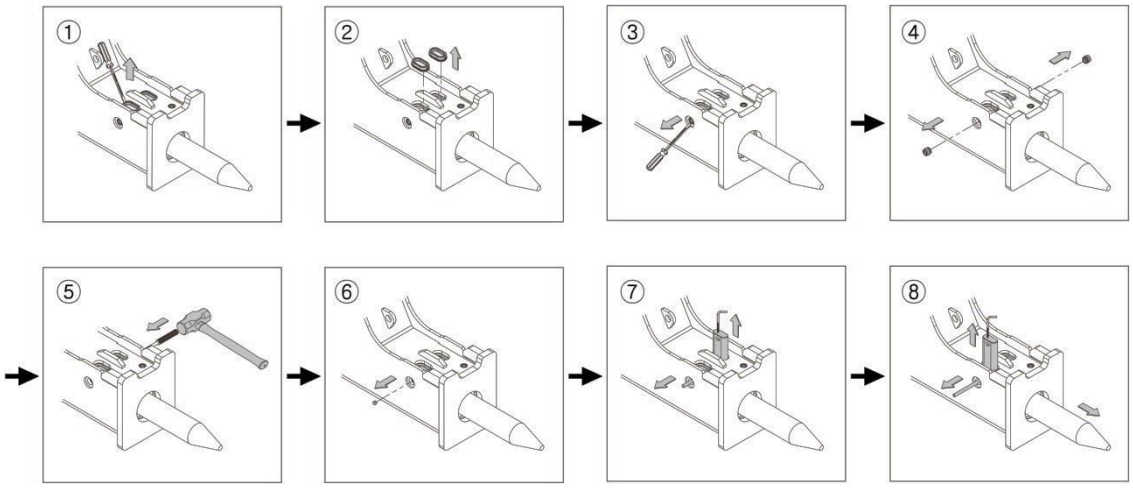
WARNING!

Remove any residual pressure from the carrier before replacing the chisel/tool.

Remove the chisel/tool from the breaker as illustrated below.
Assembling the chisel/tool to the breaker can be done in reverse sequence order.



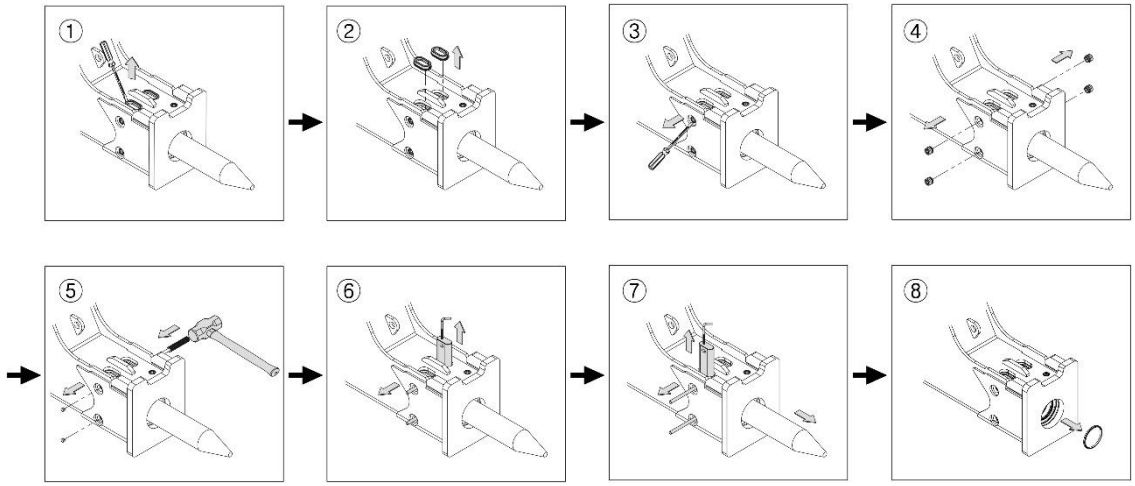
6V ~ 40V



60V ~ 80DX

NOTE!
Before assembling brand new chisel/tool,
- Clean, if any, dirt on the area where chisel/tool and chisel/tool pins will be inserted.
- Apply grease on the areas where chisel/tool, chisel/tool pins and wear bushes are contacting each other.
- Remove, if any, burrs from chisel/tool grooves.

VI. Service and maintenance

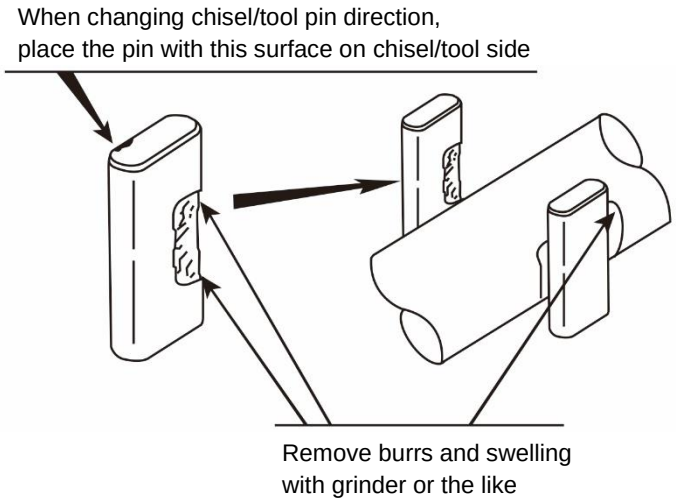


100DX ~ 1200DX

NOTE!
Before assembling brand new chisel/tool,
- Clean, if any, dirt on the area where chisel/tool and chisel/tool pins will be inserted.
- Apply grease on the areas where chisel/tool, chisel/tool pins and wear bushes are contacting each other.
- Remove, if any, burrs from chisel/tool grooves.

L. Chisel/Tool pin replacement or repair

Every 50 hours and whenever replacing chisel/tool, chisel/tool pin condition shall be checked along with chisel/tool. Remove, if any, burrs and swelling of chisel/tool pins and chisel/tool grooves.



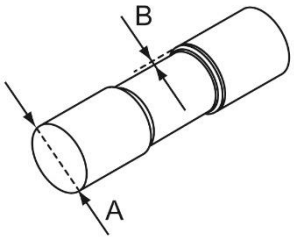
If only one of chisel/tool pin faces is worn over the limit, turn both chisel/tool pins around so that they can contact the chisel/tool with unused faces. When one of the chisel/tool pins is replaced, the rest pin should be turned around so that its reverse face contacts the chisel/tool.

NOTE! When chisel/tool pin is excessively deformed, it is difficult to replace chisel/tool. Therefore change chisel/tool pin face every 100 to 150 operating hours whether chisel/tool pin has reached wear limit or not.

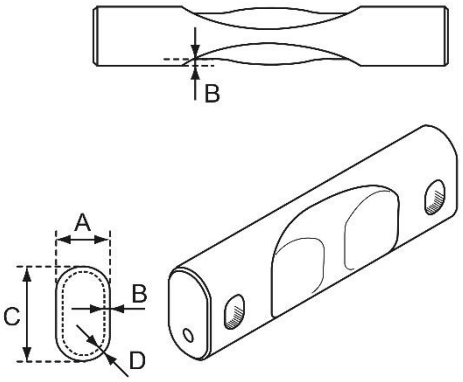
M. Wear limit

a) Chisel/Tool pin

6V ~ 40V



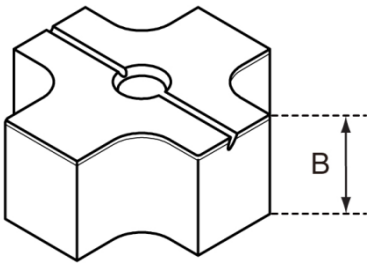
60V ~ 1200DX



Model	Unit	Standard value (A)	Wear limit (B)	Standard value (C)	Wear limit (D)
6V, 7V	mm (inch)	22 (0.87)	2 (0.08)	—	—
8V	mm (inch)	25 (0.98)	2 (0.08)	—	—
17V	mm (inch)	30 (1.18)	2 (0.08)	—	—
40V	mm (inch)	36 (1.42)	2 (0.08)	—	—
60V	mm (inch)	25 (0.98)	2 (0.08)	42 (1.65)	2 (0.08)
70DX	mm (inch)	28 (1.10)	2 (0.08)	45 (1.77)	2 (0.08)
80DX	mm (inch)	32 (1.26)	2 (0.08)	50 (1.97)	2 (0.08)
100DX	mm (inch)	35 (1.38)	2 (0.08)	60 (2.36)	2 (0.08)
130DX	mm (inch)	35 (1.38)	3 (0.12)	70 (2.76)	3 (0.12)
150DX ~ 180DX	mm (inch)	40 (1.57)	3 (0.12)	70 (2.76)	3 (0.12)
200DX	mm (inch)	40 (1.57)	3 (0.12)	90 (3.55)	3 (0.12)
220DX	mm (inch)	45 (1.77)	3 (0.12)	100 (3.93)	4 (0.16)
250DX	mm (inch)	50 (1.97)	3 (0.12)	95 (3.74)	3 (0.12)
300DX	mm (inch)	50 (1.97)	3 (0.12)	112 (4.41)	4 (0.16)
360DX	mm (inch)	52 (2.05)	3 (0.12)	115 (4.53)	4 (0.16)
450DX	mm (inch)	50 (1.97)	3 (0.12)	125 (4.92)	4 (0.16)
550DX ~ 650DX	mm (inch)	50 (1.97)	3 (0.12)	134 (5.28)	4 (0.16)
700DX ~ 750DX	mm (inch)	65 (2.56)	5 (0.20)	160 (6.30)	5 (0.20)
1200DX	mm (inch)	70 (2.76)	5 (0.20)	180 (7.09)	5 (0.20)

NOTE! Chisel/Tool pin wearing beyond the limit may cause failure of chisel/tool as well as chisel/tool pin

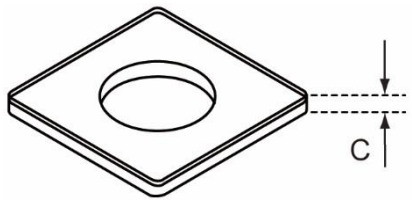
b) Upper damper



Model	Unit	Standard value	Wear limit (B)
6V ~ 7V	mm (inch)	—	—
8V ~ 17V	mm (inch)	54 (2.13)	52 (2.05)
40V ~ 80DX	mm (inch)	78 (3.07)	75 (2.95)
100DX ~ 130DX	mm (inch)	100 (3.94)	96 (3.78)
150DX ~ 200DX	mm (inch)	110 (4.33)	106 (4.17)
220DX ~ 550DX	mm (inch)	125 (4.92)	121 (4.76)
650DX	mm (inch)	130 (5.11)	125 (4.92)
700DX ~ 750DX	mm (inch)	147 (5.79)	142 (5.59)
1200DX	mm (inch)	160 (6.29)	154 (6.06)

NOTE! Upper damper wearing beyond the limit may cause shaking of power cell and various parts failure of power cell and housing.

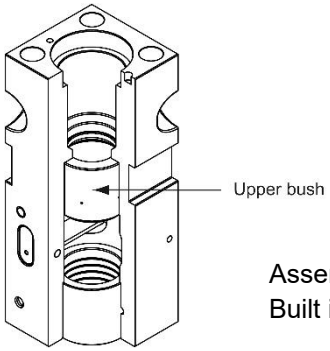
c) Bottom damper



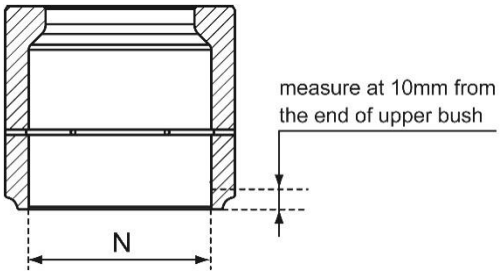
Model	Unit	Standard value	Wear limit (C)
6V ~ 7V	mm (inch)	—	—
8V ~ 60V	mm (inch)	20 (0.79)	18 (0.71)
70DX ~ 80DX	mm (inch)	15 (0.59)	13 (0.51)
100DX ~ 200DX	mm (inch)	20 (0.79)	18 (0.71)
220DX ~ 550DX	mm (inch)	25 (0.98)	22 (0.87)
650DX	mm (inch)	40 (1.58)	37 (1.46)
700DX ~ 750DX	mm (inch)	35 (1.38)	31 (1.22)
1200DX	mm (inch)	45 (1.77)	40 (1.58)

NOTE! Bottom damper wearing beyond the limit may cause shaking of power cell and various parts failure of power cell and housing.

d) Upper bush



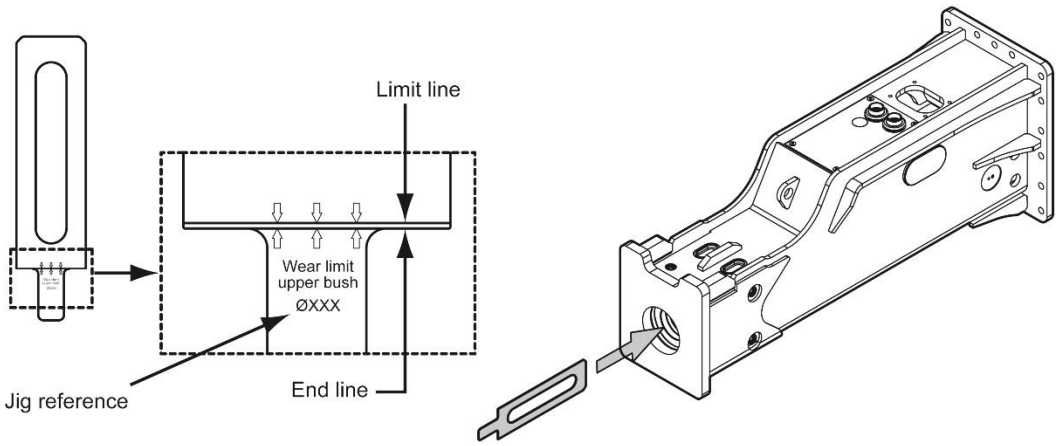
Assembled inside front head block (60V & above)
Built in front head as part of front head block (6V ~ 40V)



NOTE! Upper bush wearing may affect breaker performance decrease and cause piston and chisel/tool failure. Therefore the operator should check upper bush wearing amount by periodical monitoring and replace upper bush or front head in case wearing amount has reached the limit. See wear limit table below.

Model	Unit	Standard value (N)	Wear limit
6V, 7V	mm (inch)	40 (1.57)	45 (1.77)
8V	mm (inch)	45 (1.77)	50 (1.97)
17V	mm (inch)	57 (2.24)	62 (2.44)
40V	mm (inch)	70 (2.76)	75 (2.95)
60V	mm (inch)	75 (2.95)	80 (3.15)
70DX	mm (inch)	80 (3.15)	86 (3.39)
80DX	mm (inch)	90 (3.54)	96 (3.78)
100DX	mm (inch)	95 (3.74)	101 (3.98)
130DX	mm (inch)	105 (4.13)	111 (4.37)
150DX	mm (inch)	115 (4.53)	121 (4.76)
180DX	mm (inch)	125 (4.92)	131 (5.16)
200DX, 220DX	mm (inch)	135 (5.31)	142 (5.59)
250DX	mm (inch)	145 (5.71)	153 (6.02)
300DX	mm (inch)	150 (5.91)	158 (6.22)
360DX	mm (inch)	155 (6.10)	164 (6.46)
450DX	mm (inch)	165 (6.50)	174 (6.85)
550DX	mm (inch)	175 (6.90)	184 (7.24)
650DX	mm (inch)	180 (7.09)	189 (7.44)
700DX	mm (inch)	200 (7.87)	209 (8.23)
750DX	mm (inch)	205 (8.07)	215 (8.46)
1200DX	mm (inch)	240 (9.45)	250 (9.84)

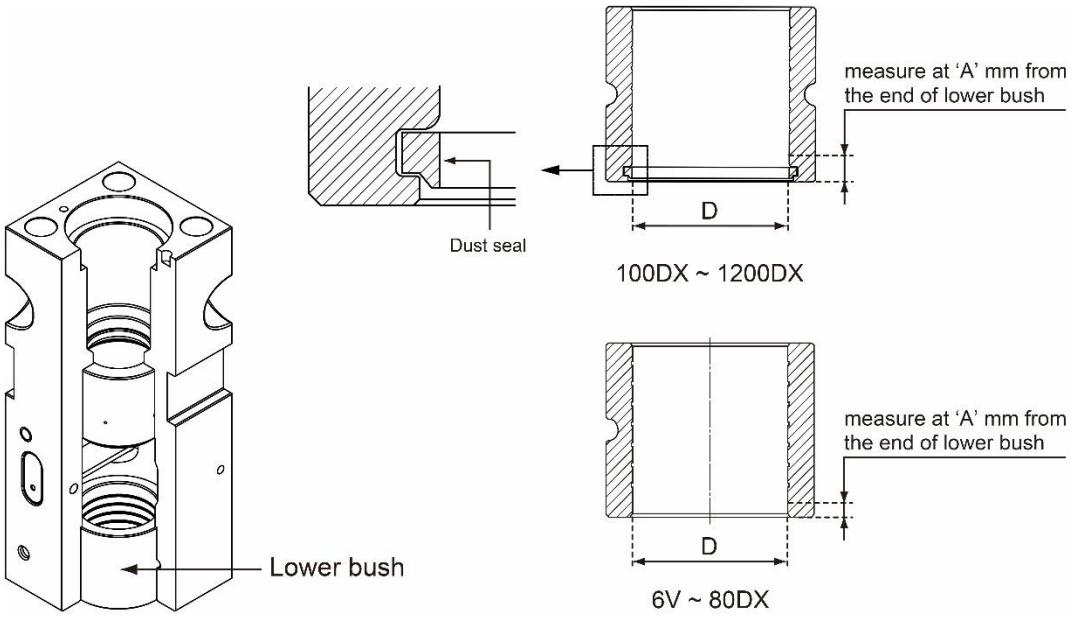
NOTE! For 60V & above, the jig to measure upper bush wearing is supplied with breaker as option accessory. As illustrated below, put the jig into the hole of breaker housing, then replace upper bush if bottom of lower bush touches the Limit Line of jig.



Model	Jig reference
60V	Ø75
70DX	Ø80
80DX	Ø90
100DX	Ø95
130DX	Ø105
150DX	Ø115
180DX	Ø125
200DX	Ø135
220DX	Ø135
250DX	Ø145
300DX	Ø150
360DX	Ø155
450DX	Ø165
550DX	Ø175
650DX	Ø180
700DX	Ø200
750DX	Ø205
1200DX	Ø240

NOTE! In case the jig has been lost, ensure that you purchase new one from an authorized dealer, upon below upper bush jig reference table.

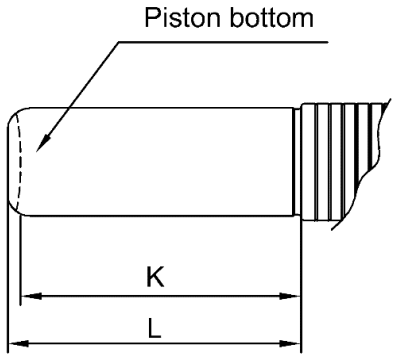
e) Lower bush



Model	Unit	Standard value (D)	Wear limit	Measure (A)
6V, 7V	mm (inch)	40 (1.57)	43 (1.69)	10 (0.40)
8V	mm (inch)	45 (1.77)	48 (1.89)	
17V	mm (inch)	57 (2.24)	60 (2.36)	
40V	mm (inch)	70 (2.76)	73 (2.87)	
60V	mm (inch)	75 (2.95)	78 (3.07)	
70DX	mm (inch)	80 (3.15)	84 (3.31)	
80DX	mm (inch)	90 (3.54)	94 (3.70)	
100DX	mm (inch)	95 (3.74)	99 (3.90)	20 (0.79)
130DX	mm (inch)	105 (4.13)	109 (4.29)	
150DX	mm (inch)	115 (4.53)	119 (4.68)	
180DX	mm (inch)	125 (4.92)	129 (5.08)	
200DX, 220DX	mm (inch)	135 (5.31)	140 (5.51)	
250DX	mm (inch)	145 (5.71)	151 (5.94)	
300DX	mm (inch)	150 (5.91)	156 (6.14)	
360DX	mm (inch)	155 (6.10)	162 (6.38)	
450DX	mm (inch)	165 (6.50)	172 (6.77)	
550DX	mm (inch)	175 (6.90)	182 (7.17)	
650DX	mm (inch)	180 (7.09)	187 (7.36)	
700DX	mm (inch)	200 (7.87)	207 (8.14)	
750DX	mm (inch)	205 (8.07)	213 (8.39)	40 (1.58)
1200DX	mm (inch)	240 (9.45)	248 (9.76)	

NOTE! Dust seal shall be replaced whenever chisel/tool is replaced.

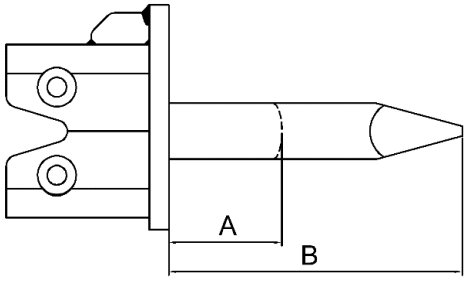
f) Piston



Model	Unit	Standard value (L)	Wear limit (K)
6V	mm (inch)	137 (5.39)	136 (5.35)
7V	mm (inch)	159 (6.26)	158 (6.22)
8V	mm (inch)	150 (5.91)	149 (5.87)
17V	mm (inch)	168 (6.61)	167 (6.57)
40V	mm (inch)	177 (6.97)	176 (6.93)
60V	mm (inch)	210 (8.27)	209 (8.23)
70DX	mm (inch)	218 (8.58)	217 (8.54)
80DX	mm (inch)	246 (9.69)	245 (9.65)
100DX	mm (inch)	255 (10.04)	254 (10.00)
130DX	mm (inch)	273 (10.75)	272 (10.71)
150DX	mm (inch)	290 (11.42)	288 (11.34)
180DX	mm (inch)	291 (11.46)	289 (11.38)
200DX	mm (inch)	305 (12.01)	303 (11.93)
220DX	mm (inch)	311 (12.24)	309 (12.17)
250DX	mm (inch)	336 (13.23)	334 (13.15)
300DX	mm (inch)	353 (13.90)	351 (13.82)
360DX	mm (inch)	363 (14.29)	361 (14.21)
450DX	mm (inch)	412 (16.22)	410 (16.14)
550DX	mm (inch)	455 (17.91)	453 (17.83)
650DX	mm (inch)	490 (19.29)	488 (19.21)
700DX	mm (inch)	462 (18.19)	460 (18.11)
750DX	mm (inch)	513 (20.20)	511 (20.12)
1200DX	mm (inch)	594 (23.39)	592 (23.31)

NOTE! Piston wearing is highly sensitive to breaker performance. Any piston that has reached wear limit may cause malfunction of breaker, shall be replaced with brand new piston.

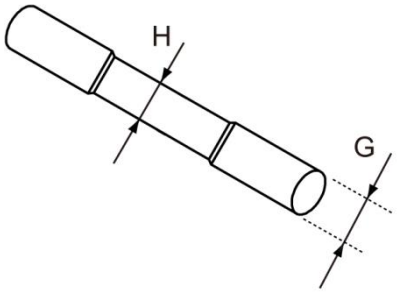
g) Chisel/Tool



Model	Unit	Standard value (B)	Wear limit (A)
6V	mm (inch)	286 (11.26)	150 (5.91)
7V	mm (inch)	300 (11.81)	150 (5.91)
8V	mm (inch)	258 (10.16)	150 (5.91)
17V	mm (inch)	331 (13.03)	200 (7.87)
40V	mm (inch)	358 (14.09)	250 (9.84)
60V	mm (inch)	367 (14.44)	250 (9.84)
70DX	mm (inch)	504 (19.84)	250 (9.84)
80DX	mm (inch)	530 (20.86)	250 (9.84)
100DX	mm (inch)	552 (21.73)	250 (9.84)
130DX	mm (inch)	532 (20.94)	250 (9.84)
150DX	mm (inch)	560 (22.04)	300 (11.81)
180DX	mm (inch)	630 (24.80)	350 (13.78)
200DX	mm (inch)	645 (25.39)	350 (13.78)
220DX	mm (inch)	592 (23.31)	350 (13.78)
250DX	mm (inch)	657 (25.86)	450 (17.72)
300DX	mm (inch)	643 (25.31)	450 (17.72)
360DX	mm (inch)	675 (26.57)	500 (19.69)
450DX	mm (inch)	744 (29.29)	500 (19.69)
550DX	mm (inch)	781 (30.75)	550 (21.65)
650DX	mm (inch)	716 (28.19)	550 (21.65)
700DX	mm (inch)	835 (32.87)	550 (21.65)
750DX	mm (inch)	945 (37.20)	550 (21.65)
1200DX	mm (inch)	880 (34.65)	550 (21.65)

NOTE! Measuring wear shall be done at the breaker position with chisel/tool completely pushed up. Use of chisel/tool beyond wear limit will led to shortening life time of housing and also dust/debris entering into breaker percussion chamber ultimately causing contamination failure.

h) Stopper pin

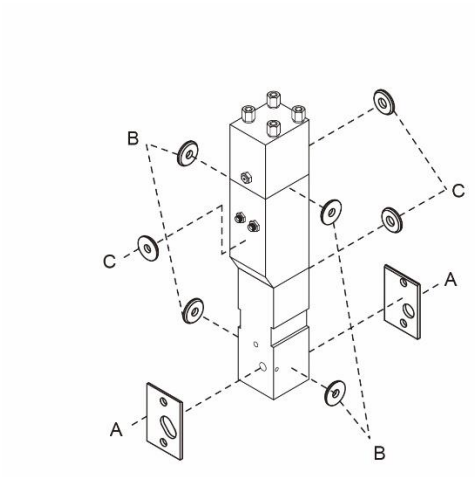


Model	Unit	Standard value (G)	Wear limit (H)
6V ~ 40V	mm (inch)	10 (0.39)	8 (0.31)
60V	mm (inch)	15 (0.59)	13 (0.51)
70DX	mm (inch)	16 (0.63)	14 (0.55)
80DX	mm (inch)	15 (0.59)	13 (0.51)
100DX ~ 180DX	mm (inch)	17.5 (0.69)	15.5 (0.61)
200DX ~ 250DX	mm (inch)	17.5 (0.69)	15.5 (0.61)
300DX ~ 360DX	mm (inch)	21.5 (0.85)	19.5 (0.77)
450DX ~ 1200DX	mm (inch)	27.5 (1.08)	25.5 (1.00)

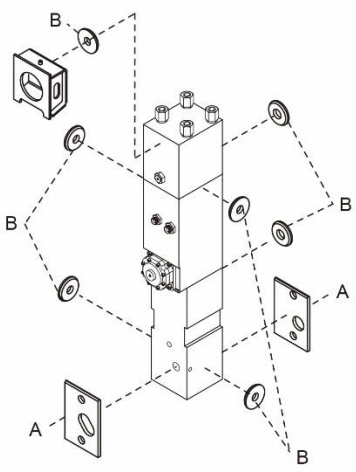
NOTE! Stopper pin wearing over the limit may cause chisel/tool pin, chisel/tool and/or bush failures as well as stopper pin failure.

NOTE! When breaker striking force has been delivered to stopper pin over and over, it can be bended or deformed. Heavily bended or deformed stopper pin may not be removed from chisel/tool pin and bush, which will cause a significant amount of repair time and resource spending. Check stopper pin condition periodically and replace it with brand new before too late.

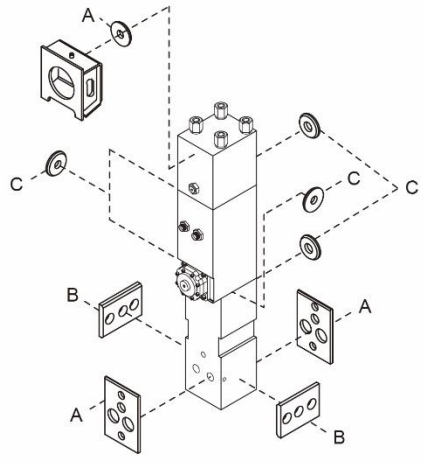
i) Shell pad



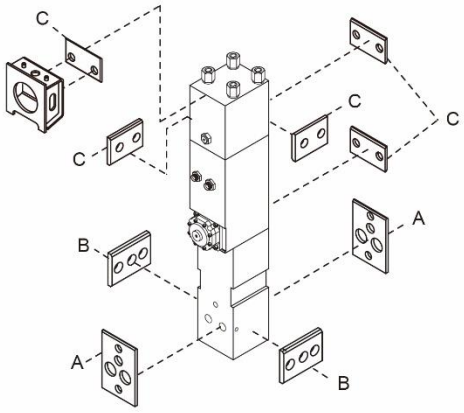
8V, 17V



40V

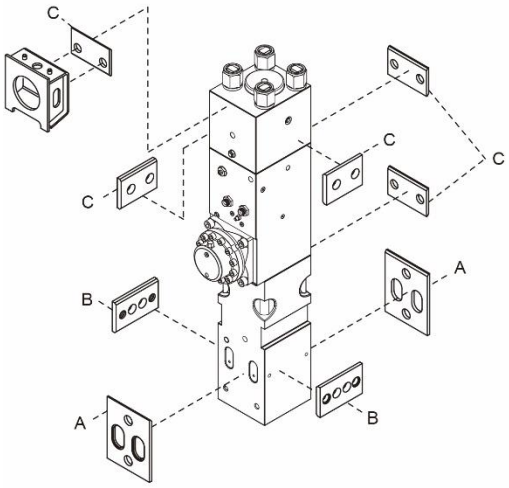


60V

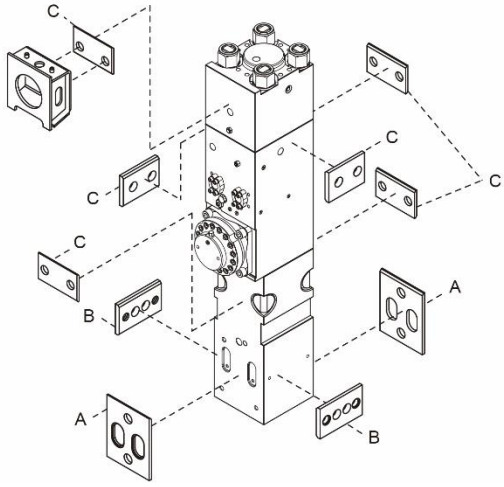


70DX, 80DX

Model	Standard value (A)	Wear limits	Standard value (B)	Wear limits	Standard value (C)	Wear limits
	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)
8V ~ 17V	12 (0.47)	10.5 (0.41)	22 (0.87)	20.5 (0.81)	12 (0.47)	10.5 (0.41)
40V ~ 60V	15 (0.59)	13.5 (0.53)	15 (0.59)	13.5 (0.53)	15 (0.59)	13.5 (0.53)
70DX ~ 80DX	15 (0.59)	13.5 (0.53)	15 (0.59)	13.5 (0.53)	15 (0.59)	13.5 (0.53)



100DX ~ 450DX



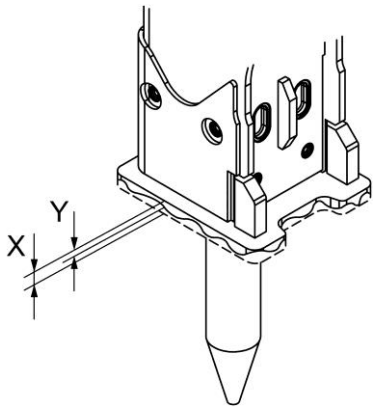
550DX ~ 1200DX

Model	Standard value (A)	Wear limits	Standard value (B)	Wear limits	Standard value (C)	Wear limits
	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)
100DX ~ 1200DX	15 (0.59)	13.5 (0.53)	15 (0.59)	13.5 (0.53)	15 (0.59)	13.5 (0.53)

NOTE! Shell pad wearing beyond the limit may cause shaking of power cell and various parts failure of power cell and housing.

NOTE! Also operating breaker with any missing shell pad may cause shaking of power cell and various parts failure of power cell and housing.

j) Housing bottom plate



Model (Box type)	Unit	Standard value (X)	Wear limit (Y)
8V ~ 130DX	mm (inch)	25 (0.98)	15 (0.59)
150DX ~ 180DX	mm (inch)	40 (1.57)	20 (0.79)
200DX ~ 250DX	mm (inch)	40 (1.57)	20 (0.79)
300DX ~ 360DX	mm (inch)	50 (1.97)	25 (0.98)
450DX	mm (inch)	60 (2.36)	30 (1.18)
550DX ~ 1200DX	mm (inch)	80 (3.15)	40 (1.57)

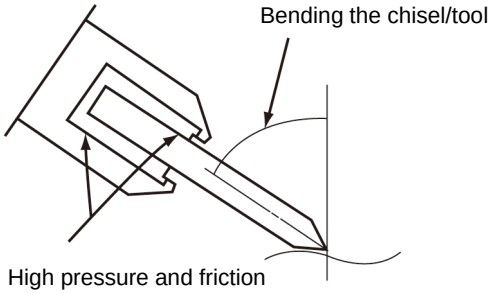
NOTE! Bottom plate wearing over the limit may incur failure or shorter service life of housing, bottom damper and/or lower bush, shall be reinforced before too late.

N. Cause of chisel/tool failure

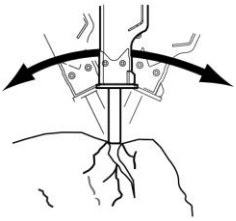
1. Accumulated side force from repeated chisel/tool leverage working, such as but not limited to incorrect breaker striking angle, pulling the material with breaker, etc.
2. Excessive force delivered to the chisel/tool from repeated blank fires.
3. Extremely cold condition at the job site.
4. Chisel/Tool overheating from abnormal friction caused by lack of lubrication or excessive bending force.
5. Oblique striking angle caused by excessive lower bush wear beyond the limit.

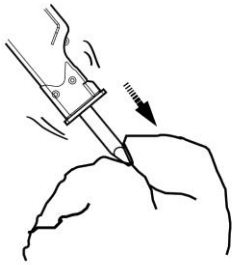


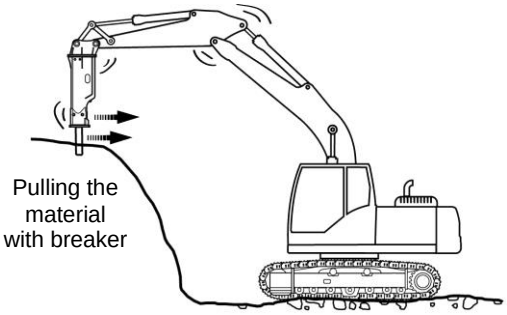
Bending by high pressure



Chisel/Tool failure root cause example


Leverage


Oblique striking angle



VII. Underwater kit

This is about requirements of the underwater application breaker. It is very important for you to read and understand the instruction before the breaker is put into underwater application. Keep the instructions provided herewith with you all the time.

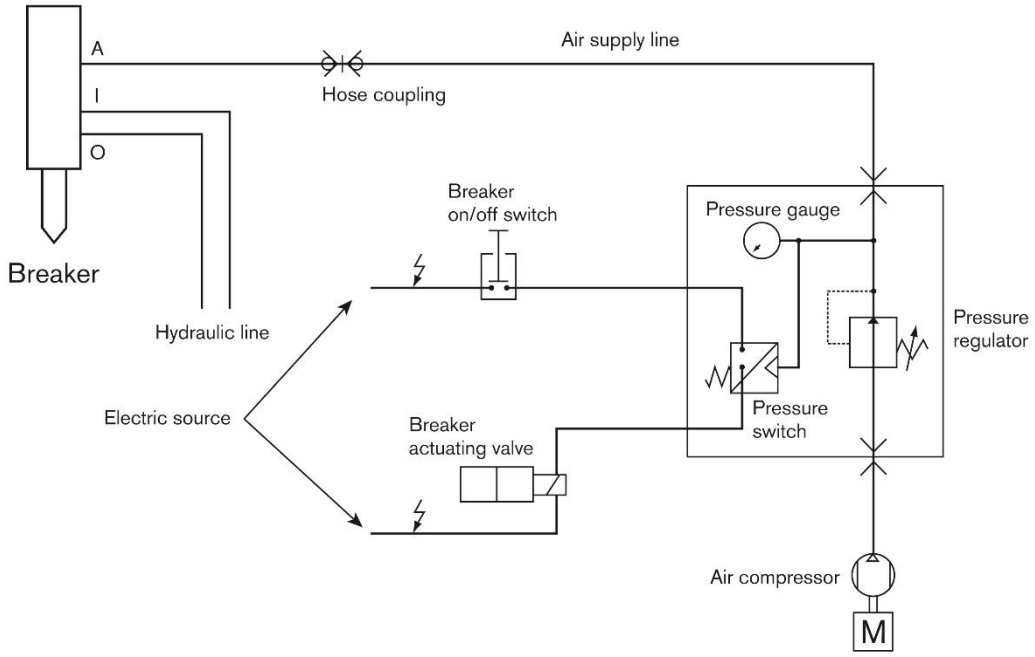
When the breaker is operated at underwater application without any proper underwater kit, water comes into percussion chamber and cylinder, cause serious damage to seals, cylinder, piston and control valve such as corrosion, scratch and crack as well as a significantly shortened life time of chisel/tool, chisel/tool pins, upper bush, lower bush, etc. Therefore a proper underwater kit should be installed on the breaker and working whenever the breaker works at under water application.

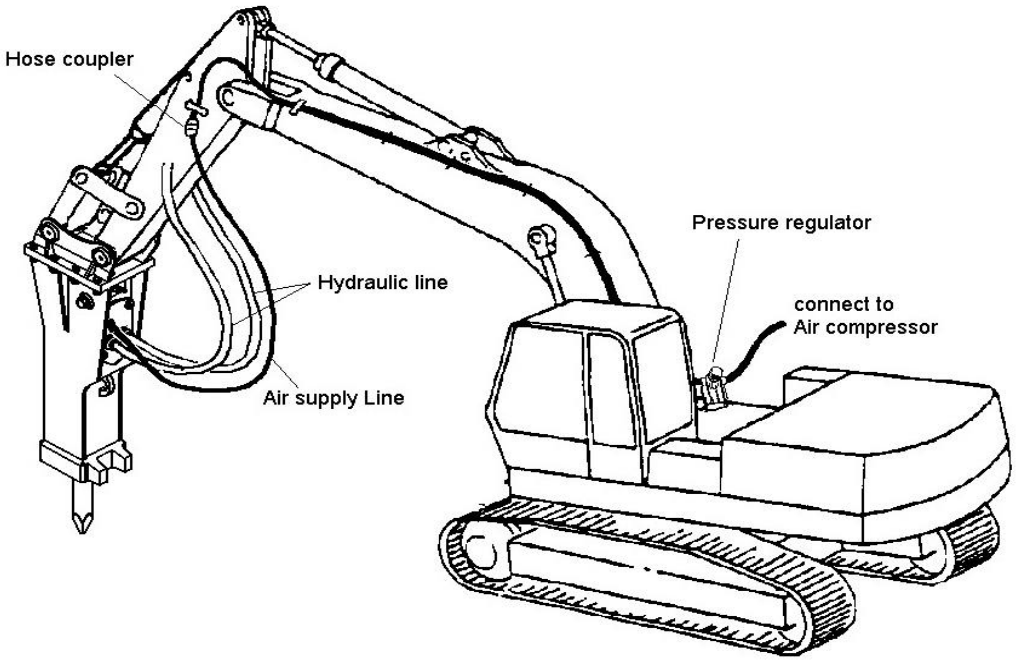
IMPORTANT! The breaker manufacturer do NOT supply any underwater kit. All information related with underwater kit technical information, installation, capacity, setting pressure, operation, maintenance, part list, etc. of this Service Manual is only to help the operator understand risks and requirements of underwater application breaker, shall NOT be interpreted as breaker manufacturer's responsibility to warrant underwater kit as well as underwater breaker.

IMPORTANT! Underwater application breaker is not supported by breaker manufacturer's warranty. Breaker operation at underwater application shall be carried out at full responsibility of the Operator.

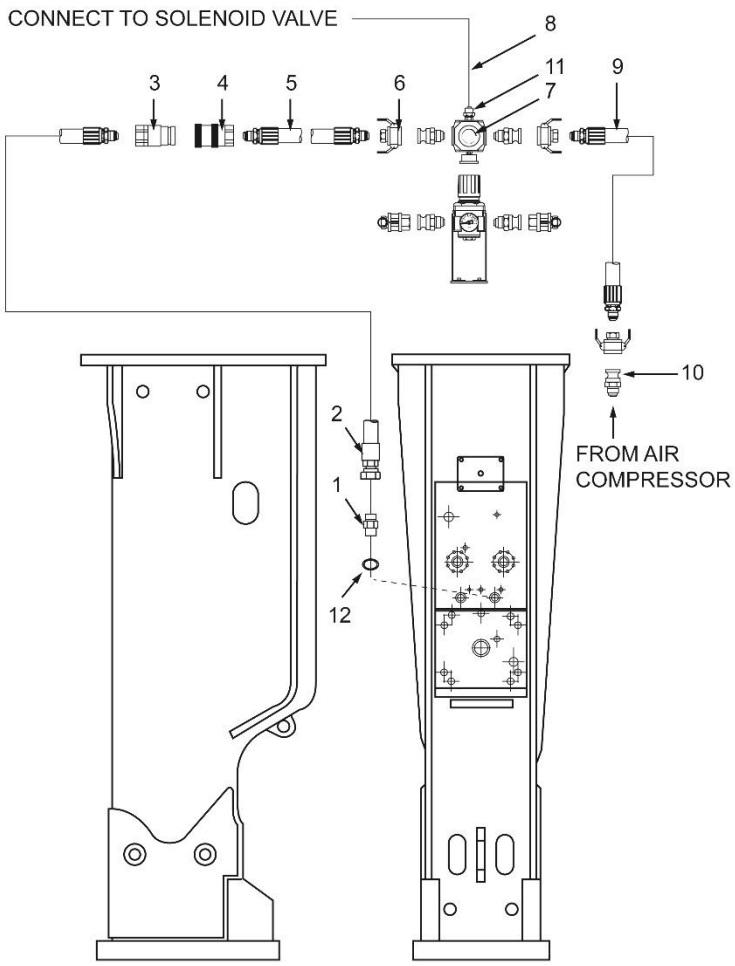
A. Structure of underwater kit

Normally underwater kit consists of air compressor, air supply line, pressure regulator, pressure switch, electric cable, coupling, adaptor, fasteners, etc.



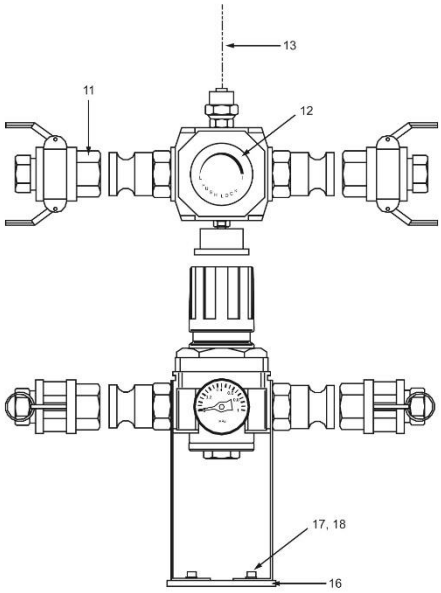


Typical underwater kit parts of 220DX class



Item	Part name	Q'ty
1	Adaptor	1
2	Hose	1
3	Quick Coupler Plug	1
4	Quick Coupler Socket	1
5	Hose	1
6	Female Thread Coupler	3
7	Regulator Ass'y	1
8	Electric Cable	1
9	Hose	1
10	Male Thread Coupler	3
11	Pressure Switch	1
12	O-ring	1

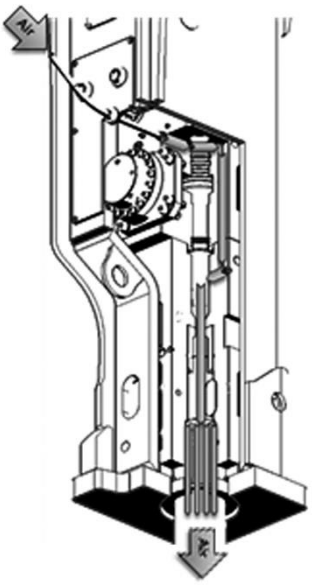
Pressure regulator



Item	Part Name	Q'ty
11	Coupler Socket	3
12	Pressure Regulator Assembly	1
13	Electric Cable	1
16	Plate	1
17	Socket Bolt	2
18	Washer	2

B. Technical requirements

Air supply channel is built in the breaker cylinder and front head blocks as standard for the range 100DX & above range.



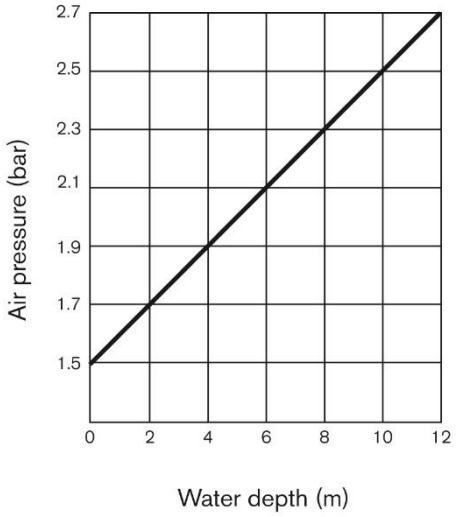
Air supply hose can be fitted to the air inlet port of cylinder. Insert air supply hose through rubber cover and fit it on the air inlet port.

Air inlet port size
- 100DX ~ 300DX : PF1/2 inch
- 360DX ~ 1200DX : PF3/4 inch

IMPORTANT! The hoses twisted or folded will not Allow a proper air supply to the breaker.

		Unit	100DX ~ 130DX	150DX ~ 250DX	300DX	360DX	450DX ~ 1200DX
Air hose size (inner dia.)		inch	1/2			3/4	
Regulated air pressure		bar (psi)	0 ~ 5.5 (0 ~ 80)				
Switching pressure		bar (psi)	1.5 (22) activating pressure switch				
Air compressor capacity	Min. air pressure	bar (psi)	5 (73)				
	Air delivery	m^3/min	1.5	2.7	3	3	3.3
	Rated output	kW (ps)	12.5 (17)	22 (30)	25 (34)	25 (34)	27 (37)

Air pressure = Water depth / 10 + 1.5 bar (22 psi)



Water pressure gets 1 bar at every 10 m water depth. You may calculate air pressure from the formulated on the left.

You may also get an idea of proper air pressure level from the chart on. the left

C. Requirements of underwater application breaker maintenance

As soon as underwater breaker operating is finished, remove water that remains in percussion chamber

1. Operate the breaker at the ground over 10 times with air supply from the compressor.
2. Keep supplying compressed air to the breaker for minimum 10 minutes.
3. Apply hydraulic oil or anti-rust oil inside percussion chamber with air supply line.
4. Apply grease inside percussion chamber, repaint the breaker if necessary.

• Following is what you may refer to for maintain underwater application breaker.

Every 30 min.	• Grease chisel/tool, chisel/tool pins, bushes • Check if chisel/tool moves up and down with no difficulty. • Check function range of air pressure switch. • Check air hoses and their fitting condition.
Daily (8 hours)	• Remove chisel/tool pin and chisel/tool condition, remove burrs if any. • Check if chisel/tool was greased sufficiently, grease more frequently if needed. • Check if the breaker is rust or abnormally worn out, particularly piston face and percussion chamber.
When the job is over	• Completely disassemble breaker and carry out overhauling including but not limited to seals. • Check if any breaker parts were damaged or rust, replace if any. • Check if all underwater kit parts are in good condition and work properly.

VIII. Specifications

A. Breakers for excavator or tractor loader backhoe carrier

Description		Unit	6V	7V	8V	17V	40V
Operating weight*		kg	80	105	141	184	325
		lb	176	232	311	406	717
Overall length**		mm	1,116	1,182	1,197	1,400	1,626
		inch	43.94	46.54	47.13	55.12	64.02
Chisel/Tool diameter		mm	40	40	45	57	70
		inch	1.57	1.57	1.77	2.24	2.76
Port relief setting pressure***		kg/cm²	175	175	175	175	175
		Psi	2,489	2,489	2,489	2,489	2,489
Operating pressure		kg/cm²	60~130	90~120	90~120	90~120	110~165
		Psi	853~ 1,849	1,280~ 1,707	1,280~ 1,707	1,280~ 1,707	1,565~ 2,347
Oil flow		lpm	15~21	12~25	13~30	20~60	29~60
		gpm	3.96~ 5.55	3.17~ 6.60	3.43~ 7.93	5.28~ 15.85	7.66~ 15.85
Blow rate	Power mode	bpm	800~ 1,200	800~ 1,400	550~ 1,000	600~ 1,500	380~ 1,000
	Speed mode	bpm					
Back head gas pressure		kg/cm²	10~14	10~14	10~14	14~16	10~14
		Psi	142~199	142~199	142~199	199~228	142~199
Accumulator gas pressure		kg/cm²	—	—	—	—	40~50
		Psi	—	—	—	—	569~711
Suitable carrier		ton	0.5~2.0	0.5~2.0	0.8~2.5	1.5~4.0	3.0~6.5
		lb	1,102~ 4,409	1,102~ 4,409	1,764~ 5,512	3,307~ 8,818	6,614~ 14,330

Note : * Operating weight including mount cap and pins
** Overall length including chisel/tool, box housing, mount cap
*** Guide for carrier 2nd (port) relief valve pressure setting
Specifications are subject to change without notice.

Description		Unit	60V	70DX	80DX	100DX	130DX
Operating weight*		kg	412	518	600	875	1,012
		lb	908	1,143	1,323	1,929	2,231
Overall length**		mm	1,699	1,947	2,120	2,203	2,285
		inch	66.89	76.65	83.46	86.73	89.96
Chisel/Tool diameter		mm	75	80	90	95	105
		inch	2.95	3.15	3.54	3.74	4.13
Port relief setting pressure***		kg/cm²	175	175	175	210	210
		Psi	2,489	2,489	2,489	2,987	2,987
Operating pressure		kg/cm²	120~165	140~170	140~170	140~180	140~190
		Psi	1,707~ 2,347	1,991~ 2,418	1,991~ 2,418	1,991~ 2,560	1,991~ 2,702
Oil flow		lpm	34~68	38~85	42~85	63~102	68~119
		gpm	8.98~ 17.96	10.04~ 22.45	11.10~ 22.45	16.64~ 26.95	17.96~ 31.44
Blow rate	Power mode	bpm	380~900	400~800	350~700	350~600	350~550
	Speed mode	bpm		600~1,100	490~1,000	600~900	600~900
Back head gas pressure		kg/cm²	16~18	10~14	10~14	10~14	10~14
		Psi	228~256	142~199	142~199	142~199	142~199
Accumulator gas pressure		kg/cm²	40~50	40~50	40~50	55~60	55~60
		Psi	569~711	569~711	569~711	782~853	782~853
Suitable carrier		ton	4.5~8.0	4.5~8.0	6.0~10.0	8.0~12.5	10~15
		lb	9,921~ 17,637	9,921~ 17,637	13,228~ 22,046	17,637~ 27,558	22,046~ 33,069

Note : * Operating weight including mount cap and pins
** Overall length including chisel/tool, box housing, mount cap
*** Guide for carrier 2nd (port) relief valve pressure setting
Specifications are subject to change without notice.

Description		Unit	150DX	180DX	200DX	220DX	250DX
Operating weight*		kg	1,231	1,448	1,577	1,845	2,021
		lb	2,714	3,192	3,477	4,068	4,456
Overall length**		mm	2,457	2,602	2,725	2,818	2,954
		inch	96.73	102.44	107.28	110.94	116.30
Chisel/Tool diameter		mm	115	125	135	135	145
		inch	4.53	4.92	5.31	5.31	5.71
Port relief setting pressure***		kg/cm²	210	210	210	210	210
		Psi	2,987	2,987	2,987	2,987	2,987
Operating pressure		kg/cm²	140~190	150~190	160~190	160~190	160~190
		Psi	1,991~ 2,702	2,134~ 2,702	2,276~ 2,702	2,276~ 2,702	2,276~ 2,702
Oil flow		lpm	85~127	85~131	102~132	119~161	127~178
		gpm	22.45~ 33.55	22.45~ 34.61	26.95~ 34.87	31.44~ 42.53	33.55~ 47.02
Blow rate	Power mode	bpm	320~550	320~500	320~480	340~450	270~400
	Speed mode	bpm	400~700	400~600	400~600	420~550	330~500
Back head gas pressure		kg/cm²	14~16	14~16	14~16	14~16	14~16
		Psi	199~228	199~228	199~228	199~228	199~228
Accumulator gas pressure		kg/cm²	55~60	55~60	55~60	55~60	55~60
		Psi	782~853	782~853	782~853	782~853	782~853
Suitable carrier		ton	12~18	16~22	18~24	20~26	24~30
		lb	26,455~ 39,683	35,274~ 48,502	39,683~ 52,911	44,092~ 57,320	52,911~ 66,139

Note : * Operating weight including mount cap and pins
** Overall length including chisel/tool, box housing, mount cap
*** Guide for carrier 2nd (port) relief valve pressure setting
Specifications are subject to change without notice.

Description		Unit	300DX	360DX	450DX	550DX
Operating weight*		kg	2,507	2,770	3,487	4,099
		lb	5,527	6,107	7,688	9,037
Overall length**		mm	3,045	3,168	3,398	3,611
		inch	119.88	124.72	133.78	142.17
Chisel/Tool diameter		mm	150	155	165	175
		inch	5.91	6.10	6.50	6.89
Port relief setting pressure***		kg/cm²	210	230	230	210
		Psi	2,987	3,271	3,271	2,987
Operating pressure		kg/cm²	160~190	160~190	150~190	150~190
		Psi	2,276~ 2,702	2,276~ 2,702	2,134~ 2,702	2,134~ 2,702
Oil flow		lpm	153~204	170~221	187~238	204~272
		gpm	40.42~ 53.89	44.91~ 58.38	49.40~ 62.87	53.89~ 71.85
Blow rate	Power mode	bpm	250~380	230~400	230~345	230~330
	Speed mode	bpm	300~450	270~470	270~410	270~500
Back head gas pressure		kg/cm²	14~16	14~16	10~14	14~16
		Psi	199~228	199~228	142~199	199~228
Accumulator gas pressure		kg/cm²	55~60	55~60	55~60	55~60
		Psi	782~853	782~853	782~853	782~853
Suitable carrier		ton	25~36	28~42	34~50	40~60
		lb	55,116~ 79,366	61,729~ 92,594	74,957~ 110,231	88,185~ 132,277

Note : * Operating weight including mount cap and pins
** Overall length including chisel/tool, box housing, mount cap
*** Guide for carrier 2nd (port) relief valve pressure setting
Specifications are subject to change without notice.

Description		Unit	650DX	700DX	750DX	1200DX
Operating weight*		kg	4,486	5,838	6,710	9,564
		lb	9,890	12,871	14,793	21,085
Overall length**		mm	3,770	4,018	4,346	4,540
		inch	148.43	158.19	171.10	178.74
Chisel/Tool diameter		mm	180	200	205	240
		inch	7.09	7.87	8.07	9.45
Port relief setting pressure***		kg/cm²	210	250	250	250
		Psi	2,987	3,556	3,556	3,556
Operating pressure		kg/cm²	150~190	170~210	170~210	170~210
		Psi	2,134~ 2,702	2,418~ 2,987	2,418~ 2,987	2,418~ 2,987
Oil flow		lpm	221~306	238~323	255~340	298~383
		gpm	58.38~ 80.84	62.87~ 85.33	67.36~ 89.82	78.72~ 101.18
Blow rate	Power mode	bpm	270~380	220~300	205~285	170~230
	Speed mode	bpm	380~530	290~400	235~420	195~275
Back head gas pressure		kg/cm²	14~16	14~16	14~16	9~11
		Psi	199~228	199~228	199~228	128~156
Accumulator gas pressure		kg/cm²	55~60	55~60	55~60	55~60
		Psi	782~853	782~853	782~853	782~853
Suitable carrier		ton	45~80	58~100	60~100	85~140
		lb	99,208~ 176,370	127,868~ 220,462	132,277~ 220,462	187,393~ 308,647

Note : * Operating weight including mount cap and pins
** Overall length including chisel/tool, box housing, mount cap
*** Guide for carrier 2nd (port) relief valve pressure setting
Specifications are subject to change without notice.

B. Breakers for skid steer loader carrier

Description		Unit	17S	40S	60S	70S
Operating weight*		kg	270	357	430	542
		lb	595	787	948	1,195
Overall length**		mm	1,483	1,604	1,671	1,920
		inch	58.39	63.15	65.79	75.59
Chisel/Tool diameter		mm	57	70	75	80
		inch	2.24	2.76	2.95	3.15
Port relief setting pressure***		kg/cm²	230	230	230	230
		Psi	3,271	3,271	3,271	3,271
Operating pressure		kg/cm²	100~190	110~190	120~190	140~190
		Psi	1,422~ 2,702	1,565~ 2,702	1,707~ 2,702	1,991~ 2,702
Oil flow		lpm	23~70	35~70	40~80	45~90
		gpm	6.08~ 18.49	9.25~ 18.49	10.57~ 21.13	11.89 ~ 23.78
Blow rate	Power mode	bpm	600~1,500	380~1,000	380~900	400~800
	Speed mode	bpm				600~1,100
Back head gas pressure		kg/cm²	10~12	10~12	10~12	10~12
		Psi	142~171	142~171	142~171	142~171
Suitable carrier		ton	1.5~4.0	3.0~6.5	4.5~8.0	4.5~8.0
		lb	3,307~ 8,818	6,614~ 14,330	9,921~ 17,637	9,921~ 17,637

Note : * Operating weight including mount cap and pins
** Overall length including chisel/tool, box housing, skid steer loader mount cap only
*** Guide for carrier 2nd (port) relief valve pressure setting
When mounted on New Holland Skid steer loader, charge back head gas chamber at 8~10 kg/cm².
Specifications are subject to change without notice.

Not all products are available in all markets. Under our policy of continuous improvement, we reserve the right to change specifications and design without prior notice. The illustrations do not necessarily show the standard version of the breaker.

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