HYDRAULIC BREAKER

SERVICE MANUAL - DX SERIES

I. Forward

This Service 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, inspection, maintenance, repair or any other service of the breaker. Keep this manual at the workshop and mobile service vehicle 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 serviceable as efficiently and safely as possible. The accidents which occur in spite of this, are mostly caused by the human factor. A safety conscious person and well serviced/maintained breaker 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 Service Manual before service or maintenance is carried out or before running the breaker.

The breaker manufacturer will not accept any responsibility if any chisel/tools or work methods other than those described in this Service Manual are used.

BREAKER SERVICE MANUAL

WARNING!

This warning symbol means risk of fatalities or personal injury if the instructions are not followed.

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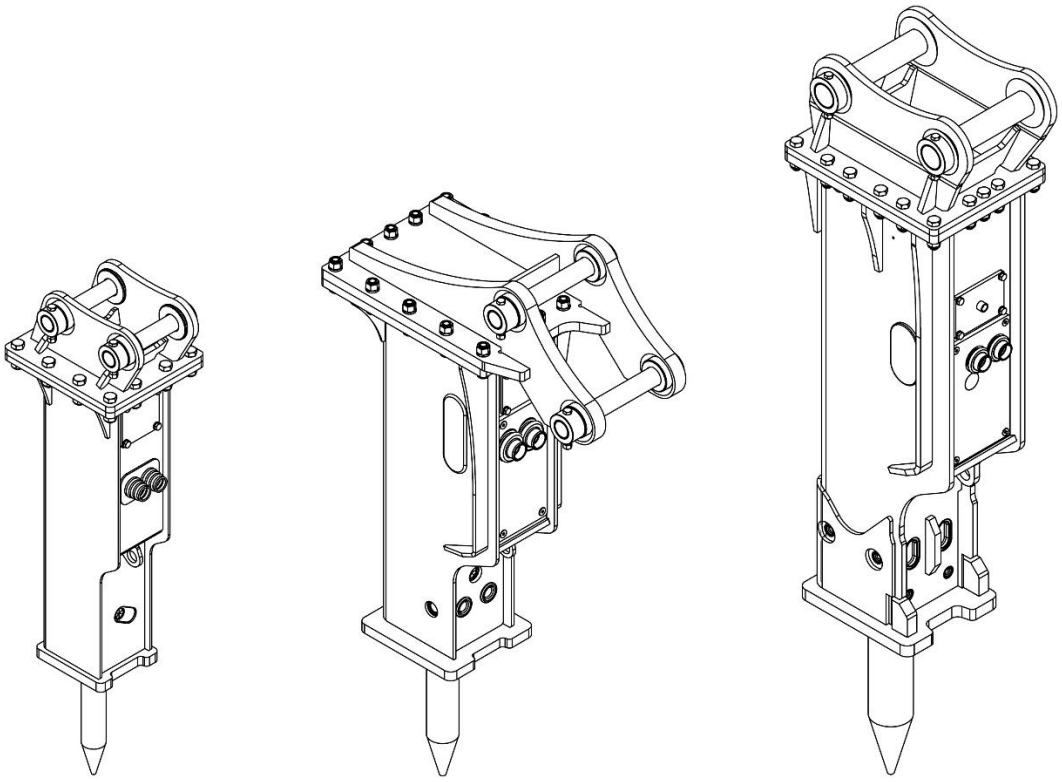
III. Presentation



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.

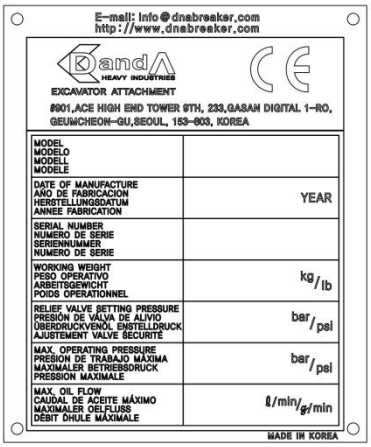
No additional pressure accumulators are necessary for the carrier since the integrated pressure accumulator absorbs hydraulic pressure peaks. The breaker impact energy is almost constant and independent of the carrier's hydraulic system.

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. Name plate

The breaker information including serial number and key technical data is available on the name plate, shown below, 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.



C. 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"

D. 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

IMPORTANT! Use of non-genuine parts may damage the breaker, will void the breaker warranty.

E. Modification and welding

Non approved modification and/or welding can cause injury and/or damage. Consult with the breaker manufacturer.

IMPORTANT! Non approved modification and/or void the breaker warranty.

F. Warranty registration card

Breaker installation on the carrier must be carried out according to the instruction of this Service Manual.

Particularly when brand new breaker is installed on the carrier for the first time, delivery and inspection information must be provided to the breaker manufacturer in the form of Warranty Registration Card. See Warranty Registration Card on the appendix of this Service Manual.

IMPORTANT! Warranty is void if no Warranty Registration Card is submitted.

G. Failure and/or warranty claim report

The breaker manufacturer must be immediately informed of any defect and the defective product shall not be operated until the defect has been rectified.

The breaker manufacturer has to have a written statement form (see Failure and/or Warranty Claim Report on the appendix of this Service Manual) of this concerning any defect during the warranty time.

IMPORTANT! The breaker manufacturer has to be informed within five (5) days from the date of defect. Otherwise the breaker manufacturer is discharged from the warranty responsibility as far as the defect in question is concerned.

H. Specifications and applicable carrier

Each and every breaker was produced for its own specifications (see Specifications on the appendix of this Service Manual) and its dedicated applicable carrier.
Ensure all breakers used within the range of specifications and applicable carrier.

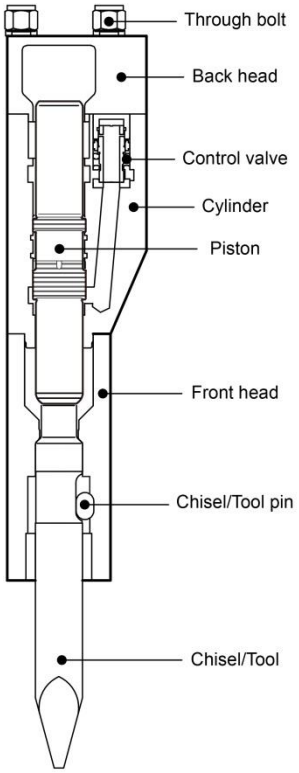
IMPORTANT! Warranty is void if any breaker has been used and/or serviced beyond the range of specifications and/or applicable carrier.

I. Main structure

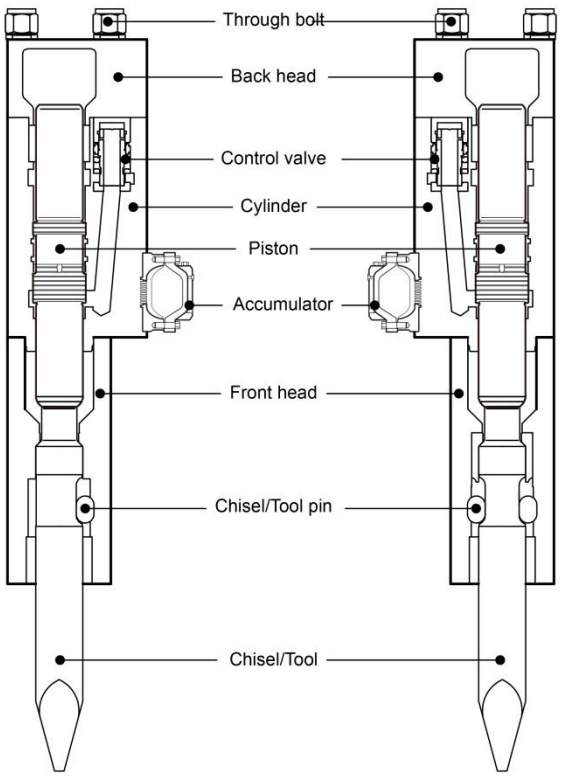
Breaker consists of five main sections such as **Cylinder, Piston, Control valve, Front head and Back head.**

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

J. Operating principle

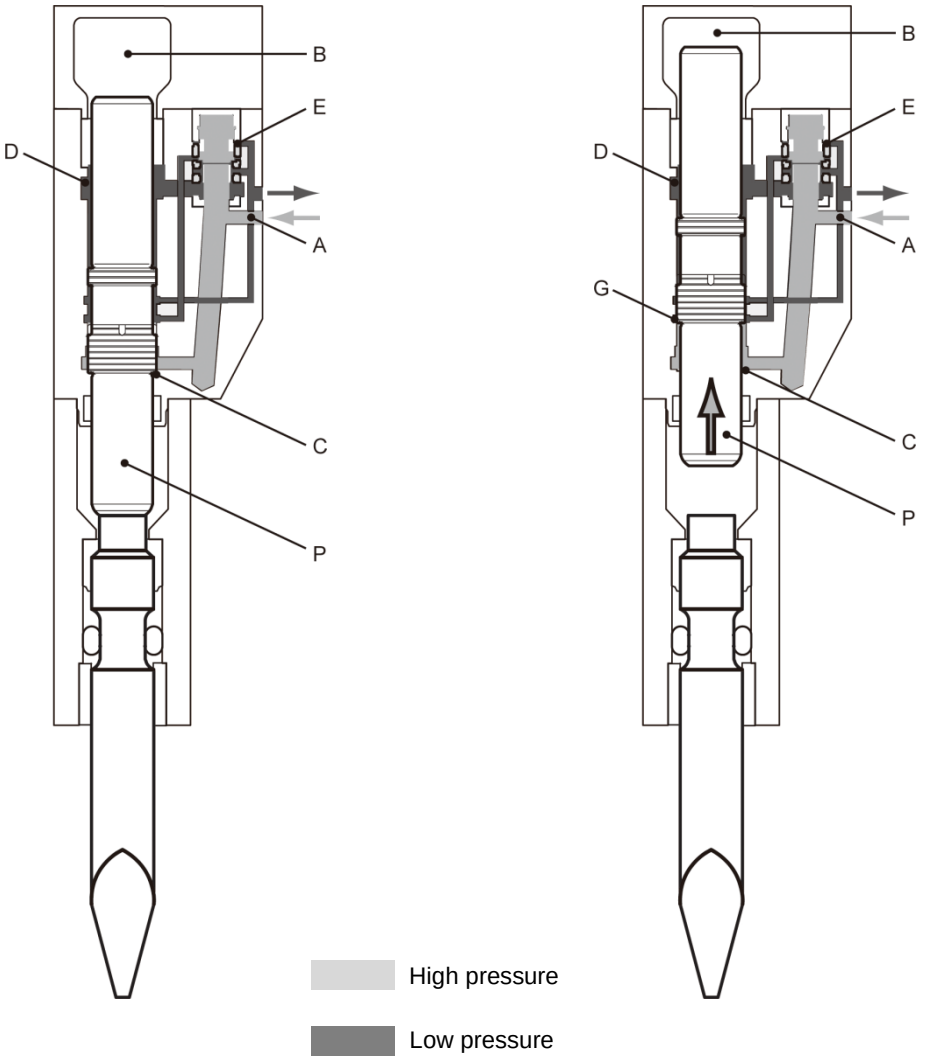
A) 6V ~ 70DX (non-accumulator type)

Start up

When operator put breaker on the breaking target material and activates carrier breaker switch, high pressure oil comes to piston lower part (C), inside valve & outside valve upper part. At this stage, valve is pushed down by high pressure oil outside valve upper part (E) and low pressure oil at piston upper part (D) is connected to return line.

Piston raising

High pressure oil at the piston lower part (C) raises piston up inside back head gas chamber (B). At this stage, nitrogen gas inside the chamber (B) is compressed and low pressure oil at the piston upper part (D) returns to the carrier oil tank.

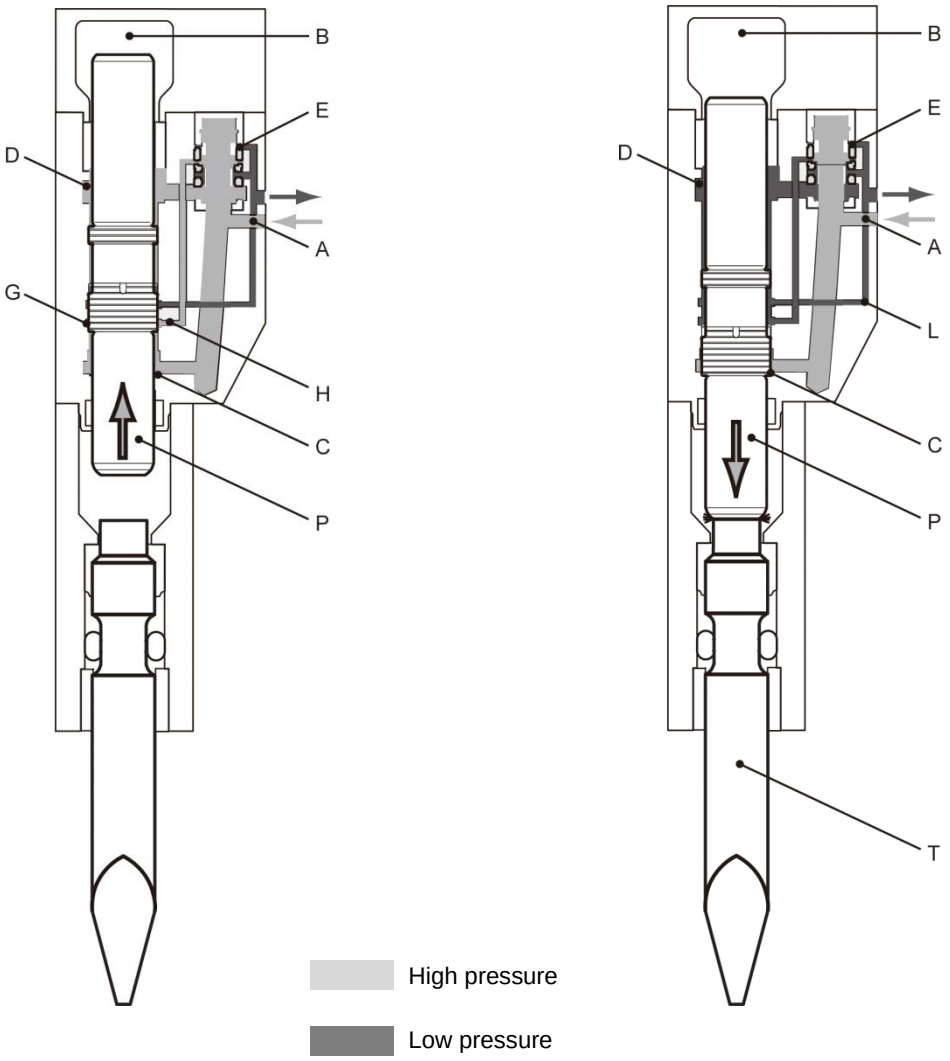


Valve position change

While piston is moving up, high pressure oil at the piston lower part (C) comes into channel (H) and reaches the outside of valve middle part. At this stage, valve moves up and opens the channel for high pressure flow to come into piston upper part (D).

Impact

Compressed nitrogen gas at the chamber (B) with high pressure at the piston upper part (D) pushes piston and piston strikes chisel/tool (T), delivering impact energy to the breaking target material. At this stage, pilot channel (L) is connected to return line, then valve moves down and cuts high pressure flow into piston upper part (D), then piston upper part area (D) is changed to low pressure and piston lower part area (C) is changed to high pressure which puts breaker into start up position again.



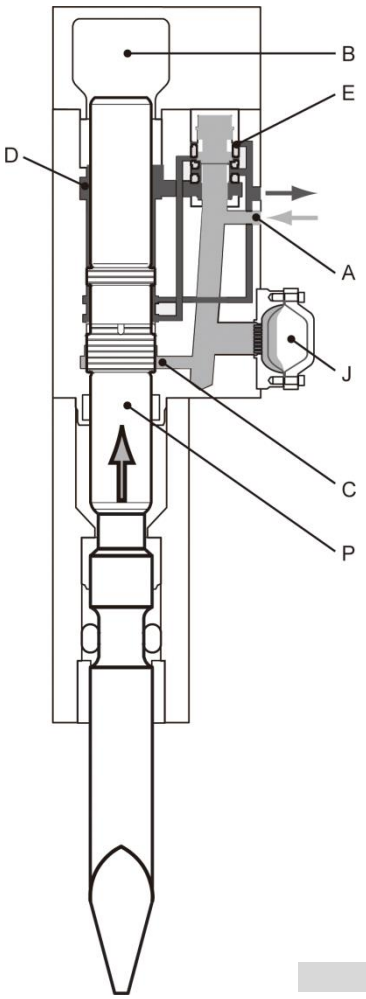
B) 40V ~ 1200DX (accumulator type)

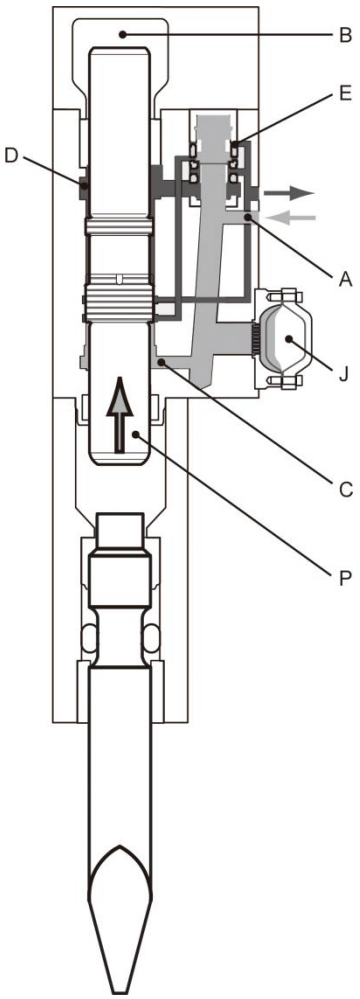
Start up

When operator put breaker on the breaking target material and activates carrier breaker switch, high pressure oil comes to piston lower part (C), inside valve & outside valve upper part and entrance of accumulator (J). At this stage, valve is pushed down by high pressure oil outside valve upper part (E) and low pressure oil at piston upper part (D) is connected to return line.

Piston raising

High pressure oil at the piston lower part (C) raises piston up inside back head gas chamber (B). At this stage, nitrogen gas inside the chamber (B) is compressed and low pressure oil at the piston upper part (D) returns to the carrier oil tank.





High pressure

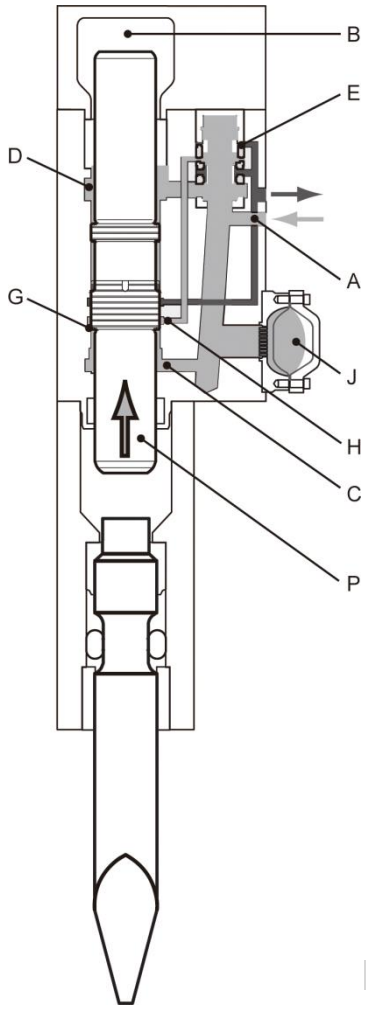
Low pressure

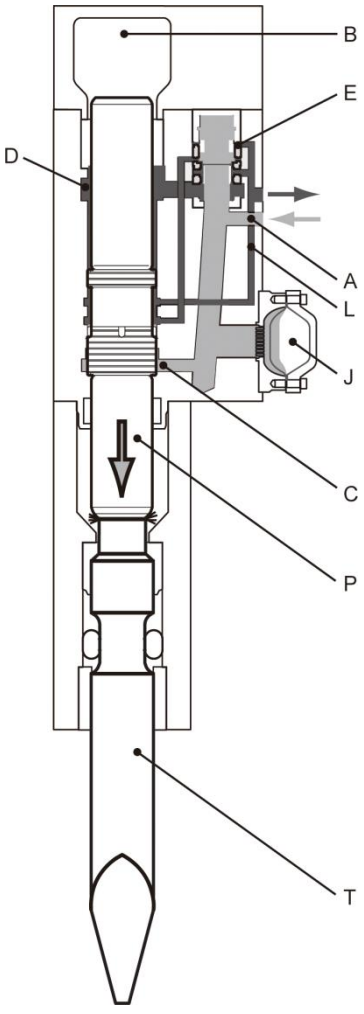
Valve position change

While piston is moving up, high pressure oil at the piston lower part (C) comes into channel (H) and reaches the outside of valve middle part. At the same time high pressure also comes inside accumulator (J), compressing gas inside accumulator gas chamber. At this stage, valve moves up and opens the channel for high pressure flow to come into piston upper part (D).

Impact striking

Compressed nitrogen gas at the chamber (B) with high pressure at the piston upper part (D) pushes piston and piston strikes chisel/tool (T), delivering impact energy to the breaking target material. At that time the compressed gas inside accumulator pumps "accumulated" high pressure oil into piston upper part, increasing piston striking speed and power. At this stage, pilot channel (L) is connected to return line, then valve moves down and cuts high pressure flow into piston upper part (D), then piston upper part area (D) is changed to low pressure and piston lower part area (C) is changed to high pressure which puts breaker into start up position again.



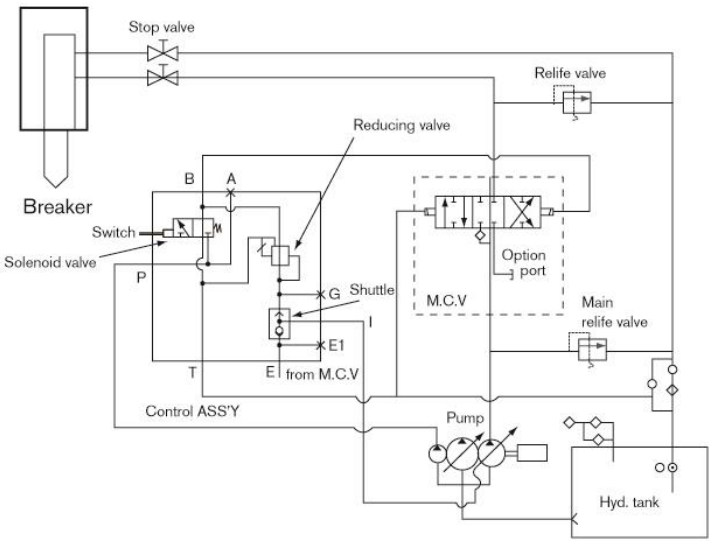


High pressure

Low pressure

K. Hydraulic system

Breakers were produced to be working with hydraulic system of various carrier types. Below hydraulic circuit is an example of how breaker interacts with carrier hydraulic system.

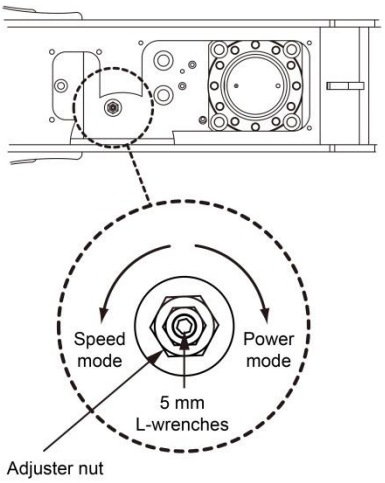


IMPORTANT! Be sure you are thoroughly familiar with hydraulic system of the carrier, along with the instructions in this Service Manual before installation, service, maintenance or running the breaker

NOTE! Hydraulic circuit on the left is an example, can be different by carrier brand, carrier type and carrier model.

L. Work mode selection

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



- 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.

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.

M. Oil temperature

The oil temperature varies by working condition but it is usually 40 ~ 80°C. If it is over 80°C, life time of seals and accumulator diaphragm becomes shorter.

Ensure that the breakers are used under following condition to avoid unnecessary rising of oil temperature.

1. Do not break the same material point continuously over 30 seconds.
2. Do not blow continuous over 15 seconds.
3. Do not increase carrier engine rpm or oil flow beyond the range of breaker oil flow.
4. Keep clean carrier cooler all the time.

N. Maintenance

All hydraulic components of 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.

NOTE! Read through following instruction and carry out maintenance of the breaker accordingly. Warranty is void if any breaker has not been maintained according to the maintenance instruction of this Service Manual

A) Maintenance interval

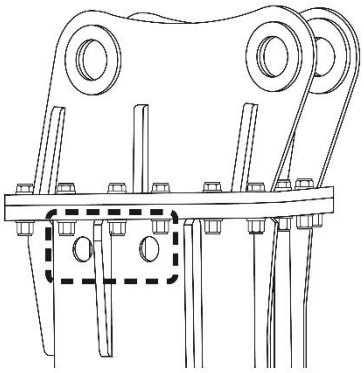
NOTE! Hours are carrier hours while the breaker is mounted/used on/by the carrier, including installation, breaking operation, repositioning on the rocks, etc. whether breaker piston is striking or not.

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

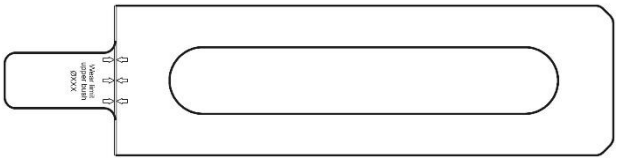
1. Remove chisel/tool and chisel/tool pins, then check their wearing shape and amount.
2. Replace or repair chisel/tool and chisel/tool pins upon wear limit and repair instruction, if necessary. See section Chisel/Tool Pin Replacement or Repair.
3. Check if chisel/tool and lower bush are sufficiently 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 19 ~ 28.

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.

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 18 ~ 28.			
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..

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 18 ~ 28.			
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.

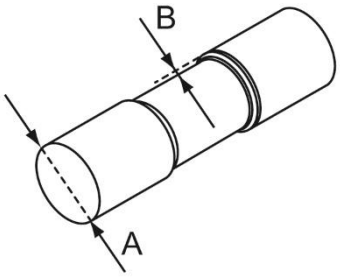
The end users are highly recommended to keep fast moving spare parts in stock close to the breaker such as chisel/tool, chisel/tool pin, stopper pin, rubber plug/cover, through bolt and hoses.

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

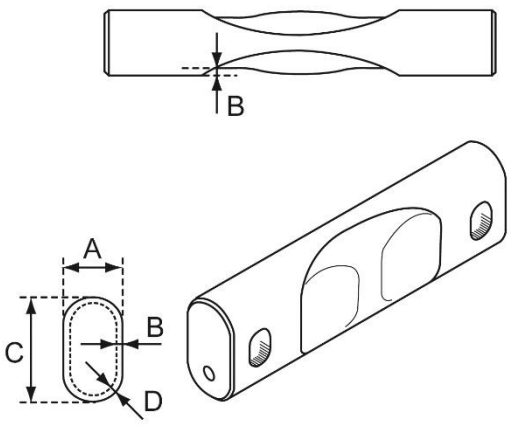
NOTE! Consumption of spare and wear parts varies upon the condition of breaker and/or carrier, operator's skill, work material, job site condition, etc. Therefore, if necessary, the parts should be replaced more frequently than the interval stated on above table.

Chisel/Tool pin

6V ~ 40V



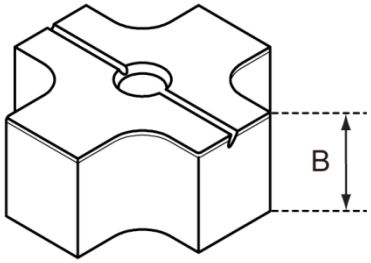
60V ~ 1200DX



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

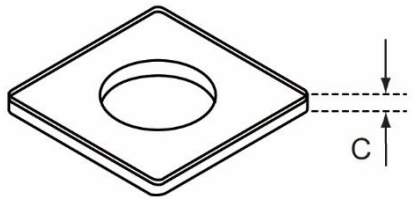
Upper damper



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.

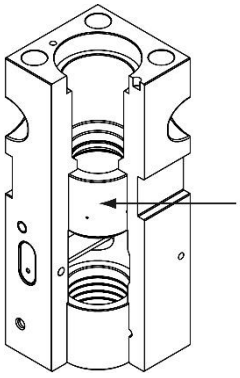
Bottom damper



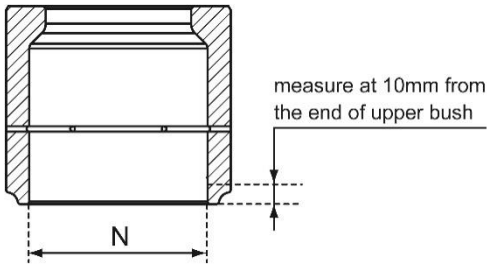
Model	Unit	Standard value	Wear limit (C)
6V ~ 7V	mm (inch)	—	—
8V ~ 60V	mm (inch)	20 (0.79)	18 (0.71)
70DX ~ 80DX	mm (inch)	15 (0.59)	13 (0.51)
100DX ~ 200DX	mm (inch)	20 (0.79)	18 (0.71)
220DX ~ 550DX	mm (inch)	25 (0.98)	22 (0.87)
650DX	mm (inch)	40 (1.58)	37 (1.46)
700DX ~ 750DX	mm (inch)	35 (1.38)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

Upper bush



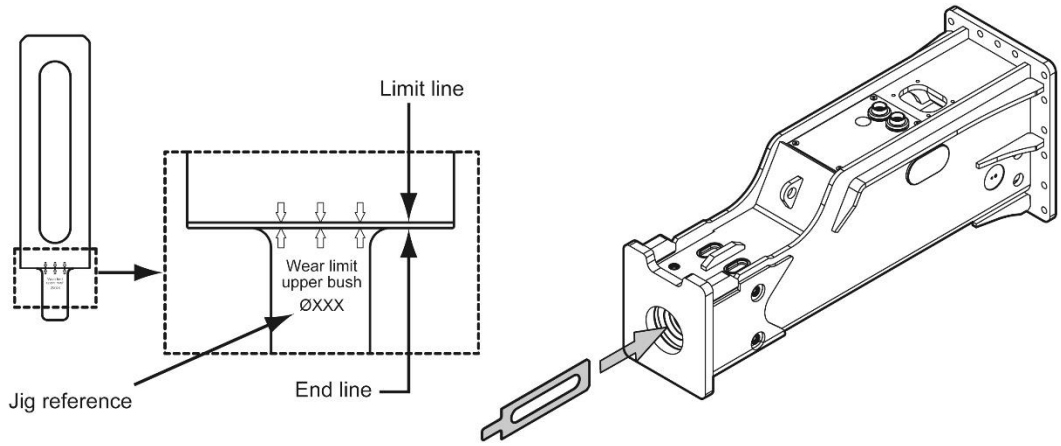
Assembled inside front head block (60V & above)
Built in front head as part of front head block (6V~ 40V)



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)

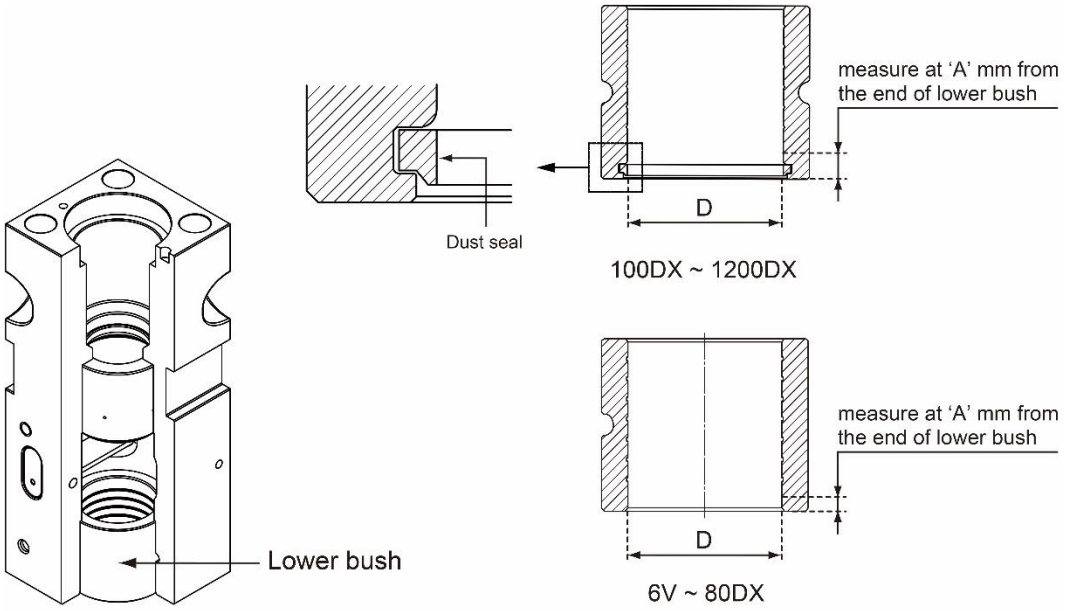
NOTE! For 60V & above, the jig to measure upper bush wearing is supplied with breaker as standard accessories. As illustrated below, put the jig into the hole of breaker housing, then replace upper bush if bottom of lower bush touches the Limit Line of jig.



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.

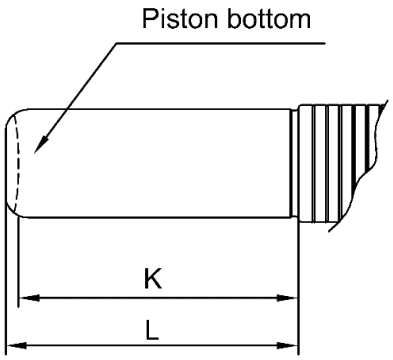
Lower bush



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	mm (inch)	135 (5.31)	140 (5.51)	
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.

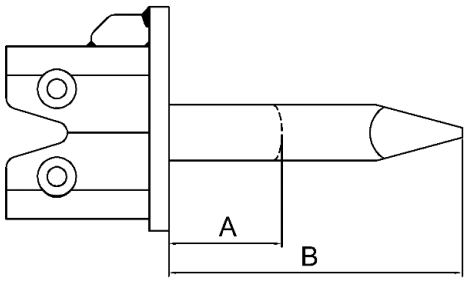
Piston



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.

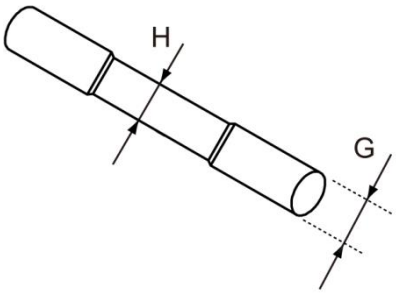
Chisel/Tool



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.

Stopper pin

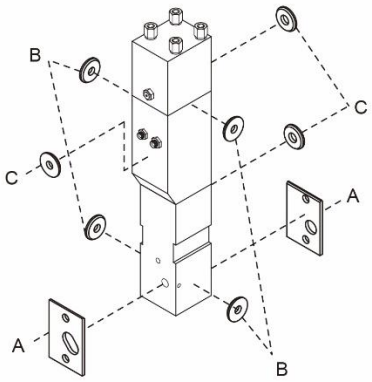


Model	Unit	Standard value (G)	Wear limit (H)
6V ~ 40V	mm (inch)	10 (0.39)	8 (0.31)
60V	mm (inch)	15 (0.59)	13 (0.51)
70DX	mm (inch)	16 (0.63)	14 (0.55)
80DX	mm (inch)	15 (0.59)	13 (0.51)
100DX ~ 180DX	mm (inch)	17.5 (0.69)	15.5 (0.61)
200DX ~ 250DX	mm (inch)	17.5 (0.69)	15.5 (0.61)
300DX ~ 360DX	mm (inch)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

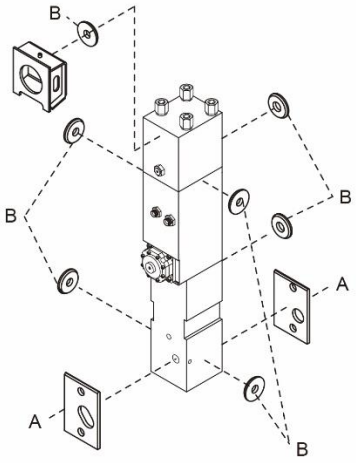
NOTE! Stopper pin wearing over the limit may cause chisel/tool pin, chisel/tool and/or bush failures as well as stopper pin failure.

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.

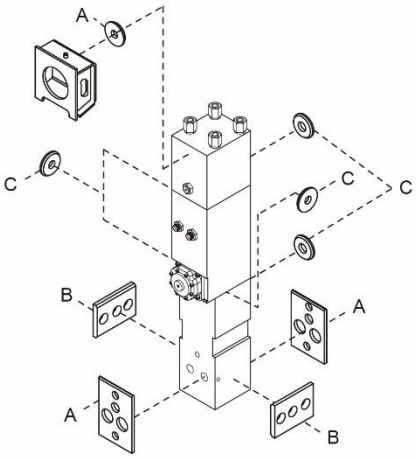
Shell pad



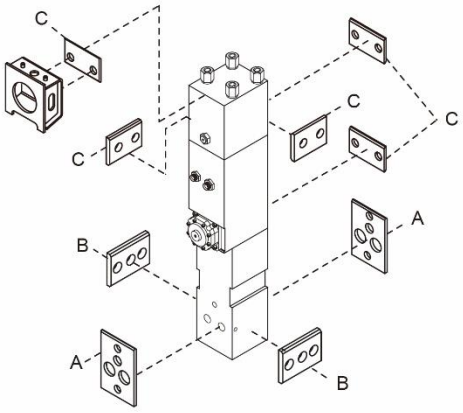
8V ~ 17V



40V



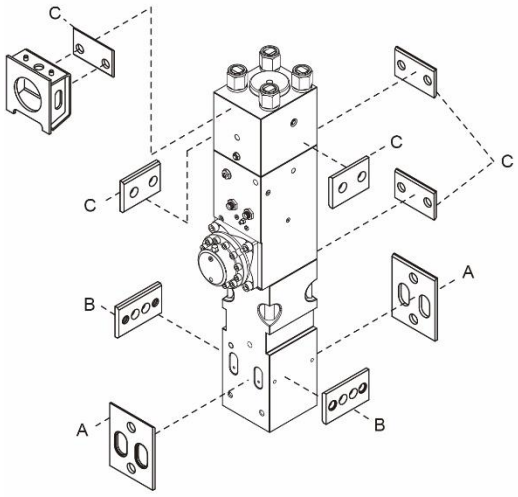
60V



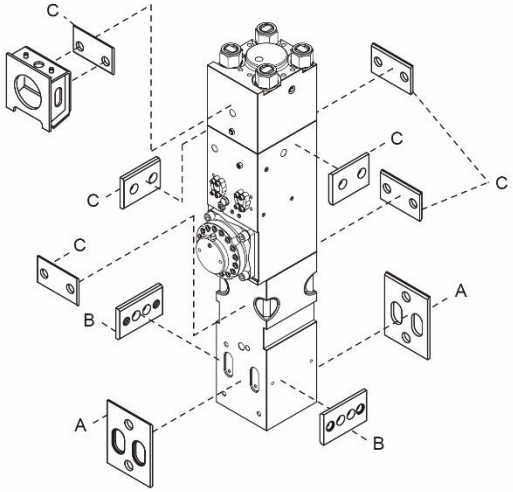
70DX, 80DX

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)

Shell pad



100DX ~ 450DX



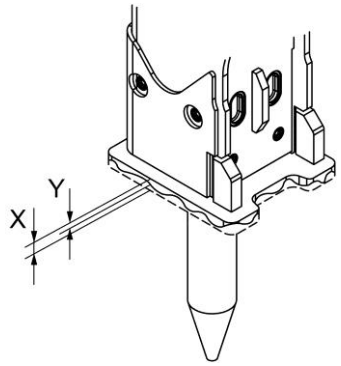
550DX ~ 1200DX

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 ~ 450DX	15 (0.59)	13.5 (0.53)	15 (0.59)	13.5 (0.53)	15 (0.59)	13.5 (0.53)
550DX ~ 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.

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.

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.

IV. Safety

All mechanical equipment can be hazardous if operated without due care or correct maintenance. Most accidents involving breaker commissioning, maintenance and repair 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 Service 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 servicing or operating 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.

A. Service manual

Read and understand this Service Manual.

- You must be thoroughly familiar with how to carry out service on the breaker and should undergo required training on the breaker.
- You must follow the instructions of this Service Manual and the Carrier Service 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 Service Manual or requires additional explanation, contact your authorized dealer.

B. 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.

C. Clothing and protective items

- 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.

D. 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.

E. Lifting instruction

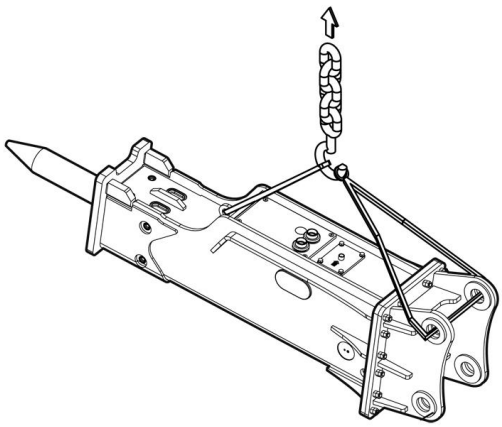
WARNING!

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.



F. Lifting eyes and lifting eye bolts

WARNING!

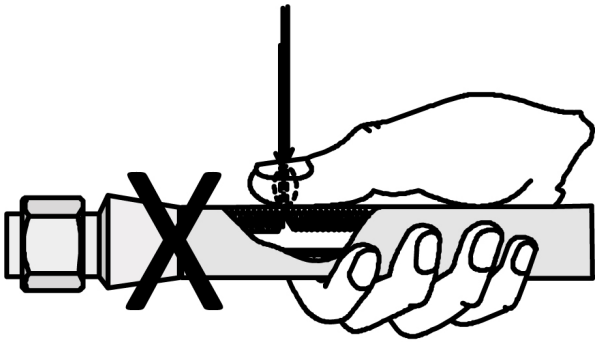
Ensure that lifting eye bolts are fully tightened to the housing before using them for lifting. If any lifting eye bolt is not properly tightened it may break. If the breaker falls down there is a risk of personal injuries.

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.

G. 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.

H. Pressure accumulator

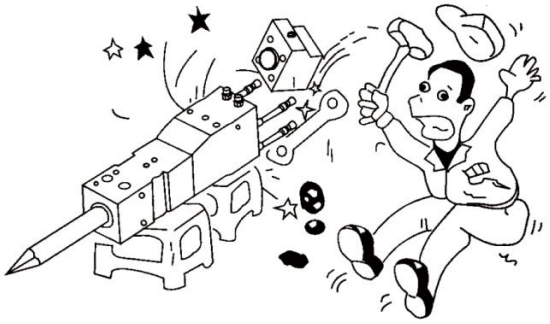
- The breaker incorporates pressure accumulator. The accumulator is pressurized even after hydraulic pressure has been released from the breaker. Attempting to remove or dismantle the accumulator without first releasing the pressure can cause severe injury or death. Do not try to dismantle pressure accumulator,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

I. Back head, gas charging valve and accumulator cover

• When disassembling back head, gas charging valve or accumulator cover, all of sudden it may spring out due to gas or hydraulic pressure that remains inside the breaker. Before disassembling any of those parts, you must ensure that gas and hydraulic pressures are fully discharged.

WARNING!

Disassembly with gas or hydraulic pressure kept inside the breaker is very dangerous and may cause injury to the mechanics.



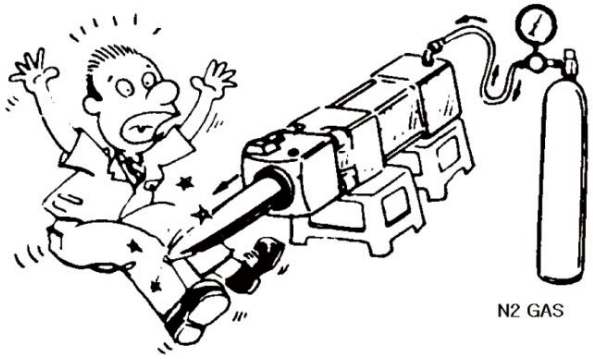
J. Charging nitrogen gas

WARNING!

Fill with nitrogen only.
Filling with air or oxygen runs the RISK OF AN EXPLOSION!

WARNING!

Chisel/Tool may spring out of the power cell when charging Nitrogen gas into back head, may cause injury to the mechanics. Do not stand in front of the chisel/tool.



V. Servicing

Prerequisites for breaker performance and its long life time are;
- Proper commissioning by experienced/skillful dealer technicians
- Respect P (pressure) and Q (flow) rate requirements upon specifications
- Use fresh and contamination free hydraulic oil
- Proper operation as per Operator's Manual
- Respect maintenance interval as per Operator's Manual
- Proactive inspection by dealer technicians as we as operator
- Timely repair by experienced/skillful dealer technicians as per Service Manual

It is therefore extremely important that dealer technicians/mechanics read through Service section of this Service Manual very carefully, build their capability to provide the customer with a professional breaker service according to the instructions and guides stated in the manual.

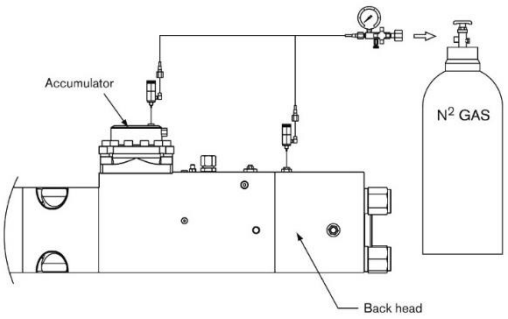
A. Commissioning

A) Gas pressure

Hydraulic breaker is working with gas pressure as well as hydraulic oil pressure. If gas pressure is higher than optimum level, the breaker gets overload. If gas pressure is lower than optimum level, the breaker delivers low performance. Therefore it is crucial to keep gas pressure at the optimum level all the time. See below gas pressure guide.

Unit: kg/cm²

Model	Back head		Accumulator
	Excavator/ Backhoe loader	Skid steer loader	
6V ~ 8V	10 ~ 14	—	—
17V	14 ~ 16	10 ~ 12	—
40V	10 ~ 14	10 ~ 12	40 ~ 50
60V	16 ~ 18	10 ~ 12	40 ~ 50
70DX	10 ~ 14	10 ~ 12	40 ~ 50
80DX	10 ~ 14	—	40 ~ 50
100DX ~ 130DX	10 ~ 14	—	55 ~ 60
150DX ~ 360DX	14 ~ 16	—	55 ~ 60
450DX	10 ~ 14	—	55 ~ 60
550DX ~ 750DX	14 ~ 16	—	55 ~ 60
1200DX	9 ~ 11	—	55 ~ 60



NOTE! Some skid steer loader carrier may incur return line back pressure issue and decrease breaker power, which can be easily sorted out by simple alternation of gas pressure. Please consult with your breaker supplier.

NOTE! Gas must be charged only after the breaker has been sufficiently cooled down.

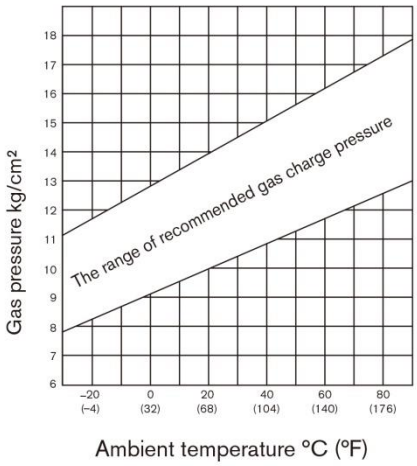
NOTE! Ensure that working chisel/tool shall not be pushed up into power cell.

NOTE! Ensure gas cylinder is not stored under sunshine, also its valve is always closed.

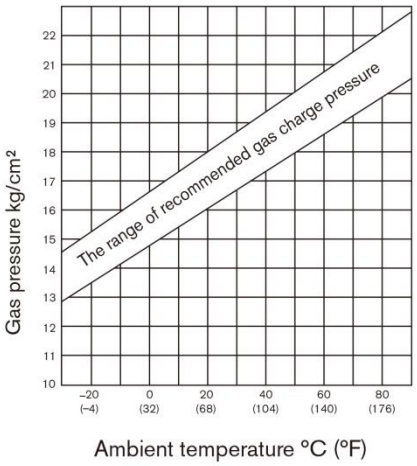
NOTE! The optimum gas pressure varies upon ambient temperature of the job site. See below chart.

a) Back head gas pressure

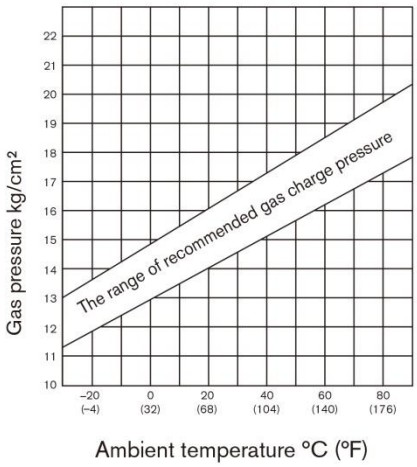
6V, 7V, 8V, 40V, 70DX, 80DX, 100DX, 130DX, 450DX



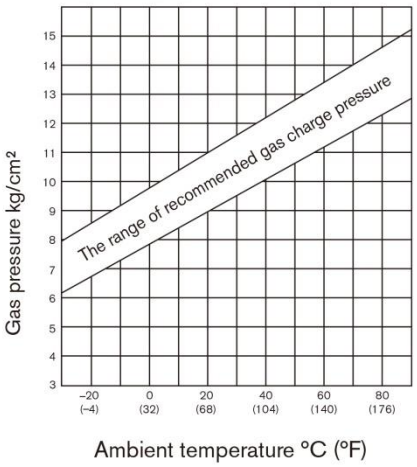
60V



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

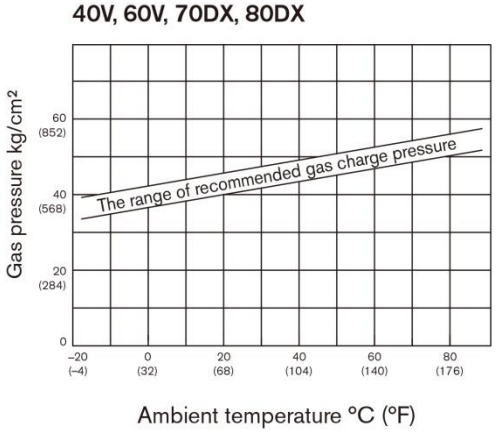


1200DX

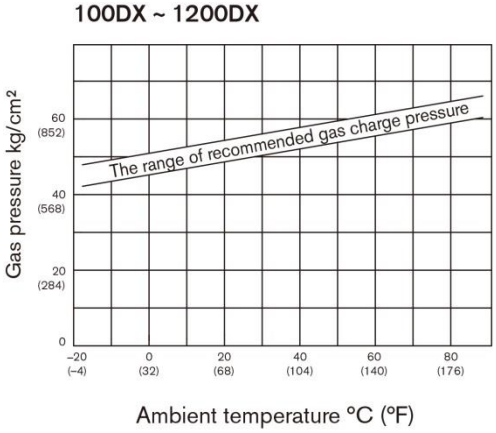


b) Accumulator gas pressure

40V, 60V, 70DX, 80DX

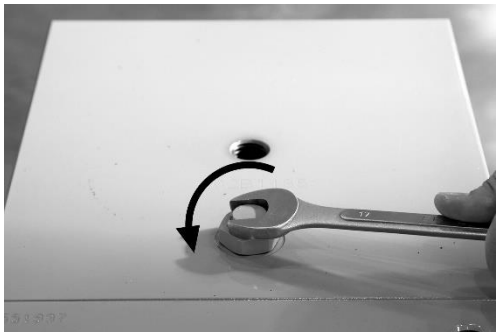


100DX ~ 1200DX

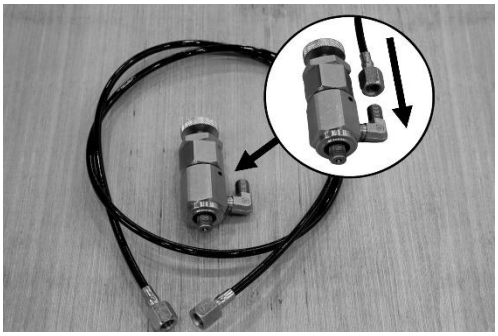


B) Gas charging

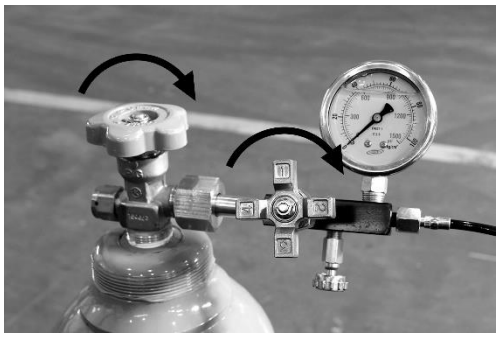
a) Gas charging to back head



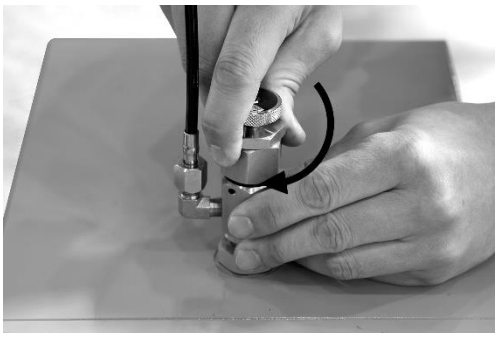
1. Open valve cap.



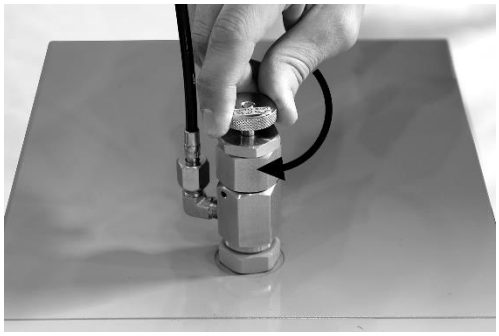
2. Connect hose to adapter.



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



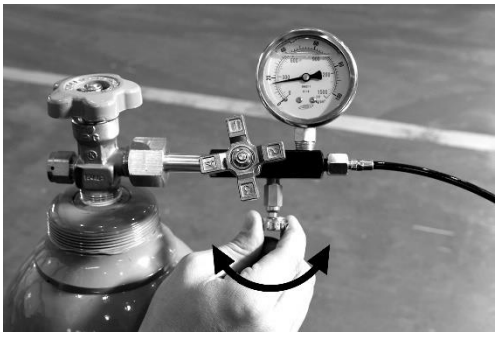
4. Fit adapter on the inlet port by tightening middle section of adapter.



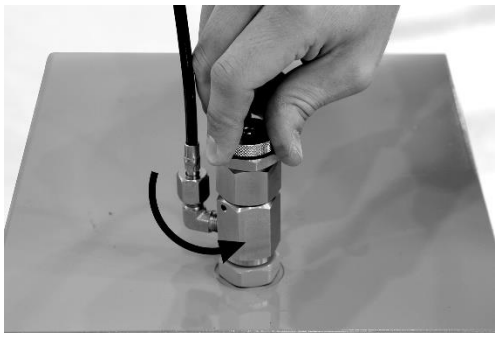
5. Tighten top section of adapter.

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

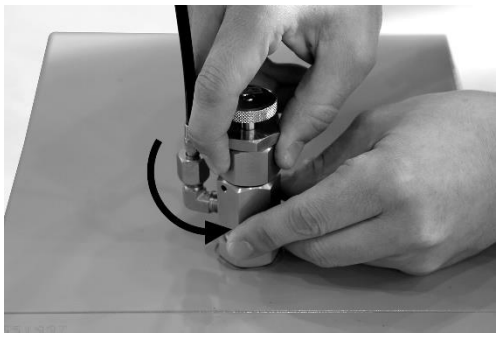
7. Open 3-way valve slowly, charge N2 gas up to 20 kg/cm², close the valve.



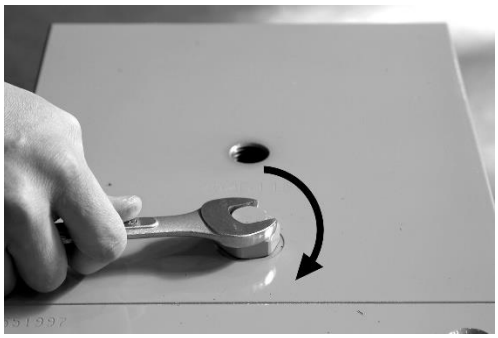
8. Drain the gas to 16~18 kg/cm² upon ambient temperature of job site.



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

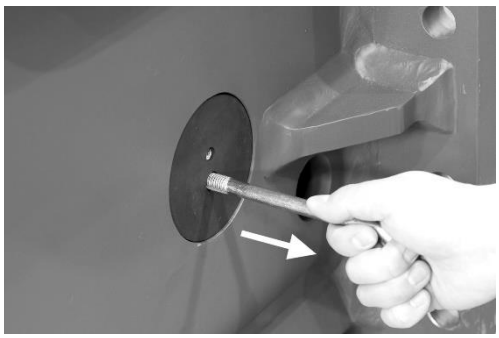


10. Disassemble adapter from the inlet port by loosening middle section of adapter.



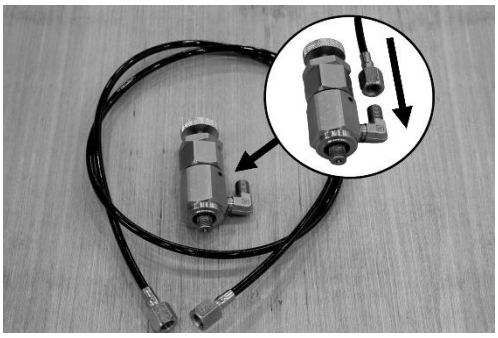
11. Assemble valve cap to the inlet port.

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

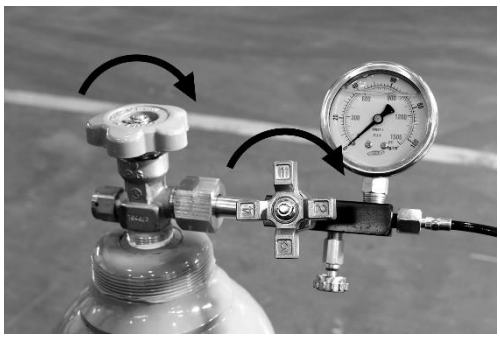


1. Remove rubber plug.

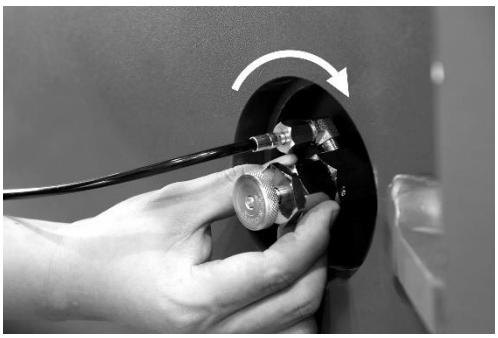
2. Open valve cap.



3. Connect hose to adapter.



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

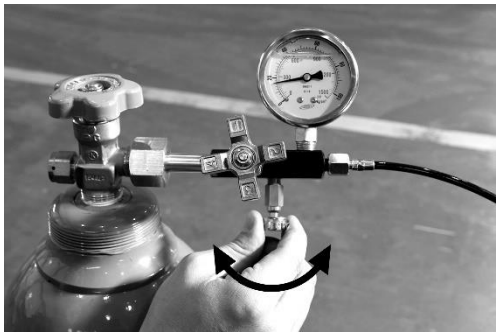


5. Fit adapter on the inlet port by tightening middle section of adapter.

6. Tighten top section of adapter. Quick valve opening may cause damage on the gauge.

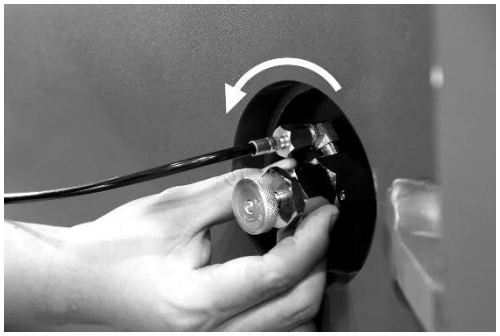
7. Open gas bottle valve SLOWLY.

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.

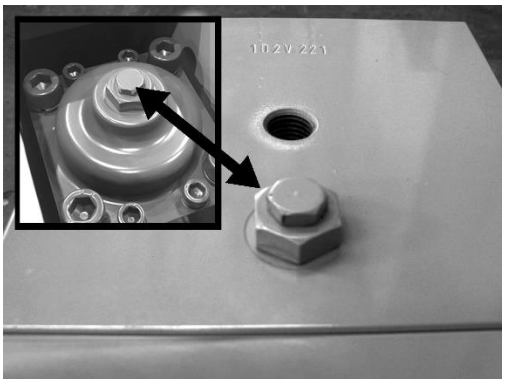


11. Disassemble adapter from the inlet port by loosening middle section of adapter.

12. Assemble valve cap to the inlet port.

13. Assemble rubber plug.

c) Gas charging to accumulator

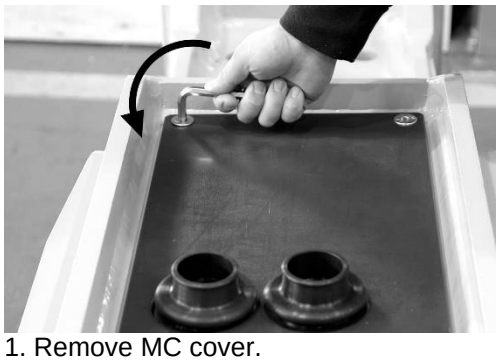


Accumulator gas charging valve is same as back head gas charging valve. Charging accumulator gas can be done in the same way as illustrated earlier for back head.

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.

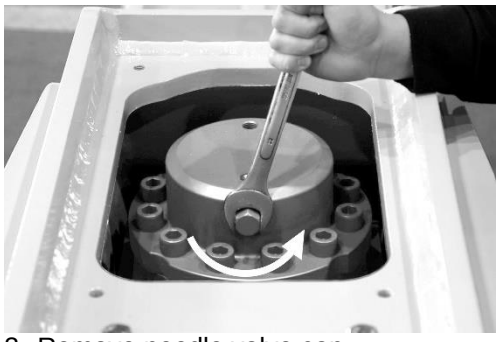
NOTE! When storing gas bottle, ensure the bottle is not exposed to the sun and its valve is always closed.

d) Gas charging to accumulator (needle valve type)

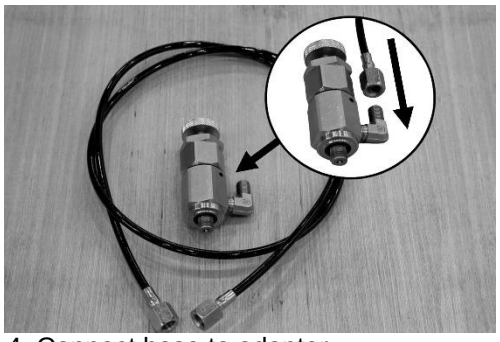


1. Remove MC cover.

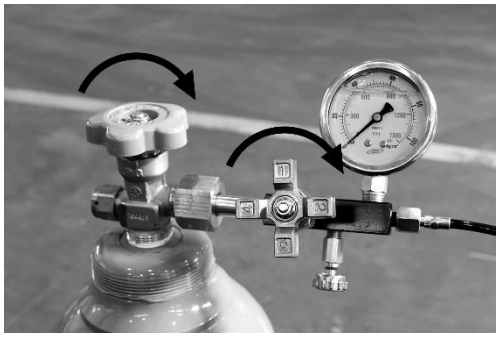
2. Remove valve cap.



3. Remove needle valve cap.

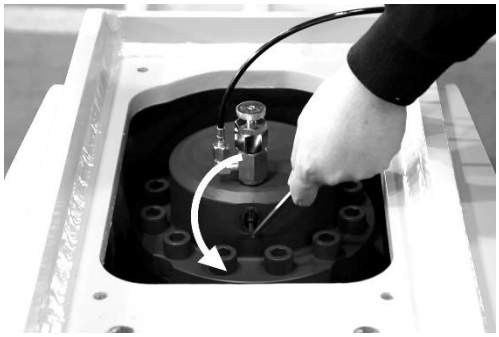


4. Connect hose to adapter.



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

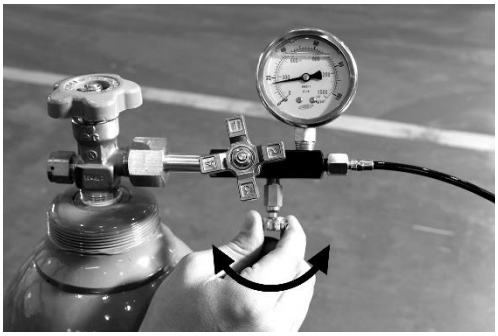
6. Connect adapter to inlet port.



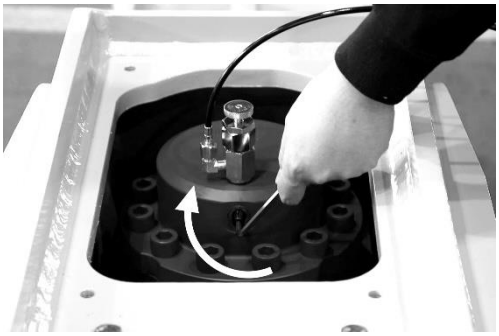
7. Open needle valve with 5mm L-wrench.

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.

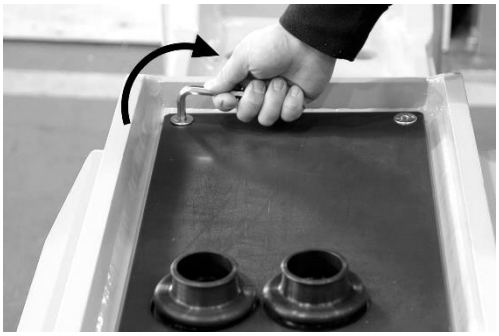


11. Close needle valve.

12. Remove gas charging adapter.

13. Assemble needle valve cap.

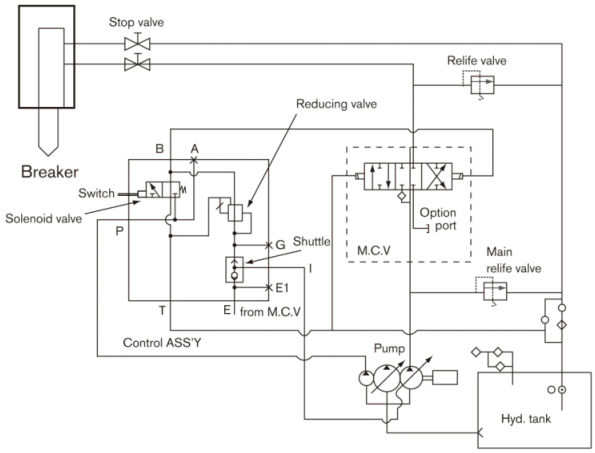
14. Assemble valve cap.

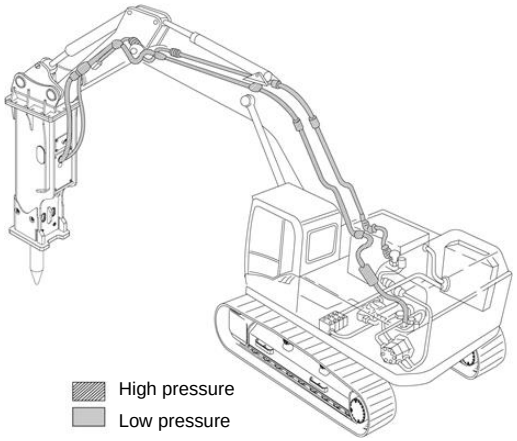


15. Assemble MC cover.

C) Carrier hydraulic pipe lines and controls

The breaker requires following devices from the carrier. Contact carrier supplier if any missing.
• Auxiliary control valve
• Pedal switch or joy stick button switch
• High pressure pipe lines to feed high pressure oil to breaker
• Low pressure pipe lines for low pressure oil to return to carrier oil tank
• Stop valve to shut off oil lines when installing or disassembling breaker on/off the carrier





IMPORTANT! Once those devices are available on the carrier,
• Check the connection to breaker. Fitting threads must be free of damage and contamination.
• Ensure that hydraulic line width and fitting are the ones to match with breaker hose size.

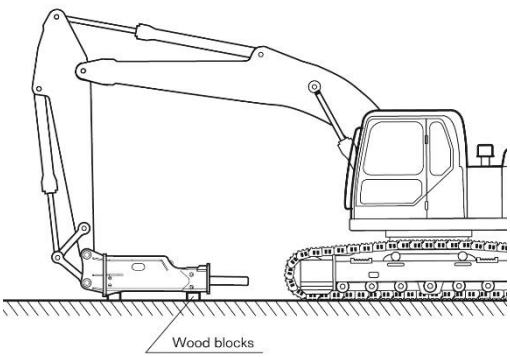
Model	6V	7V ~ 40V	60V ~ 130DX	150DX ~ 220DX	250DX ~ 750DX	1200DX
Hose size	⅜"	½"	¾"	1"	1 ¼"	1⅝"

• Pressure relief valve must be genuine part of the carrier manufacturer.

D) Oil contamination

Oil contamination causes failures of control valve, piston and cylinder as well as breaker performance decrease. Ensure that breaker working oil is kept in clean condition all the time. Replace carrier oil filter every 100 hours and working oil every 600 hours. When installing breaker on an aged carrier, check working oil condition and replace it if necessary.

While the breaker is installed on the carrier, hydraulic circuit parts can be easily exposed to the risks of contamination or damage. Therefore breaker installation shall be carried out with utmost care.



1. Select a plain place where breaker and carrier circuit can be contaminated by dust or dirt. Service workshop is highly recommended.
2. Put the breaker on wood blocks.
3. Make an optimum positioning of breaker and carrier for mounting the breaker. See an example on the left.
4. Turn off carrier main switch.
5. Carrier hydraulic oil tank may be pressurized. Bleed pressurized air from oil tank.

E) Port (2nd) relief valve pressure

The breaker is not self-powered. It uses hydraulic power system of the carrier where it is mounted. To enable the carrier to operate the breaker, carrier hydraulic power system must be converted accordingly to requirement of each breaker working pressure range. Set port relief valve pressure as per below guide.

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Excavator and Tracked loader backhoe

Description	Unit	6V ~ 80DX	100DX ~ 300DX	360DX ~ 450DX	550DX ~ 650DX	700DX ~ 1200DX
Port relief valve setting pressure	kg/cm²	175	210	230	210	250
	psi	2,489	2,987	3,271	2,987	3,556

Skid Steer Loader

Description	Unit	17S ~ 70S
Port relief valve setting pressure	kg/cm²	230
	psi	3,271

NOTE! If port relief valve is set higher than the guide of this Service Manual, breaker working pressure becomes higher than specified range of breaker and will cause failures on various breaker parts and shorten breaker service life. This case will void the warranty of breaker.

F) Flow setting

The breaker is to work with its specific flow range. Set carrier flow feeding to the breaker as follows.

1. Connect breaker hoses to the flow meter.
2. Open flow meter restrictor fully.
3. Connect the other end of breaker hoses to the end of carrier pressure and return lines.
4. Check flow requirements of the breaker (see Specifications on the appendix).
5. Open stop valve of carrier hydraulic lines.
6. Adjust flow to the range of breaker specifications by tuning carrier engine rpm or if available flow control valve.

NOTE! Over flow will cause oil heating, early seal failures and piston & cylinder scratches. Use of breaker over the specification will not be supported by the breaker supplier's warranty.

B. Disassembly

A) Tools for disassembly

a) Suitable eye bolt for handling power cell

Model	Weight		Eye bolt size				Allowed weight	
	kg	lb	Front head	cylinder	Piston	Back head	kg	lb
6V	33	73	(M16)	M10	M10	M10	150	331
7V	53	117	(M20)	M10	M10	M10	150	331
8V	60	132	M10	M10	M10	M10	150	331
17V	75	165	M10	M10	M10	M10	150	331
40V	130	287	M12	M12	M12	M12	220	485
60V	190	419	M12	M12	M12	M12	220	485
70DX	250	551	M16	M16	M12	M16	450	992
80DX	310	683	M16	M16	M12	M16	450	992
100DX	406	895	M16	M16	M12	M20	630	1,389
130DX	517	1,140	M20	M20	M12	M20	630	1,389
150DX	602	1,327	M20	M20	M16	M20	630	1,389
180DX	725	1,598	M20	M20	M16	M20	630	1,389
200DX	800	1,764	M20	M20	M16	M20	630	1,389
220DX	950	2,094	M20	M20	M16	M24	950	2,094
250DX	1,100	2,425	M30	M30	M16	M30	1,500	3,307
300DX	1,280	2,822	M30	M30	M24	M30	1,500	3,307
360DX	1,500	3,307	M30	M30	M24	M30	1,500	3,307
450DX	1,720	3,792	M36	M36	M24	M36	2,300	5,071
550DX	1,960	4,321	M36	M36	M24	M36	2,300	5,071
650DX	2,050	4,519	M36	M36	M24	M36	2,300	5,071
700DX	2,567	5,659	M42	M42	M24	M42	3,400	7,496
750DX	3,396	7,487	M42	M42	M24	M42	3,400	7,496
1200DX	5,090	11,222	M42	M42	M24	M42	3,400	7,496

b) Suitable tools for handling power cell

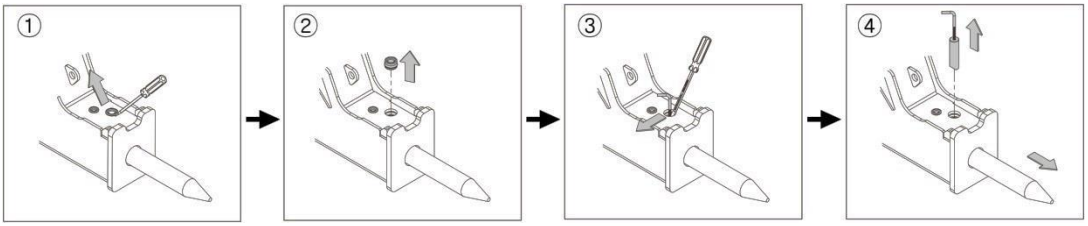
Model	L-wrench (mm)			Spanner (mm)				
	ACC body bolt	ACC cover bolt	Hose adapter	Through bolt set	Breaker bracket bolt	Gas charging valve cap	Hose adapter	Hose
6V				24	27	17	22	22
7V				27	27	17	27	27
8V				27	27	17	27	27
17V				32	27	17	27	27
40V	14	10		36	27	17	27	27
60V	14	10		36	27	17	36	36
70DX	14	10		36	27	17	36	36
80DX	14	10		46	27	17	36	36
100DX	17	14		55	36	17	36	36
130DX	17	14		60	36	17	36	36
150DX	19	14		65	36	17	41	41
180DX	19	14		70	36	17	41	41
200DX	19	14		70	36	17	41	41
220DX	19	14		75	36	17	41	41
250DX	19	17		75	36	17	50	50
300DX	22	17	12	75	55	17		
360DX	22	17	12	80	55	17		
450DX	22	17	12	90	55	17		
550DX	22	17	12	95	55	17		
650DX	22	17	12	95	55	17		
700DX	22	17	14	105	55	17		
750DX	22	17	14	115	55	17		
1200DX	22	17	14	135	55	17		

B) Chisel/Tool disassembly

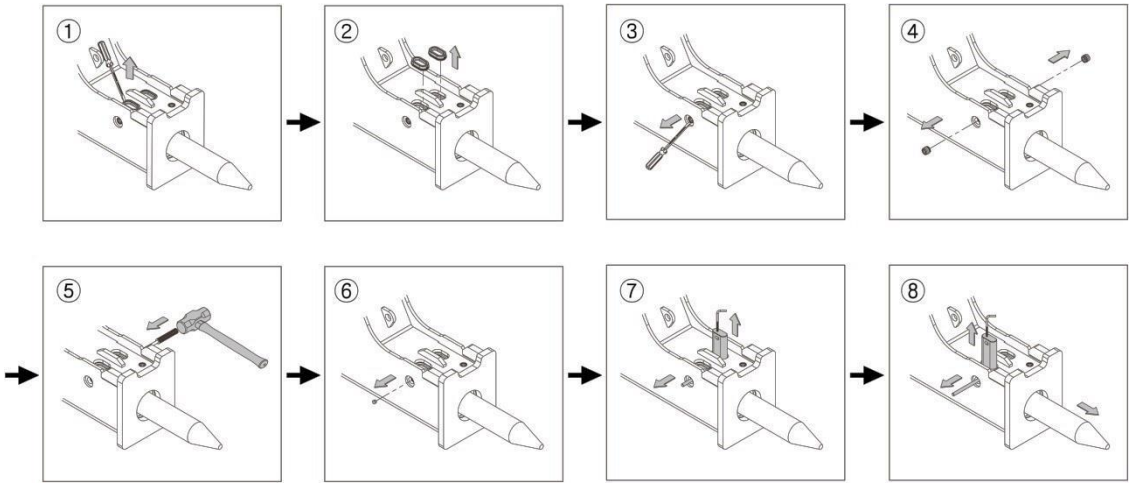
WARNING!

For safety reason, the carrier must be switched off before performing the following work.

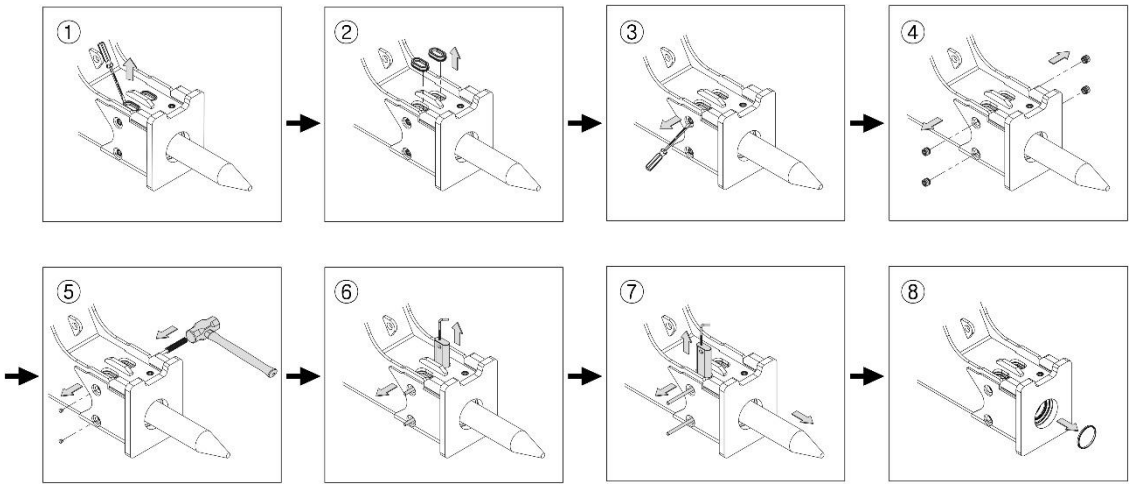
- Never use your fingers to check whether the recesses on the working chisel/tool shaft are aligned to the slots for the chisel/tool pin.
- Always wear protective glasses when fitting or removing the chisel/tool, since metal splinters may fly off when breaking out the stopper pins.



6V ~ 40V



60V ~ 80DX



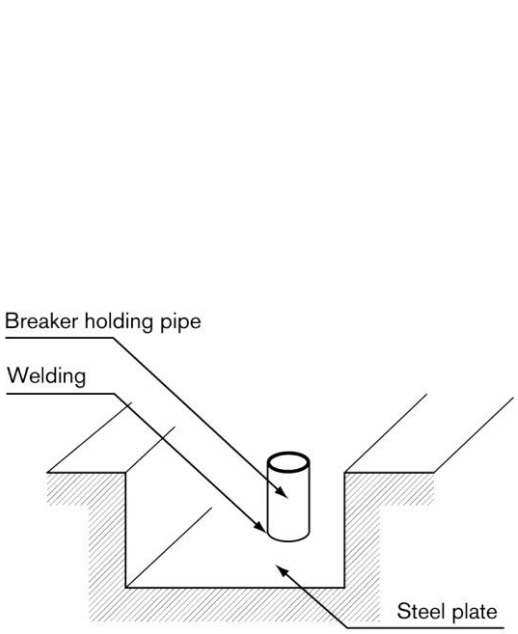
100DX ~ 1200DX

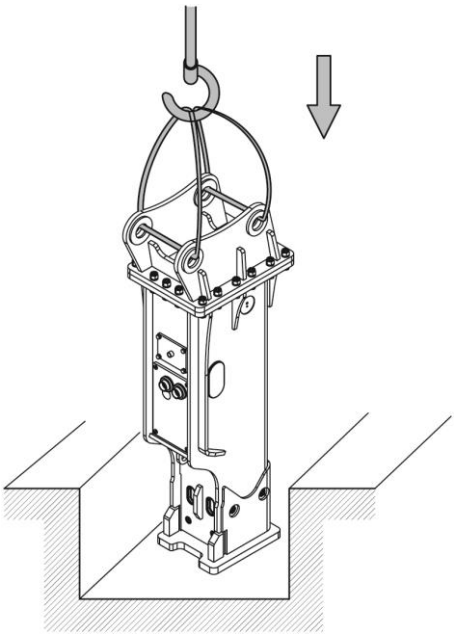
C) Housing disassembly

WARNING!

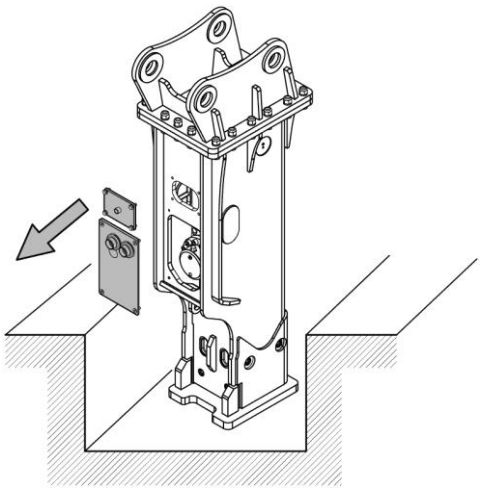
Use right capacity lifting devices. Also ensure holding pipe as shown below is available to avoid breaker falling down. Disassembling work without proper lifting devices and holding pipe is very dangerous and may cause injury or fatal accident.

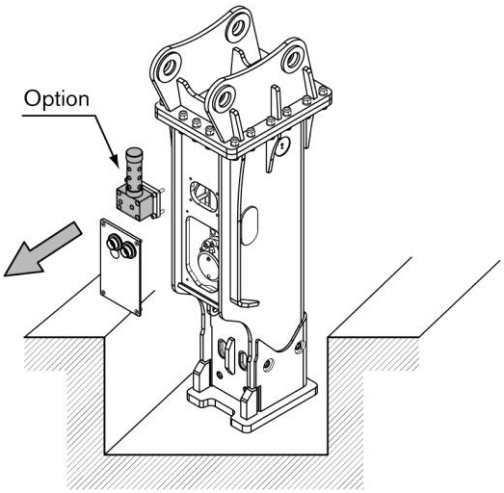
a. Prepare a hole and holding pipe and place the breaker on the pipe



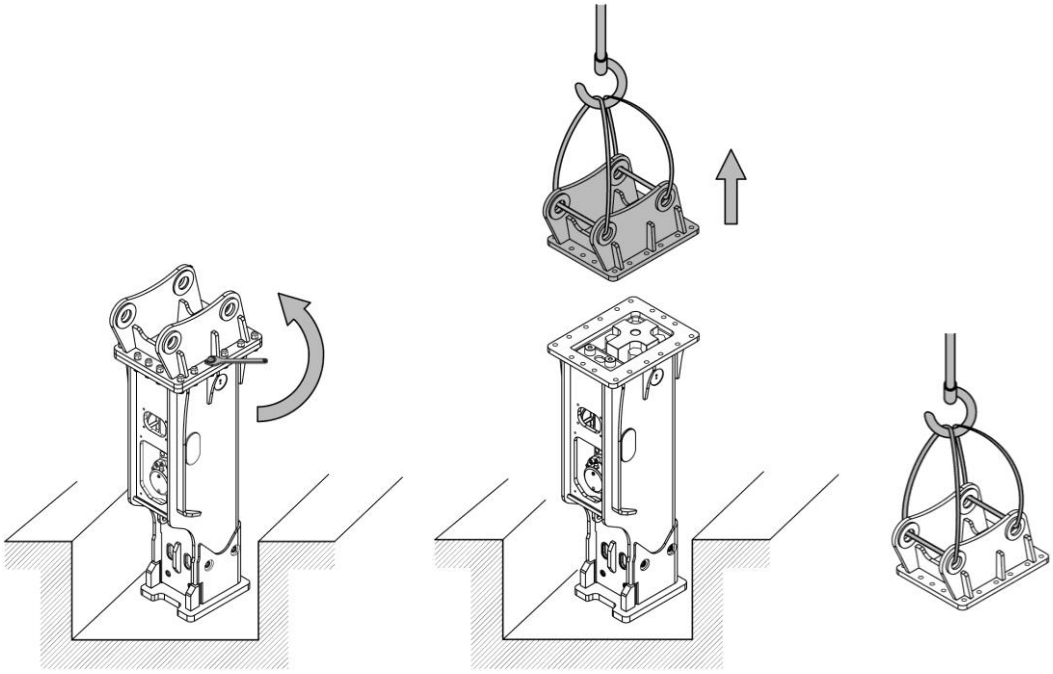


b. Remove MC cover and gas cover (or ALS and its bracket if mounted on the breaker).





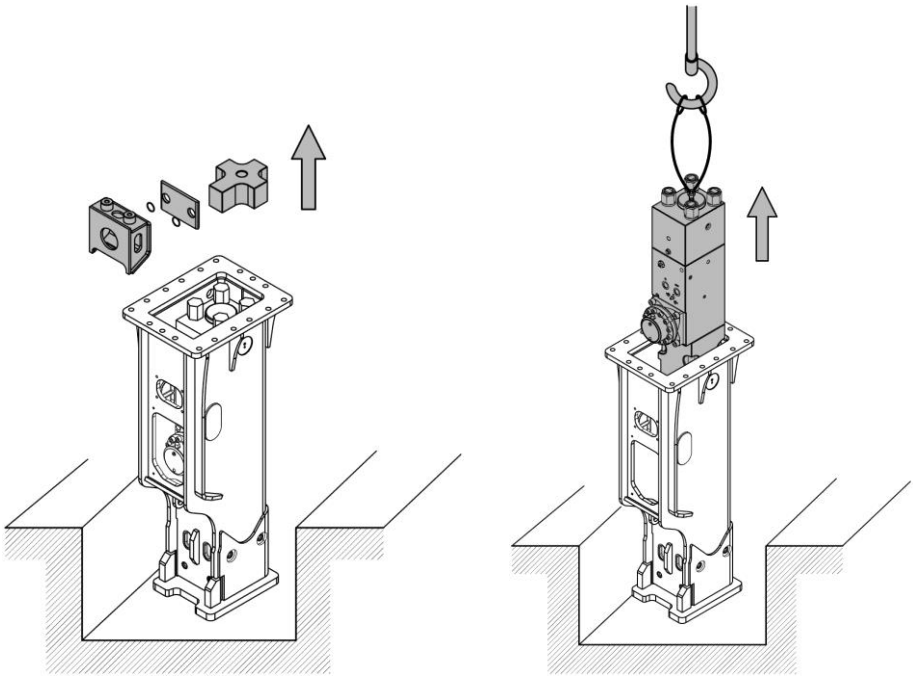
c. Disassemble breaker bracket and put it on the floor safely.



d. Take upper damper, head plate, shell pad and power cell off the housing.

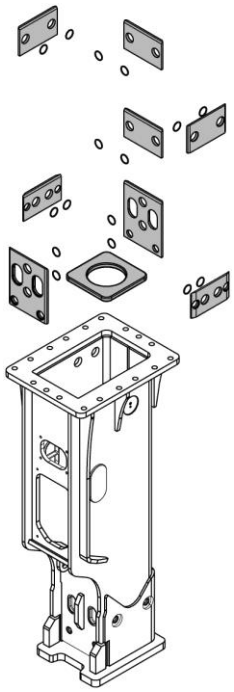
WARNING!

Ensure that eye bolt is fitted tightly and lifting devices and facilities are up to the right capacity to handle power cell weight.



NOTE! Be careful not to lose rubber plug(s) on the head plate and two O-rings between head plate and shell pad. Reassembly of breaker with any missing will cause failure of breaker parts.

e. Remove all remaining shell pads and bottom damper from the housing.



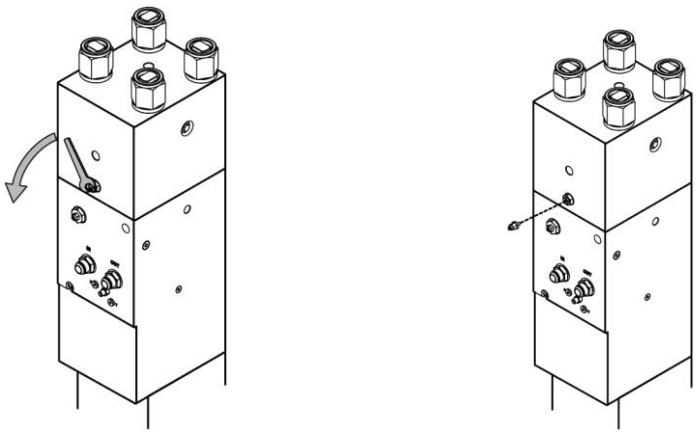
NOTE! Be careful not to lose two O-rings between shell pad and shell pad assembly post. Reassembly of breaker with any missing will cause failure of breaker parts as well as shell pad.

D) Discharge of nitrogen gas

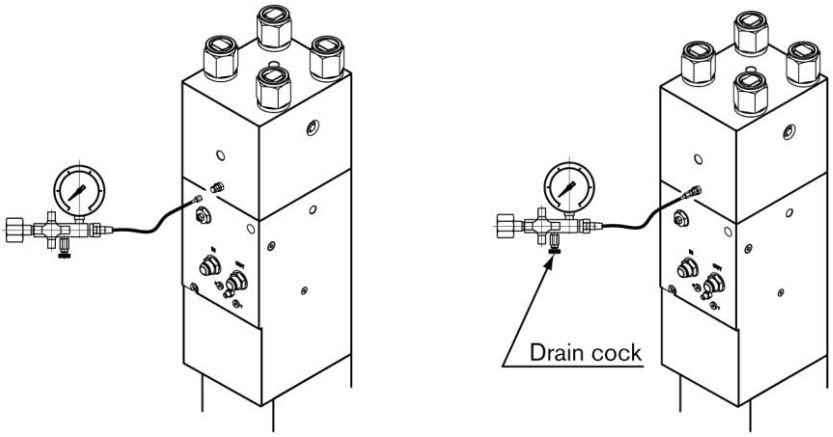
WARNING!

Ensure back head gas is completely discharge before disassembly of power cell. Any residual gas pressure inside back head may cause injury or fatal accident.

a. Open gas charging valve cap. Assemble gas charge adapter on the gas charging port.



b. Connect gas charging kit to the adapter. Discharge gas completely by opening drain cock.

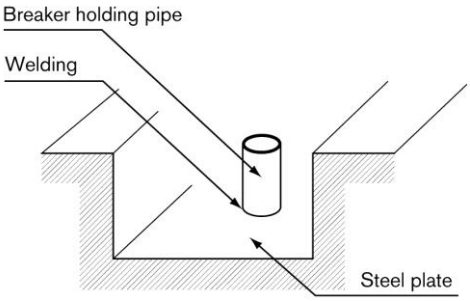


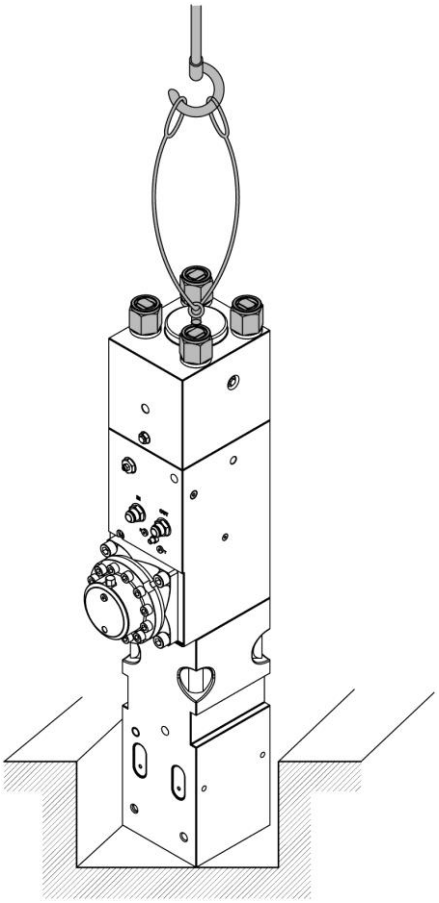
E) Power cell disassembly

WARNING!

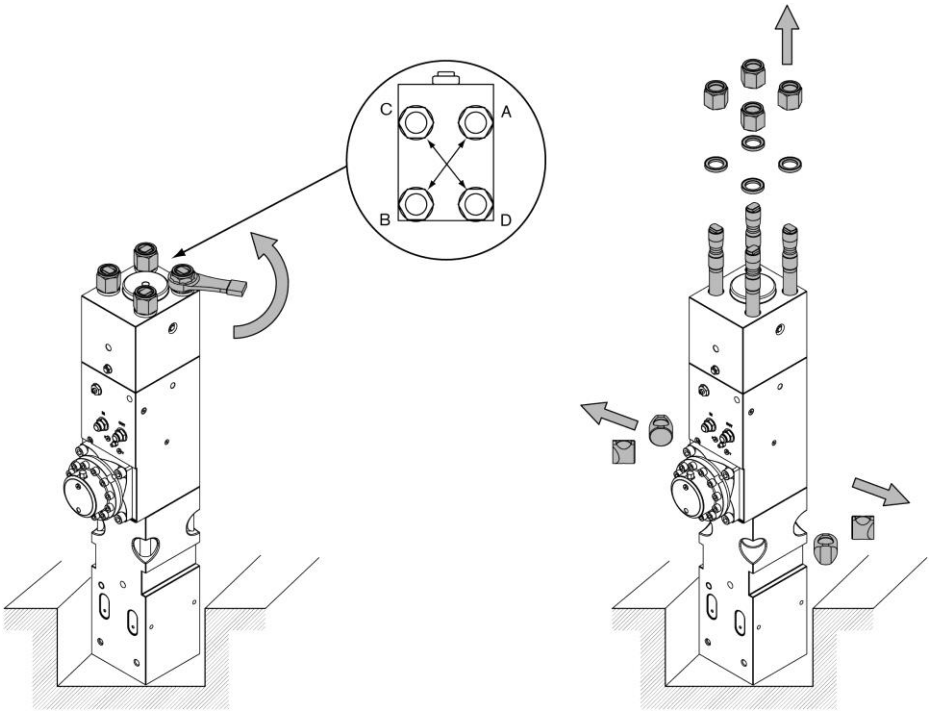
Ensure holding pipe is available to avoid power cell falling down. Disassembling without proper lifting devices and holding pipe is very dangerous and may cause injury or fatal accident.

a. Place power cell on the pipe.

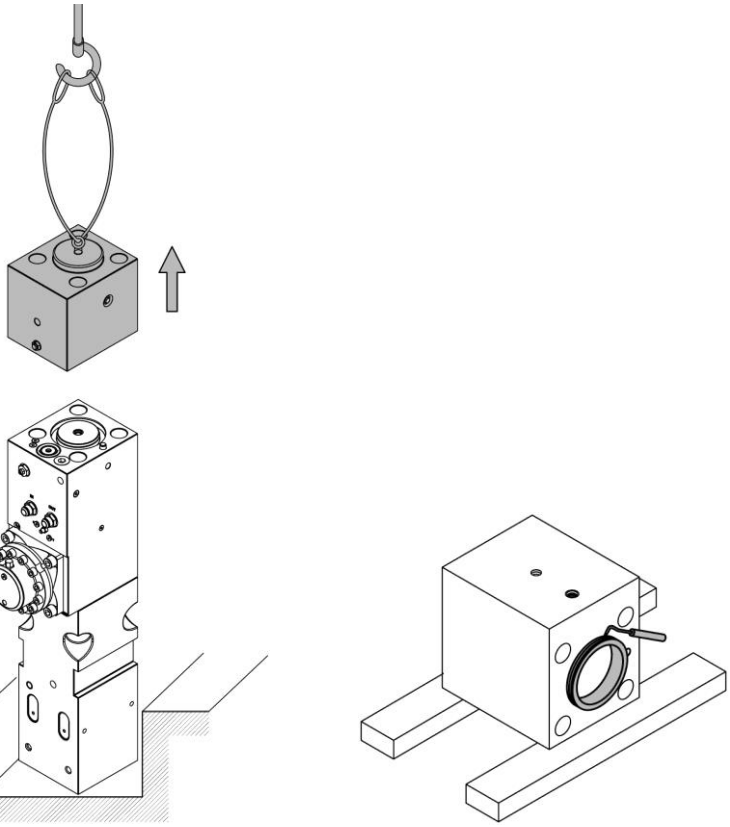




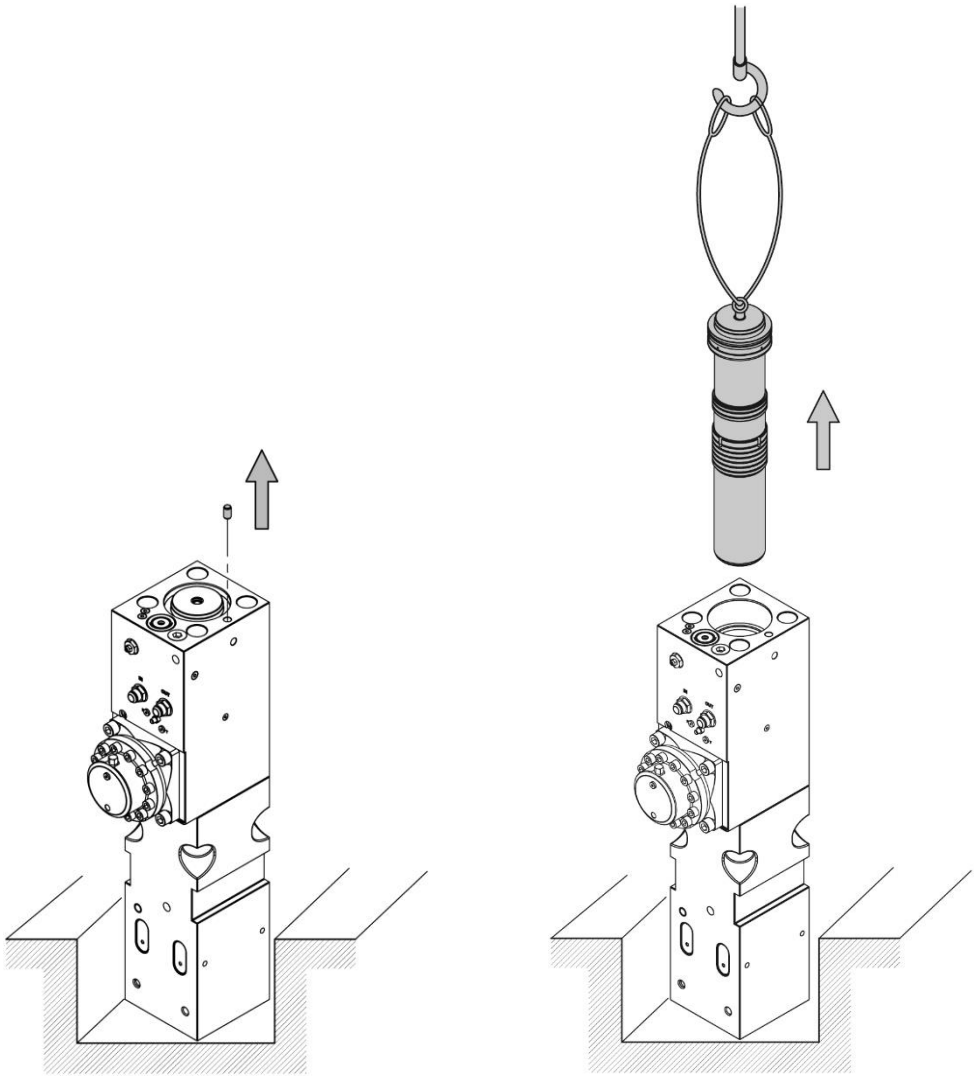
b. Loosen through bolt nuts, remove through bolts, top nuts and washers (and bottom nuts and washers as well for 100DX & above).



c. Remove back head.
Put the back head down on wood blocks and remove O-ring from the back head.

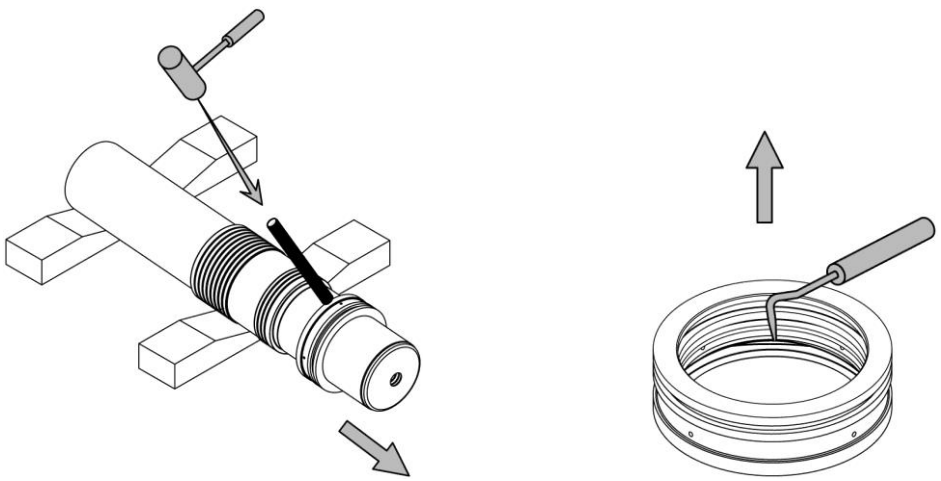


d. Take holding pin and piston out of the cylinder (70DX & above).

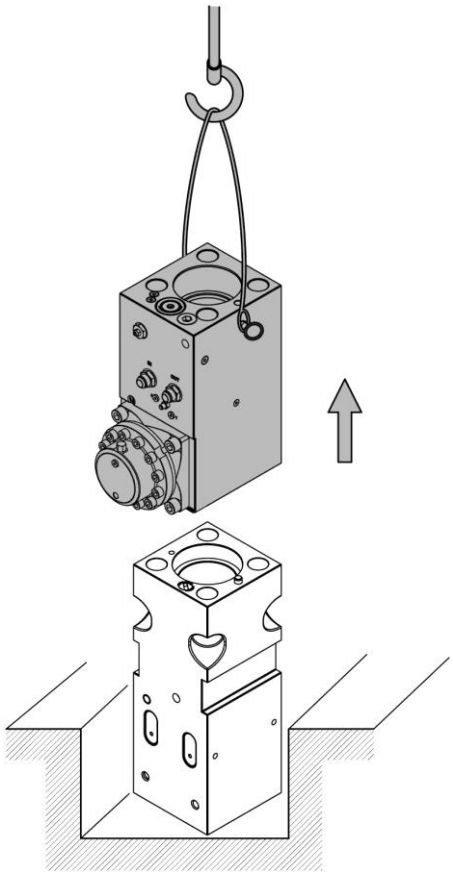


e. Disassemble cylinder bush from the piston. Remove seals on the cylinder bush.

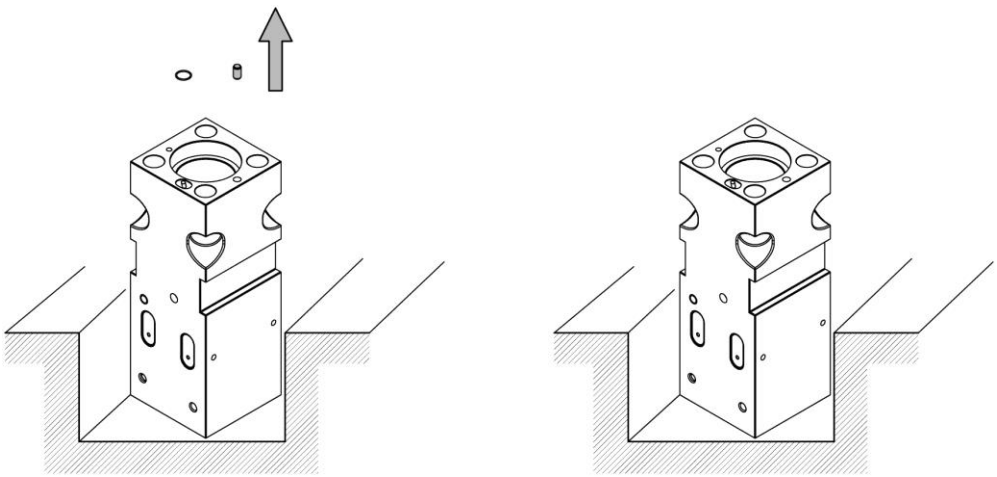
CAUTION Use ***wood or plastic hammer only*** when removing cylinder bush. Removed seals shall never be recycled.



f. Remove cylinder block.

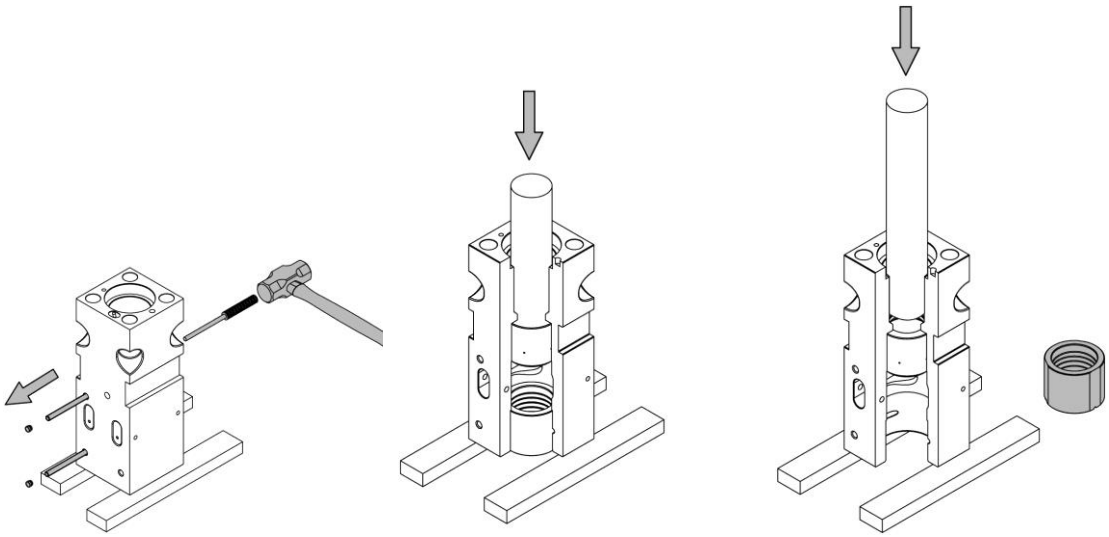


g. Remove holding pin (70DX & above) and O-ring from the front head block (100DX & above).



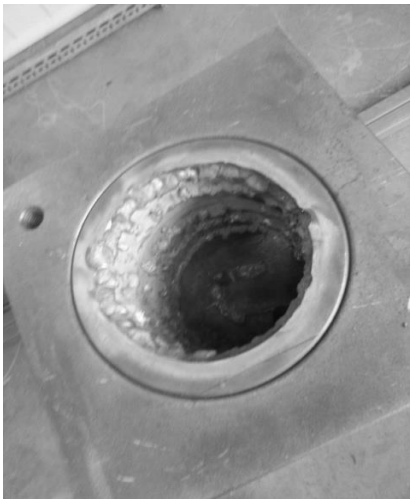
h. Disassembly of lower bush (and upper bush as well for 60V & above)

• Remove stopper pins and rubber plug.
• Put front head block upside down on wood block.
• Insert a round steel bar into front head hole.
• Remove lower bush from the front head block by pushing the bar down with hydraulic press.
• Take upper bush out of front head block by the same way



Lower bush Upper bush

NOTE! In case hydraulic press is unavailable, bushes can be removed by welding torch.

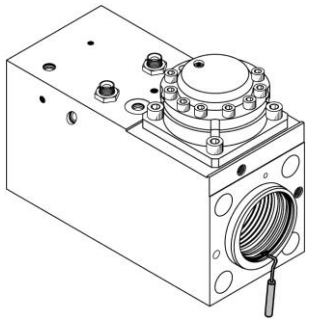


Model	Bead layer	Bead size	
		mm	inch
6V ~ 17V	4	5 × 5	0.20 × 0.20
40V ~ 130DX		7 × 7	0.28 × 0.28
150DX ~ 250DX	5	9 × 9	0.35 × 0.35
300DX ~ 650DX		12 × 12	0.47 × 0.47
700DX ~ 1200DX	7	12 × 12	0.47 × 0.47

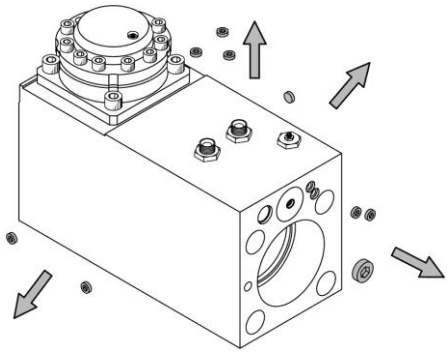
i. Disassembly of cylinder block

1. Remove seals

NOTE! Cylinder is a very sensitive part to contamination. Ensure cylinder block disassembly is carried out on a completely clean pad.

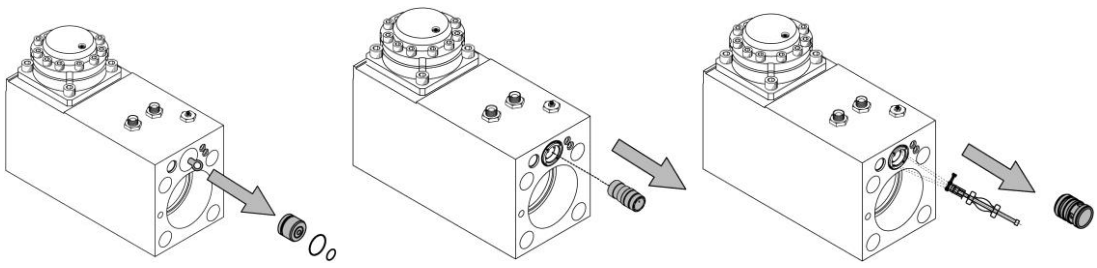


2. Removing Ro plugs is not required for breaker overhauling. DO NOT remove any Ro plugs at all if not agreed with the breaker supplier for a specific purpose.



3. Remove valve cap with eye bolt, valve by hand and valve bush with valve puller.

NOTE! Valve puller (P/No. B202B-115JA) can be purchased from the breaker supplier.



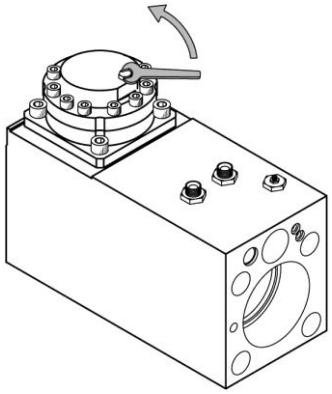
4. Disassembly of accumulator

4-1. Discharge accumulator gas

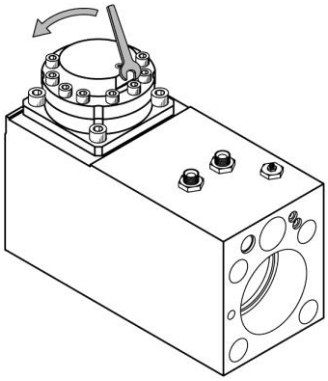
WARNING!

Ensure accumulator gas is completely discharged before disassembly.
Any remaining gas pressure may cause injury or fatal accident.

a. Open charging valve cap.

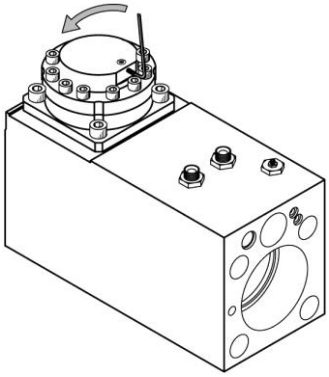


b. Open needle valve cap

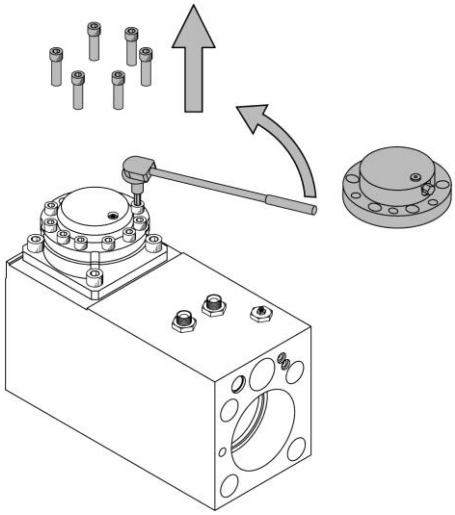


c. Open needle valve & release gas, you will hear nose of gas releasing.

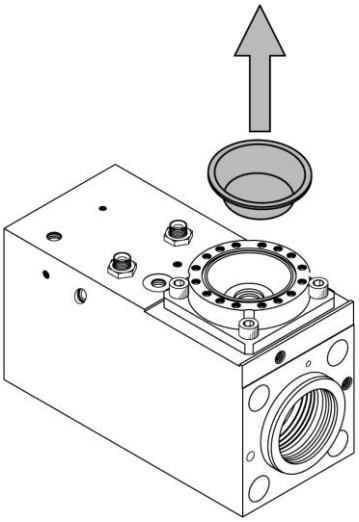
d. Check if gas releasing is done completely by opening needle valve a bit more.



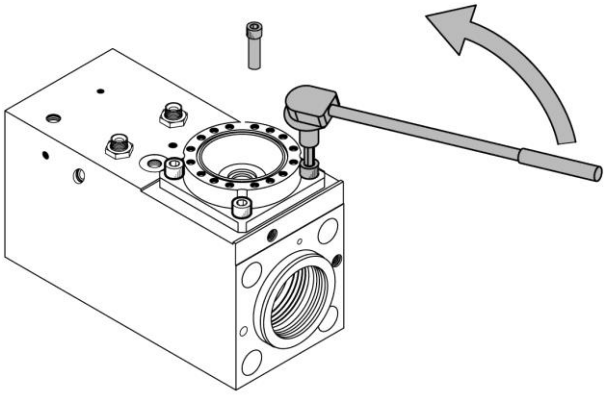
4-2. Loosen accumulator cover bolts and disassemble accumulator cover.

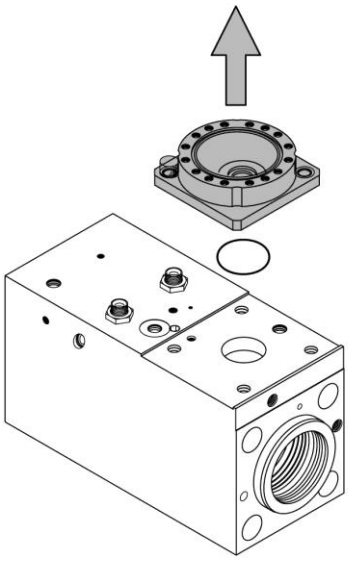


4-3. Remove diaphragm



4-4. Loosen accumulator body bolt and remove accumulator body & face-seal (or a set of O-ring & back up ring).





Face-seal or
a set of O-ring & back up ring

C. Inspection

A) Fasteners

When the breaker gets aged, breaker fasteners can be loosened. Check the condition of all breaker fasteners and retighten them. When you retighten one fastener of fastener set, retighten the rest fasteners as well so that each fastener of the set can play the same role. In case any frequent loosening of fastener, replace it (or a complete set) with brand new.

B) Gas leakage

In case back head and/or accumulator gas is losing pressure despite of recharging gas, check O-ring condition of gas charging valve and replace it.

C) External oil leakage

Check if any oil leaks where parts are connected. Leakage of a little amount oil between chisel/tool and lower bush can be disregarded as it helps lubrication in between.

Check if any seal is scratched, heavily pressed/deformed, severely decolored, or taken out of the seal position (groove).

NOTE! When checking seal condition, do NOT remove seals from the seal grooves. Check their condition with the seals kept where they are. You trial of removing may end up with seal scratches. Even a light scratch may cause oil leakage.

NOTE! Never recycle any seal once taken out of the seal groove, whether partially or entirely and whether in good or bad condition.

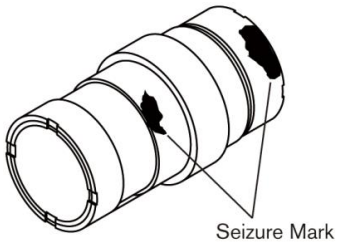
NOTE! Seal failure is often the outcome of some other root causes. When you check seal condition, ensure that you also check followings as well

1. Oil contamination
2. Piston scratch
3. Cylinder scratch
4. Back head gas pressure
5. Carrier setting oil flow
6. Carrier port relief valve setting pressure

D) Internal oil leakage

In case of internal oil leakage (from cylinder to back head), replace gas seal and O-ring that are fitted on cylinder bush. If piston has got any scratches, remove the scratches or if necessary replace it with brand new. See Trouble shoot guide on page 80.

E) Control valve

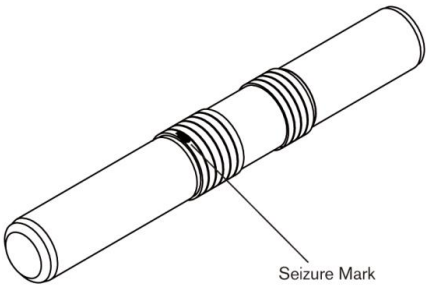


Check if valve has any sign of seizing or scuffing.
In case of small size seizing, you can use the valve after polishing such seizing mark area with fine oilstone or sand paper, #1000~1200.

NOTE! Ensure that you also inspect valve and valve cap of the concerned valve.

F) Piston

Lower part of piston large diameter area must be inspected periodically.

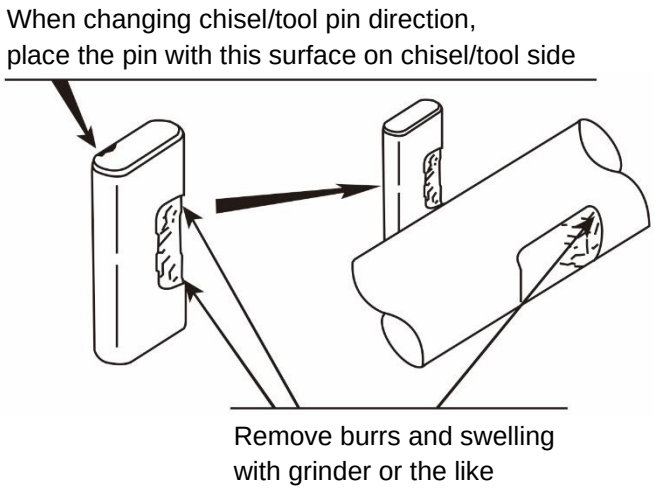


Check if any sign of seizing or scuffing. In case of small size seizing, you can use the valve after polishing such seizing mark area with fine oilstone or sand paper, #1000~1200.

NOTE! Ensure that you also inspect cylinder area that has interfaced such piston seizing or scuffing area.

G) Chisel/Tool, chisel/tool pins

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.

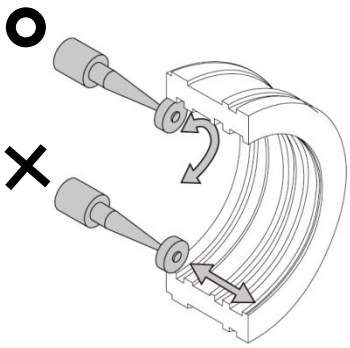
D. Repair

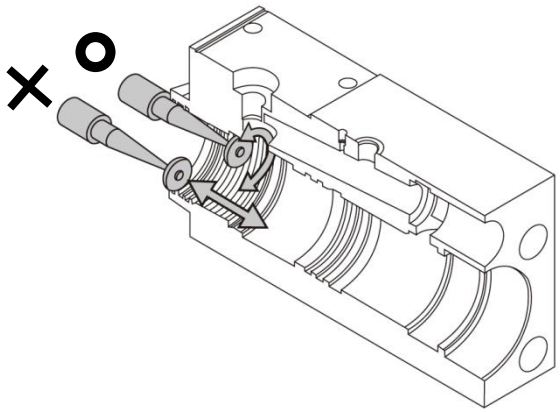
Removing seizing marks and/or scratches on cylinder or piston should be done as smooth as possible. Ensure you use an oilstone, emery paper, flex hone and/or pneumatic grinder stone according to below guide, keeping in mind that overworking may cause oil leakage and/or malfunctioning of breaker.

Tool type	Roughing	Finish
Oilstone	Rough and medium grain	Finish grain
Emery paper	#100, #160, #240	#400, #600
Pneumatic grinder stone	#220	#1000

A) Cylinder bush and cylinder

When using the buffering grindstone, apply the grinder correctly to the circumference. If the grinder is led straight ahead, circularity will be spoiled. Wash the parts after finishing them.



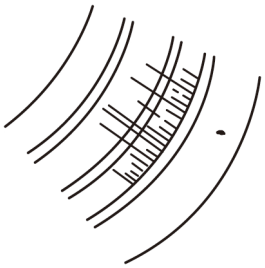
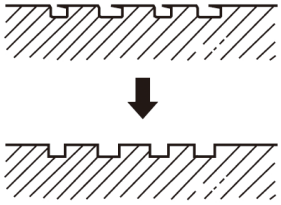
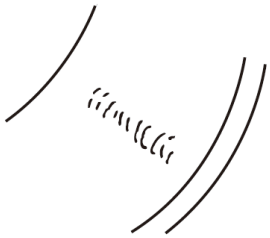
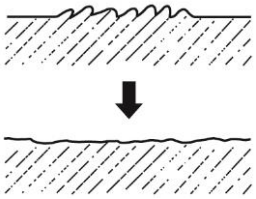
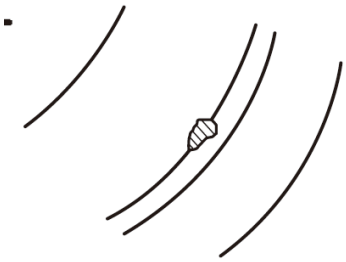
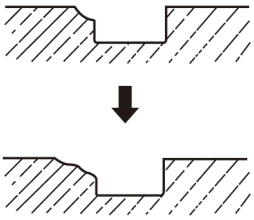
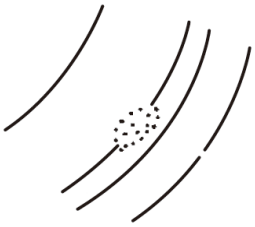
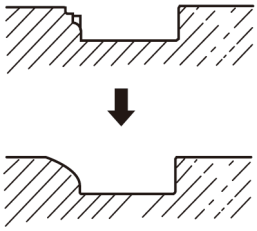


NOTE! Using breaker with unrepaired condition will eventually destroy cylinder. Repair at early failure stage before too late.

NOTE! Polish to perpendicular direction only. If not, circularity will be spoiled.

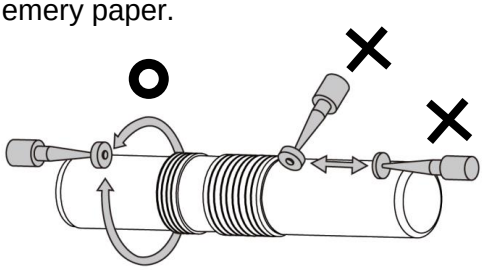
NOTE! Clean repaired cylinder before reassemble.

Caution on using pneumatic grinder stone, oilstone and/or emery paper

Fault type	Condition	Remedy
Vertical scratch	 Stripped marks running to the direction of piston striking.	 If burrs stick out of grooves, remove burrs and repair vertical scratches with oilstone, emery paper.
Galling	 Localized fault wider than vertical scratch	 Finish galling with oilstone till no step exists on the surface, then finish with fine emery paper.
Chipping	 Chipped corner of sliding section	 Finish the chipped edge smoothly with oilstone..
Vermin	 “Vermin” shape fault at the corner of sliding part	 Vermin causes galling if not repaired. Remove it with pneumatic grinder stone, finish edge with oilstone.

B) Piston sliding surface

Repair seizing mark and/or scratch area with pneumatic grinder stone, oilstone and/or emery paper.

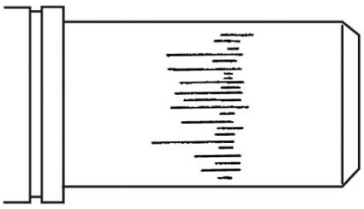
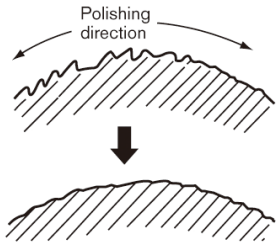
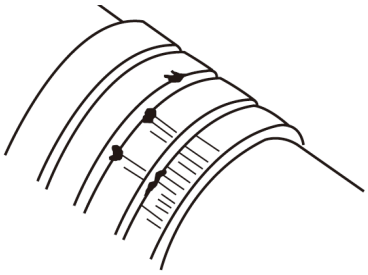
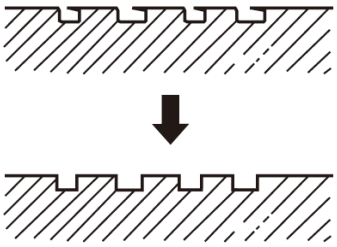
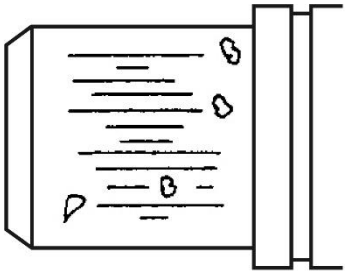
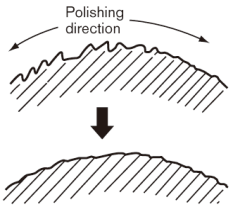


NOTE! Using breaker with unrepaired condition will eventually destroy cylinder. Repair at early failure stage before too late.

NOTE! Polish to perpendicular direction only. If not, circularity will be spoiled.

NOTE! Wash repaired piston before reassemble.

Caution on using pneumatic grinder stone, oilstone and/or emery paper

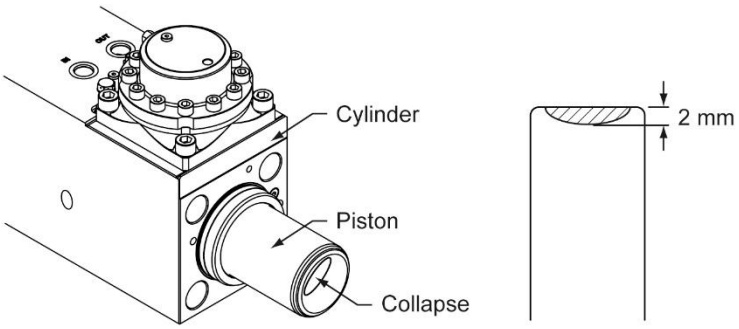
Fault type	Condition	Remedy
Vertical scratch	 Striped scratches to the direction of piston striking.	 Remove burrs by polishing to the circumferential direction.
Scratch in the grooves	 Repair at early stage as scratches may develop to a fatal failure.	 Remove burrs sticking out of grooves and finish edges.
Vertical scratch or rust pit on lower part of piston	 Chipped corner of sliding section	 Remove burrs by polishing machine to the circumferential direction. NO polishing more than 0.05 mm in depth from normal diameter. Replace the piston if scratches and rust pits are not removed by that much polishing.

C) Piston impact surface

Damaged piston impact surface causes an adverse effect to the breaker chisel/tool. Repair it at early failure stage before too late or replace the piston.

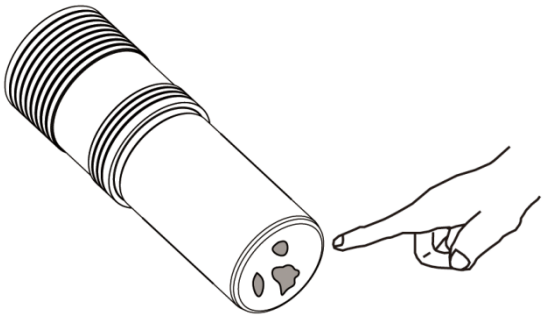
a) Collapse

If impact surface has collapsed by more than 2 mm in depth, replace the piston.
If impact surface deformation is less than 2 mm in depth, smooth the deformed area as flat as possible.



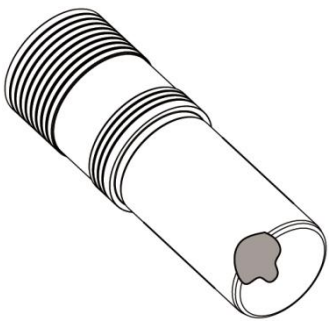
b) Chipping a peeling-off

If impact surface has got chipping or peeling-off on some limited areas, smooth the areas to stop progress of peeling-off.



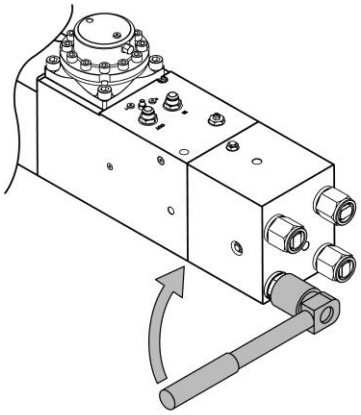
c) Chipping-off at the piston bottom edge

Replace the piston immediately.

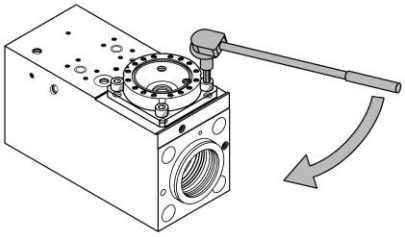


E. Torque and torque value

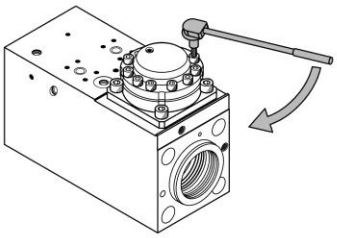
Before starting work, check all the bolts tightness and also be sure to retighten loose bolts to the specified torque referring to the manual. The tightening torque of each bolt is as follows.



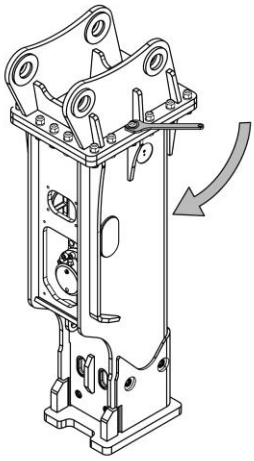
Through bolt set



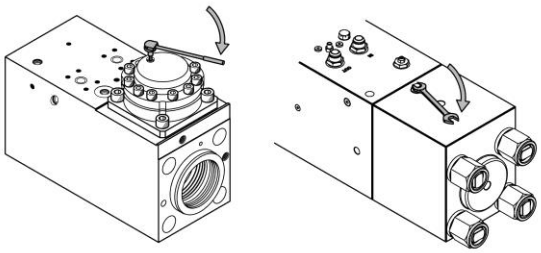
Accumulator body bolt



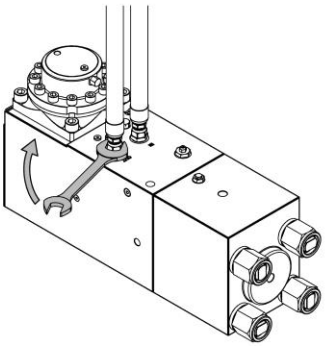
Accumulator cover bolt



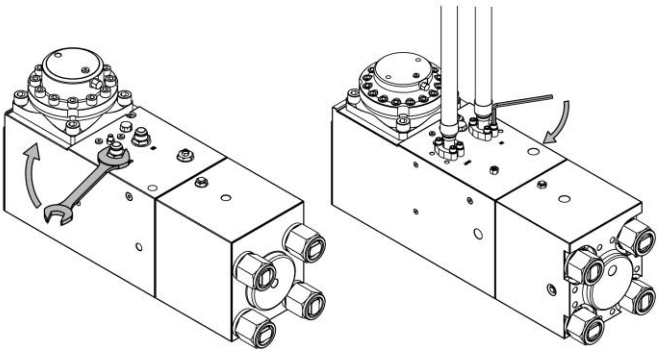
Breaker bracket bolt



Gas charging valve cap



Hose



Hose adapter

Torque value

Model	Through bolt set	Breaker bracket bolt	ACC body bolt	ACC cover bolt	Gas charging cap	Hose adapter	Hose
	kg.m (N.m)	kg.m (N.m)	kg.m (N.m)	kg.m (N.m)	kg.m (N.m)	kg.m (N.m)	kg.m (N.m)
6V	25 (245)	45 (440)	—	—	5 (49)	9 (88)	4 (39)
7V	30 (294)	45 (440)	—	—	5 (49)	18 (176)	6 (59)
8V	30 (294)	45 (440)	—	—	5 (49)	18 (176)	6 (59)
17V	45 (440)	45 (440)	—	—	5 (49)	18 (176)	6 (59)
40V	50 (490)	45 (440)	45 (440)	14 (137)	5 (49)	18 (176)	6 (59)
60V	50 (490)	45 (440)	45 (440)	14 (137)	5 (49)	26 (255)	12 (118)
70DX	95 (931)	45 (440)	45 (440)	14 (137)	5 (49)	26 (255)	12 (118)
80DX	95 (931)	45 (440)	45 (440)	14 (137)	5 (49)	26 (255)	12 (118)
100DX	130 (1,274)	100 (980)	60 (588)	35 (343)	5 (49)	26 (255)	12 (118)
130DX	160 (1,568)	100 (980)	60 (588)	35 (343)	5 (49)	26 (255)	12 (118)
150DX	240 (2,352)	100 (980)	110 (1,078)	35 (343)	5 (49)	35 (343)	16 (157)
180DX	270 (2,646)	100 (980)	110 (1,078)	35 (343)	5 (49)	35 (343)	16 (157)
200DX	270 (2,646)	100 (980)	110 (1,078)	50 (490)	5 (49)	35 (343)	16 (157)
220DX	330 (3,234)	100 (980)	110 (1,078)	50 (490)	5 (49)	35 (343)	16 (157)
250DX	330 (3,234)	100 (980)	110 (1,078)	65 (637)	5 (49)	40 (392)	25 (245)
300DX	380 (3,724)	250 (2,450)	180 (1,764)	65 (637)	5 (49)	20 (196)	—
360DX	390 (3,822)	250 (2,450)	180 (1,764)	65 (637)	5 (49)	20 (196)	—
450DX	550 (5,390)	250 (2,450)	180 (1,764)	65 (637)	5 (49)	20 (196)	—
550DX	620 (6,076)	250 (2,450)	180 (1,764)	65 (637)	5 (49)	20 (196)	—
650DX	620 (6,076)	250 (2,450)	180 (1,764)	65 (637)	5 (49)	20 (196)	—
700DX	720 (7,061)	250 (2,450)	180 (1,764)	65 (637)	5 (49)	35 (343)	37 (363)
750DX	790 (7,742)	250 (2,450)	180 (1,764)	65 (637)	5 (49)	35 (343)	37 (363)
1200DX	950 (9,316)	250 (2,450)	180 (1,764)	65 (637)	5 (49)	35 (343)	37 (363)

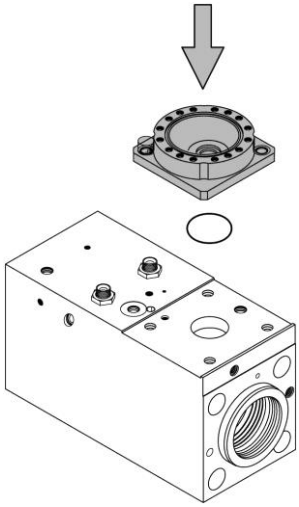
F. Reassembly

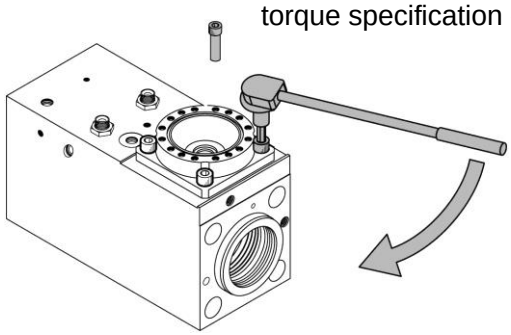
A) Power cell assembly

a) Accumulator and cylinder assembly

CAUTION :
Before starting reassembly of breaker, ensure all the parts of accumulator and cylinder are cleaned with cleaning liquid and air gun.

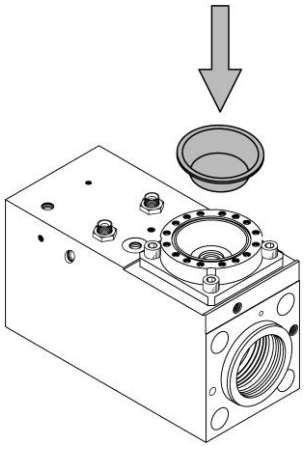
a. Assemble face seal and accumulator body.



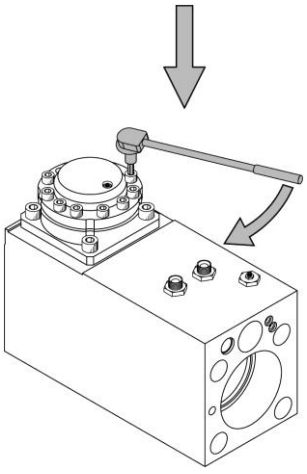


NOTE! Torque must be applied to accumulator body bolt. See torque specification on page 66.

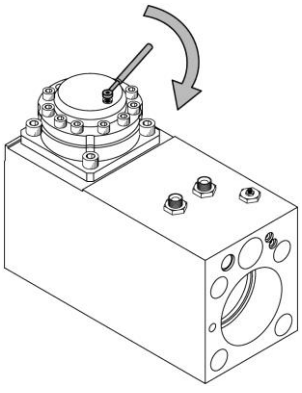
b. Assemble diaphragm and accumulator cover



NOTE! Apply grease around diaphragm lip



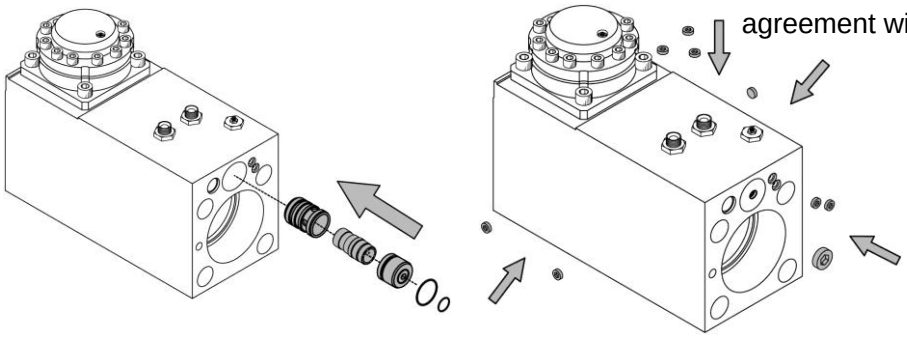
NOTE! Apply torque on accumulator body bolt. See torque table on page 66.



NOTE! See Gas Charging on page 39~41.

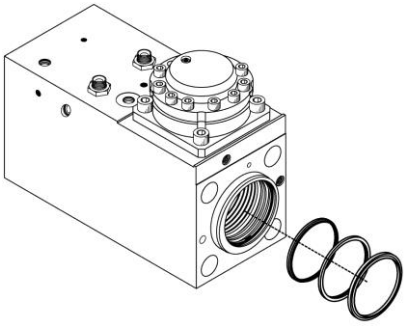
c. Assemble control valve set, then RO-plug and O-rings.

NOTE! Not required unless disassembled as per agreement with the breaker

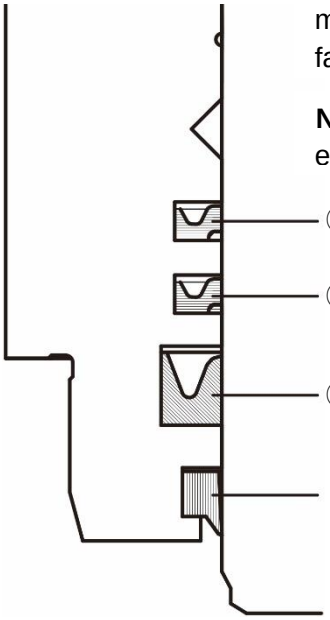


NOTE! Put valve, valve bush and valve cap into oil basin so that oil can be applied on them entirely. Sub-assemble valve set, 2 O-rings on valve cap and then assemble valve set into cylinder. Any O-ring missing will be led to leakage and/or valve cap crack.

d. Fit seals inside the cylinder.



NOTE! Apply oil on seals and seal grooves before fit the seals.



NOTE! Seal fitting direction is extremely important. Dust seal lip must face outside the cylinder. U-packing and buffering lips must face inside. Flat surface of step seal must face outside.

NOTE! Fitting with wrong direction causes contamination and/or external leakage as well as seal crack.

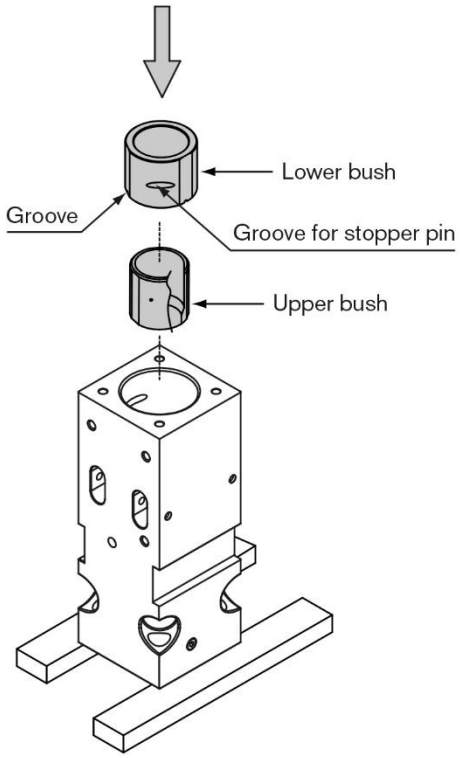
NOTE! Seal type and number of seals are different breaker model by model. See the concerned breaker part catalog.

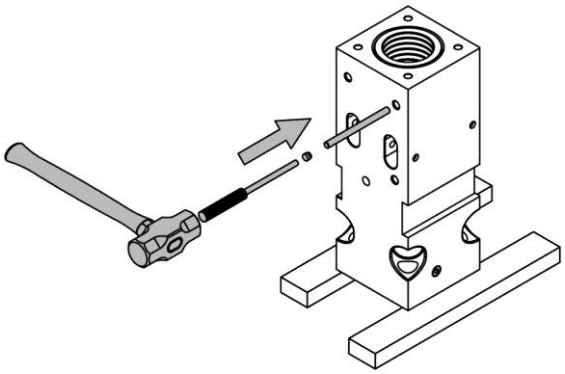
Model	Seal
8V ~ 60V	① ②
6V, 7V, 70DX ~ 650DX	① ② ④
700DX	① ③ ④
750DX ~ 1200DX	① ② ③ ④

b) Front head assembly

a. Assemble upper bush (and upper bush as well for 60V & above) in the front head.

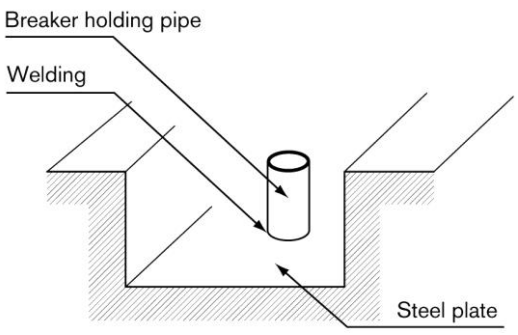
NOTE! Align bush groove direction and bush stopper pin hole direction precisely before inserting bushes into the front head block. Otherwise bush stopper pin will not be assembled

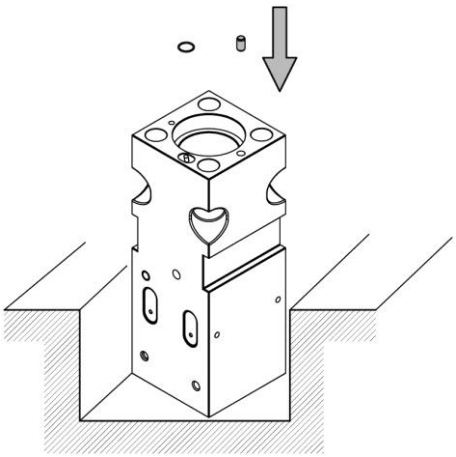




b. Put front head on the holding pipe. Fit O-ring at the entrance of grease channel and then apply grease. Insert lock pin (holding pin) on the lock pin hole.

WARNING!
Without holding pipe, power cell or its parts may fall down, causing fatal accident.

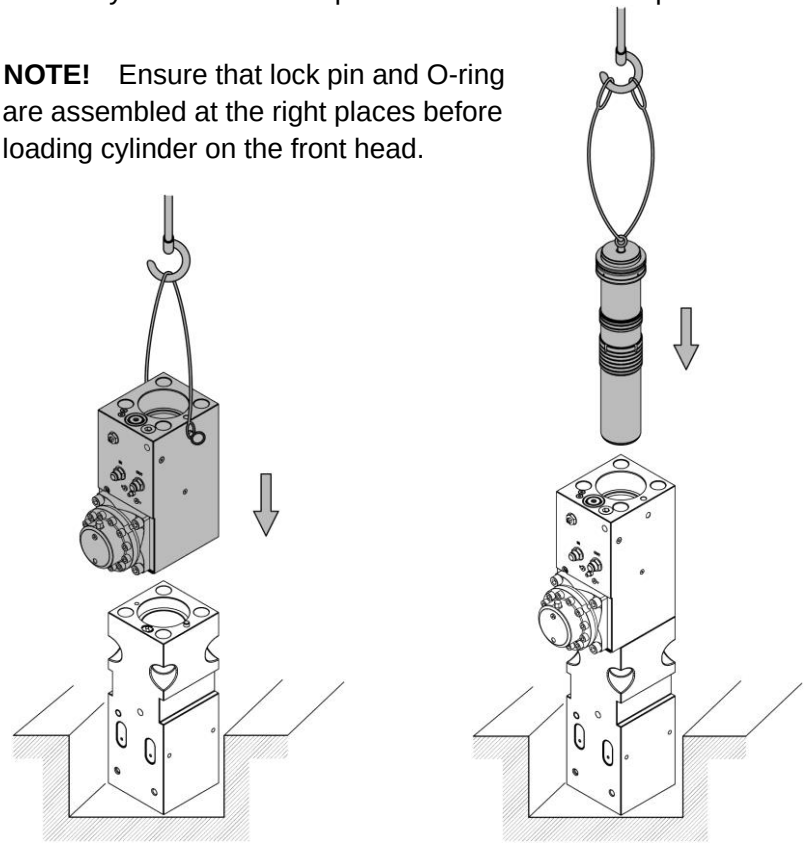




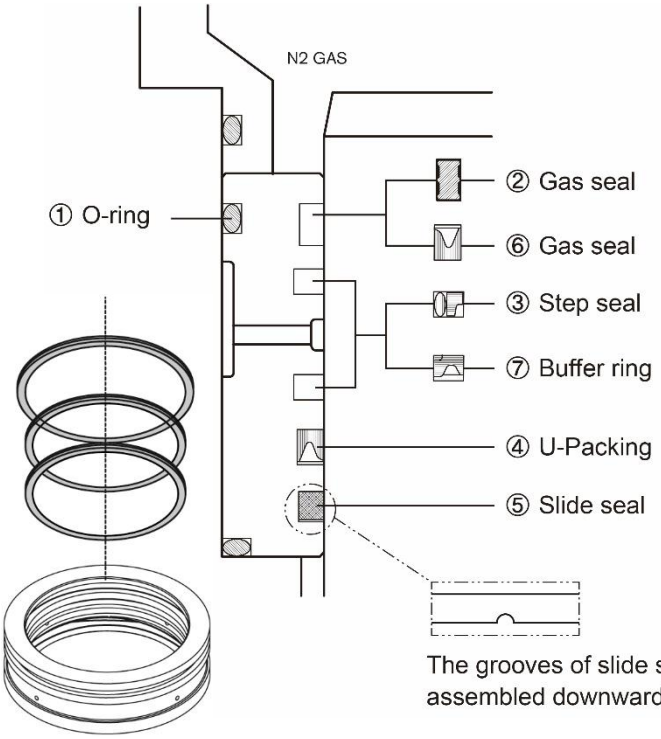
c) Piston and cylinder bush assembly

a. Put the cylinder block on top of front head. Insert the piston into cylinder hole slowly.

NOTE! Ensure that lock pin and O-ring are assembled at the right places before loading cylinder on the front head.



b. Fit seals to the grooves of cylinder bush



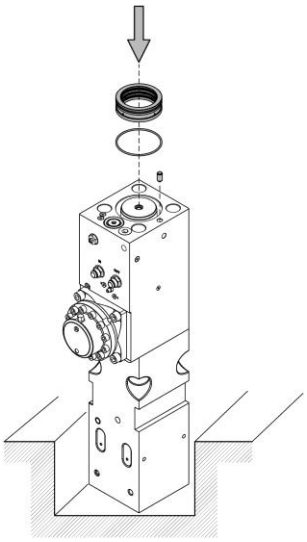
The grooves of slide seal must be assembled downwards.

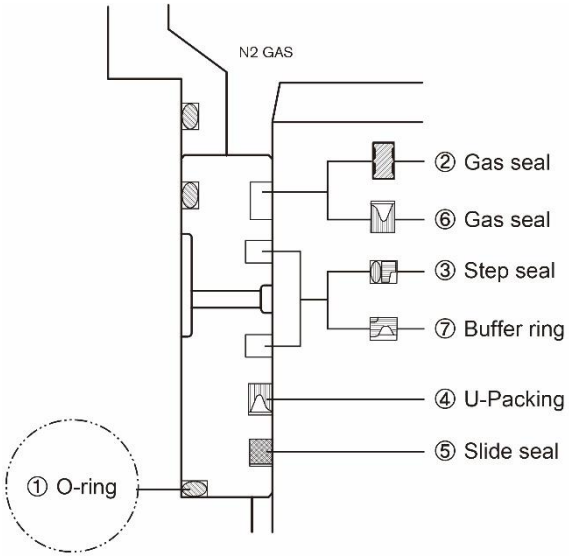
NOTE! Apply oil on seal grooves and seals (except gas seal) before fitting.

NOTE! Apply grease on gas seal before fitting.

Model	Seal
6V, 7V, 8V	① ② ③
17V	① ② ④
40V	① ② ④ ⑤
60V ~ 250DX	① ② ③
300DX ~ 750DX	① ② ③ ⑤
1200DX	① ⑥ ⑦

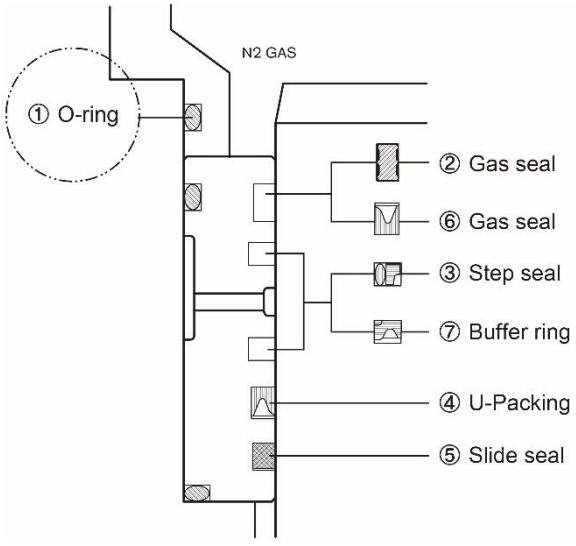
c. Fit O-ring around piston and then push it down to the bottom. Insert cylinder bush around piston and then push it to the bottom by hammering with a plastic bar.

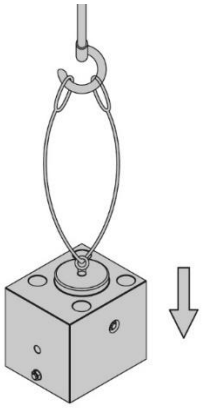


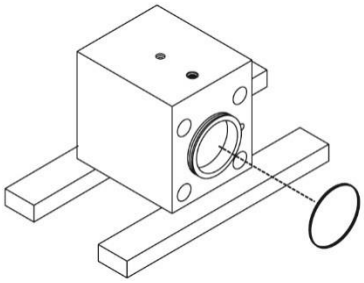


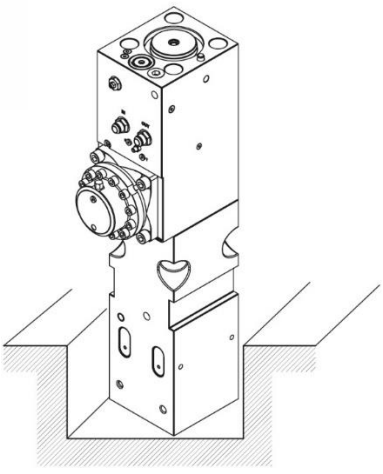
d) Back head assembly

Fit O-ring underneath back head. Then Put the back head on top of cylinder.







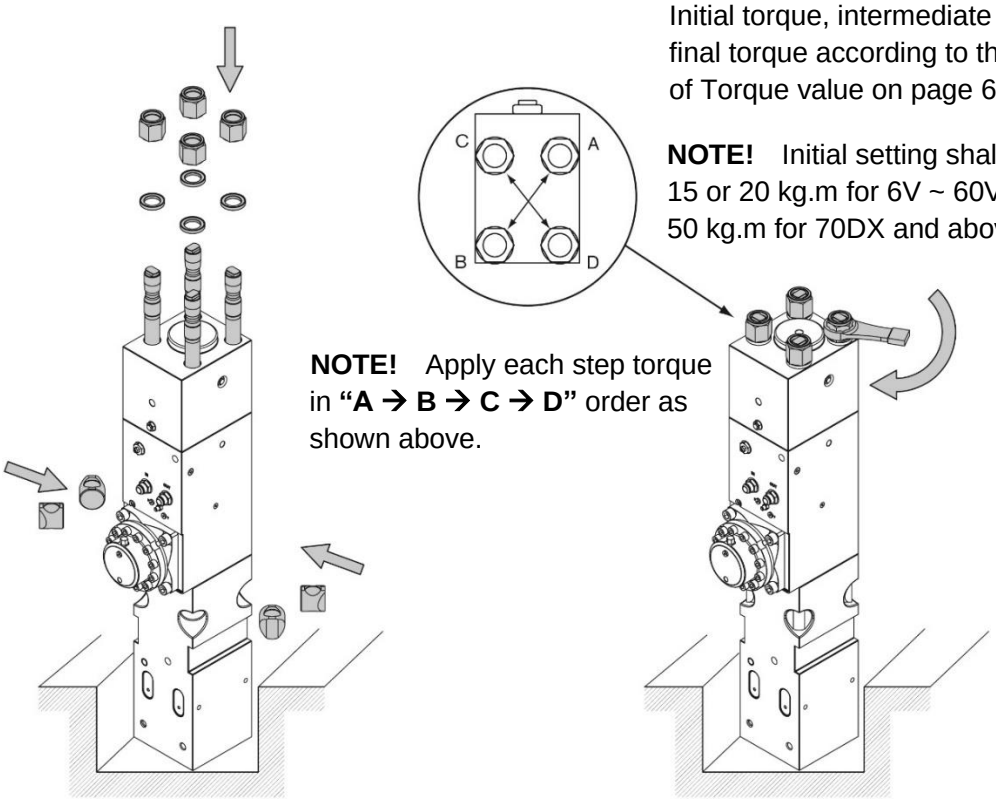


e) Through bolt set assembly

Put bottom nuts into the holes on the front head. Put washers on the holes on the back head. Insert through bolts into the holes of back head. Put top nuts on the through bolts. Then tighten the nuts with specified torque by power torque wrench. See section Torque value on page 66.

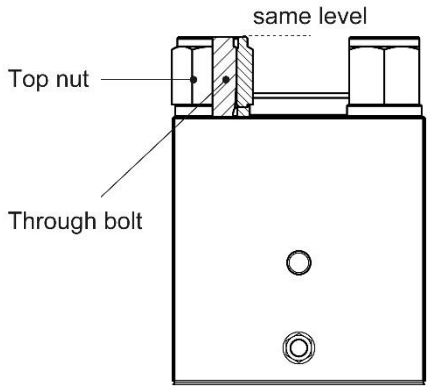
NOTE! Apply torque step by step. Initial torque, intermediate torque, then final torque according to the instruction of Torque value on page 66.

NOTE! Initial setting shall be made by 15 or 20 kg.m for 6V ~ 60V and 50 kg.m for 70DX and above.

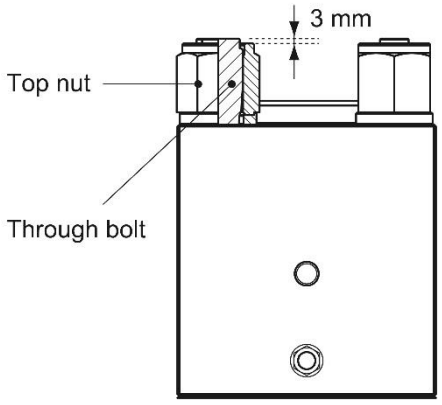


NOTE! Apply each step torque in **"A → B → C → D"** order as shown above.

NOTE! When setting through bolt and top nut before you apply initial torque, ensure through bolt top surface and top nut surface are aligned as show below.



6V ~ 450DX



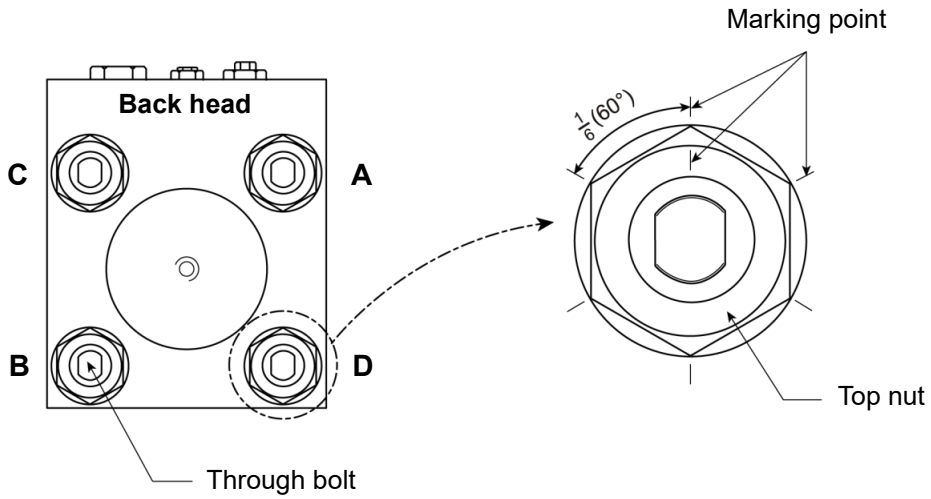
550DX ~ 1200DX

f) Apply manual torque on through bolt set

For 70DX and above, manual torque can also be applied if power torque wrench out of order.

1st step
Make **Initial Setting** of top nuts with 50 kg.m (490 N.m) torque wrench and impact socket.
Mark an apex of top nut and also mark back head surface where each apex of top nut indicates.

Hammer specification
- 40V ~ 80DX 10 lb (4.54 kg)
- 100DX ~ 150DX 12 lb (5.44 kg)
- 180DX ~ 220DX 16 lb (7.26 kg)
- 250DX ~ 1200DX 20 lb (9.07 kg)



NOTE! Apply each step torque in **"A → B → C → D"** sequence.

2nd, 3rd, 4th step
Turn top nut with hammer and impact socket until the marked apex turns by number of turns specified on the 2nd, 3rd, 4th step respectively. See Manual Torque table.

Manual torque applying

Model	Torque value (kg.m/N.m/ft.lb)	Manual torque			
		1st step		2nd step	
		Torque value	Turn	Torque value	Turn (from previous step)
6V	25/245/180	15/147/108	–	–	–
7V	30/294/217	15/147/108	–	–	–
8V	30/294/217	15/147/108	–	–	–
17V	45/441/326	20/196/145	–	–	–
40V	50/490/362	20/196/145	–	–	–
60V	50/490/362	20/196/145	–	–	–
70DX	95/931/687	50/490/362	–	–	–
80DX	95/931/687	50/490/362	–	–	–
100DX	130/1,274/940	50/490/362	–	90/882/651	1/6
130DX	160/1,568/1258	50/490/362	–	90/882/651	1/6
150DX	240/2,352/1,738 (270/2,646/1,953)	50/490/362	–	90/882/651	0.5/6
180DX	270/2,646/1,953 (310/3,038/2,242)	50/490/362	–	90/882/651	0.5/6
200DX	270/2,646/1,953 (310/3,038/2,242)	50/490/362	–	90/882/651	0.5/6
220DX	330/3,234/2,387 (380/3,724/2,749)	50/490/362	–	150/1,470/1085	1.5/6
250DX	330/3,234/2,387 (380/3,724/2,749)	50/490/362	–	150/1,470/1085	1.5/6
300DX	380/3,724/2,749 (440/4,312/3,183)	50/490/362	–	150/1,470/1085	1/6
360DX	390/3,822/2,821 (450/4,410/3,255)	50/490/362	–	150/1,470/1085	1/6
450DX	550/5,390/3,978 (600/5,880/4,340)	50/490/362	–	200/1,960/1,447	1/6
550DX	620/6,076/4,489 (710/6,958/5,140)	50/490/362	–	200/1,960/1,447	1/6
650DX	620/6,076/4,489 (710/6,958/5,140)	50/490/362	–	200/1,960/1,447	1/6
700DX	720/7,061/5,208	Torque applying is only possible by power torque wrench (mechanical power).			
750DX	790/7,742/5,714				
1200DX	950/9,316/6,871				

NOTE!

- Torque unit: kg.m/N.m/ft.lb
- Value in ( ) shall be applied to the breakers in India, Middle East and Mexico.

Manual torque				Model
3rd step		**4th step**		
Torque value	**Turn** (from previous step)	**Torque value**	**Turn** (from previous step)	
–	–	25/245/180	–	6V
–	–	30/294/217	–	7V
–	–	30/294/217	–	8V
–	–	45/441/326	–	17V
–	–	50/490/362	–	40V
–	–	50/490/362	–	60V
–	–	95/931/687	2.5/6	70DX
–	–	95/931/687	2.5/6	80DX
–	–	130/1,274/940	2.2/6	100DX
–	–	160/1,568/1,258	2.2/6	130DX
150/1,470/1,085	1.5/6	240/2,352/1,738	1/6 (1.4/6)	150DX
150/1,470/1,085	1.5/6	270/2,646/1,953	1/6 (1.7/6)	180DX
150/1,470/1,085	1.5/6	270/2,646/1,953	1/6 (1.7/6)	200DX
250/2,450/1,808	1.5/6	330/3,234/2,387	0.5/6 (1/6)	220DX
250/2,450/1,808	1.5/6	330/3,234/2,387	0.5/6 (1/6)	250DX
250/2,450/1,808	1/6	380/3,724/2,749	1.3/6 (1.9/6)	300DX
250/2,450/1,808	1.5/6	390/3,822/2,821	1.2/6 (1.8/6)	360DX
400/3,920/2,893	2/6	550/5,390/3,978	1/6 (1.3/6)	450DX
400/3,920/2,893	2/6	620/6,076/4,489	1/6 (1.3/6)	550DX
400/3,920/2,893	2/6	620/6,076/4,489	1/6 (1.3/6)	650DX
Torque applying is only possible by power torque wrench (mechanical power).				700DX
				750DX
				1200DX

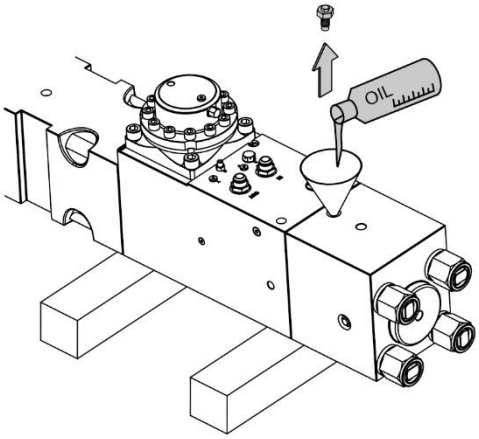
NOTE!

- Torque unit: kg.m/N.m/ft.lb
- Value in ( ) shall be applied to the breakers in India, Middle East and Mexico.

g) Filling hydraulic oil into back head

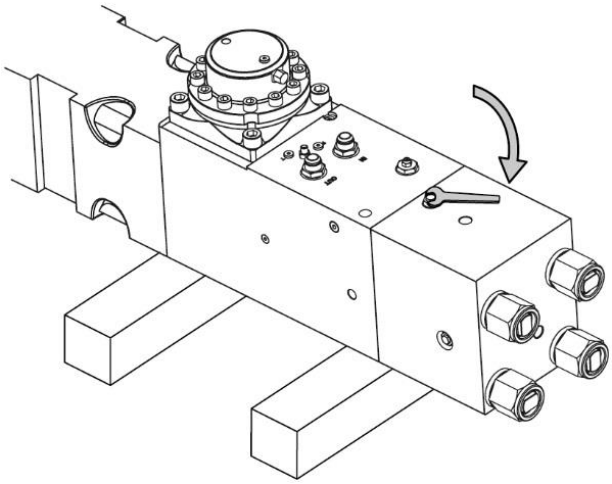
Lay the assembled power cell and fill hydraulic oil into back head.

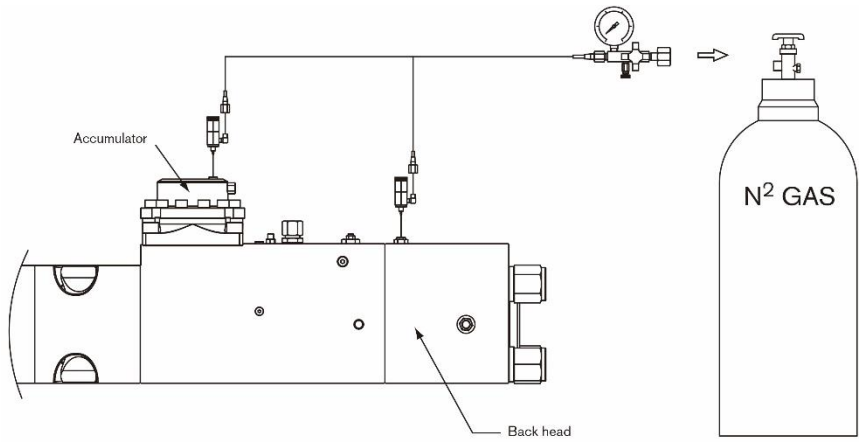
Model	Volume of hydraulic oil
6V ~ 8V	20 cc
17V ~ 60V	30 cc
70DX ~ 80DX	50 cc
100DX ~ 250DX	100 cc
300DX ~ 450DX	150 cc
550DX ~ 650DX	200 cc
700DX ~ 1200DX	250 cc



h) Gas charging

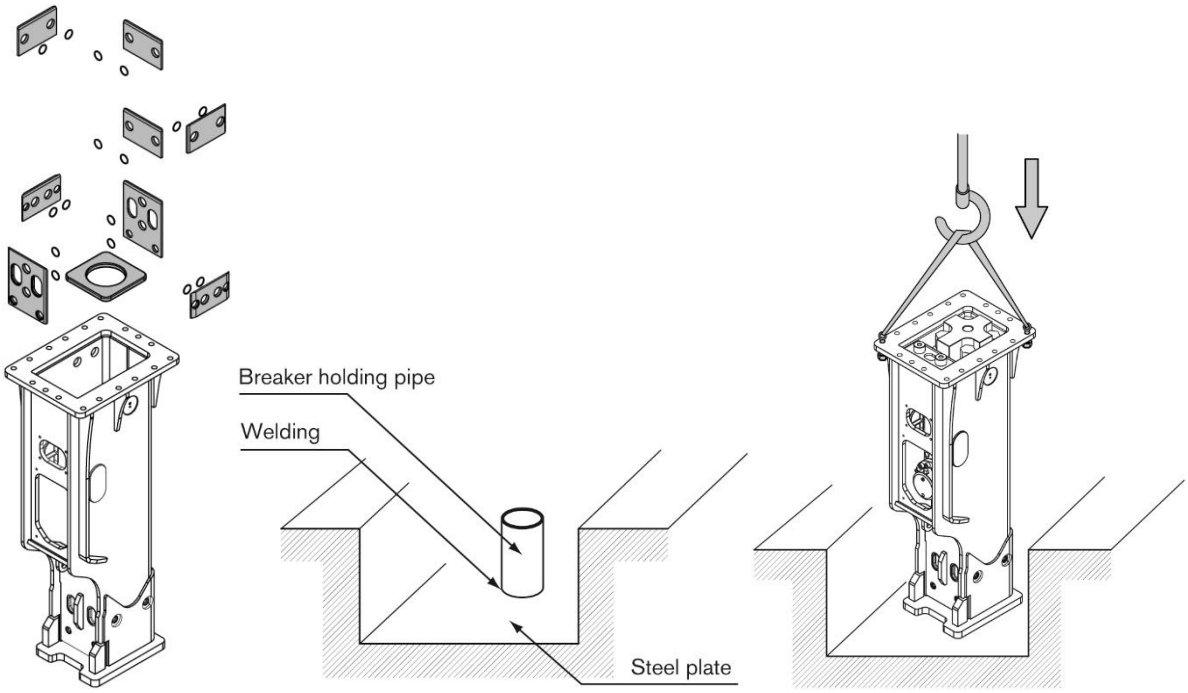
Assemble gas charge valve and valve cap. Charge gas into back head and assemble gas valve cap. See Gas Pressure and Gas Charging on page 35~38.



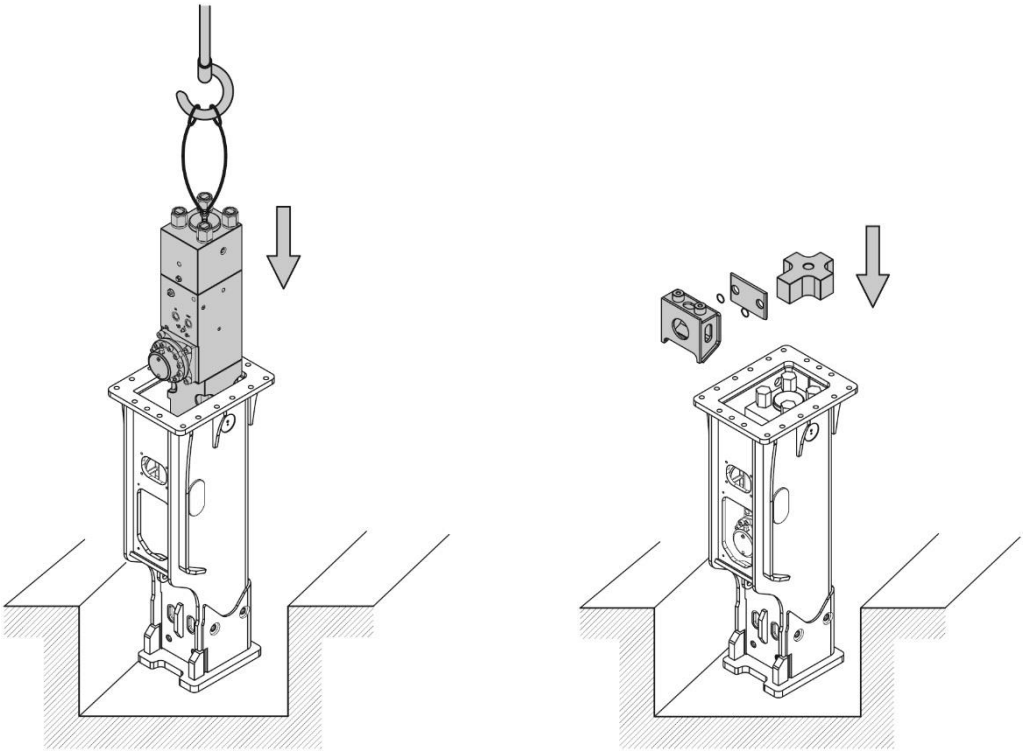


B) Housing assembly

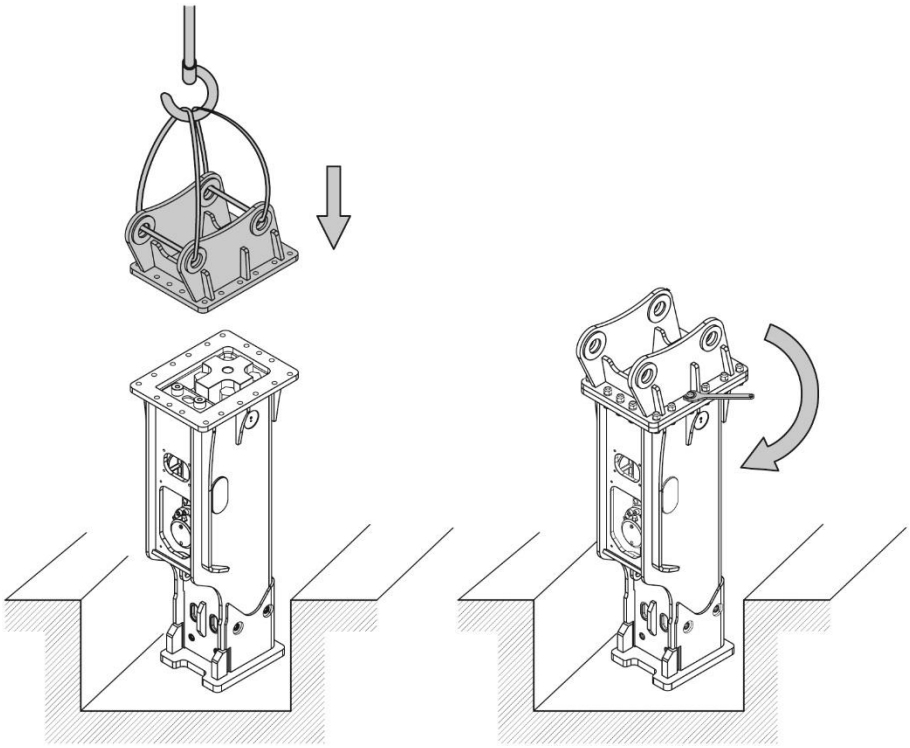
a. Assemble bottom damper and, O-rings and shell pads on the housing. Then place the housing on the holding pipe.



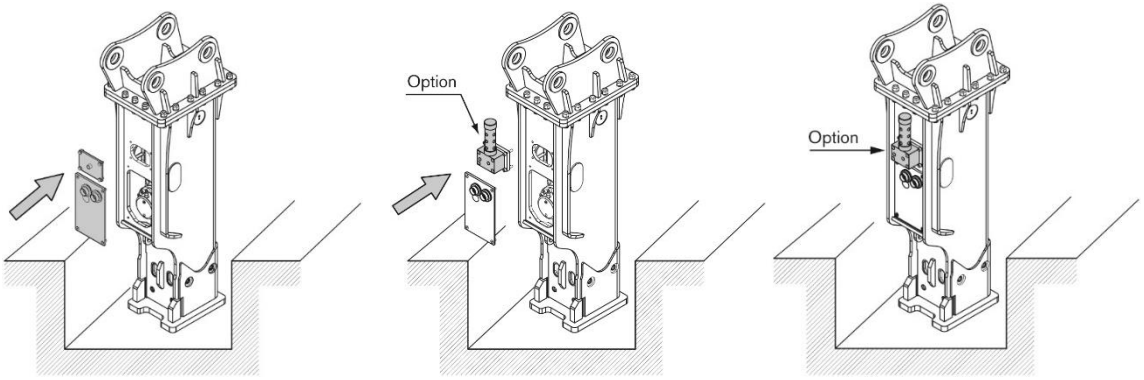
b. Assemble power cell, power cell holder, shell pad, O-rind and upper damper.



c. Assemble breaker bracket according to Torque value on page 66.



d. Assemble hose and gas covers or optional ALS.

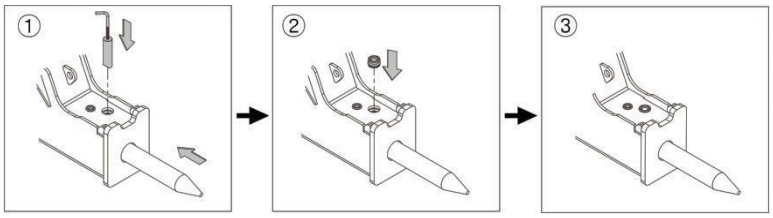


C) Chisel/Tool assembly

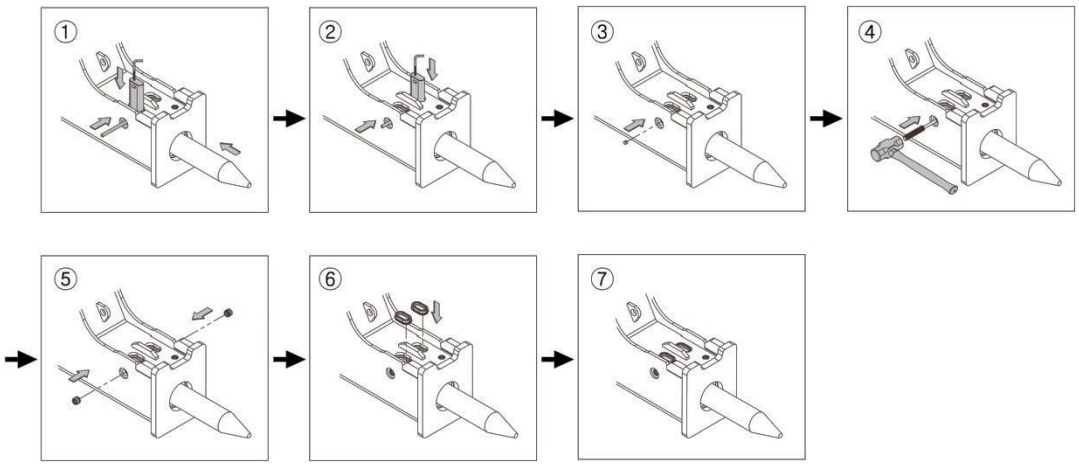
WARNING!

For safety reason, the carrier must be switched off before performing the following work.

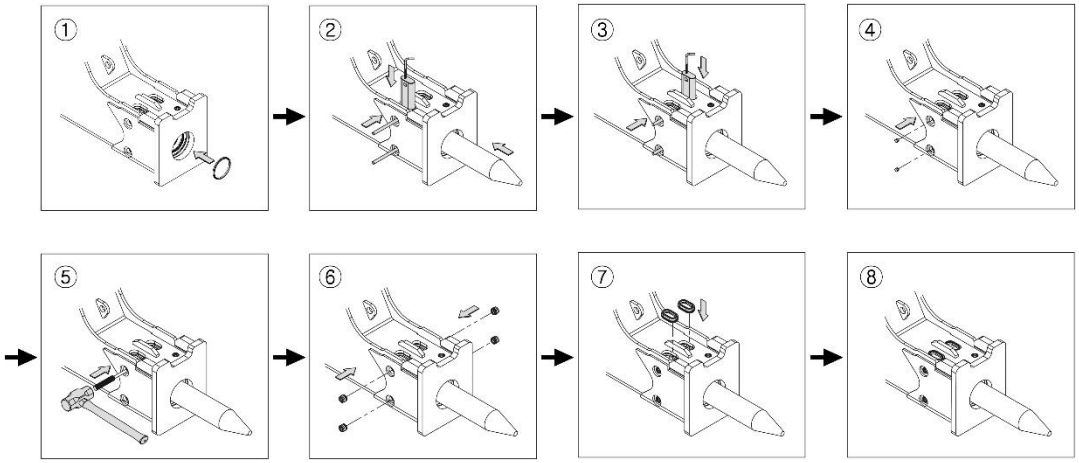
- Never use your fingers to check whether the recesses on the working chisel/tool shaft are aligned to the slots for the chisel/tool pin.
- Always wear protective glasses when fitting or removing the chisel/tool, since metal splinters may fly off when breaking out the stopper pins.
- Clean away any dirt adhering to the working chisel/tool in the insert zone.
- Lubricate to the contact faces in the lower breaker part between the working chisel/tool and the wear bushes.
- The chisel/tool should only be fitted correctly.



6V~ 40V



60V ~ 80DX



G. Trouble shoot guide

Prerequisites for breaker performance and its long life time are;

- Proper commissioning by experienced/skillful dealer technicians
- Respect P (pressure) and Q (flow) rate requirements upon specifications
- Use fresh and contamination free hydraulic oil
- Proper operation as per Operator's Manual
- Respect maintenance interval as per Operator's Manual
- Proactive inspection by dealer technicians as we as operator
- Timely repair by experienced/skillful dealer technicians as per Service Manual

Repairing breaker troubles by dealer technicians/mechanics protects value of customers, builds a huge trust of customers and significantly contributes to retaining the customers.

Particularly well repairing by dealer efforts is often paid back by following breaker orders during the business cycle of Sales to Order, Order to Delivery and Delivery to Repurchase.

Therefore breaker dealer should response promptly to any types of breaker failure, dealer technicians/mechanics should be repeatedly trained to build up breaker service understanding, knowledge and skills to correctly grasp trouble symptoms and take adequate counter measures to root causes with no time delay.

Breaker problems may be caused by carrier hydraulic system if it is not working to specifications. Therefore thoroughly check carrier condition like hydraulic pump output, port relief valve setting pressure and valve itself, breaker piping line, return pressure, oil filter, pedal or joy stick switch, cooling system, etc. prior to any repair inspection/action on the breaker in trouble.

Breaker problems may also be caused by operator's insufficient respect to instruction and guide for operation and/or maintenance on the Operator's Manual. Do not forget to inspect operator's way of using and maintain the breaker before commencing any repair inspection/action on the breaker in trouble.

Following instructions are about breaker symptoms, causes and countermeasures, will help dealer technicians/mechanics properly response to the troubles that the customers may encounter. Read them through carefully and ensure all instructions are fully captured in your way of handling the troubles of your customer.

A) Malfunctions

1. Carrier

Symptom	Cause	Remedy
Breaker does not work	Too low port relief valve setting pressure	Check/adjust setting pressure
	Clogged piping	Check, flush or and/or repair hydraulic line from the stop valve to pump/oil tank
	Main control valve does not operate properly.	Check conditions of MCV and pilot pressure. Consult with carrier dealer or supplier.
	Insufficient input power (P x Q)	Check power (P x Q)
Irregular blows at the beginning of breaker operation	Too low port relief valve setting pressure	Check/adjust setting pressure
Breaker easily damaged due to too strong impact power	Too high port relief valve setting pressure	Check/adjust setting pressure
Rapid increase of oil temperature	Poor carrier cooling system	Consult with carrier dealer or supplier
	Wear of pump internal parts	Consult with carrier dealer or supplier
	Clogged hydraulic line	Check, flush or and/or repair hydraulic line from the stop valve to pump/oil tank

2. Breaker

Symptom	Cause	Remedy
Breaker does not work	Seizure of breaker (piston or valve)	Repair or replace worn parts
	Oil entering into back head gas chamber	Remove oil. Check/replace gas seal and step seals. Ensure that you check if piston or cylinder has got any scratch.
Stop breaking or erratic striking after 30 to 90 minutes of operation	Oil entering into back head gas chamber	Remove oil. Check/replace gas seal and step seal. Also ensure that you check if piston or cylinder has got any scratch.
Chisel/Tool crack	See section Breaker Chisel/Tool Failure.	
Chisel/Tool point melting		
Chisel/Tool tip edge crack		
Pulsation of pressure line hose	Diaphragm crack	Replace diaphragm. Check if the breaker has made frequent blank fires.
Irregular blows at the beginning of breaker operation	Seizure of piston and cylinder	Inspect cylinder, piston seal condition. Check if contaminated or not. Remove seizing marks. Replace cylinder and piston if necessary.
Low blow speed	Insufficient power (P x Q)	Check power (P x Q)
Weak striking force	Insufficient power (P x Q)	Check power (P x Q)

B) Oil leakage

Oil leakage do not always require any part replacing. Check below before calling the breaker supplier.

Symptom		Cause & Remedy
Leakage between chisel/tool and lower bush	Light oil leakage	Leave it as it is. Keep using breaker as it helps lubrication.
	Heavy oil leakage	Seals at the cylinder bottom might have been damaged. Inspect/replace the complete seal set.
Leakage between cylinder & back head	Leakage from control valve or Ro-plug	Damaged or missing O-ring during breaker overhauling. Check/replace O-ring.
	Oil entering into back head gas chamber	Remove oil. Check/replace gas seal and step seal. Also ensure that you check if piston or cylinder has got any scratch.
	Oil leakage	Loosed through bolts & nuts : Retighten

C) Poor operation of breaker

NOTE! The symptoms with below causes should be followed by dealer training to the operator for proper use and maintenance of breaker as per the breaker Operator's Manual.

Symptom	Cause	Remedy
Breaker does not work	Too high back head gas pressure or too low port relief valve setting pressure	Check/adjust gas pressure or port relief valve setting pressure
	Insufficient pushing down the chisel/tool	Train operator for proper breaker operation
Irregular blows at the beginning of breaker operation	High oil temperature.	Refill hydraulic oil.
	Too high back head gas pressure	Check/adjust gas pressure.
	Insufficient pushing down of chisel/tool	Push chisel/tool down with a bit higher force.
	Too large clearance between chisel/tool and lower bush	Measure lower bush wearing. Replace lower bush.
	Excessive wearing of chisel/tool head	Check chisel/tool head wearing. Check piston impact surface condition as well.
	Control valve contamination	Inspect control valve condition. Clean control valve set. Also inspect cylinder and piston condition, flush or replace them.
Stop breaking or erratic striking after 30 to 90 minutes of operation.	Chisel/Tool high back head gas pressure	Check/adjust gas pressure
Hard to install/ remove chisel/tool	Deformation of chisel/tool pin	Replace deformed chisel/tool pin.
Excessive plays between housing and power cell	Damper and/or shell pad wearing beyond the limit	Check wearing amount and replace upper damper, bottom damper and/or shell pads.
Weak striking force	Too low back head gas pressure	Check/adjust gas pressure
Low blow speed	Insufficient pushing down of chisel/tool	Train operator for proper breaker operation
	Too high back head gas pressure	Check/adjust gas pressure
Low blow speed	Chisel/Tool low back head gas pressure	Check/adjust gas pressure.
	Insufficient pushing down of chisel/tool	Push chisel/tool down with a bit higher force.
Breaker easily damaged due to too strong impact power	Too high back head gas pressure	Check/adjust gas pressure

D) Accumulator (40V ~ 1200DX)

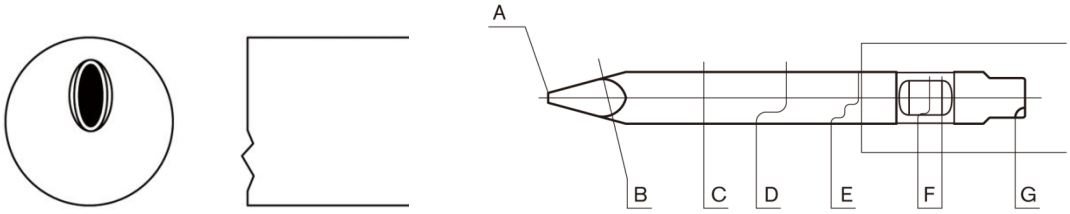
Check accumulator gas pressure in case of a big tremor on the hose of high pressure line. If the gas pressure is low, recharge accumulator gas chamber. After refilling the gas, if there is still a big tremor and gas is lost after a short time breaker running, check O-ring of accumulator charging valve and check whether oil is leaking around accumulator. After replacement and inspection, the socket bolts that fix the accumulator should be tightened by the torque wrench.

H. Chisel/Tool failure

Followings are typical chisel/tool failure cases that the customers encounter. Read them through carefully and response to them correctly.

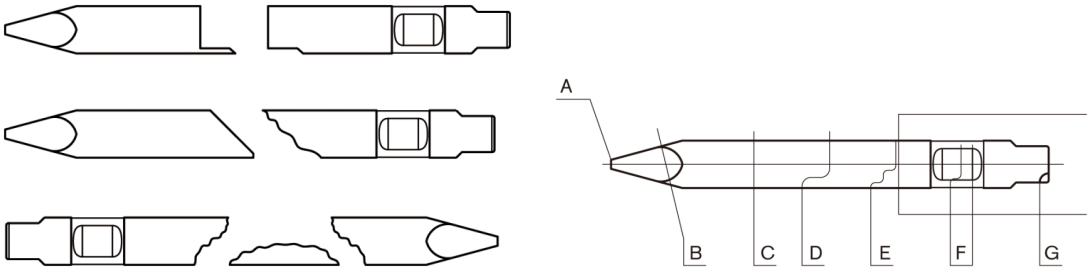
Material defect

Chisel/Tool crack on the area between C and E, caused by material defect, shows stress concentration point on the broken surface but inside outer circle.

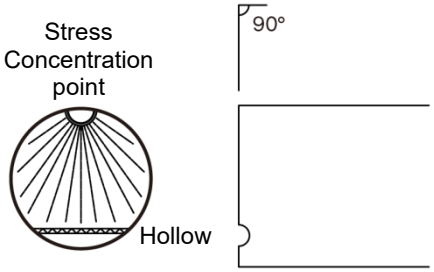


Excessive bending force

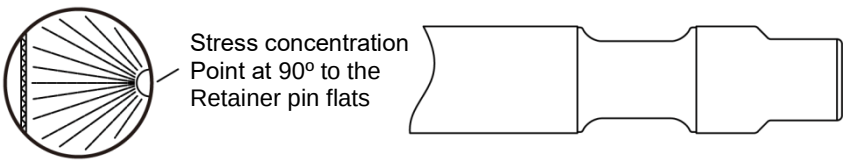
Chisel/Tool crack on the area between C and E, caused by excessive bending force, show below chisel/tool fracture shapes.



Typical high stress fracture when breaker “pulls” material.



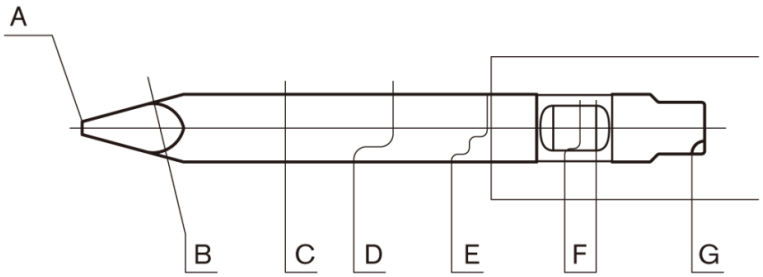
Typical fracture when levering chisel/tool while buried in the burden



Lubrication, burrs, maintenance or blank firing

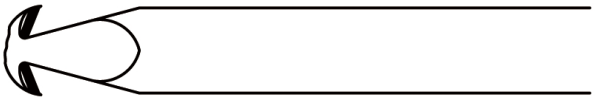
Chisel/Tool crack on the area F is another typical failure case from miss-use of breaker.
1. Insufficient lubrication on chisel/tool and chisel/tool pin
2. Breaker use with no removal of burrs on chisel/tool pin and chisel/tool
3. Chisel/Tool pin use with no periodical chance of chisel/tool pin face
4. Chisel/Tool pin use over wear limit
5. Blank firing by less experienced or skilled operator

NOTE! This is a frequent failure type at the secondary rock breaking application.



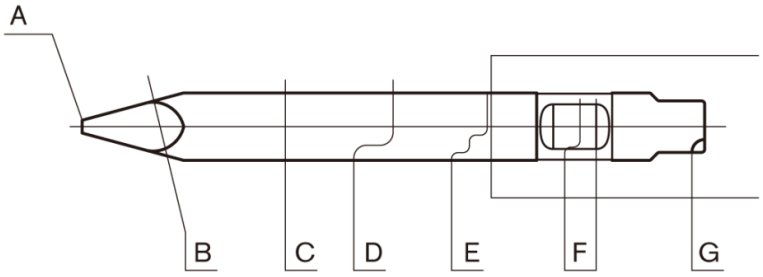
Mushrooming

Deformation on chisel/tool point, so called “mushrooming”, is caused by;
1. Striking the same material spot for a too long time.
   NOTE! Do not break the same spot for more than 30 seconds.
2. Use of moil point chisel/tool at hard rock breaking application, volcanic rock for example
3. Disappearing of heat treat surface by local reshaping chisel/tool point



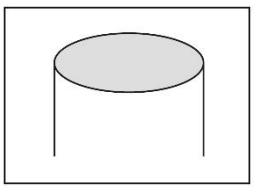
Chipping of chisel/tool point

Chipping of chisel/tool point area F occurs when the chisel/tool strikes unstable material, particularly at the secondary rock breaking application or small rock boulder demolishing application.



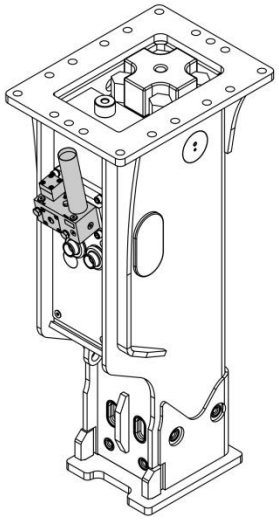
Cold fracture

Use of chisel/tool under cold ambient temperature below 0 °C Celsius may end up with a sudden chisel/tool facture with no prior indicative sign. Preheat the chisel/tool before commence breaker chisel/tool striking.

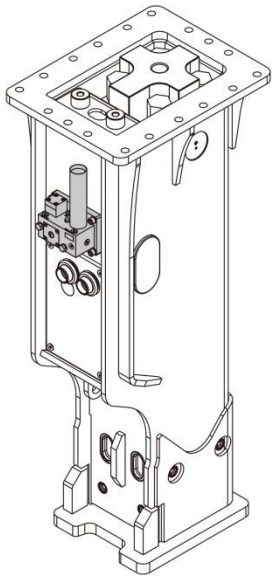


I. Auto lubrication system

A) Hydraulic ALS

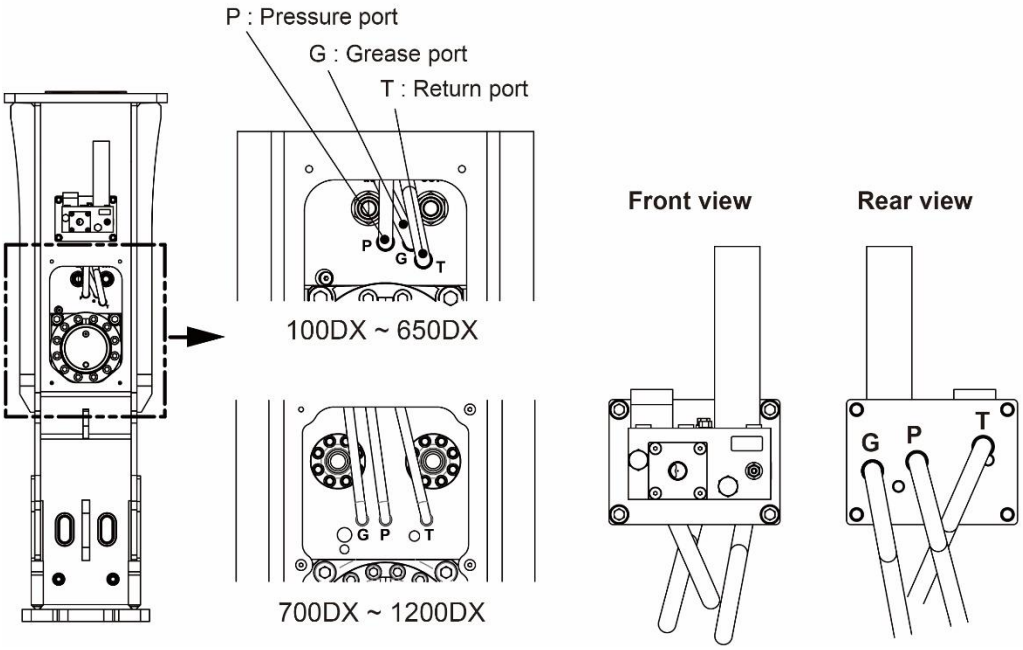


100DX ~ 180DX



200DX ~ 1200DX

a) Installation

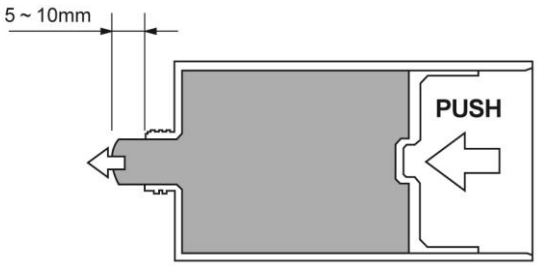


• Connect grease hose to the port ‘G’ of ALS block.
• Connect 1st hydraulic hose to the port ‘P’ of ALS block.
• Connect 2nd hydraulic hose to the port ‘T’ of ALS block.

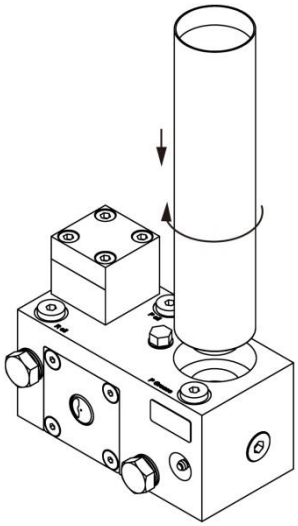
• Connect the other end of grease hose to the port ‘G’ on the cylinder.
• Connect the other end of 1st hydraulic hose to the ‘P’ on the cylinder.
• Connect the other end of 2nd hydraulic hose to the ‘T’ on the cylinder.

b) Cartridge replacement

First remove the cap from the cartridge opening, then, using the cartridge follower piston press out grease by 5 mm to 10 mm.



Subsequently, insert the cartridge in the cartridge holder by pressing it slightly, and fasten it by hand.

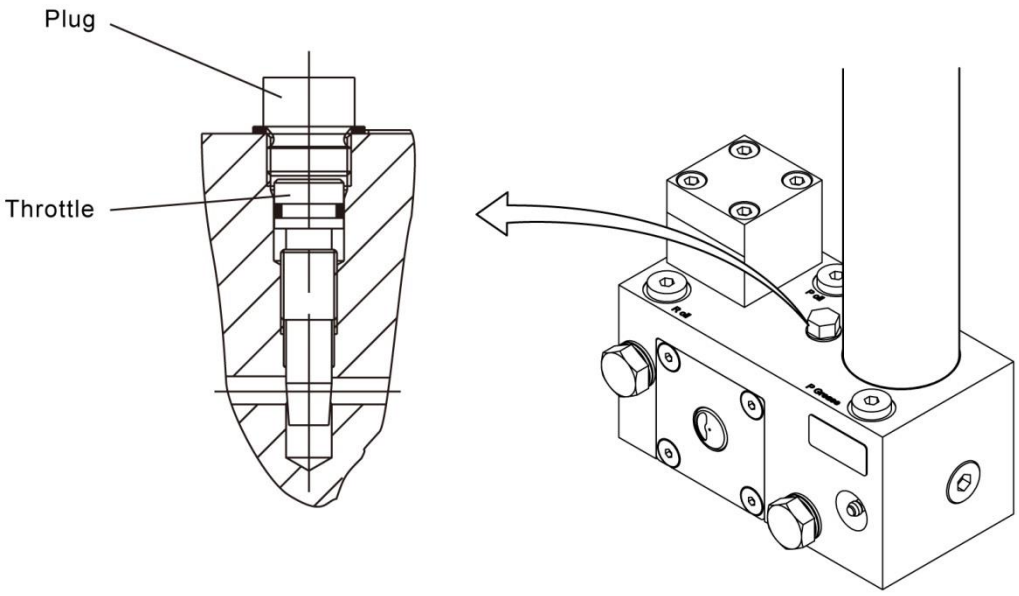


WARNING!

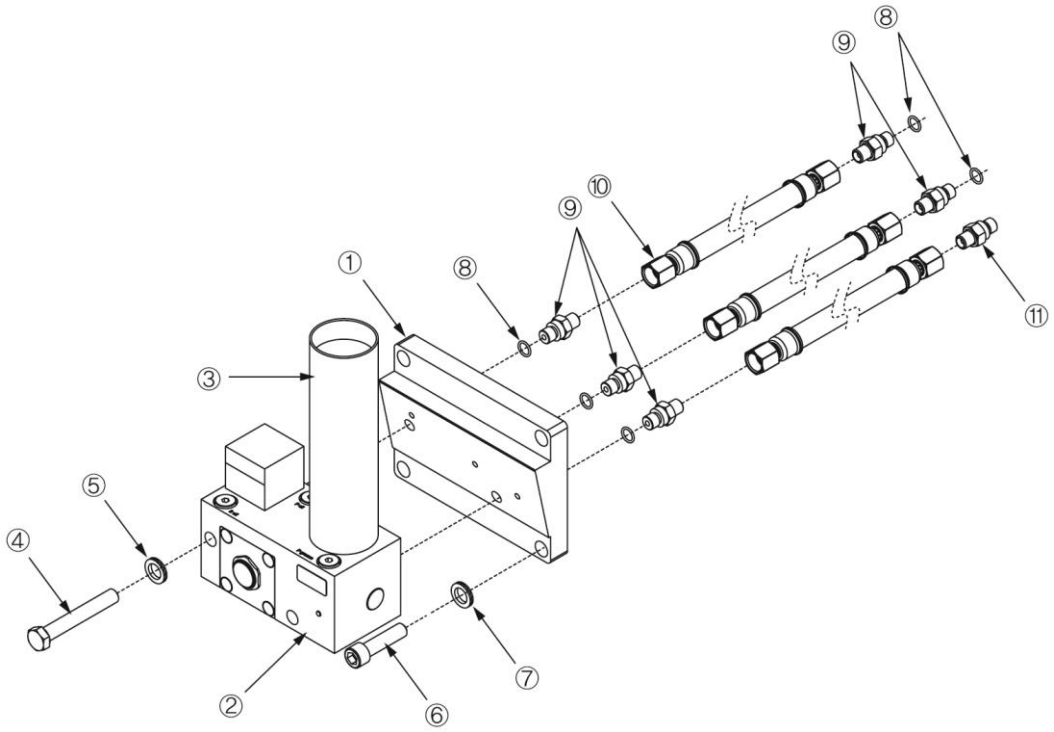
When replacing the cartridge, make sure that no contamination enters the intake area of the cartridge!

c) Adjustment

Before adjustment, you must remove the plug screw. Afterwards, you can release the throttle using a slotted screwdriver. By unscrewing the throttle, you increase the flow rate, thus enhancing the delivery rate.



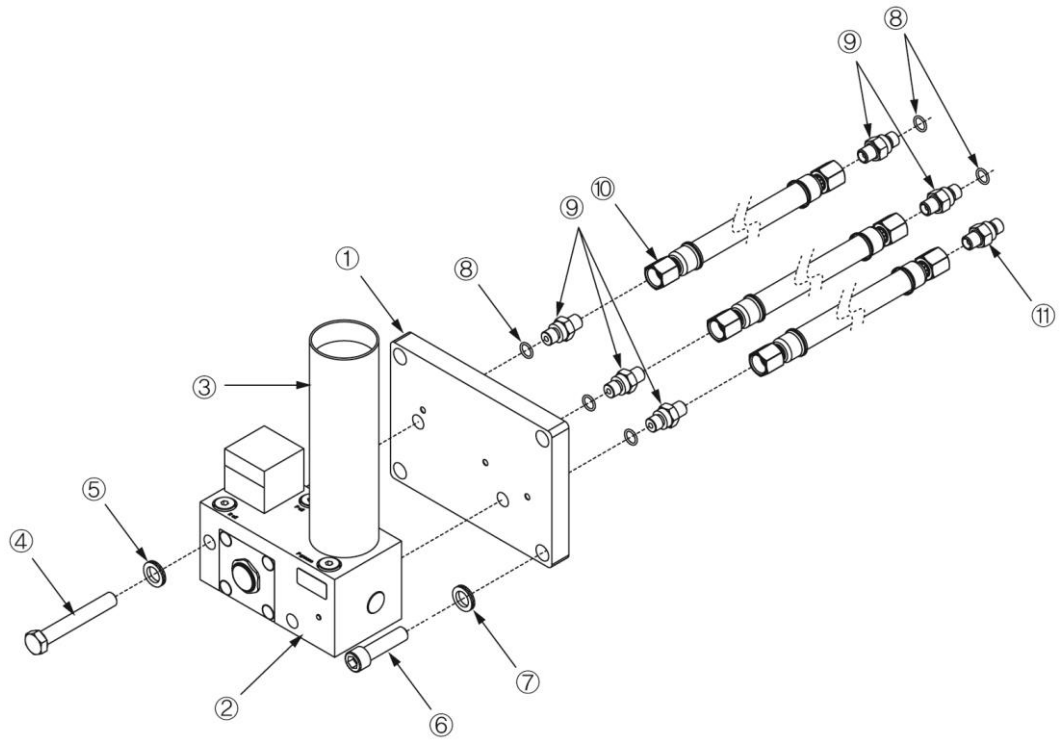
d) Hydraulic ALS kit composition (100DX~180DX)



No.	Part description	Q'ty
1	AUTO GREASE BASE PLATE	1
2	AUTO GREASE BODY	1
3	CARTRIDGE	1
4	HEX BOLT	2
5	NORDLOCK WASHER	2
6	SOCKET BOLT	4

No.	Part description	Q'ty
7	NORDLOCK WASHER	4
8	O-RING	5
9	ADAPTER	5
10	GREASE HOSE	3
11	ADAPTER	1

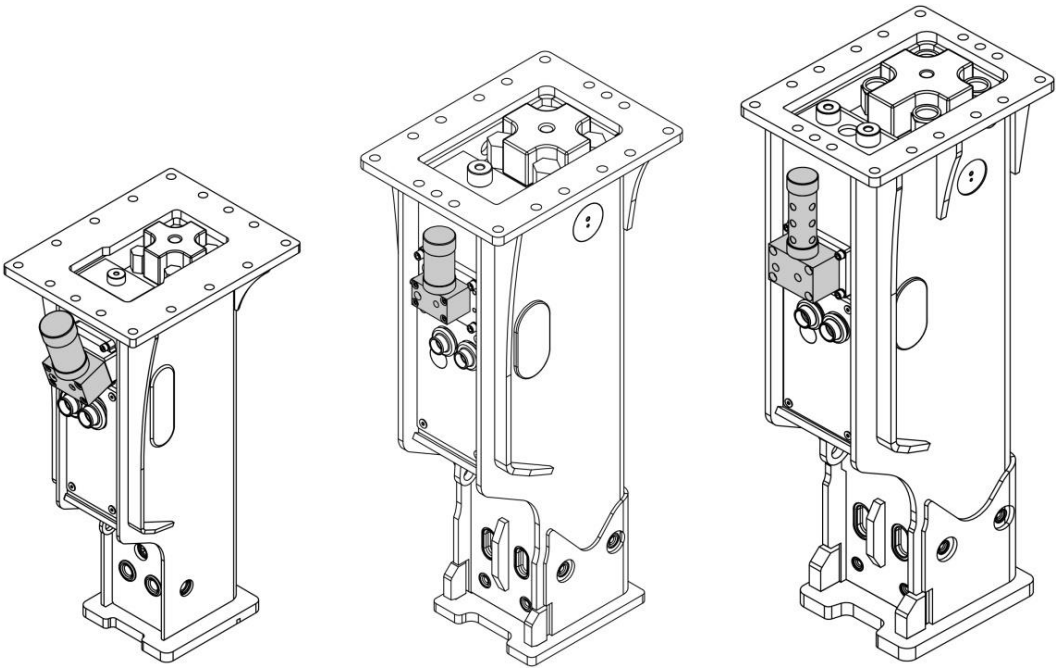
e) Hydraulic ALS kit composition (200DX ~ 1200DX)



No.	Part description	Q'ty
1	AUTO GREASE BASE PLATE	1
2	AUTO GREASE BODY	1
3	CARTRIDGE	1
4	HEX BOLT	2
5	NORDLOCK WASHER	2
6	SOCKET BOLT	4

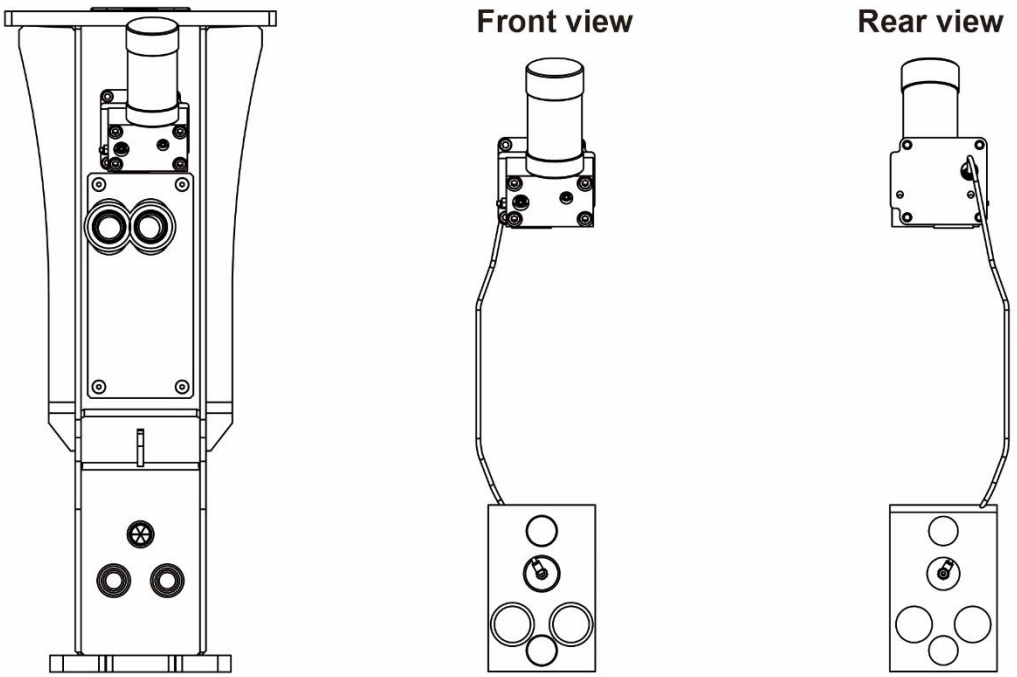
No.	Part description	Q'ty
7	NORDLOCK WASHER	4
8	O-RING	5
9	ADAPTER	5
10	GREASE HOSE	3
11	ADAPTER	1

B) Vibrating ALS

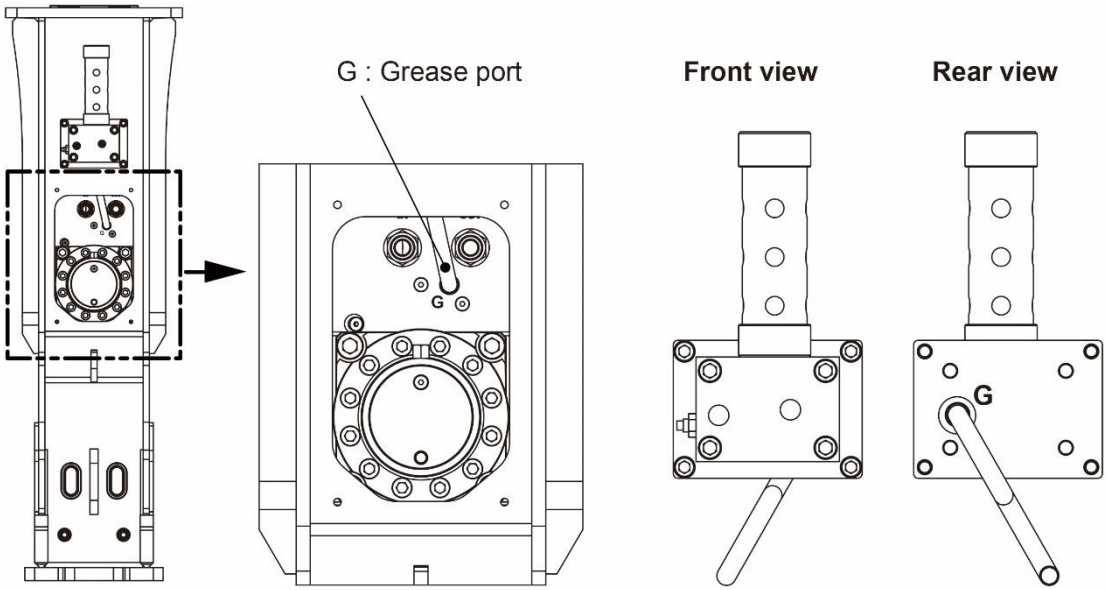


60V ~80DX | 100DX ~ 180DX | 200DX ~ 1200DX

a) Installation (60V ~ 80DX)



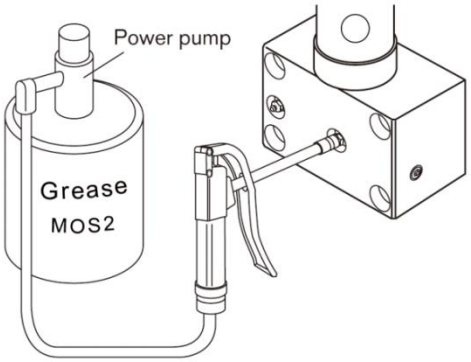
b) Installation (100DX ~ 1200DX)

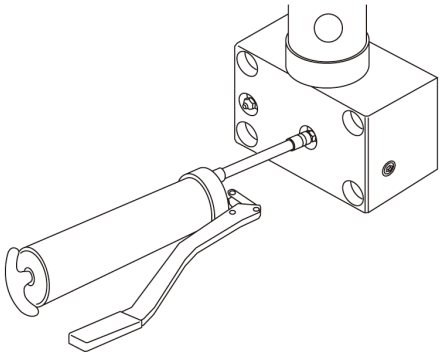


- Connect grease hose to the port ‘G’ of ALS block.
- Connect the other end of grease hose to the port ‘G’ on the cylinder.

c) Manual refilling

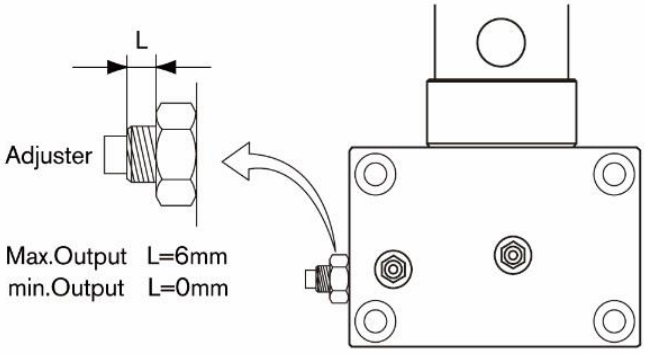
Manual refilling is available with grease gun or power pump.



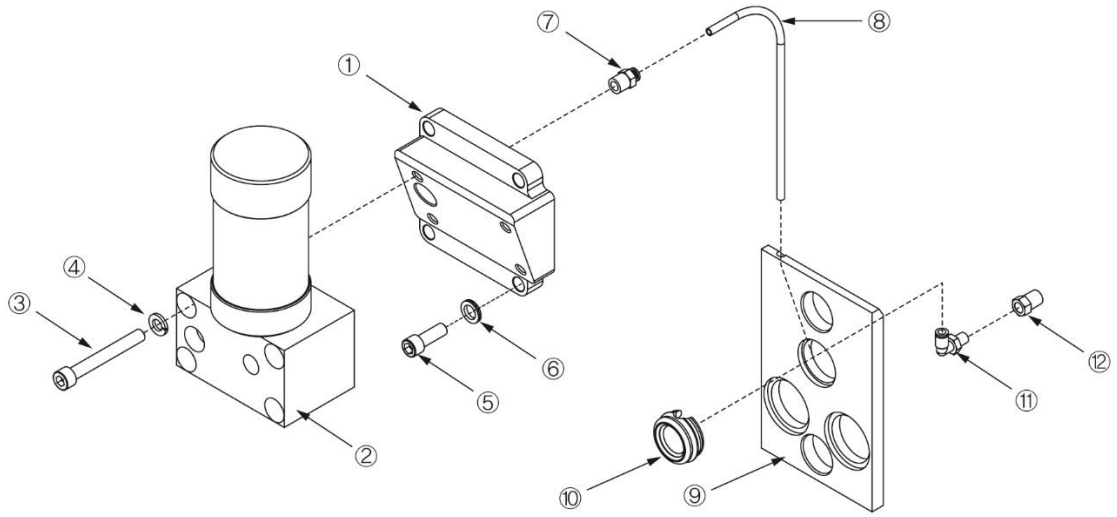


d) Adjustment

Grease output is easily adjustable upon job requirements. Before adjustment, you must remove. Turn adjuster to the left to get increased output or to the right to get reduced output.



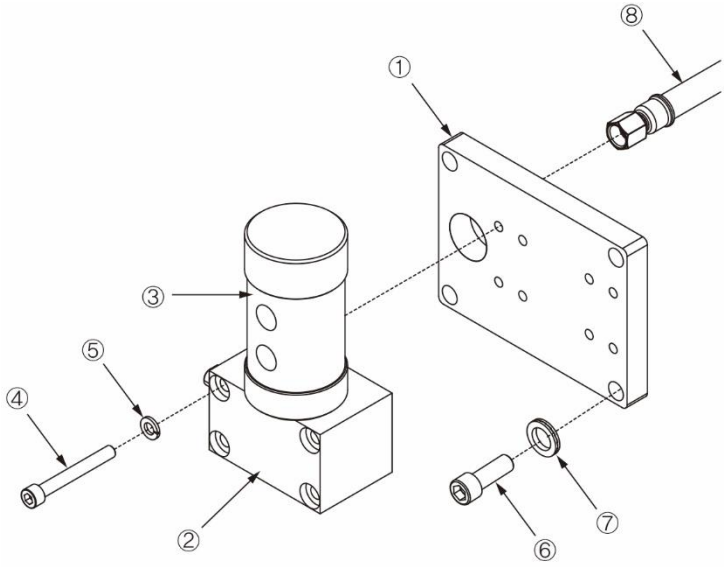
e) Vibrating ALS kit composition (60V ~ 80DX)



No.	Part description	Q'ty
1	AUTO GREASE BASE PLATE	1
2	AUTO GREASE BODY	1
3	SOCKET BOLT	4
4	SPRING WASHER	4
5	SOCKET BOLT	4
6	NORDLOCK WASHER	4

No.	Part description	Q'ty
7	ONE TOUCH FITTING	1
8	GREASE HOSE	1
9	SHELL PAD	1
10	RUBBER COVER	1
11	ONE TOUCH ELBOW	1
12	HEX BUSH	1

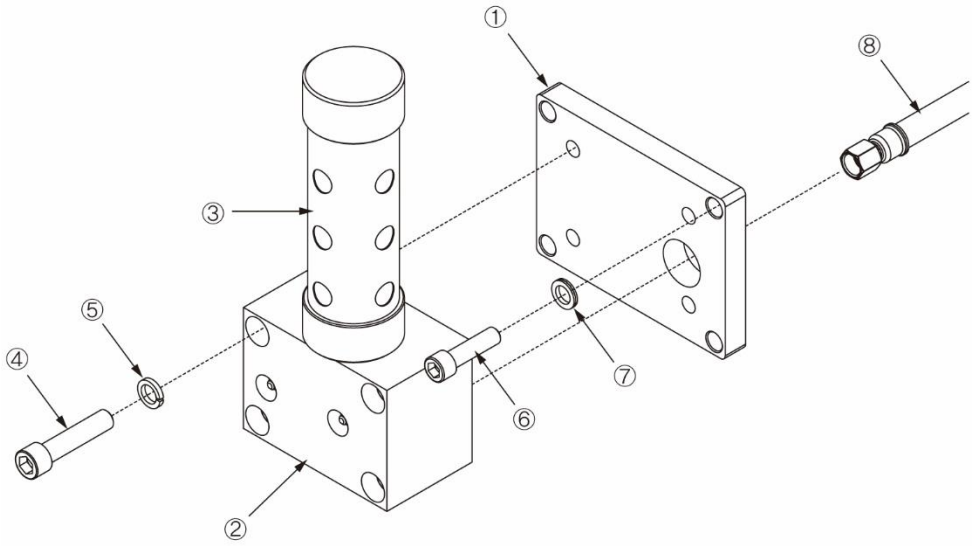
f) Vibrating ALS kit composition (100DX ~ 180DX)



No.	Part description	Q'ty
1	AUTO GREASE BASE PLATE	1
2	AUTO GREASE BODY	1
3	CARTRIDGE	1
4	SOCKET BOLT	4

No.	Part description	Q'ty
5	SPRING WASHER	4
6	SOCKET BOLT	4
7	NORDLOCK WASHER	4
8	GREASE HOSE	1

g) Vibrating ALS kit composition (200DX ~ 1200DX)



No.	Part description	Q'ty
1	AUTO GREASE BASE PLATE	1
2	AUTO GREASE BODY	1
3	CARTRIDGE	1
4	SOCKET BOLT	4

No.	Part description	Q'ty
5	SPRING WASHER	4
6	SOCKET BOLT	4
7	NORDLOCK WASHER	4
8	GREASE HOSE	1

J. Underwater application breaker

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.

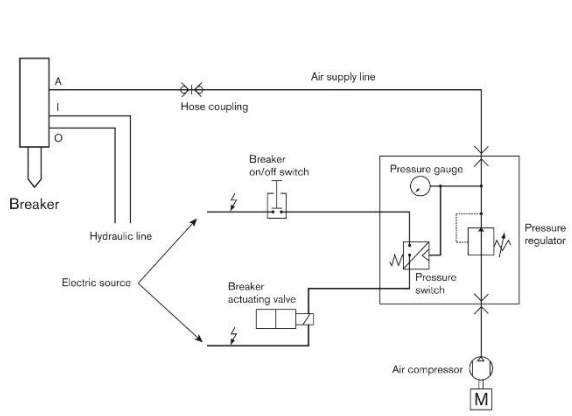
When the breaker is operated at underwater application without any proper underwater kit, water comes into percussion chamber and cylinder, cause serious damage to seals, cylinder, piston and control valve such as corrosion, scratch and crack as well as a significantly shortened life time of chisel/tool, 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.

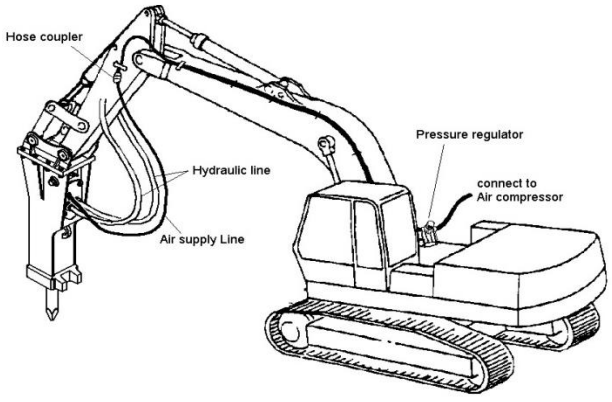
IMPORTANT! The breaker manufacturer do NOT supply any underwater kit.
All information related with underwater kit technical information, installation, capacity, setting pressure, operation, maintenance, part list, etc. of this Service Manual is only to help the operator understand risks and requirements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

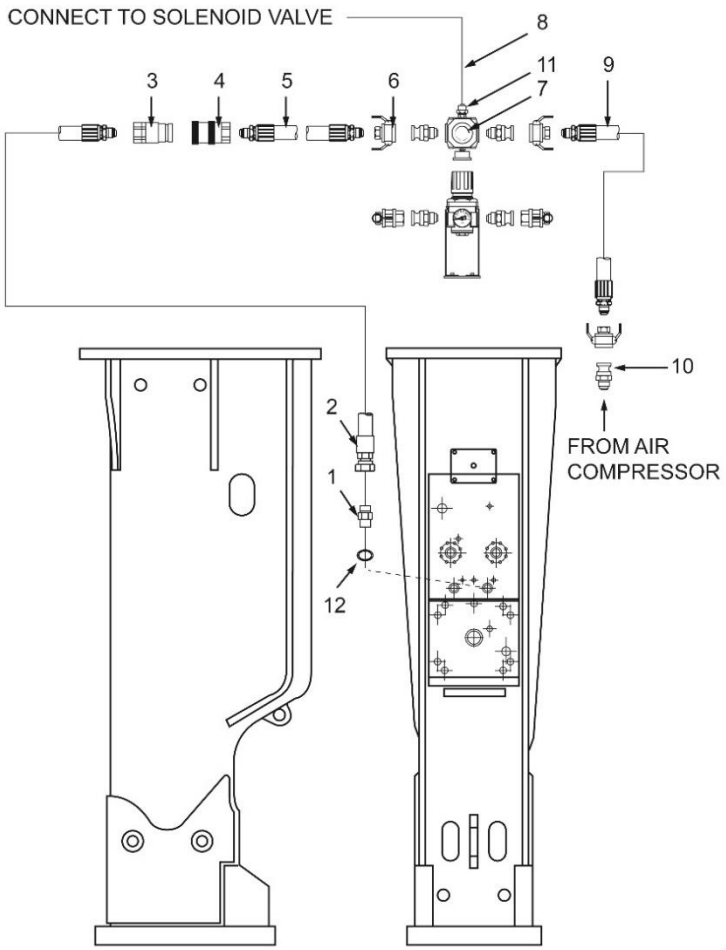
A) Structure of underwater kit

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



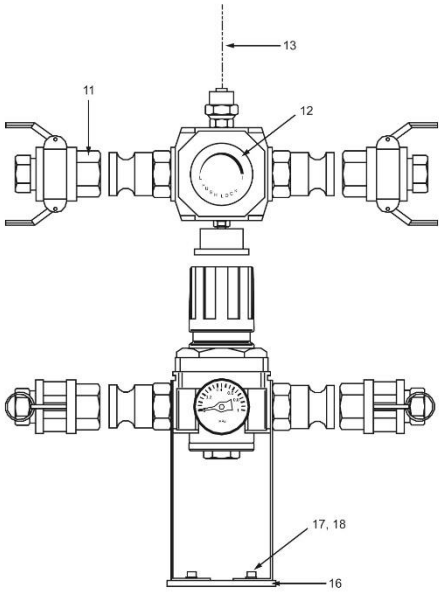


a) Typical underwater kit parts of 220DX class



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

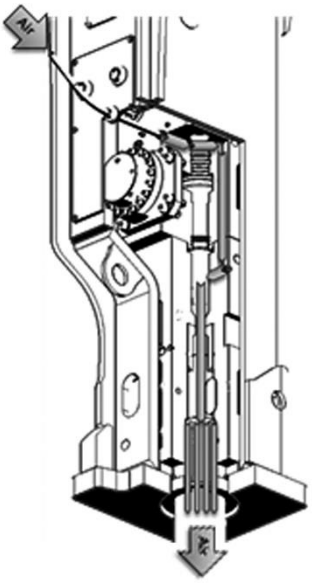
b) Pressure regulator



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.



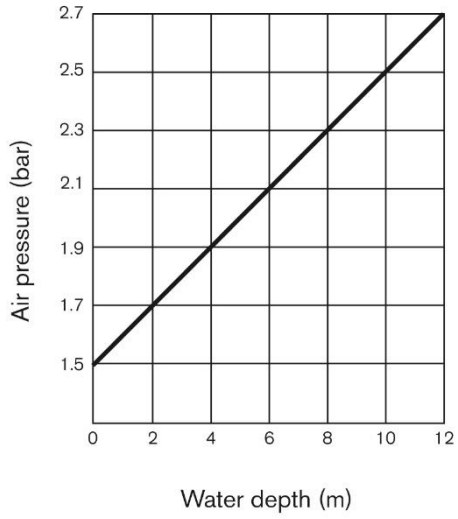
Air supply hose can be fitted to the air inlet port of cylinder. Insert air supply hose through rubber cover and fit it on the air inlet port.

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.

Warranty Registration Card

1. Customer and Dates Related

Distributor Name		Date of Delivery to dealer	
Customer Name		Date of Install	
Customer Address			

2. Breaker

Model		Gas Pressure (B/H)	Kg/cm^2
Serial Number		Gas Pressure (Acc')	Kg/cm^2

3. Accessories delivered with breaker to the customer

No.	Accessories		No.	Accessories	
1	Breaker chisel/tool	Yes ☒ No ☐	6	Tool box	Yes ☒ No ☐
2	Gas charging kit	Yes ☒ No ☐	7	Operation manual	Yes ☒ No ☐
3	Gas cylinder	Yes ☐ No ☒	8	Breaker bracket	Yes ☒ No ☐
4	Spring guard hose	Yes ☒ No ☐	9	Part catalog	Yes ☒ No ☐
5	Maintenance chisel/tools	Yes ☒ No ☐	10	ALS (option)	Yes ☒ No ☐

4. Type and Condition of Base Carrier

Brand		Manufactured Year	
Model		Total Weight	Ton

Operating Pressure	Kg/cm^2	Main Relief Set Pressure	Kg/cm^2
Oil Flow	L/min	2nd Relief Set Pressure	Kg/cm^2
Hours (when installed)		Max. Output of Pumps Supplying	L/min

5. Warranty

Date of Start		Date of Expiry	

6. Acknowledgement & Comment

Inspector's Comment / Distributor	SIGNATURE
	Date :
Inspector's Comment / Customer	SIGNATURE
I hereby acknowledge that the product has been delivered in satisfactory condition and operates satisfactorily, and that I received all items as checked above, and that all aspect of the standard warranty and suggestions in use has been fully explained to me.	Date :

Failure report

1. Customer profile

Customer name		Failure date★	
Distributor name		Repair date	
Location★★		Report date	
Work type	☐Primary breaking. ☐Secondary breaking. ☐Demolition. ☐Hard rock removal. ☐Soft rock removal.		
Working shift	☐Single ☐Two ☐Three		

2. Breaker & carrier profile

Breaker		**Carrier** (excavator, backhoe loader etc.)	
Model		Model	
Serial number		Manufactured year	
Delivery date★★★		Delivery date	
Operating hours		Operating hours	

3. Breaker & carrier working condition

2nd relief setting pressure	Kg/cm^2 psi	Gas pressure (B/H)	Kg/cm^2 psi
Oil flow	L/min g/min	Gas pressure (Acc')	Kg/cm^2 psi

4. Breaker failure

4-1. Failure detail

Failure part	
Symptom	
Distributor Comment	

★ Fill in dd/mm/yyyy
★★ Fill in both city and country
★★★ The day when the breaker was delivered to the customer

4-2. Repaired and/or replaced parts

Part number	Part description	Quantity

5. Required photos for failure analysis

Whole carrier body	Carrier hour meter
Whole breaker body	Breaker name plate
Breaker failure part	Breaker failure part
Breaker failure part	Breaker failure part

Breaker failure part	Breaker failure part
Breaker failure part	Breaker failure part

6. Appendix

A. 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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