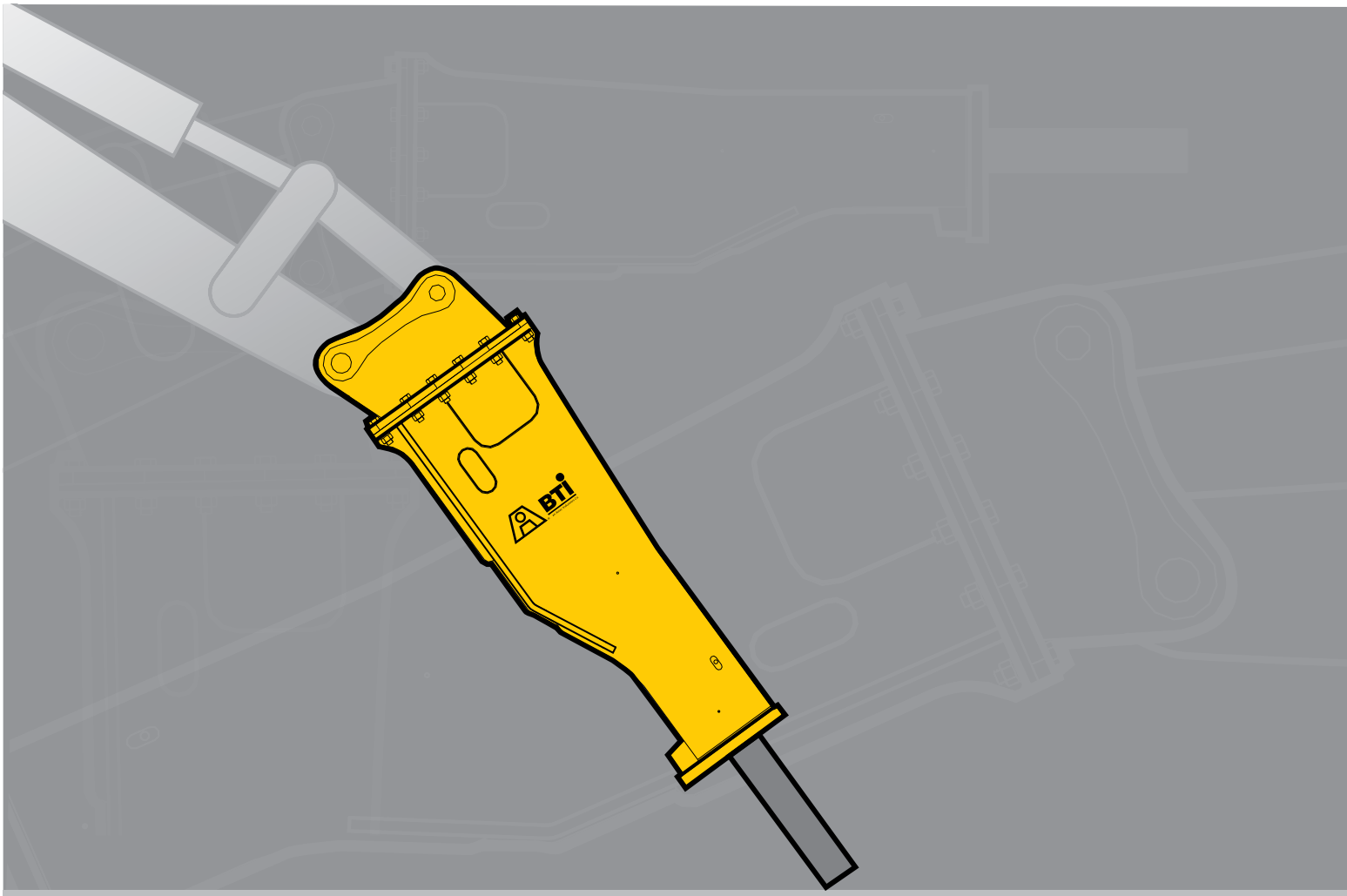
Hydraulic Breaker

Owner's Manual



BXR SERIES

Operation and Parts

BXR50, BXR65,
BXR85, BXR100,
BXR120, BXR160

BTI
an Astec Industries Co.

150-2086

Introduction

To our customer

Thank you for purchasing a Breaker Technology (BTI) product for your application. At BTI, we pride ourselves in the equipment we manufacture and distribute.

BTI has led the way providing equipment and services for construction, aggregate and mining industries for over 50 years. Technology plays a critical role in the company's continued success. BTI enjoys a reputation for engineering products with the most advanced technologies, yet the resulting systems are remarkably easy to use.

At BTI we believe our product is the industry standard, without exception. Meticulous care has been taken to ensure that this product will meet rigorous product requirements. Using up-to-date CAD modelling software, complemented with finite element analysis, you can be satisfied that our product will meet and exceed your prerequisites. BTI has successfully registered our Thornbury facilities as ISO 9001:2008 compliant and to ISO 14001:2004, which is an internationally recognized environmental management system. As always, BTI is committed to continuous improvements translated into positive action.

We feel fortunate to say that our team consists of seasoned, long-term, dedicated employees. They are able to respond quickly from our strategically located sales and service locations to any questions you may have.

BTI
an Astec Industries Co.

www.rockbreaker.com

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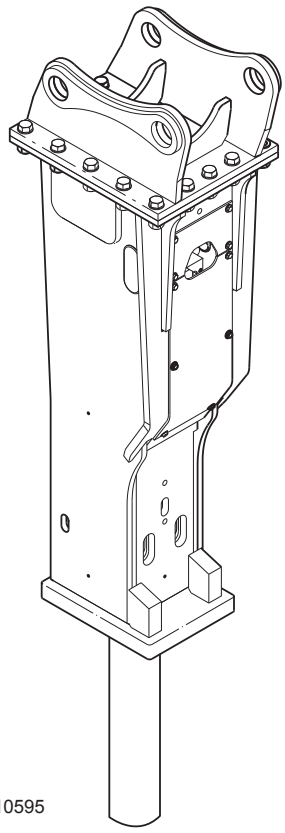
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Foreword

This book is intended as a guide to the use and maintenance of the BTI BXR Series Hydraulic Breakers. Keep it with the operator at all times.

Replace it immediately if it becomes lost.

The design of the BXR Series of Hydraulic Breakers produces stable high-speed percussion, and exceptional value and durability for all construction, demolition, and rock breaking requirements. BTI BXR Series Hydraulic Breakers use sophisticated technology to produce a simple design.

Field-proven and customer-sanctioned BTI breakers are enthusiastically accepted as the standard for the industries they serve.

Some typical applications are:

- Construction
- Demolition
- Recycling
- Mining
- Quarrying
- Trenching
- Tunneling

Contents

NOTES

General Information

Product Serial Number

Always state the product serial number (S.N.) in any correspondence with BTI or any authorized customer service center.

The Master Serial Number for the breaker and the body are stamped at the top of the cylinder body.

There are other serial numbers for major parts stamped on different parts of the breaker. This may not be the same as the master serial number for the cylinder and breaker.

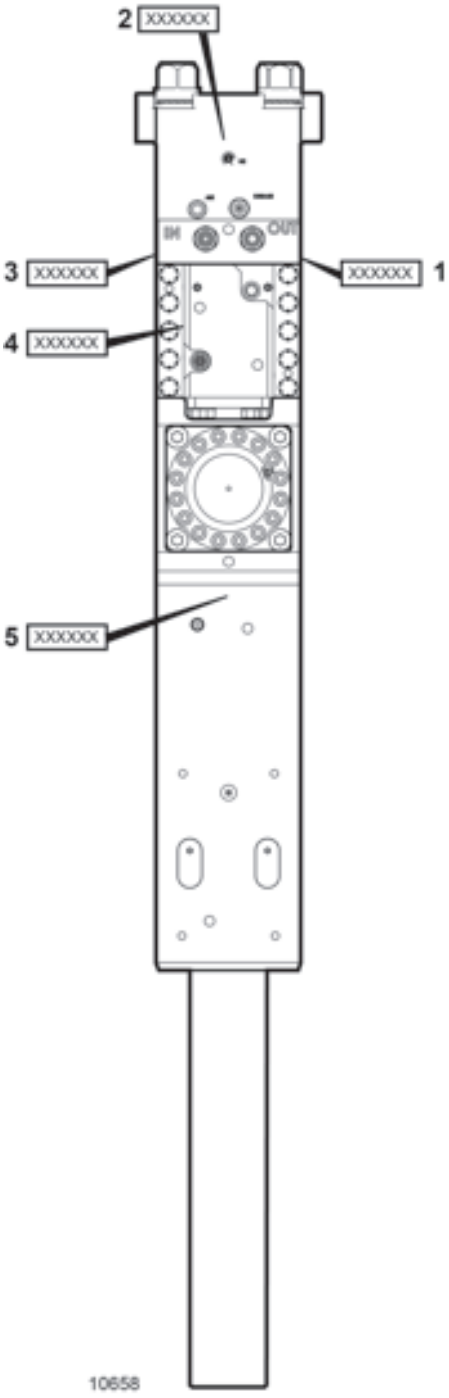
1) Master Breaker / Cylinder Serial Number

2) Rear Head Serial Number

3) Breaker Model Number

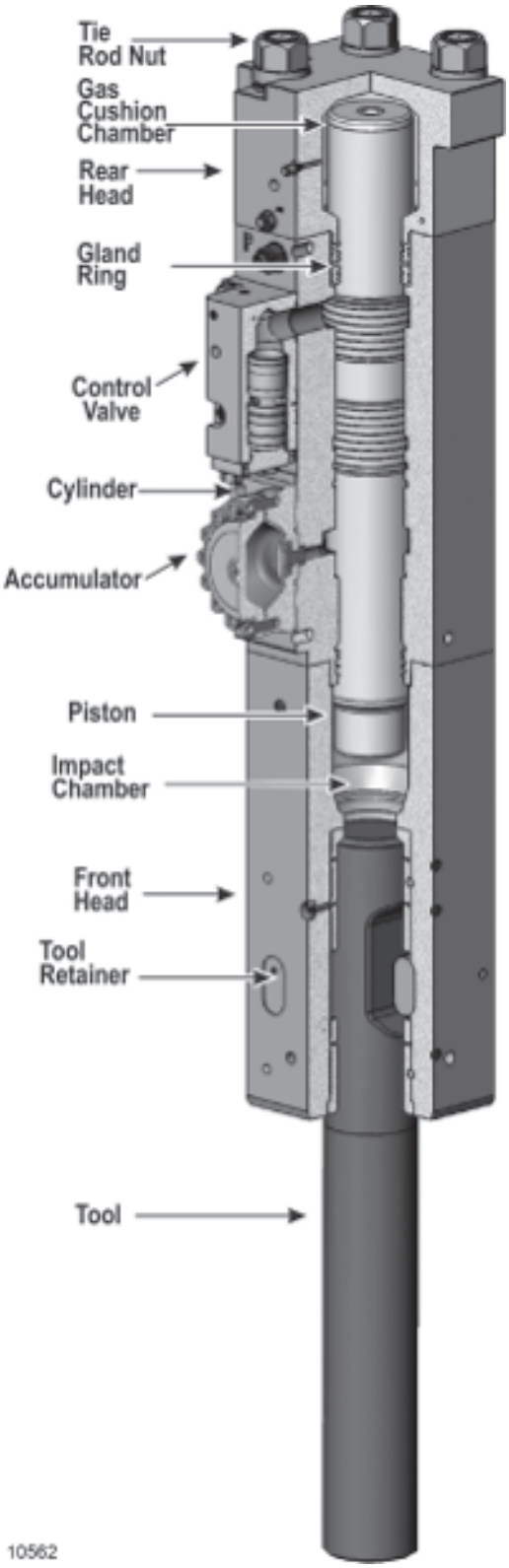
4) Valve Chest Serial Number

5) Front Head Serial Number



Structure and Design

The BXR hydraulic breaker represents the state of the art in rock breaking technology. The BTI hydraulic breaker delivers rock-breaking power with the minimum of parts.



Four tie rods are assembled to hold the cylinder and rear head together with the front head.

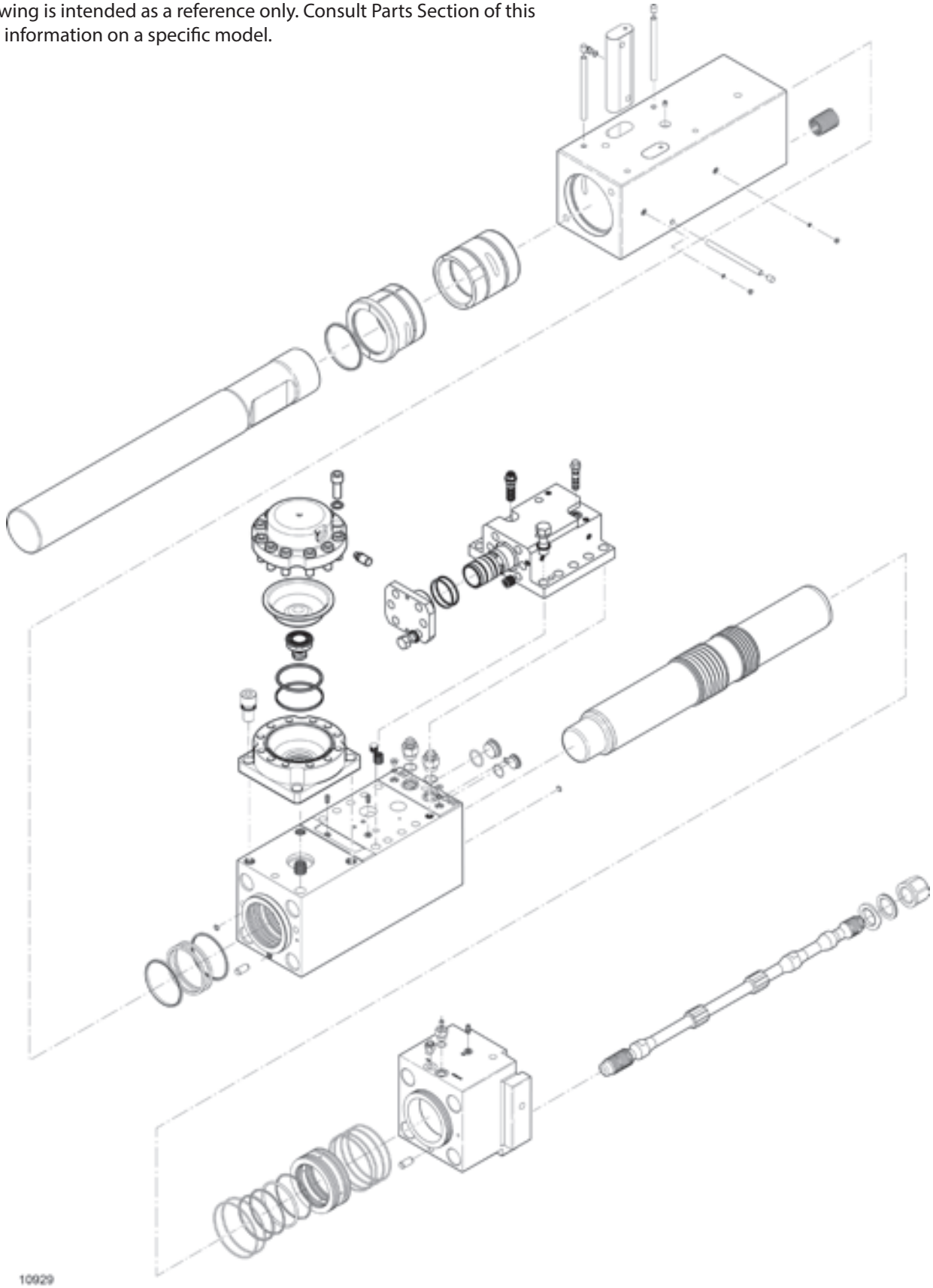
A control valve is assembled to the cylinder and regulates piston movement.

The cylinder contains a moving piston that strikes the tool.

Retainer pins inside the front head prevent the tool from coming out.

Bare Breaker Exploded View

NOTE: Drawing is intended as a reference only. Consult Parts Section of this manual for information on a specific model.



Features and Benefits

1) Overall system designed for harsh, continuous duty use in demanding rock-breaking applications.

2) High volume nitrogen chamber – reduces pressure fluctuations in the hydraulic circuit and provides stable piston acceleration, while providing consistent blow energy and recoil energy absorption.

3) Effective energy recovery system captures recoil energy for use on the next blow – increasing breaker efficiency, providing more power to the target material resulting in higher production rates.

4) Precise tolerances between the piston and cylinder – provide high breaker efficiencies, blow rates, and power.

5) Extra-long stroke piston – provides stable piston acceleration and efficient absorption of recoil energy for reliable operation in all breaking situations. The extra long stroke and heavy piston design improves the power-to-weight ratio of the breaker providing the widest carrier range and power available in the energy class.

6) Large tool diameter – provides excellent raking strength and transmission of energy from the piston to the tool and target material.

7) A high-pressure accumulator reduces any potential pressure spikes produced by the large piston and energy recovery system.

8) Remote air breather located at the top of the breaker – provides clean air to impact chamber, and allows for convenient hook up of compressed air for underwater applications.

9) Remote greasing port, located near the top of the breaker, close to the main hydraulic hose connections – provides a convenient interface to carrier-mounted remote greasing systems.

10) Unique teardrop washer and hardened stainless steel "Nordlock" washers located at the top of the tie rod – eliminates the loss of the tie rod torque due to bolts loosening from vibration.

11) Oversized, high tensile alloy steel tie-rods equipped with multiple vibration dampeners – reduce tie-rod stress and vibration increasing breaker life and dependability.

12) The design concept provides for stronger short tie-rods reducing tie rod fatigue from vibration.

13) Oversized heliserts located at the lower end of the tie-rods in the front-head – provide excellent load transmission between the components reducing fatigue.

14) Oversized upper and lower shock absorbing isolators reduce vibration feedback to the carrier.

15) Large access panels allow routine maintenance to the accumulator, control valve body and hose connections without removing the breaker from the box housing.

16) Contoured, composite, high-pressure accumulator bladder design-maximizes bladder life.

17) Flat top tool design – allows for maximum levels of energy transfer.

18) Oversized, full-length oval retaining pins - provide excellent resistance to blank fire with an expansive load bearing area on the front head.

19) Thick abrasion resistant plate and rock-claws at the breaker nose – prolong box housing life and improve material handling.

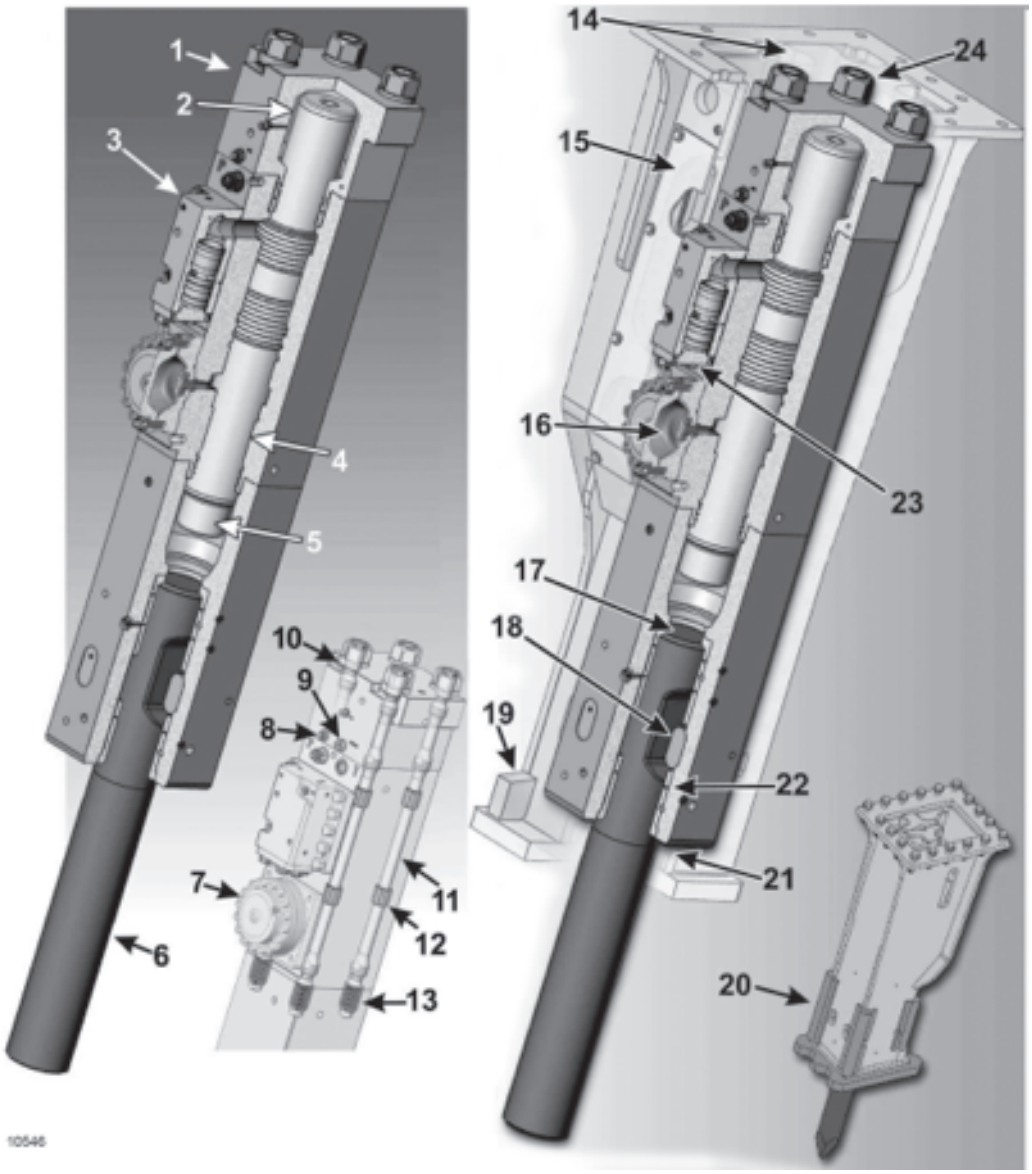
20) Optional severe duty package with additional abrasion resistant plate at the nose and wear bars along the side of the breaker withstand the toughest wear conditions.

21) Suspended breaker design – reduces breaker noise for a quieter system and reduces vibration to the carrier.

22) BTI's exclusive front head restraint system within the housing tightly guides the front head within the box-housing - reduces loading to the tie rods and the upper portion of the breaker by eliminating load transfer to the upper half of the breaker.

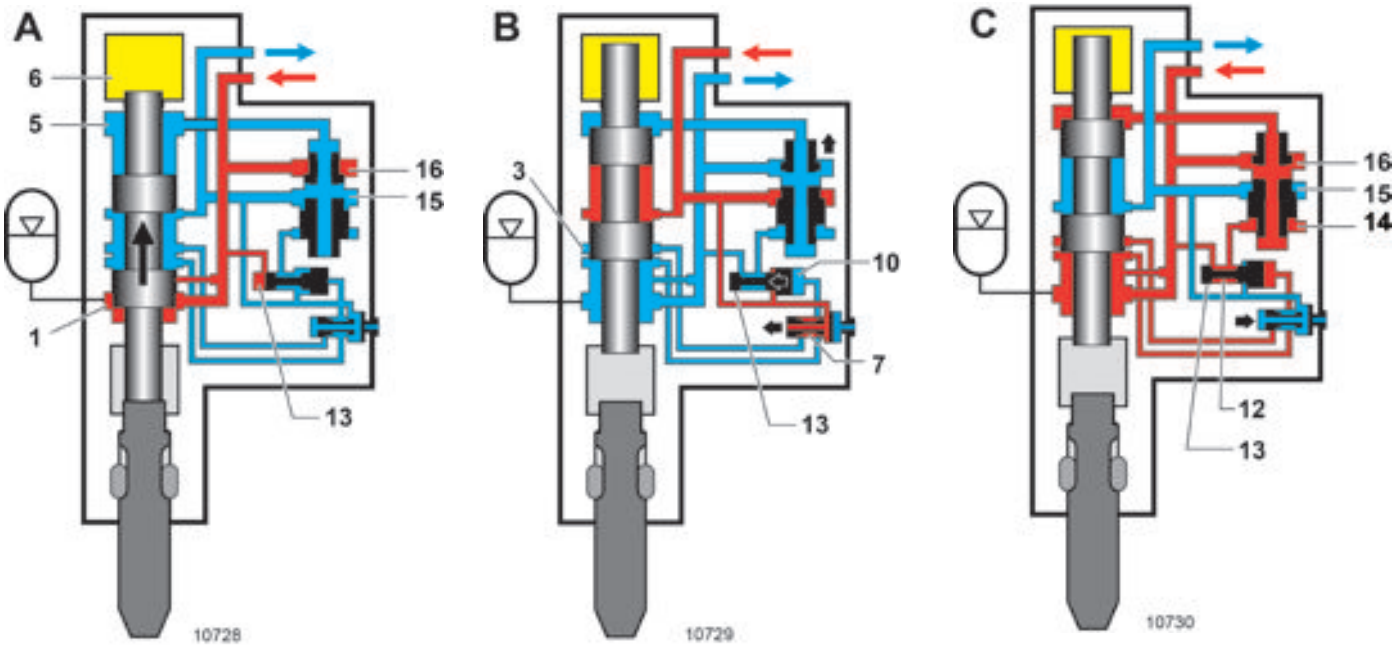
23) Anti-blank fire interlock - prevents blank fire of tool, reducing shock loading to the retaining pins and front head.

24) Rounded thread profile on the upper tie rod threads provides better load distributions and reduces stress to tie rod nuts, eliminating tie rod failure.



Simplified Principle of Operation

BXR Series hydraulic breakers have a simple design. The following diagrams illustrate the stages of movement as the breaker cycles in operation.



(A) Piston Upward Movement

Pressurized oil enters cylinder chamber (1), pilot chamber (13), and control valve chamber (16), the high/low speed selector valve is pushed to the right (low speed condition) by low-pressure. The pressurized oil in pilot chamber (13) pushes the pilot valve to the right side.

The pressurized oil in control valve chamber (16) pushes the control valve spool down. The pressurized oil in cylinder chamber (1) lifts the piston up compressing gas in nitrogen chamber (6).

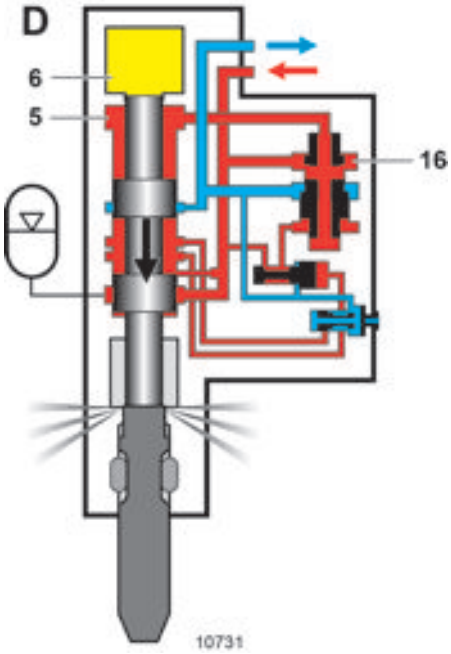
At this time, the oil on the opposite side of the piston in cylinder chamber (5) flows out through the control valve chamber (15).

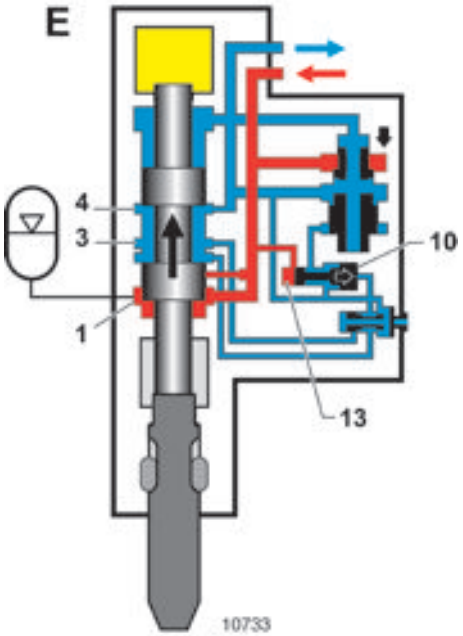
(B) Activating Pilot Valve On

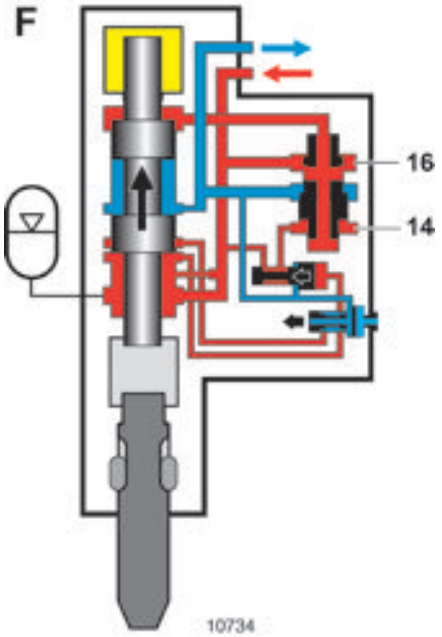
When the oil from the lower piston flange reaches cylinder chamber (3), pressurized oil flows through the high/low speed selector valve chamber (7) working against pilot valve chamber (10). Once the pressurized oil activates pilot chamber (10), pilot chambers (10) and (13) equalize pressure and due to the surface area difference, the pilot control valve spool is pushed to the left.

(C) Pilot Valve ON

When the pilot valve spool is pushed to the left (due to the surface area difference in the pilot valve) the pressurized oil working on pilot chamber (13) allows oil to pass through pilot chamber (12), activating the lower section of control valve chamber (14). When pressurized oil activates control valve chamber (14), chamber (14) and (16) equalize pressure (due to surface area difference) and the control valve spool moves up.







(D) Piston Downward Movement – Impact

When the control valve spool moves up, the pressurized oil in control valve chamber (16) moves through the control valve into cylinder chamber (5) pushing the piston down. The compressed gas in the nitrogen chamber (6) assists in the downward force on the piston.

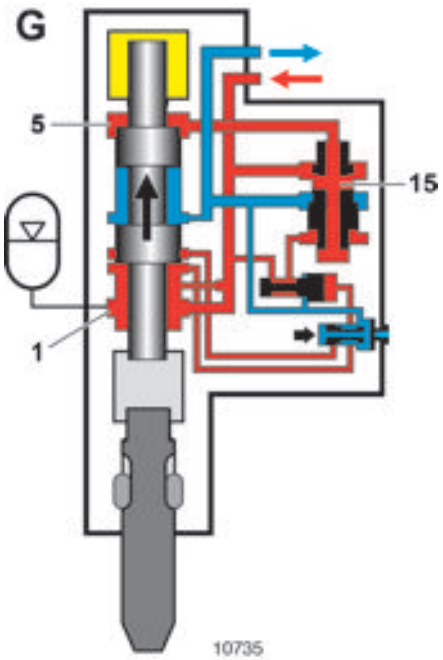
The piston hits the tool.

(E) Piston Upward Movement

As the piston's large diameter groove reaches pilot chamber (10) the pressurized oil flows out cylinder chambers (3) and (4). Pilot chamber (10) becomes low-pressure and because pilot chamber (13) is activated by pressurized oil, the pilot valve spool is pushed to the right.

(F) Pilot Valve OFF

When the pilot valve spool is pushed right, it activates the lower flange area of the control valve chamber (14), this pressurized oil passes through the pilot valve groove, draining the pilot chambers (11) and (12). When control valve chamber (14) becomes low-pressure, the control valve chamber (16) continues to be affected by pressurized oil pushing the control valve spool down.



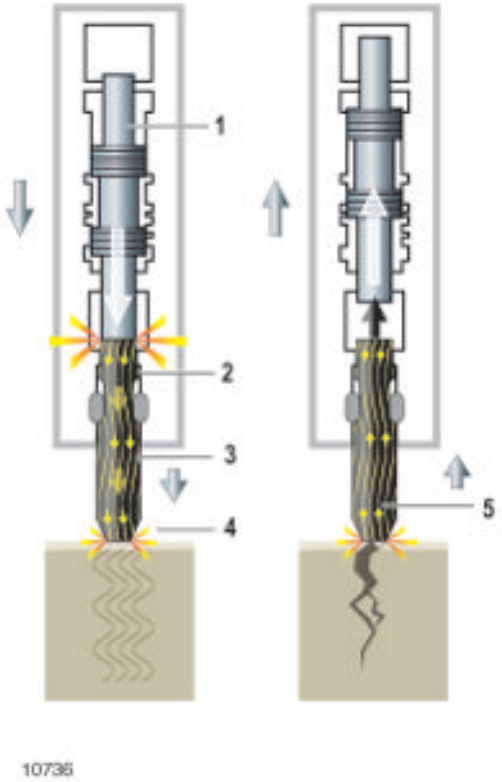
Main Control Valve OFF

When the control valve spool is pushed down, the control valve chamber (15) and the inside of the control valve connect, reducing pressure inside the control valve and in the upper section of the cylinder chamber. Pressurized oil enters the lower section of the cylinder chamber (1) pushing the piston up.

The above cycle repeats, resulting in continuous blows.

Oil Regeneration System

The timing (delayed circuit) for the pilot valve to switch over delays the switch over for the control valve. When the piston hits the tool, the reaction lifts (bounces) the piston and the oil in the upper flange area of piston chamber (5) passes through the control valve to the lower flange area of the piston chamber (1). This system reuses the pressurized oil to increase the blows per minute to improve breaker efficiency.



How the Tool Breaks Rock

The following paragraphs describe what happens to break rock when the piston strikes the tool.

Contact–Initial Compression Stress Wave

When the piston (1) strikes the top of the tool (2), it sends a compressive stress wave (3) down to the working end of the tool. If the tool is touching a rock, this energy/force (compressive stress wave) travels through the tool directly into the rock (4), fracturing it.

Recoil–Reflected Stress Wave

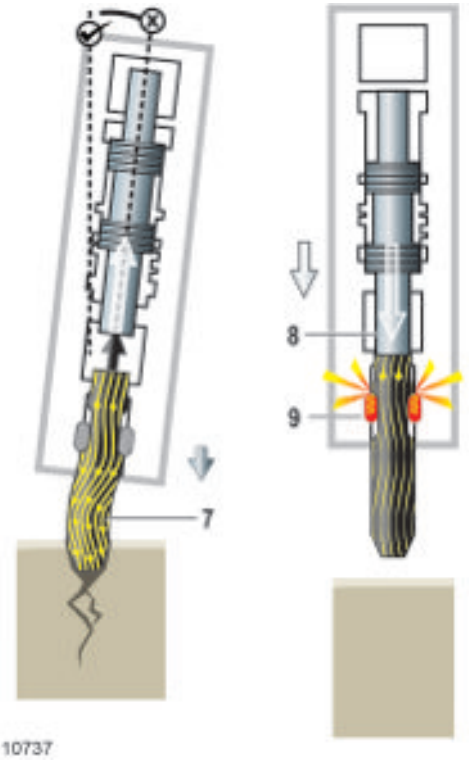
Immediately following the initial compressive stress wave, a reflected stress wave is formed (5), which travels back up the tool, 'bouncing' the piston up off the top of the tool. This cycle of compressive and tensile stresses flowing up and down the tool is repeated with each piston blow

Bending

Anything interfering with the strength of the flow of the compressive stress waves (7) during operation such as blank-firing (free-running) or prying with the tool, can lower breaker performance and cause tool fatigue. The breaker must be at a 90º angle to the face of the rock.

Blank-firing

Blank-firing the breaker without the tool pressing on a rock causes the energy that normally travels out the tool into the rock (8), to impact the retainer pins (9) and front head causing excess stress to these components.

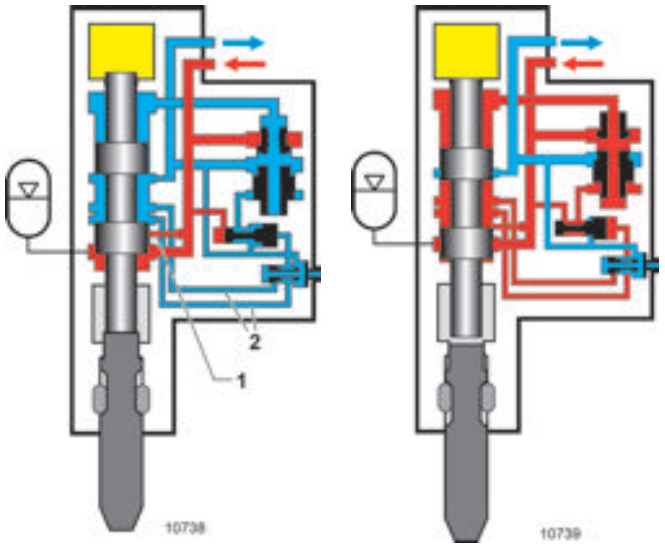


Anti-blank Firing

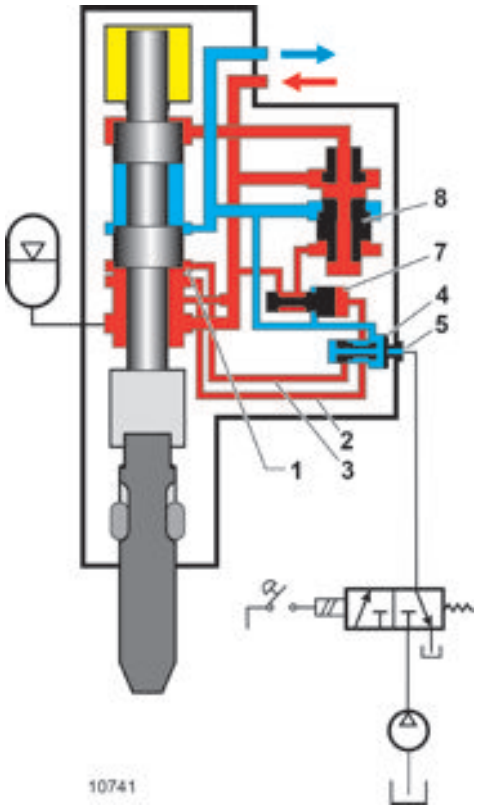
The BXR series of hydraulic breakers are equipped for anti-blank firing operation. During normal operation the blank-fire port (1) stops high-pressure oil moving to the upper diameter of the piston. As a result, the piston moves up and down normally.

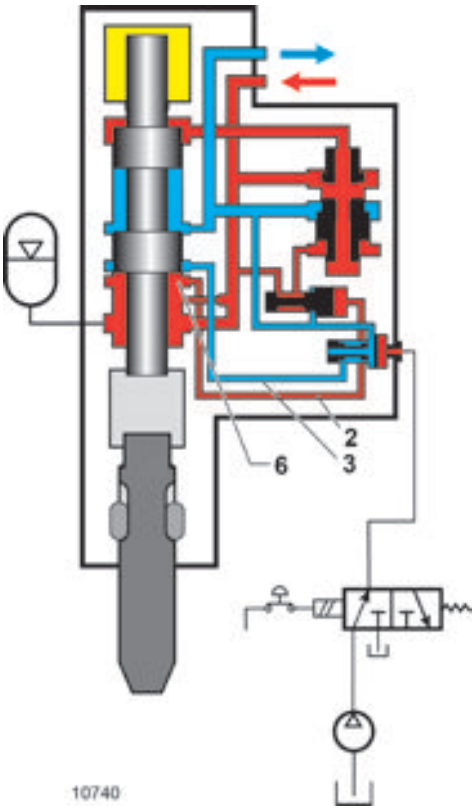
When a blank-fire situation occurs (tool is too low for the piston to hit) the groove located in the large diameter of the piston connects to the blank-fire blow port (1).

At this point, the high/low speed pilot lines (2) are activated and move the control valve spool up, and as a result allow high-pressure oil to the upper diameter of the piston. This prevents further cycling of the piston until the tool pushes the piston back up into the firing position.



Normal Operation **Anti-blank Fire Mode**





High/low Speed Selector Valve

The BXR series hydraulic breaker has an internal two-speed selector valve that can be remotely actuated by the operator.

NOTE: Connecting a minimum oil supply of 400 psi (27 bar) controlled by an on/off valve to the two-speed valve connection port, will allow the operator to manually shift the breaker between long and short stroke modes.

The longer stroke provides a slower speed and a higher power mode. The shorter stroke provides a higher speed and a lower power mode.

Long stroke / Slow speed (factory setting)

The breaker will operate in the standard mode with no hydraulic connection to the two-speed valve.

Venting hydraulic oil from the two speed valve to tank, shifts the valve spool to the right due to the back-pressure within the breaker. As a result, the high-speed pilot line (2) will be blocked triggering the low-speed pilot line (3) allowing the piston to operate in long-stroke mode.

The piston retracts up to the stroke signal cavity shifting the main valve spool; hydraulic pressure is sent to the two-speed valve, and the ORG pilot valve. The ORG pilot valve shifts, sending high-pressure oil to the main directional control valve spool. The main valve shifts and forces the piston back down to strike the tool.

1) Long Stroke Cavity
2) High-speed Pilot Line
3) Low-speed Pilot Line
4) Two-speed Valve
5) Two-speed Valve Connection Port
6) Short Stroke Cavity
7) ORG Pilot Valve
8) Main Control Valve

Short stroke / High speed (requires oil supply)

Remote pilot pressure is required to shift the two-speed valve. By pressurizing the two-speed control valve port, the valve spool is shifted left. This connects the high-speed pilot line (2) and low-speed pilot line (1), triggering the high-speed pilot line (2). This allows the piston to work in the short-stroke mode.

The piston retracts up to the stroke signal cavity shifting the main valve spool. A hydraulic pressure signal is generated and passes the two-speed valve to the main directional control valve spool. The main valve shifts and forces the piston back down to strike the tool.

See "High/Low Speed Selector Valve" on page 49 for additional information.

Sizing the Hydraulic Breaker

When sizing the breaker to the machine, two key points should be given careful consideration:

- Machine operating weight
- Hydraulic system capabilities

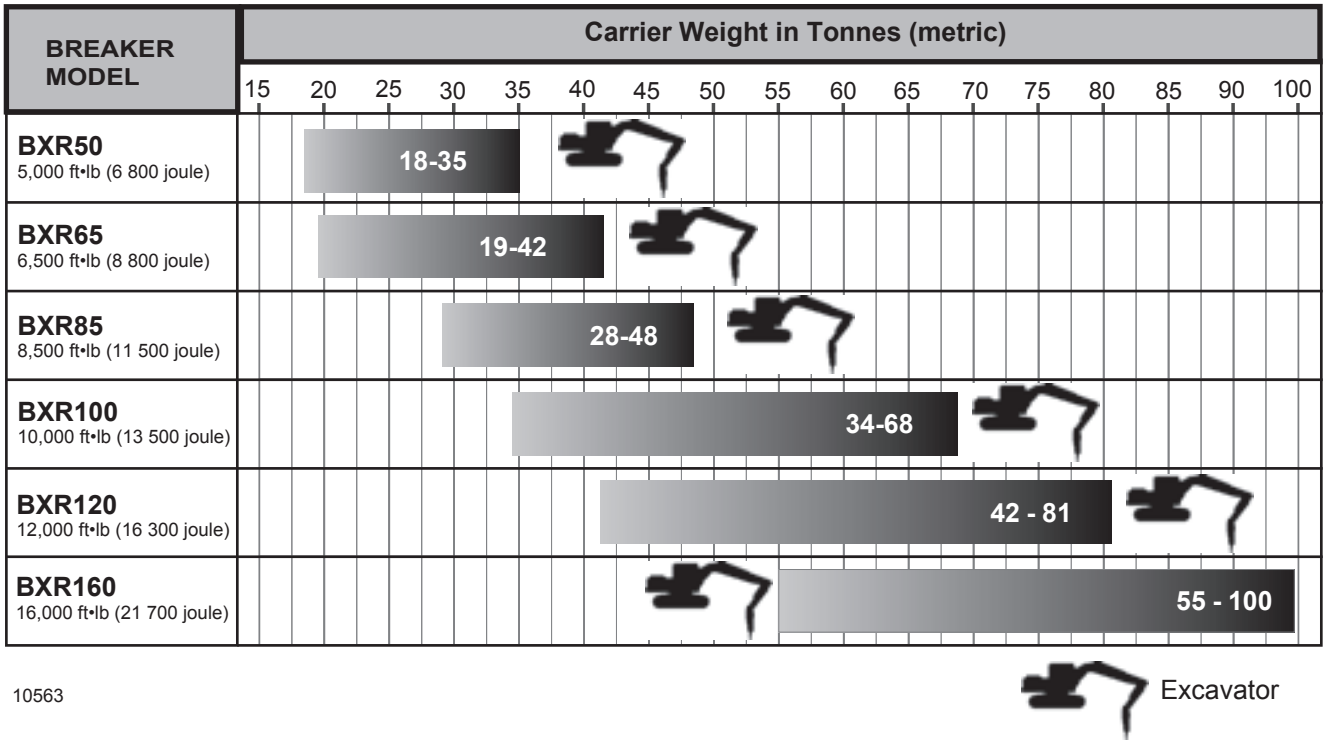
With the correct carrier weight, BTI offers hydraulic breakers that are designed to break any material that the machine can handle. Sizing the breaker by carrier hydraulics gives the operator a carrier/breaker combination designed to optimize the system efficiency, thereby reducing heat generation and eliminating power loss.

The following steps will result in a well-matched installation. This manual will not cover all types of applications, so for assistance in any unusual situations please contact your BTI representative.

Based on Carrier Weight

By using the *Carrier Sizing Chart* below, you can narrow your hammer choice. Normally breaker production rate is the most crucial factor when trying to choose a breaker size. It is of great benefit to do some research and understand your hydraulic system capabilities and the material size and hardness before determining an expected production rate. This rate will also be affected by breaking conditions and the operator.

Carrier Sizing Chart



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Based on Material Type and Hardness

It is also very important to match the breaker size to the hardness and size of the oversize material.

The table below illustrates the relationship of oversize rock and its hardness (compressive strength) to the size of the breaker required.

When the rock physical size or hardness exceeds the suggestions below, then it will be necessary to increase the breaker size accordingly.

Material Type and Hardness

Typical Oversize (average)	Compressive Strength (Rock Type)	Breaker Energy Class ft•lb	joule
1 cu yd and smaller	5,000–10,000 psi (cement grade soft limestone)	1,000	1 350
1 cu yd	10,000–20,000 psi (aggregate grade dolomite, limestone)	2,000	2 700
2 cu yd	20,000–30,000 psi (hard rock to softer granite)	4,000	5 400
3 cu yd	30,000-40,000 psi (very hard rock, granite, trap rock)	5,500	7 500
4 cu yd	30,000-50,000 psi (very hard rock, granite, trap rock)	8,500	11 500
6 cu yd	30,000-60,000 psi (very hard rock, granite, trap rock, iron ore)	10,000	13 600
8 cu yd	30,000-70,000 psi (very hard rock, granite, trap rock, iron ore)	12,000	16 300
10 cu yd and larger	30,000-90,000 psi (very hard rock, granite, trap rock, iron ore)	16,000	21 700

Based on the Type of Work

The Production Rate is the next important factor to consider in sizing the breaker. Refer to "Breaker Production Rates" on page 19. Most situations call for the largest breaker that your carrier could handle. The largest breaker is therefore the one to choose. The lifting capacity of your machine is then the limiting factor. The carrier machine must be able to safely handle the breaker at any distance out from the machine where you might be working.

Small Breakers

Smaller sized breakers up to 1,000 ft•lb class (1 350 joule) are typically used in concrete and other light duty work.

Medium Breakers

Medium sized breakers 1,500–4,000 ft•lb class (2 000–5 400 joule) are used in both concrete and rock applications with limitations on the size and amount of material to be broken.

Large Breakers

Larger breakers greater than the 4,000 ft•lb class (5 400 joule) are typically used in hard rock, high production applications.

Breaker Production Rates

The values shown are non-binding guidelines. They will vary depending on machine, operator and job conditions.

Production Rate/8 Hour Shift – yd^3 (m^3)

BREAKER MODEL	NON-REINFORCED CONCRETE	REINFORCED CONCRETE	MEDIUM ROCK	HARD ROCK
BXR50 5,000 ft•lb (6 800 joule)	475–600 (363–458)	200–340 (153–260)	250–440 (191–336)	200–360 (153–275)
BXR65 6,500 ft•lb (8 800 joule)	600–800 (459–612)	230–400 (176–306)	300–500 (229–382)	230–500 (176–382)
BXR85 8,500 ft•lb (11 500 joule)	700–900 (535–688)	250–510 (191–390)	360–600 (275–459)	300–475 (229–363)
BXR100 10,000 ft•lb (13 500 joule)	800–1,000 (612–765)	400–650 (306–497)	400–650 (306–497)	330–530 (252–405)
BXR120 12,000 ft•lb (16 300 joule)	900–1200 (688–917)	650–900 (497–688)	550–800 (420–612)	400–650 (306–497)
BXR160 16,000 ft•lb (21 700 joule)	1,000–1,400 (765–1 070)	800–1,100 (612–841)	650–1,000 (497–765)	490–800 (375–612)

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Breaking Oversize

When breaking oversize material, the breaker is expected to break the material down quickly into multiple pieces. This is optimum production. If the operator has to re-position the breaker towards the edge of the rock and gradually downsize the material, the production rate slows down.

To assess which breaker will effectively handle this application, the size and hardness of the material must be known.

For example, if a 4 cubic yard piece of hard rock (20,000 psi or greater) needs to be broken in half, a 7,500 ft•lb or larger breaker is required. If a 2 cubic yard piece of limestone (20,000 psi or less) needs to be broken in half, a 3,000–5,000 ft•lb breaker is required.

Trenching

When trenching, the breaker is expected to fracture a solid mass of rock into manageable pieces. The size of the material could be hundreds of cubic yards, and the energy will be quickly absorbed. This is why it is recommended to work from a bench so the rock has somewhere to break out.

When trenching in limestone or medium hard rock, use a 3,000–5,000 ft•lb breaker.

When working in hard material use a 7,500–10,000 ft•lb breaker, and if high production is critical, a larger breaker would be beneficial.

Breaking Concrete

When breaking Concrete, the breaker is expected to penetrate the material, allowing it to crack and shake loose from the reinforcing steel. High frequency breakers tend to provide better performance in this application. It is not the energy per blow, but the fast blow rate that destroys the concrete's structural integrity.

On concrete walls, footings and floors use a 750–1,500 ft•lb breaker.

With larger projects consisting of large footings greater then 4 cubic yards, use a 2,000–5,000 ft•lb breaker.

The high production demand of bridge and building demolition requires a 7,500–10,000 ft•lb breaker.

Recommended Hydraulic Oils

Generally speaking, the hydraulic oil intended for an excavator (carrier) can be used in the hydraulic breaker. A hydraulic oil with anti-wear, anti-oxidation, anti-foaming, and anti-rust properties is recommended with a Viscosity Index of 150–160.

Refer to the table below. Hydraulic oils from different suppliers that fall within the ISO (International Standards Organization) bar graph will have very similar viscosities. However, since working with the hydraulic breaker will heat the oil much more than in excavation work, the viscosity of the oil should be checked.

In continuous breaker operation, the temperature of the hydraulic oil stabilizes. This is dependent on ambient temperature, working conditions. In this situation, the viscosity of the hydraulic oil must be 20–45 cSt (2.90–6.20°E).

Recommended Hydraulic Oil	Ambient Temperature											
	ºF		-40	-22	-4	+14	+32	+50	+68	+86	+104	+122
	ºC		-40	-30	-20	-10	0	+10	+20	+30	+40	+50
Premium Quality HVI (High Viscosity Index)	** ISO HVI 15											
	ISO HVI 46											
	ISO HVI 68											

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** Warm-up procedure required in low temperatures. Refer to "Cold Weather Operation" on page 48 for special cold weather start-up and operation procedures.

CAUTION!

The breaker must not be operated when the hydraulic oil viscosity is above 800 cSt (114ºE) or below 15 cSt (2,35ºE). Serious damage may occur to the breaker and hydraulic circuit. Ensure procedures outlined in the carrier manual are followed.

Recommended Hydraulic Oils

The following hydraulic oils are recommended for BTI Breakers. For further reference information on selecting hydraulic oils not listed in this table , refer to Other Hydraulic Oils below.

The most suitable oil is selected such that the temperature of the oil (after continuous use) is in the **Ideal Operating Temperature Range**. This is when the hydraulic system is used to best advantage.

In continuous operation the oil temperature will stabilize. At this temperature, the viscosity of the hydraulic oil must be 20–45 cSt (2.90 - 6.20°E). A mineral based hydraulic oil or oil meeting the SE quality requirements in API classification should be used. Hydraulic oil intended for an excavator or front-end loader can be used in the breaker.

The carrier machine will always govern the hydraulic system oil cleanliness; however, for BTI hydraulic breakers, oil cleanliness must meet SAE Class 6 or ISO Class 1815. Refer to the carrier specification.

		Viscosity +40°C (104°F) cSt (E)	Permitted Operating Temperature Range 800 . . . 15 cSt Min: -20ºC (-4ºF) Max: 80ºC (176ºF)	Ideal Operating Temperature Range 40 . . . 20 cSt °C (°F)	Pour Point °C (°F)
Shell Tellus	**T32**	32 (4,35)	-15 (5) ...+60 (140)	+35 (95) ...+53 (127)	-50 (-58)
	T37	37 (4,95)	-10 (14) ... +65 (149)	+40 (140) ...+56 (133)	-40 (-40)
	T46	46 (6,15)	-5 (23) ...+70 (158)	+42 (108) ...+60 (140)	-35 (-31)
Mobil	**DTE13**	29 (3,95)	-20 (-4) ...+62 (144)	+32 (90) ...+52 (126)	-45 (-49)
	DTE15	40 (5,35)	-13 (9) ...+72 (162)	+40 (104) ...+61 (142)	-46 (-51)
	DTE16	58 (7,70)	-8 (18) ...+80 (176)	+48 (118) ...+71 (160)	-40 (-40)
Esso Univis	**HP32**	30 (4,10)	-17 (1) ...+60 (140)	+32 (90) ...+50 (122)	-48 (-54)
	HP46	45 (6,00)	-12 (10) ...+75 (167)	+45 (113) ...+65 (149)	-45 (-49)
Petro Canada Harmony	**AW32**	30 (4,10)	-20 (-4) ...+65 (149)	+33 (91) ...+54 (129)	-36 (-33)
	AW46	45 (5,60)	-20 (-4) ...+72 (162)	+43 (109) ...+62 (144)	-33 (-27)
	HVI22	20	-30 (-22) ...+57 (135)	+27 (81) ...+50 (122)	-57 (-71)
BP Energol	**HLP46**	50 (6,65)	-3 (27) ...+72 (162)	+44 (115) ...+62 (144)	-30 (-22)
Texaco Rando	**HDZ15**	16 (2,45)	-20 (-4) ...+43 (109)	+15 (59) ...+3 (37)	-60 (-76)
	HDZ32	32 (4,35)	-20 (-4) ...+65 (149)	+35 (95)...+55 (131)	-48 (-54)
	HDCZ68	65 (8,60)	-9 (16) ...+80 (176)	+55 (131) ...+80 (176)	-36 (-33)

Other Hydraulic Oils

Refer to the chart on the next page.

For optimum efficiency and service life of a BTI hydraulic breaker, it is recommended the operating viscosity of the selected oil (at operating temperature) be selected in the range "V opt", where V = oil viscosity.

Operating viscosity 20 . . . 45 mm^2/s refers to tank temperature (open loop circuit).

The following values are valid for extreme operating conditions:

- V_{min} =15 mm²/s for short periods at maximum leakage oil temperature of 90 °C
- V_{max} = 800 mm²/s for short periods upon cold start.
- Breaker operating temperature range where "t" = temperature: t_{min} = -20 °C t_{max} = +70 °C

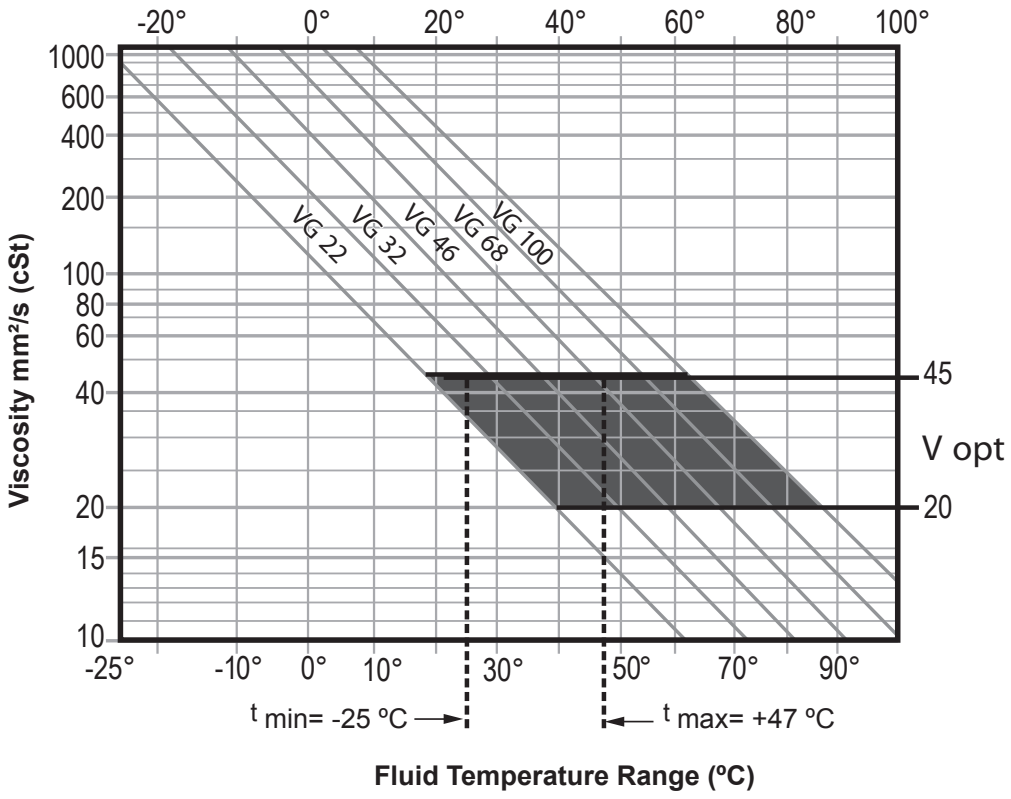
For correct selection of the fluid, it is assumed the operating temperature in the tank is known in relation to the ambient temperature.

The fluid selected must fall within the optimum range "V opt" (shaded area of chart). Always choose the higher viscosity grade in each case.

Example: At an ambient temperature of X ºC, the operating temperature in the tank will be 60 ºC. In the optimum operating viscosity range (V opt), this corresponds to viscosity grade VG46 or VG68. VG68 should be selected.

IMPORTANT: The leakage oil temperature is influenced by pressure and speed and is always higher than the tank temperature. The Breaker can stop working at temperatures over 158 ºF (70 ºC) inlet and 194 ºF (90 ºC) drain.

Contact BTI if the above recommendations cannot be adhered to because of extreme operating conditions and ambient temperatures.



Arctic Grade Oils

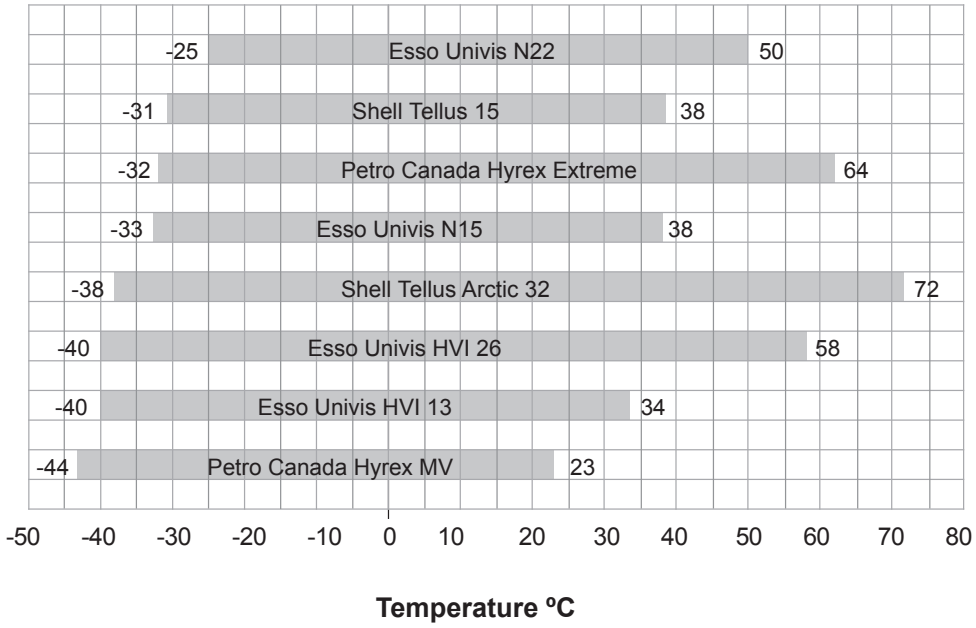
CAUTION!

Different hydraulic oils are required for summer and winter use where there is an average temperature difference of more than 95 ºF (35 ºC).

Hydraulic oil selection and recommendations:

Switching the hydraulic oil in the carrier to a lighter winter grade will assist in ensuring proper performance and longevity of the breaker. It is important to consult with your carrier supplier to consider their recommendations for the cold weather operation

The hydraulic system also requires the correct type and viscosity of hydraulic oil suitable for both the ambient temperature and the operating temperature range of the hydraulic circuit. The major consideration for oil selection is the viscosity and temperature range. BTI recommends an operating viscosity of the oil at 20 to 45 mm^2/sec (centistokes) with an extreme viscosity of 800 mm^2/sec at cold start up only.



Oil is Too Thick or Too Thin

Thick oil may cause:

- Difficult start-up
- Stiff operation
- Danger of cavitation in the pumps
- Accelerated wear of pumps and breaker
- Sticky valves
- Filter bypasses (oil impurities not removed), contamination in hydraulic tank

Thin oil may cause:

- Efficiency losses (internal leakage)
- Breaker strikes slowly and irregularly
- Damage to gaskets and seals, leaks
- Accelerated wear of parts from decreased lubrication

Hydraulic Oil Purity

It is beneficial for the tank return line to pass through a filter. This ensures dirt introduced into the system by connecting and disconnecting the breaker is caught before entering the carrier's pump. Dirt destroys a hydraulic system, so ensure the breaker hose connections are protected when the breaker is not in use. Impurities also heat and age the hydraulic oil.

Air and water are also considered impurities in oil (not all impurities can be seen with the naked eye).

Impurities can enter the hydraulic system:

- When components are repaired or serviced
- During hydraulic oil changes and refilling
- When the breaker is operated with worn cylinder and seals
- When hoses are disconnected during breaker removal/installation

Results of damage by hydraulic oil impurity:

- Working life of pump(s) significantly shortened – rapid wear of parts, corrosion.
- Valves do not function properly – spools bind, accelerated wear of parts, blocking of small holes.
- Rapidly accelerated wear on cylinders and seals.
- Reduced breaker efficiency – accelerated wear of moving parts and seals, piston seizing up, oil leakage.
- Shortened working life and reduced efficiency of hydraulic oil –overheats, ages, electrochemical changes.
- Excessive large particle contamination can cause severe damage to the piston and piston cavity.

CAUTION!

After a major component failure, the hydraulic system must be flushed.

Component damage is only a symptom. The trouble itself cannot be cured by removing the symptom.

Hydraulic Oil Cooling

CAUTION!

The maximum permitted hydraulic oil temperature in continuous breaker use is 120°–158 °F (50°–70 °C), depending on the viscosity of the oil in the system.

It is essential the carrier has a reliable hydraulic oil temperature sensor installed. The temperature of the hydraulic oil will depend upon ambient conditions, efficiency of the cooling system, and the amount of breaker use.

Additional cooling may be required.

NOTES

Safety Rules

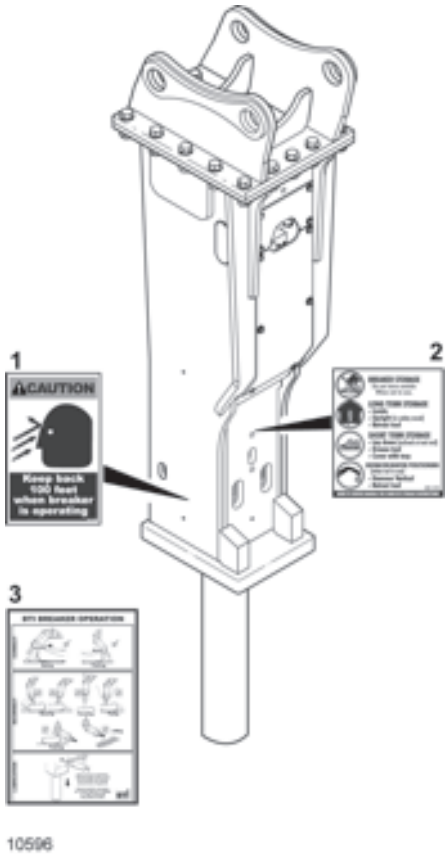
BTI's policy is to produce products that are safe and reliable. However, even when using well-engineered equipment, there will always be an element of risk. To minimize the risks and promote safety at all times, this section of the operator's manual details a number of safety rules that must always be followed and obeyed.

IMPORTANT! When it comes to safety, nothing will ever replace a careful operator.

This Owner's Manual is the primary source in maintaining optimum performance from the hydraulic breaker. It is imperative that the operator reads and understands all the safety information in this manual before proceeding. Failure to follow the instructions or heed the warnings could result in injury or death. **Proper care is your responsibility**.

BTI cannot anticipate every possible circumstance that might involve a hazard. The hazard alerts in this publication and on the product, are therefore not all inclusive. If a tool, procedure, work method, or operating technique not specifically recommended by BTI is used, you must satisfy yourself that it is safe for you and others. You should also ensure the hydraulic breaker will not be damaged or made unsafe by the operation, maintenance, or repair procedures you choose.

- It is the obligation of the operator to make sure that all warning decals are in place on the machine and that they are readable. Accidents may otherwise occur. Contact your distributor or BTI for replacement manuals or decals.
- Consult the AEM Safety Manual included with this product for additional operation safety tips and procedures for maintenance personnel.
- Should there be any information or instructions in this manual that are not in compliance with local laws and regulations in force in the country or region where this equipment is operated, the local laws and regulations must take precedence.



Safety Decal Locations

1. 500-0322 – placed on both sides of the breaker.
2. 500-1370 – placed on the valve side of the breaker.
3. 500-0665 – supplied in the tool kit.

Safety Alert Symbol

The symbol above appears at various points in the manual together with warning text. It means – be alert! Your safety is involved. This symbol is used throughout the manual to call attention to areas in which carelessness or failure to follow specific procedures may result in personal injury and/or component damage or malfunction.

Signal Words

DANGER! – Identifies the most serious hazards where failure to follow listed procedures will result in a high probability of death or serious injury.

WARNING! – Denotes a hazard exists that could result in serious injury or death if proper precautions are not taken.

CAUTION! – Is used in areas where failure to follow listed procedures may cause personal injury, component damage or subsequent malfunction.

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General Safety Precautions

⚠ WARNING!

The operator of this machine must have sufficient knowledge and instructions before he/she operates the machine.

Untrained operators may cause severe injuries or even fatalities. Therefore, it is important that you read and follow the instructions of this Owner's Manual.

- Never use a machine that has no Owner's Manual available. Learn and understand the safety signs and symbols on the machine and the operator instructions before you begin to use the machine.
- Wear protective clothing – know and use the protective equipment that is to be worn when operating or servicing the hydraulic breaker. Hard hats, protective glasses, protective shoes, gloves, reflector type vests, respirators and ear protection are types of equipment that may be required. Prolonged exposure to loud noise can cause hearing damage.
- Operate the machine only when physically fit and not under the influence of alcohol or drugs.
- Avoid loose fitting clothing, loose or uncovered long hair, jewelry and loose personal articles. These can get caught in moving parts.
- Keep all personnel well away from the hydraulic breaker when it is operating. Small pieces of stone or concrete can fly off causing serious injury to bystanders.
- Keep a first aid kit and a multi-purpose fire extinguisher on or near the machine, and know how to use them. Know where to get help.
- Before starting up the hydraulic breaker, perform a daily inspection and include it in the daily machine walk-around. Pay special attention to hoses and electrical connections. Make repairs before operating the breaker.

Practice Safe Maintenance

- Only trained mechanics should repair or disassemble the hydraulic breaker. Be sure you understand a service procedure before beginning any work; if you are uncertain, contact your BTI representative.
- Avoid unauthorized machine modifications – never substitute alternate parts not intended for the application. This could create hazardous situations or machine failure. BTI Engineering must approve all machine modifications; they can affect product reliability and machine stability.
- Before performing any work on the machine, attach a DO NOT OPERATE or similar tag in the operator's cab to alert others of service work being performed. Remove engine key and master key switch. Unexpected machine movement can cause serious injury.
- The accumulator and cushion chamber are charged with nitrogen (N_2) – a non-explosive inert gas. Only use N_2 when refilling them. Charging with any other gas could trigger an explosion and lead to serious or possibly fatal injuries.

- Relieve all gas pressure in the accumulator and cushion chamber before beginning disassembly procedures to avoid the potential for accidents or injury. They remain under pressure even after the hydraulic system is depressurized. Refer to the Maintenance section of this manual.
- Stay clear of the tool when charging the breaker cushion chamber. Gas pressure may cause unexpected piston movement and force the tool to jump against the tool retainer pins.
- Use only lifting devices with sufficient capacity to safely support the expected weight you are lifting.
- All lifting devices (straps, slings, chains, ratchet blocks, etc.) must comply with applicable local regulations and certifications. BTI cannot accept responsibility for the use of sub-standard equipment and work practices.
- When lifting or supporting the breaker or its parts, use equipment with a sufficient lifting capacity.
- Use the lifting eyes or lifting points that are located on certain breaker components.
- Do not work under a hanging or suspended load!

Precautions for Working on Hydraulic Systems

⚠ WARNING!

Risk of personal injury! Wear safety glasses and use protective gloves.

Relieve all trapped pressure before performing any service to the hydraulic system. Pressure can be maintained in the hydraulic circuits long after the power source and pump have been shut down.

- Relieve all pressure before disconnecting hoses or tubes.
- Tighten all connections before applying pressure.

It is important that each person who comes in contact with the machine be alert to any faults.

Follow these basic precautions:

- Never adjust a pressure relief valve or other pressure-limiting device to a higher pressure than specified.
- Check to make sure hydraulic hoses are not worn or damaged, and are routed to avoid chafing.
- Replace any hydraulic hose immediately that shows signs of swelling, wear, leaks or damage before it bursts.
- Hydraulic fluid escaping under pressure can penetrate the skin causing serious injury. Do not use your hand to check for hydraulic oil leaks. Use a piece of cardboard. If skin penetration occurs, seek medical attention immediately. Relieve all pressure before disconnecting hoses.
- Do not bend or strike high-pressure lines, tubes or hoses, or reinstall them in a bent or damaged condition.
- All high pressure hydraulic hoses, hose ends and adapters used for the installation of the hydraulic breaker must meet SAE J517 or DIN 20066 standards. Always make sure these standards are met if replacing any of these components. Using components of a lesser standard could result in failure.

Precautions for Handling Hydraulic Oil

⚠ WARNING!

Risk of burns! Use protective work gloves.

- Hot oil can cause painful burns. Use caution when changing the hydraulic oil.
- Oils can irritate and damage the eyes, throat and other sensitive skin. Avoid contact.
- Petroleum based oils are hazardous to the environment. Take special care not to spill or discharge these fluids. Use approved containers and methods to handle and dispose of them.
- Use an authorized disposal and recycling company.

Work Site Precautions

⚠ WARNING!

Know the location of any flammable gas lines in the construction area.

Damaged gas lines could lead to a fire or explosion. Operating the breaker may create sparks that could ignite highly flammable gases.

- Never operate the breaker in an environment where highly explosive gases could be present.
- Make sure there are no sources of flammable gases in the work area.
- Always provide sufficient ventilation when working in buildings or confined areas.

⚠ WARNING!

Never operate the breaker in the vicinity of explosives.

- Make sure there are no explosives hidden in the rock or stones being broken.
- The impact of the tool could cause them to explode.

⚠ WARNING!

Avoid all overhead cables and electrical wiring when operating the breaker to prevent the risk of electrical shock.

- Any contact with sources of electricity can lead to an electric shock, resulting in serious injury or death.
- Check the worksite for hidden electrical circuits.

Fire Prevention

IMPORTANT! Maintain a charged fire extinguisher on the machine at all times and KNOW HOW TO USE IT!

Prevent combustible debris from collecting in tight corners of the machine. This debris by itself may not cause a fire; however, when mixed with fuel, oil, or grease in a hot or confined space, the danger of fire increases dramatically.

To reduce the chance of a fire starting, follow these instructions:

Clean dust and debris from the machine daily.

- Inspect the machine daily for potential fire hazards and make any necessary repairs immediately.
- Inspect electrical wiring and connections and hydraulic hoses to ensure they are secure and not rubbing against other components.
- Clean up any excess grease and oil accumulation and spillage immediately.
- Use only non-flammable solutions for cleaning the machine or components.
- Store rags and other combustible materials in a safe, fireproof location.
- Before starting repair work such as welding, clean the surrounding area and place a fire extinguisher close by.
- Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.

Welding and Grinding Work

IMPORTANT! A fire extinguisher should be easily accessible during all welding work.

Welding repairs are to be performed by a trained welder with proper service instructions. Know the material to be welded and select the correct welding procedure and materials (electrodes, rods, wire) that will provide a weld metal strength equivalent to the parent material.

- Move the machine to a clean, safe area before welding, grinding or using an oxy/acetylene torch on it. This type of work should only be done in a clean area and not in places that contain combustible liquids, such as fuel tanks, hydraulic pipes or similar.
- Consult the carrier operator's manual before starting welding procedures. Sensitive equipment may require disconnecting machine electronics.
- If welding the breaker side plates or box housing, remove them from the breaker assembly. This prevents the possibility of internal damage to the breaker resulting from internal arcing between the cylinder and piston.
- Work with extra care when welding, grinding or torch cutting near flammable objects.
- Welding on painted surfaces releases dangerous fumes and results in a poor weld joint that can result in failure and potential accidents. Always remove paint from areas to be welded.

Work on Painted Surfaces

Heated paint gives off poisonous gases. Therefore, paint must be removed from an area with a radius of at least 4 in (10 cm) before carrying out welding, grinding or gas cutting. In addition to the health hazard, the weld will be of inferior quality and strength if the paint is not removed.

Methods and precautionary measures when removing paint

Blasting – use respiratory protective equipment and protective goggles.

Paint remover or other chemicals – use a portable air extractor, respiratory protective equipment and protective gloves.

Grinding – use a portable air extractor, respiratory protective equipment and protective gloves and goggles.

Rubber and Plastics

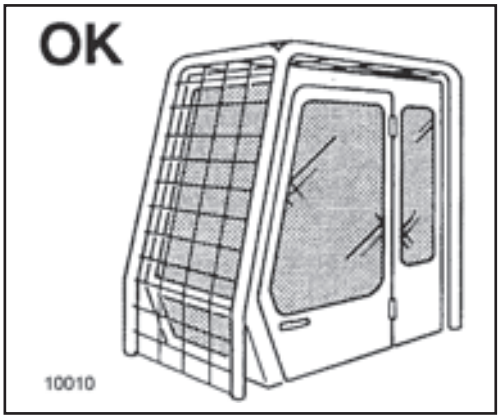
⚠ WARNING!

When heated, rubber and plastics can give off substances that are hazardous to personal health and the environment.

The following safety instructions must be followed:

- Do not weld or cut with a torch near polymer materials (plastics, urethane, and rubber) without first protecting them from the heat.
- Never burn polymer materials when scrapping them.
- Be careful when handling machines that have been exposed to fire or other intense heat. Always use gloves, protective safety glasses and breathing protection.

Hazard Alerts



⚠ WARNING!

The breaker should only be mounted to excavators whose lifting capacity is greater than the minimum value shown on "Carrier Sizing Chart" on page 17 of this Owner's Manual.

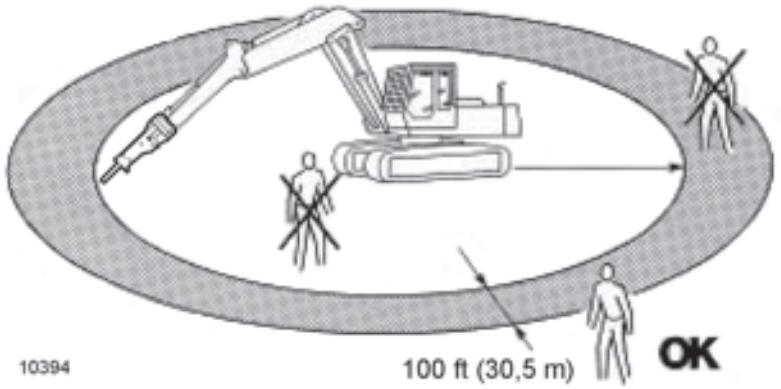
⚠ WARNING!

When working overhead, always be aware of the possibility of falling blocks or material fragments. Ensure that the machine is equipped with the necessary protection and that the cab is of the F.O.P.S. (Falling Object Protective Structure) type.

WARNING!

Keep a minimum distance of 100 ft (30,5 m) from the excavator operating area.

Protect bystanders from the working area to prevent injuries. Proceed carefully when moving the excavator.



WARNING!

The breaker must only be used by a skilled operator who has read and understood the Owner's Manual.

WARNING!

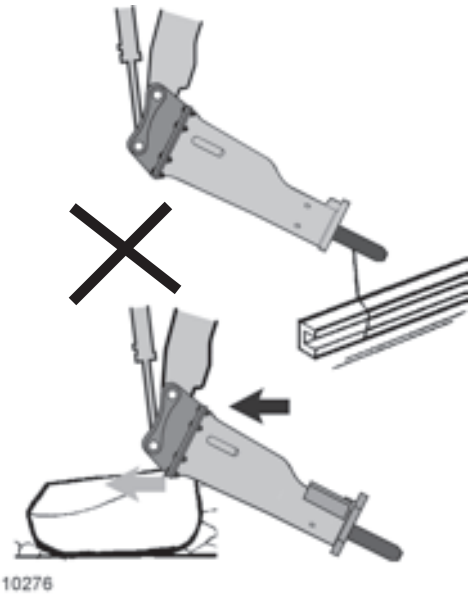
Do not allow any unauthorized person to operate or carry out any type of maintenance.

WARNING!

The breaker must be used only on the condition that it has been installed correctly using the attachment bracket and pins.

WARNING!

Do not use the breaker for lifting, hammering, or transporting materials.

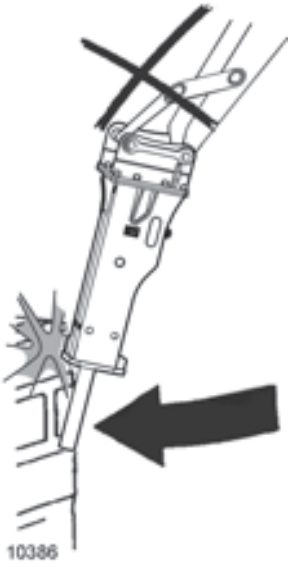


WARNING!

If the breaker becomes entangled in the reinforcement bars of the structure being demolished, free it before proceeding.

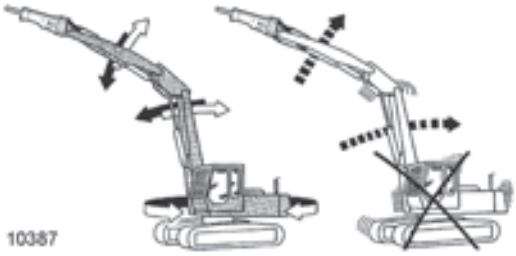
WARNING!

Do not begin demolition work from lower parts of a structure. The upper part could collapse.



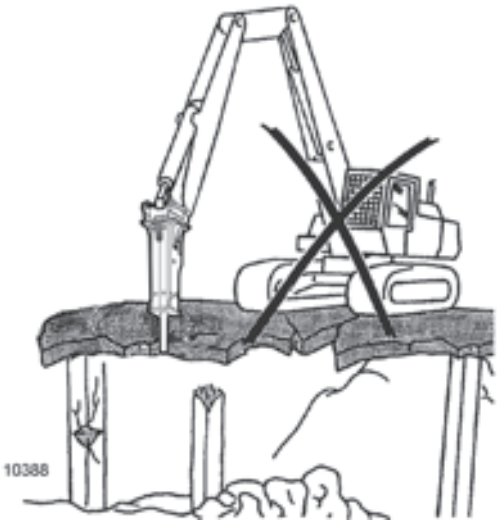
⚠ WARNING!

Do not use the breaker to hammer against the structure being demolished.



⚠ WARNING!

The excavator boom must be moved safely with slow, accurate movements. Avoid sudden movements.



⚠ WARNING!

Ensure that the structure supporting your machine is strong enough to support it's weight.

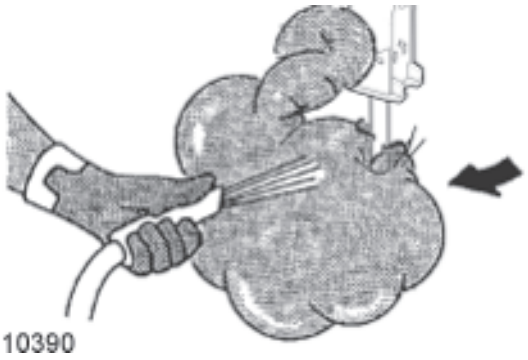
Danger of falling!

⚠ WARNING!

Stay a minimum of 30 ft (9,1 m) away from overhead wires with any part of the machine.

⚠ WARNING!

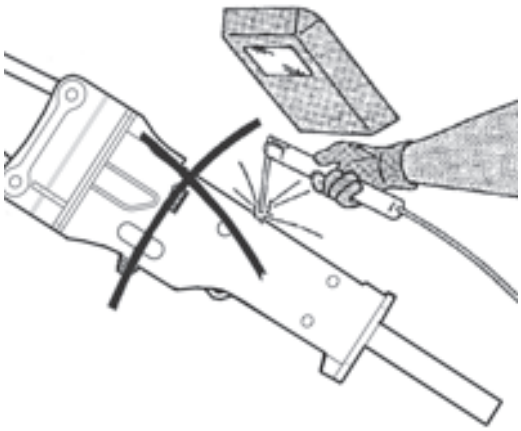
To keep dust at a minimum during operation, spray the work area with water.



⚠ WARNING!

No adaptations or modifications to the breaker are allowed unless agreed upon by BTI engineering. Written approval must be received beforehand.

Check the carrier owner's manual. Further precautions may be required.



⚠ WARNING!

All operations of adjustment, maintenance, repair or cleaning must be made with the engine OFF and the attachment resting firmly on the ground.

Fasten a "DO NOT OPERATE" or similar tag in the cab.

⚠ WARNING!

When carrying out maintenance or transporting procedures, take care to place the breaker in a stable position.

The relative movement of various parts should be prevented using ties, supports, blocks etc.

⚠ CAUTION!

Use only original BTI spare parts.

Transporting Safety Precautions

- Use a pressure washer to remove any loose gravel, mud or debris from the breaker and/or carrier.
- Load and unload the machine on a level surface.
- Ensure that the combined height of the trailer bed and the top of the machine cab is lower than local height restrictions or any bridges, overpasses or overhead obstructions expected to be encountered during transport.
- Ensure that the transporting equipment is adequate to hold the weight and size of the machine.
- Place chocks against the truck and trailer wheels.
- Use a ramp or loading dock. Ensure that the ramp is strong enough and has a low angle of rise to the height of the trailer bed.
- Do not place tie-down cables or chains over or against hydraulic tubes, hoses, cylinders or valves, etc. Fasten chains or cables to machine frame.
- Obey all local laws concerning loading, unloading or transporting the machine.
- Keep the trailer bed clean.
- Always keep bystanders clear of the area.

Installation

General

To obtain the best performance from a BTI hydraulic Breaker, it must be installed correctly and the carrier machine supplying the hydraulic power must be operating properly.

The following checklist will assist in the installation:

1) Make sure the hydraulic circuit targeted for the breaker matches the requirements for hydraulic flow and pressure relief settings. Refer to "Specifications" on page 104 to page 114 for all models.

2) The hydraulic tubing and hose size must match the requirements of the breaker. Refer to "Specifications" on page 104 to page 114 for Hydraulic Line Sizes.

3) The hydraulic oil and filter must be clean. Be sure the hydraulic reservoir is full at all times.

4) Make sure any hoses or tubes that are used are routed to prevent rubbing or chafing during operation.

It is beneficial for the tank return line to pass through a filter. This ensures dirt introduced into the system by connecting and disconnecting the breaker is caught before entering the carrier's pump.

Quick disconnects on the pressure and return lines are not recommended. If they fail, metal particles can cause internal damage in the breaker such as accelerated component wear, blockages, and seizing. They will also cause a pressure drop and flow restrictions.

IMPORTANT!
All high pressure hydraulic hoses, hose ends and adapters used for the installation of the hydraulic breaker must meet SAE J517 or DIN 20066 standards. Always make sure these standards are met if replacing any of these components. Using components of a lesser standard could result in failure.

All BTI rockbreaker systems are supplied with hoses and adapters that meet the above standards.

⚠ CAUTION!

Make sure the hose fittings are clean and dust-free.

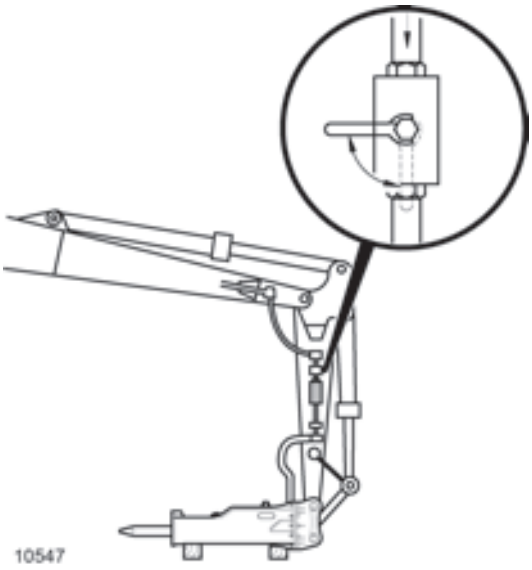
⚠ CAUTION!

Be sure the operating pressure values do not exceed those shown on page 104 to page 114.

⚠ WARNING!

It is advisable to provide clearly marked shut-off valves in the breaker pressure and return line circuits.

Shut-off valves will enable them to be isolated when removing or installing the breaker. This will overcome the risk of releasing high-pressure oil and limit the discharge of oil from the hydraulic lines.



Mounting the Breaker

1) Clean the inner surfaces of the breaker attachment bracket with a cloth.

2) Draw the carrier machine near inserting the STICK boom into the breaker attachment bracket.

3) Carefully clean any dirt from the pins and bushing. Insert the bucket pin checking its alignment and securing it with the collars and locking bolts.

⚠ CAUTION!

Do not force the pin; re-check its alignment instead.

4) Move the LINK cylinder to line up the hole of the connecting rod with the second mounting bracket attachment hole. Insert the pin and secure it with the collars and locking bolts.

Setting Flow and Pressure

See "Specifications" on page 104 to page 114 for operating pressure and oil flow requirements for all BXR models.

⚠ CAUTION!

DO NOT operate the breaker below its minimum flow rate. Internal damage to the breaker may result.

DO NOT operate the breaker at a pressure near to or above the relief valve setting. Internal damage to the relief valve may result. Ensure the relief valve is set 400–600 psi (27–41 bar) above the actual operating pressure of the breaker.

Setting the Flow

1) Install an in-line flow meter in place of the breaker.

2) Adjust the flow on the flow control valve to the maximum permitted for the breaker. The highest flow will permit the most blows per minute.

3) Ensure the flow is within the permitted range.

Setting the Relief pressure

1) Connect a flow and pressure meter in place of the breaker. (Bypass the hydraulic breaker and route the return line directly to the tank.)

2) Measure the flow under no load and verify it is in the range for the breaker.

3) Slowly increase the pressure and at the same time, verify the flow remains constant right up to the predetermined relief setting.

4) Adjust accordingly. Double check both relief pressure and flow settings.

5) When the breaker is installed and the oil is warmed to operating temperature, use a pressure gauge in the pressure line to verify the average operating pressure is within the specification.

Be sure to record this information on the BTI Warranty Card provided with each new attachment.

Start-up

Before putting the breaker to work in hard material, it is necessary to remove air from the hydraulic system and allow the new seals to work in properly.

1) Lift the unit off the ground.

2) Press the start button or pedal to fire the breaker momentarily.

3) Continue to turn the breaker ON and OFF in this manner for 10 minutes.

4) Work the breaker in soft material in short bursts for 10 minutes.

5) Check for any loose bolts or oil leakage.

The breaker is now ready to operate.

On new units, be sure the Installation Notice is properly completed and submitted.

Typical hydraulic Circuits

For a hydraulic breaker to function, it needs hydraulic flow and pressure in one direction only. The supply line should be directed out the left side of the carrier and the return line on the right (as viewed by the operator).

BXR breakers operate within a specified flow range. The operating pressure will depend on the amount of oil flow, the return line pressure, and internal efficiency of the individual attachment.

Carrier with Auxiliary Hydraulic Circuit

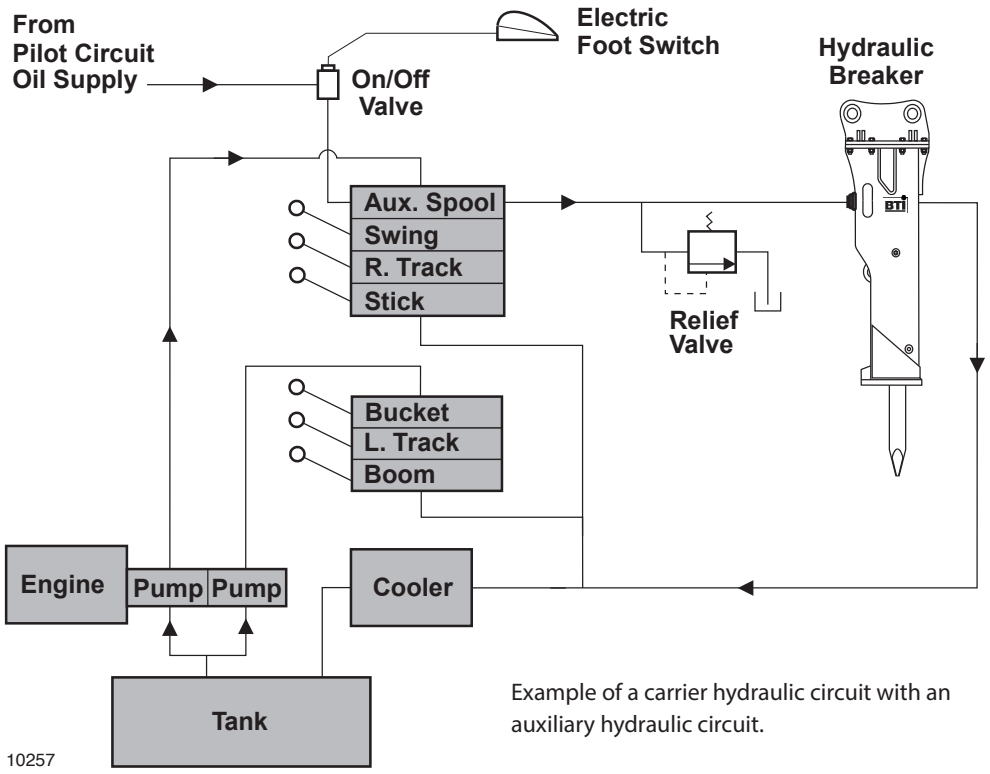
The carrier will often be equipped with an auxiliary control valve. In this case the auxiliary control can be used to control the supply of oil. It can usually be adjusted to provide the correct amount of flow, and a relief cartridge can be installed to protect the hydraulic circuit.

⚠ CAUTION!

When using the carrier's existing auxiliary control valve for the hydraulic breaker circuit, do not route the return line back through its return port. High back-pressures may result.

It is recommended to send the oil directly back through the cooler/return filter to the tank.

If it is necessary to plumb the circuit using both ports on the auxiliary valve, the return line should have a drain line connected to the tank. This will reduce back-pressure in the hydraulic circuit and protect the control valve from return line pressure spikes.

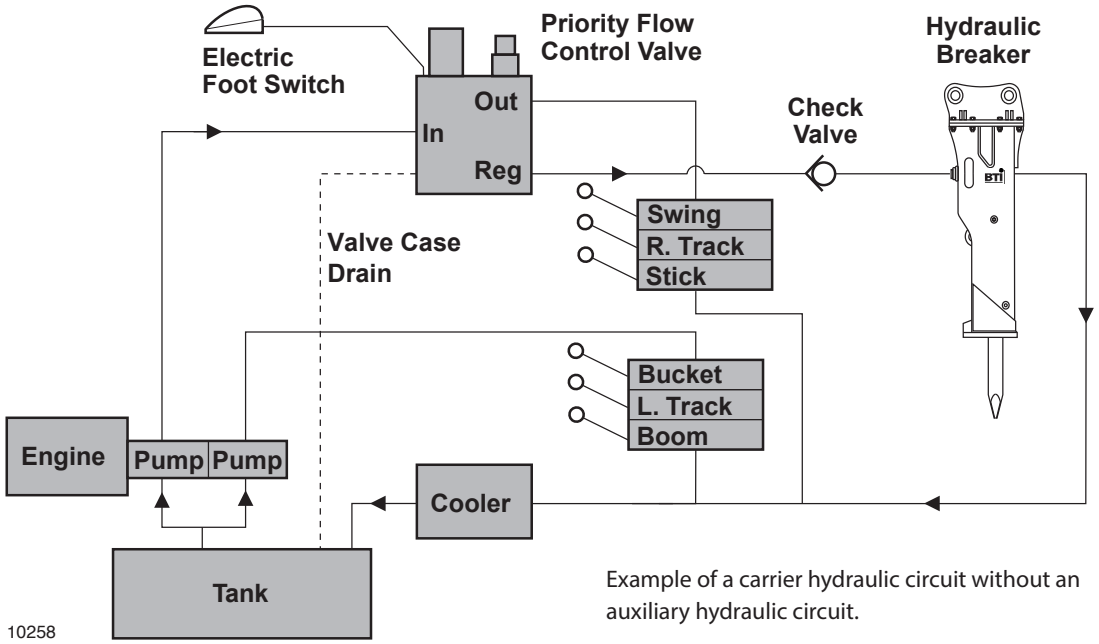


Example of a carrier hydraulic circuit with an auxiliary hydraulic circuit.

Carrier without Auxiliary Hydraulic Circuit

If the carrier is not equipped with an auxiliary control valve, install a priority flow control valve to direct the correct flow away from the normal circuit and operate the attachment.

The priority flow control valve is usually equipped with a flow adjustment and pressure relief. These valves often need a check valve on the regulated port to completely close the flow. If dividing too much flow, this circuit can generate heat and may require additional cooling capacity.



Example of a carrier hydraulic circuit without an auxiliary hydraulic circuit.

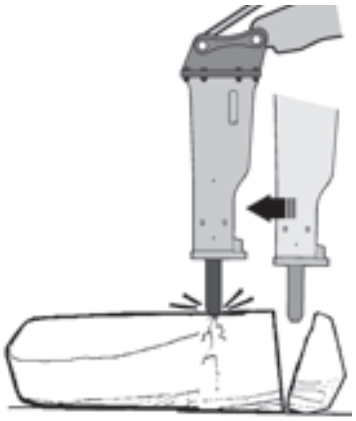
Operation

Suggestions for Efficient Operation

⚠ CAUTION!

Do not operate the breaker continuously in one spot for more than 20 seconds. Doing so will cause excessive heat that could mushroom the end of the tool.

- For large rocks, start at the edge and work toward the center, breaking off small chunks each time.
- Always keep the tool 90º to the surface of the rock to reduce side loading on the tool bushings.
- If the rock or stone shows no sign of breaking within 20 seconds, reposition the breaker.
- Breaking along a rock's natural faults and seams makes breaking easier.
- When breaking on a wall or steep incline, use a combination of the carrier's stick cylinder and tilt cylinder to provide the necessary force to hold the breaker against the material. Always work the tool at 90°to the material being broken.
- As down-force is applied on the breaker, the carrier will lift slightly indicating breaker tool is properly pressed onto the material.



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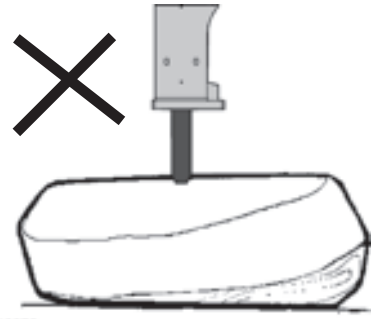
Start at the edge and work toward center.



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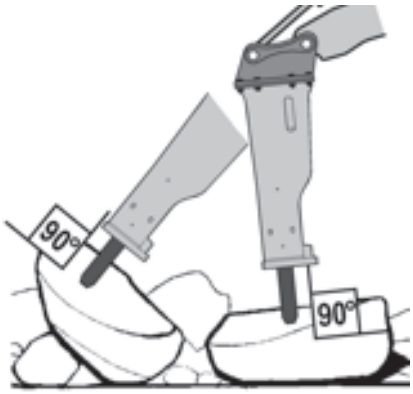
On large rocks, take a smaller bite. Do not start in the middle.



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Keep tool 90º to surface of rock.

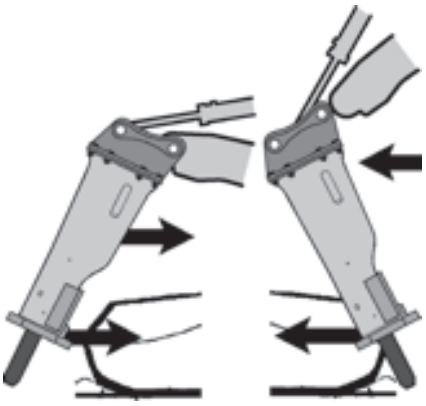
⚠ CAUTION!

The breaker should not be fired when the carrier's boom hydraulic cylinders are fully extended or fully retracted. The cylinders may be damaged from the breaker's shock pulses.

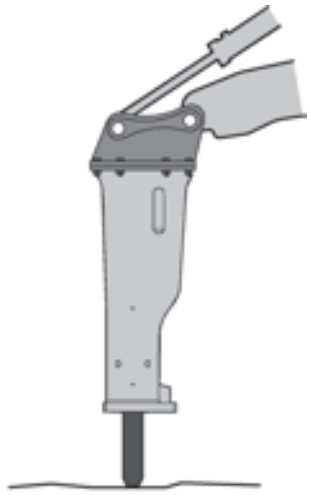
⚠ CAUTION!

When hydraulic oil temperature exceeds 158 °F (70 °C), stop breaking!

If the carrier's operating temperature runs too high, it will actually decrease the breaking power.

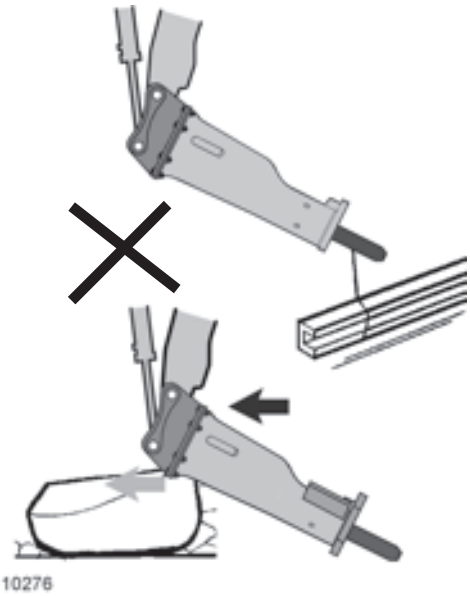


- Rake ONLY with breaker wear plate and reinforced rock claws. Do not use the tool to rake materials.
- Push ONLY with breaker wear plate and reinforced rock claws.



End of Shift

If the breaker is not removed from the carrier at the end of the day, it should be left standing vertical with the tool pushed up into the breaker.



Improper Use of Breaker

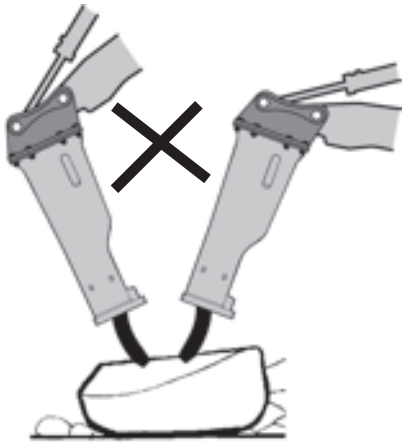
⚠ CAUTION!

Do not use the breaker to pry, pick, pound, or lift.

This can cause serious damage to the breaker as the tool is side loaded or binds in the bushing. The tool must always move freely straight up and down in the bushing.

- Do not PUSH incorrectly. Use breaker wear plate and reinforced rock claws.

- Bad alignment BENDS the tool. Always break at 90º to surface of rock.



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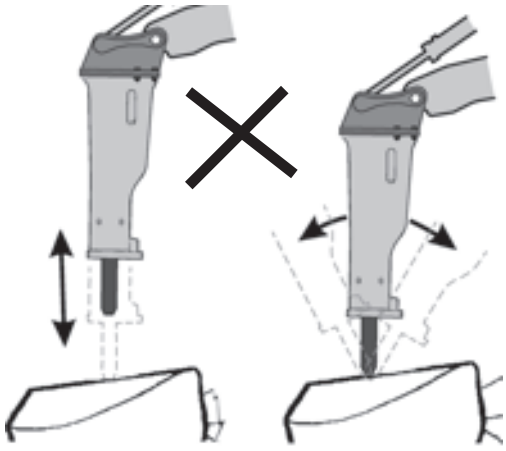
⚠ CAUTION!

Excessive down-force will not make breaking easier, in fact the carrier will be lifted too far off the ground and this can damage your equipment.

Not enough down-force and the tool will bounce on the material resulting in blank-firing.

- Do not POUND or PRY with the breaker.



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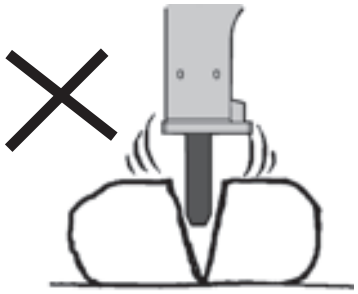
Blank Firing

BXR models are equipped with a standard anti-blank firing feature that stops the movement of the breaker's piston when full contact to the target material is lost. This reduces the strain on the tool retainers and front head during normal operation.

This feature is non-adjustable.



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Breaking Oversize Material

With practice, the best place to begin breaking will be learned by just looking at the rock.

- Position the tool on flat areas of the rock, or look for a seam or crack, which may allow easier splitting.
- To fully absorb all the breaker's energy, make sure the rock is resting on a solid base.

Trenching and Excavation

- Before trenching, remove all overburden material, exposing the rock surface to be broken.
- To begin, penetrate the breaker tool deep into the material, splitting and loosening the rock.
- Repeat this penetration several times within a small area, excavating a hole. When excavating a deep trench it is more effective to use steps or benches allowing a place for the rock to break out to.
- Maintain the benches as the trench advances.
- Slope the sides of the trench to accommodate the width of the breaker. The larger the breaker and the deeper the trench, the wider the opening at the top will need to be.
- For most situations, the excavator will sit to the side of the trench allowing you to keep steeper slopes. However the carrier swing function may not have the strength to push broken rock away from the work area. In some cases the excavator can sit on top of the trench and the broken material can be back filled under the excavator.
- For best performance, apply the down force in line with the tool, repositioning every 10 to 15 seconds or when no penetration is evident.
- Keep the breaker well greased at all times.

Breaking Concrete

When breaking concrete, it can be beneficial to alternate between high and low speed control to maximize tool penetration speeds.

- Begin by penetrating the concrete several times in one area with the breaker tool. This should loosen the concrete and separate the reinforcing steel. This rebar may need to be cut to keep the concrete pieces manageable for removal.
- When breaking concrete floors, use the down force from the carrier's boom cylinder to follow the tool through the concrete.
- For vertical walls, force must be maintained using a combination of boom, stick, and tilt cylinders.

A fast blow rate gives the best performance in breaking concrete, so ensure your carrier is providing the breaker with the maximum recommended oil flow.

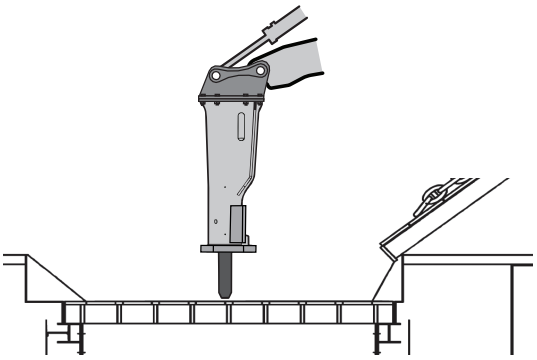
Generally, a chisel point gives the best splitting action when breaking concrete. However if breaking hard concrete with lots of rebar, a moil point may be better. The moil tip helps deflect the tool off the steel as it breaks the concrete.

Breaking on a Grizzly

If the grizzly is covered with rock, use the breaker's reinforced rock claws and the wear plate of the box housing, to rake the material. This will get most of the finer material through the bars and let the larger pieces rest directly on the grizzly.

Large pieces are easier to break if they rest directly against the grizzly bars. All the energy from the breaker is then applied directly to the rock. Breaking oversize is less effective when there is material under the rock that can absorb energy.

If rocks are hanging on the edge of the bars, use short bursts of the breaker to hammer them through.



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Guide to Tool Choice

1) Moil – used for penetration in low abrasive materials of similar make-up.

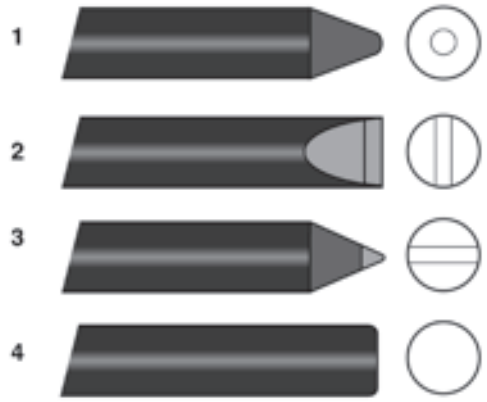
2) Chisel-X – used for splitting material made up of substances that have a different make-up.

3) Chisel-Y – Use for asphalt cutting.

4) Blunt – Used for impact in hard, crumbly rock.

NOTE: For information on what is considered normal tool wear, see "Normal Breaker Tool Wear" on page 97.

NOTE: For information on tool failures, see "Breaker Tool Fatigue Failures" on page 97 to page 100.



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⚠ CAUTION!

Use of after-market tools not approved by BTI and may void warranty.

Underwater Operation

⚠ CAUTION!

Do not operate the breaker underwater or in mud. Breakers require specific modifications for this application. Permanent damage may otherwise result.

Preparations for Underwater Operation

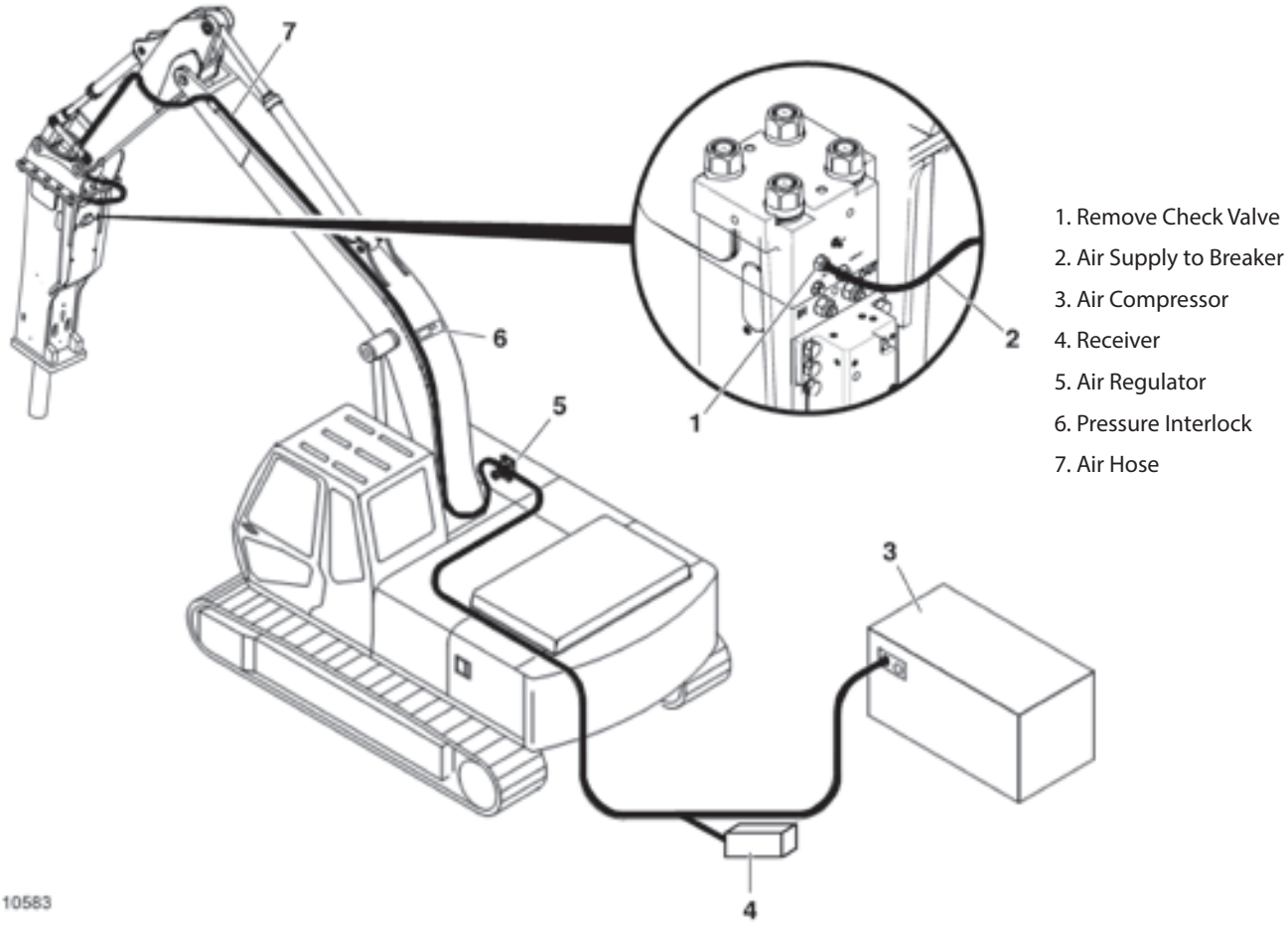
A supply of filtered, regulated, non-lubricated compressed air must be fed into the breaker front head for underwater use. If lubricated compressed air is used, the lubricant will assist in washing the grease out of the front head. This air must be fed into the breaker impact chamber area, creating a positive air pressure that will keep the water out. If water does enter the front head and impact chamber and the breaker is fired, it could force water and debris up inside resulting in seal damage.

Installing a pressure switch in the air line to create an air pressure interlock will stop the breaker from firing in the event of a loss of air pressure.

BXR breakers have a provision hole for underwater air supply. A minimum 40 scfm compressor is recommended.

A 3/4 to 1 inch air line should be plumbed to the rear head on the breaker

NOTE: The use of an automatic greasing system is recommended for underwater operation. Special grease may be required for this application. Contact your BTI representative.



1. Remove Check Valve
2. Air Supply to Breaker
3. Air Compressor
4. Receiver
5. Air Regulator
6. Pressure Interlock
7. Air Hose

Tool and tool bushing wear clearances should not be more than 1/8 in (3 mm). If the clearance is too great, too much air will flow from the Breaker. The use of new bushings and tool is recommended to reduce the gap and minimize water ingression and air leakage. Normal tool bushing clearances (page 52) do not apply to underwater applications.

Plumb the air line to the breaker's check valve port located at the rear head. Remove the air check valve assembly to connect the line. Be sure there are no small orifices in the line to impede the flow of air to the impact chamber.

Air Pressure for Underwater Operation

Water Depth ft (m)	Air Pressure psi (bar)
0–16 (0–5)	29 (2,0)
16–33 (5–10)	36 (2,5)
33–49 (10–15)	55 (3,8)
49–59 (15–18)	65 (4,5)

Operating the Breaker Underwater

⚠ CAUTION!

In underwater operation, the breaker must be greased at regular intervals less than 1 hour apart.

- The breaker should be brought up to working temperature before insertion into the water.
- Start supplying air to the breaker before placing it underwater, and continue supplying air until the breaker is removed from the water.
- The air must be running under the correct pressure and flow at all times while the breaker is under the water.
- When underwater work is completed, run the breaker for 10 minutes above water to dry it off.
- Remove the tool and dry the bottom of the piston by air. Place lubricating oil at the bottom of the piston, and reinstall the tool.
- Grease the tool and front head with the tool pressed in.
- Store the breaker vertically in a dry area.

NOTE: Extremely cold water and hot hydraulic oil may cause the breaker to stall. If this occurs, contact your BTI representative.

Cold Weather Operation

Cold Weather Starting

⚠ CAUTION!

When ambient temperature is below -4°F (-20°C), warm breaker before use. Seal failure may otherwise occur.

The following start-up technique is used to warm the breaker. Before operating the breaker, it may be necessary to warm the carrier's hydraulic system. Warming up the system to its operating temperature will prevent the breaker from misfiring.

Hydraulic System Warm-up Procedure

- Cycle each boom function by extending and retracting each cylinder through its full stroke.
- Hold the valve open for 3 to 5 seconds at each end of the cylinder's travel.
- Repeat this procedure until all boom functions operate smoothly.

Breaker Warm-up Procedure

- Raise the breaker so the tool is not pressing onto any material and fire the hammer. This is called 'idle firing'. In this position the breaker does not normally run, but circulates warm system oil through the control valve to the tank.
- Fire the breaker for 5 seconds, then release for 5 seconds.
- Repeat this procedure for 3 to 5 minutes depending on the ambient temperature. While idle-firing, the piston may move up and down but should not hit the tool.
- Start breaking rock by operating the breaker in short 3-second bursts.
- Continue operating with short bursts until the carrier and breaker are at the operating temperature.

The breaker can now be operated normally.

NOTE: Refer also to "Nitrogen Pressure versus Ambient Temperature" on page 59 of the Maintenance Section.

NOTE: In extreme situations when the oil is at a high viscosity, BTI recommends the use of the optional BXR Series oil regeneration valve Lockout Spool. This spool replaces the standard oil regeneration valve spool. Refer to "REGENERATION VALVE ASSEMBLY" on page 194.

The cold weather oil regeneration valve lockout spool will allow the breaker and the hydraulic oil in the breaker to come up to temperature quicker than the standard spool and allow for reduced warm cycle times. It will also prevent the operation of the oil regeneration circuit, causing the breaker to work at a constant speed.

Grease for Cold Weather Operation

In a warm environment (service/maintenance area) remove the tool and clean all old chisel paste from the grease passage-ways and front head.

Refer to the following table for lubricant types and operating temperature ranges.

IMPORTANT! Do not use Chisel Paste in sub-zero applications.

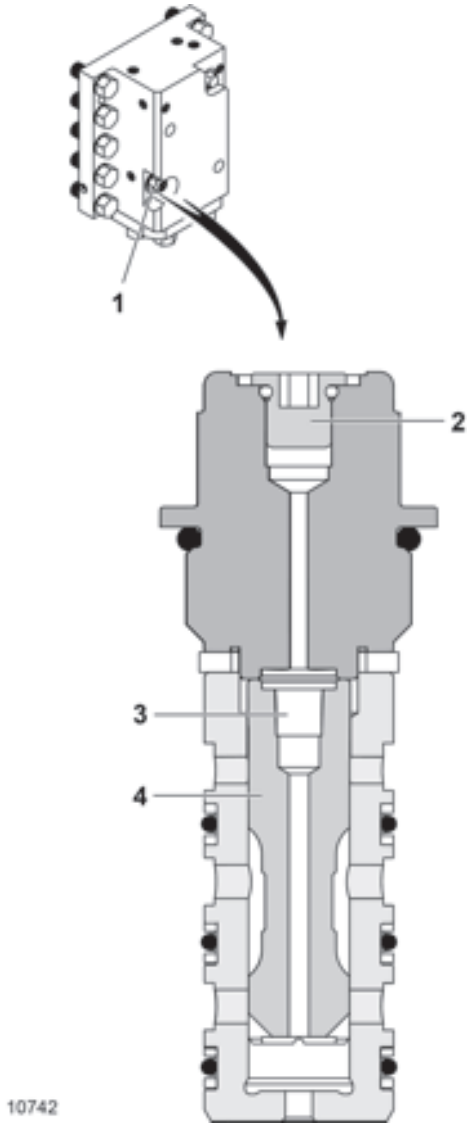
Grease Brand	Dispensing Temperature °F (°C)	Operating Temperature Range °F (°C)
Shell Alvania EP Arctic Moly	-49 (-45)	-58 to 176 (-50 to 80)
Mobil Moly 50 Arctic	-31 (-35)	-58 to 176 (-50 to 80)
Petro Canada Precision XL3 Moly Arctic	-40 (-40)	-49 to 275 (-45 to 135)
Petro Canada Precision XL5 Moly	-49 (-45)	-58 to 248 (-50 to 120)

High/Low Speed Selector Valve

Refer to “High/low Speed Selector Valve” on page 16

BXR Breakers can operate at two speeds. The normal factory setting is low speed for maximum breaking power. The higher speed setting is obtained by shortening the piston stroke. At the higher speed, the breaking power is somewhat lower, but higher production rates can be achieved in softer materials such as concrete.

Note: An operator controlled two-position on/off valve can be used to switch between high/low speed modes.



The Stroke Adjuster Assembly is located on the control valve (1).

For two-speed operation, connect a 1/4” or 3/8” pressure line to port (2). The port thread is #2 BSPP. Connecting a minimum oil supply of 400 psi (27 bar) controlled by an on/off valve to the two-speed valve connection port, will allow the operator to manually shift the breaker between long and short stroke modes.

Locking the Valve in High or low Speed Mode

Low Speed Mode

When locking valve in long stroke, slow speed, high power operation, this passageway (3) should be opened up by removing the 1/16 in NPT plug.

High Speed Mode

When locking valve in short stroke fast speed, low power operation, plug the drain cavity (3) within the spool (4) by installing the 1/16 in NPT plug.

NOTES

Maintenance

Before performing any maintenance procedures on the breaker, refer to "Practice Safe Maintenance" on page 27 of the Safety Section.

Lubrication is the single most important procedure for sustaining the life of a hydraulic breaker. To keep your breaker in top operating condition, perform the maintenance procedures outlined in this section.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Greasing the Breaker

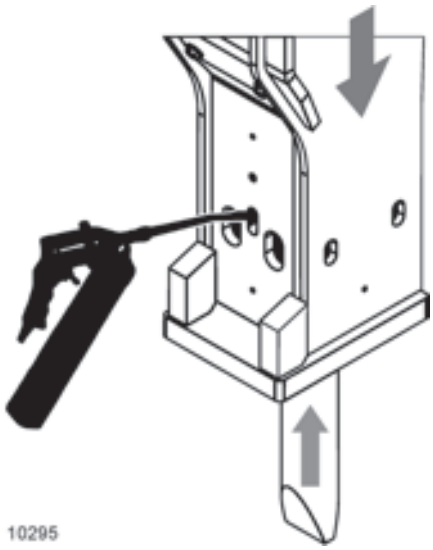
⚠ CAUTION!

Use proper grease. Always use BTI Chisel Paste or a molybdenum disulfide based (MoS_2) grease to lubricate the tool.

The use of GP (general purpose) grease is not recommended. It will melt and run down the tool providing very poor lubrication. Use only as a last resort.

Pressing the tool up inside the breaker prevents excessive grease entering the impact chamber. The excessive grease will cause a cushioning affect and a lack of breaker power when the breaker is fired. Excessive grease could contaminate the oil and cause seal failure.

1) The breaker must be in a vertical position to grease, with enough down-pressure to push the tool up inside the housing.
2) Grease until clean grease oozes out around the tool and retainer pins.
3) Grease the breaker after every two hours of continuous use, or when the tool appears shiny where it rides inside the front head.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⚠ CAUTION!

Grease often. Failure to lubricate regularly reduces the life of the tool, bushings, and front head. If the tool becomes dry and shiny during the shift, apply additional grease.

Automatic Greasing Systems

General

A provision hole for automatic greasing systems is provided on BXR models.

When greasing with an automatic greasing system, the grease should only be injected into the breaker when it's firing. This will allow the breaker to consume the grease correctly.

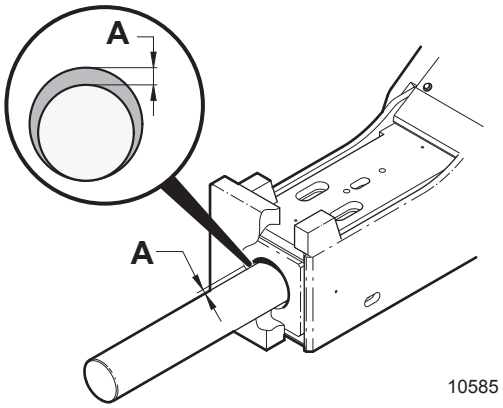
Set the flow rate so there is a continuous new grease shine near the top of the tool coming from the breaker. If the tool appears shiny, the greasing flow rate may need to be increased. This rate may change due to specific operating conditions.

CAUTION!

The use of automatic timers to inject grease into breaker is not recommended. If the amount of grease in the impact chamber becomes too great, seal failure and grease injection into the hydraulic circuit could result.

Comparison of Automatic Lubrication Systems to Manual Lubrication

Automated Lubrication	Manual Lubrication
• Constant lubrication	• Inconsistent lubrication
• Lube while machine runs	• Cannot lubricate while operating
• Closed system–no contamination	• Constant contamination
• Extended bearing life	• Premature bearing failure
• Less downtime	• Labor expense
• Quick payback on investment	



Changing the Breaker Tool

Check the wear width between the tool and tool bushing. See table on the next page for maximum and minimum permissible wear limit.

Tool and Front Tool Bushing Clearance

Check the clearance between the tool and the front tool bushing (A) every 100 hours. If the value exceeds those shown in the following table, both front and rear tool bushings must be replaced to prevent damage. Worn parts may cause misalignment between the tool and the piston.

Refer to "Tool Bushing Removal" on page 76.

CAUTION!

Exceeding the following values may damage other component parts, such as the piston and cylinder.

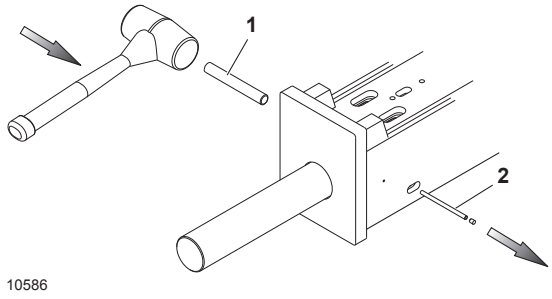
Permissible Nominal Minimum and Maximum Diameters for Wear Bushings and Breaker Tool

Model	Bushing Nominal Inside Dia. (new) in (mm)	Bushing Maximum Inside Dia. in (mm)	Working Tool Minimum Outside Dia. in (mm)
BXR50	5.5 (140)	5.669 (144)	5.354 (136)
BXR65	5.9 (150)	6.102 (155)	5.709 (145)
BXR85	6.3 (160)	6.496 (165)	6.102 (155)
BXR100	6.7 (170)	6.889 (175)	6.496 (165)
BXR120	7.1 (180)	7.283 (185)	6.890 (175)
BXR160	7.9 (200)	8.071 (205)	7.677 (195)

Tool Removal

1) To remove the tool, drive out the retainer pin and stopper plug using the drift supplied in the tool kit.

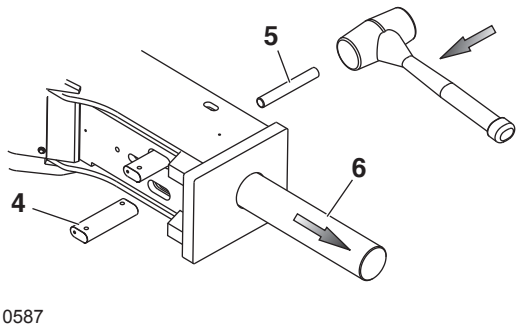
2) Use the drift to drive out the tool retainers. Inspect them for cracks or deformities and wear on the edge that rests against the tool.



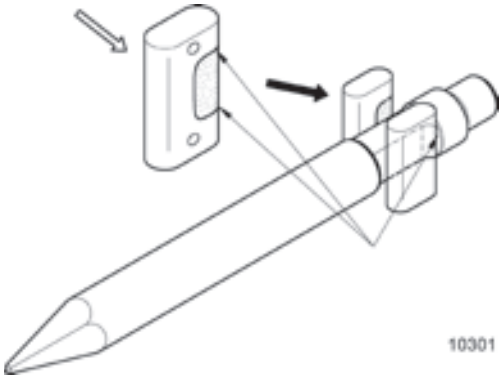
1. Drift
2. Retainer Pin

3) Remove any burrs on the retainer pins and the tool with a grinder. Check for mushrooming on the top of tool.

4) If rotating the retainer pins, make sure the marked surface is towards the tool as shown.



4. Tool Retainer
5. Drift
6. Tool

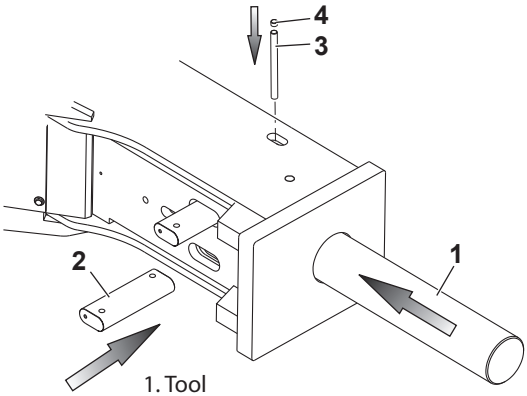


Tool Installation

To install the tool, reverse the above procedure.

1) First, grease the inside of the lower bushings. When the tool is inserted it will take the grease with it.

2) Cover the sides of the tool's top section with grease and insert the tool into the front head.



1. Tool
2. Tool Retainer
3. Retainer Pin
4. Stopper Plug

3) Grease and insert the tool retainers, then grease and insert the retainer pins and silencer plugs. The silencer plugs should be flush with the outside of front head.

Cushion Chamber Gas Pressure – Checking

IMPORTANT! Incorrect nitrogen gas pressure in the cushion chamber can damage the breaker and cause poor or erratic breaker behavior.

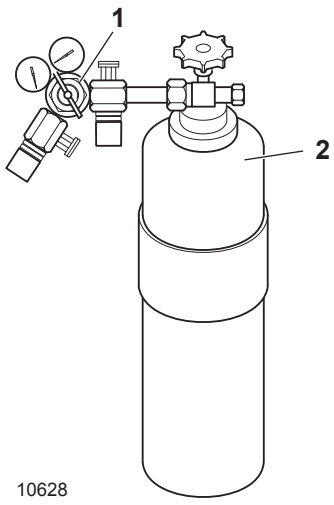
⚠ CAUTION!

Stay clear of the tool when charging the breaker cushion chamber. Gas pressure may cause unexpected piston movement and force the tool to jump against the retainer pins.

⚠ CAUTION!

The cushion chamber is charged with nitrogen (N_2) – a non-explosive inert gas. Use only N_2 when refilling it. Charging it with any other gas could trigger an explosion and lead to serious or possibly fatal injuries.

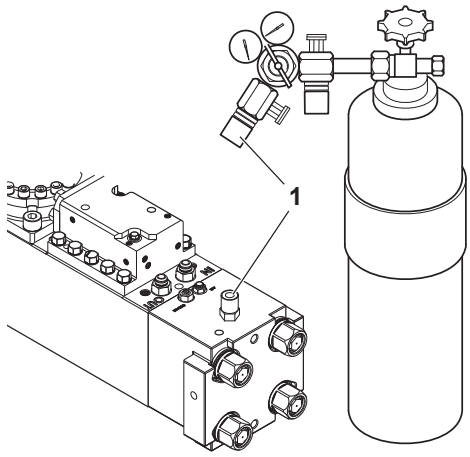
IMPORTANT! Before charging the cushion chamber, make sure the tool is NOT pushed up inside the breaker. Lay the breaker down in a horizontal position.



1. N_2 Gas Regulator
2. N_2 Gas Tank

1) Connect the gas regulator to the nitrogen gas tank.

2) Remove the gas valve cap on the breaker and the connector cap on the gas regulator.



1. Remove Caps

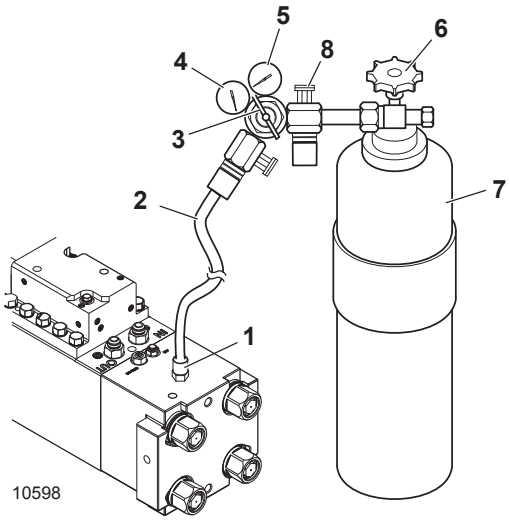
3) Connect one end of the hose to the regulator on the nitrogen tank.

4) Connect the other hose end to the gas valve on the cushion chamber as a last step.

NOTE: Be careful to connect the hose as quickly as possible. Once the hose end is starting to thread on, the valve will unseat and gas pressure can be lost.

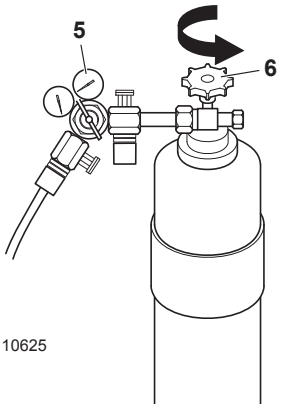
Refer to **Specifications** page 104 to page 114 for cushion chamber gas pressure values.

IMPORTANT! To determine the correct pressure in relation to ambient temperatures, refer to the table "Nitrogen Pressure versus Ambient Temperature" on page 59.



1. Gas Valve – Cushion Chamber
2. Hose
3. Gas Regulator Handle
4. Cushion Chamber Gas Gauge
5. Nitrogen Tank Gas Gauge
6. Nitrogen Tank Valve
7. Nitrogen Tank
8. Drain Valve

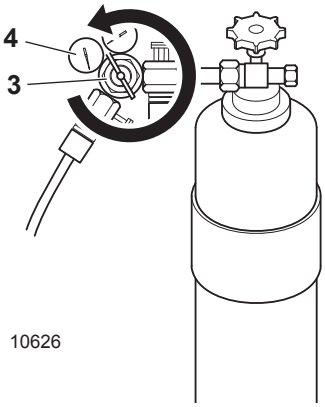
Cushion Chamber Gas Pressure – Adjusting



Model	Cushion Chamber N_2 Pressure
BXR50	145 psi (10 bar)
BXR65	145 psi (10 bar)
BXR85	131 psi (9 bar)
BXR100	145 psi (10 bar)
BXR120	159 psi (11 bar)
BXR160	159 psi (11 bar)

Increasing the Pressure

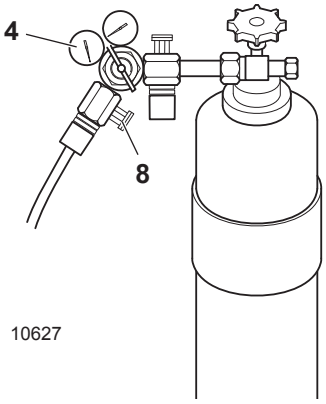
1) Open the nitrogen tank by turning the tank valve (6) counter-clockwise 1/4 –1/2 turn. Tank pressure is indicated on the gauge (5).



2) Turn the gas regulator handle (3) clockwise to increase the gas pressure in the cushion chamber. The pressure is indicated on gauge (4). Increase pressure to the value shown in the table above.

NOTE: A small amount of pressure is lost when the hose is disconnected. To compensate, leave the pressure marginally over this value.

3) Turn the gas regulator handle back counter-clockwise to stop increasing the pressure.



Decreasing the Pressure

If the N_2 pressure value in the cushion chamber is higher than the values shown in the table above, it must be reduced.

1) Open the drain valve (8) by turning it counter-clockwise to reduce the pressure.

2) Watch the gauge (4) and turn the valve clockwise to close it when the target pressure indicated in the table above is met.

Removing the Gauge and Hose

1) Close the tank valve by turning it clockwise.

2) Remove the hose end on the cushion chamber gas valve.

NOTE: Be careful to disconnect the hose as quickly as possible. A certain amount of gas pressure can be lost before the valve seats itself.

3) Disconnect the gauges from the tank.

4) Perform a leak test on the cushion chamber gas valve by applying liquid soap to the area. If bubbles appear, there is a gas leak. Check to make sure the valve has not malfunctioned.

Accumulator Gas Pressure – Checking

Check accumulator gas pressure every 500 hours of operation.

⚠ CAUTION!

The accumulator is charged with nitrogen (N_2) – a non-explosive inert gas. Use only N_2 when refilling it. Charging it with any other gas could trigger an explosion and lead to serious or possibly fatal injuries.

IMPORTANT! Incorrect nitrogen gas pressure in the accumulator can damage the breaker and cause poor or erratic breaker behavior.

IMPORTANT! Hydraulic oil pressure MUST be fully vented inside the breaker before charging the accumulator. Residual pressure will result in an incorrect N_2 charge pressure.

1) Ensure all hydraulic oil pressure inside the breaker body is fully vented.

2) Connect the gas regulator to the nitrogen gas tank.

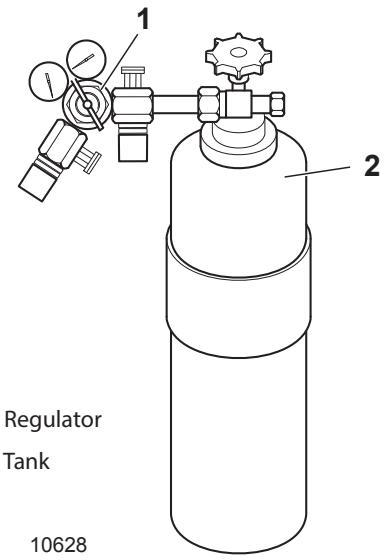
3) Remove the gas valve cap on the accumulator and the connector cap on the gas regulator. Connect one end of the hose to the regulator on the nitrogen tank.

4) Connect the other hose end to the gas valve on the accumulator as a last step.

NOTE: Be careful to connect the hose as quickly as possible. Once the hose end is starting to thread on, the valve will unseat and gas pressure can be lost.

5) Accumulator gas pressure is indicated on tank gauge (5) with tank valve closed. Ensure gas pressure is **754 psi (52 bar)** at 68 ºF (20 ºC).

IMPORTANT! To determine the correct pressure in relation to ambient temperatures, refer to the table "Nitrogen Pressure versus Ambient Temperature" on page 59.



1. N_2 Gas Regulator
2. N_2 Gas Tank

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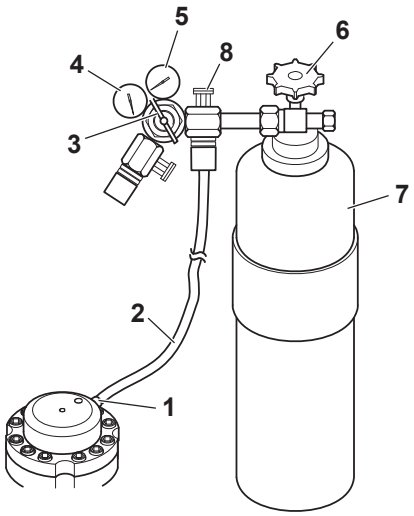

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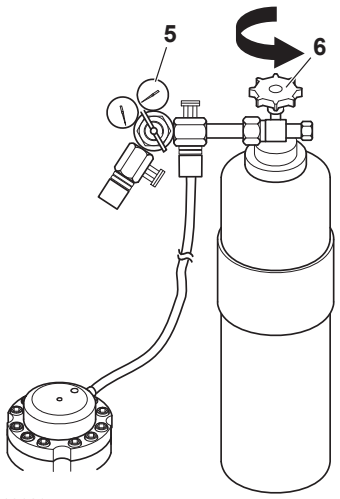
1. Gas Valve – Accumulator
2. Hose
3. Gas Regulator Handle
4. Accumulator Gas Gauge
5. Nitrogen Tank Gas Gauge
6. Nitrogen Tank Valve
7. Nitrogen Tank
8. Drain Valve

Accumulator Gas Pressure – Adjusting



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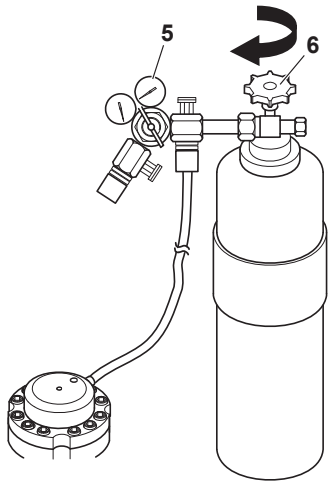
Increasing the Pressure

1) Open the nitrogen tank by turning the tank valve counter-clockwise 1/4 –1/2 turn. Accumulator pressure is indicated on the gauge (5).



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2) Increase the pressure to **754 psi (52 bar)**.

NOTE: A small amount of pressure is lost when the hose is disconnected. To compensate, leave the pressure marginally over this value.

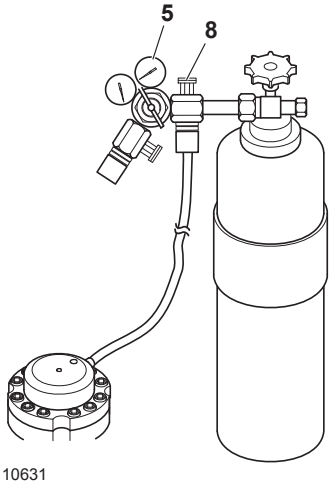
3) Turn the nitrogen tank valve clockwise to stop increasing the pressure.

Decreasing the Pressure

If the nitrogen pressure value in the accumulator is higher than 754 psi (52 bar), it must be reduced.

1) Open the drain valve (8) by turning it counter-clockwise to reduce the pressure.

2) Watch the gauge (5) and turn the valve clockwise to close it when the target pressure is met.



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Removing the Gauge and Hose

1) Close the tank valve by turning it clockwise.

2) Remove the hose end on the accumulator gas valve.

NOTE: Be careful to disconnect the hose as quickly as possible. A certain amount of gas pressure can be lost before the valve seats itself.

3) Disconnect the gauges from the tank.

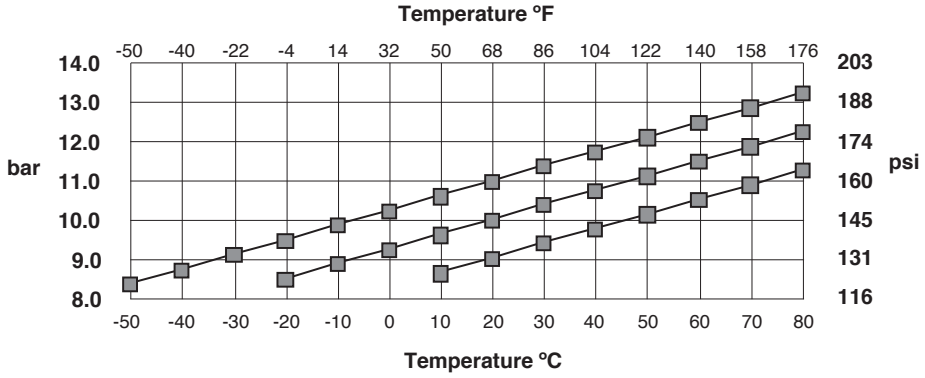
4) Perform a leak test on the accumulator gas valve by applying liquid soap to the area. If bubbles appear, there is a gas leak. Check to make sure the valve has not malfunctioned.

Nitrogen Charging Pressure versus Ambient Temperature

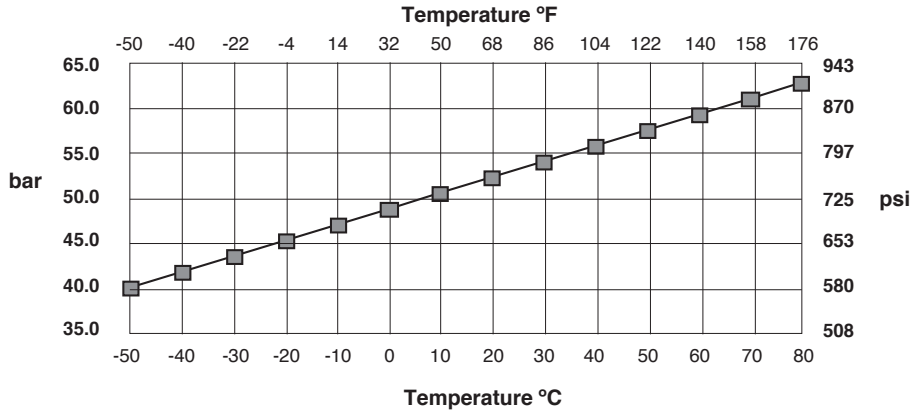
The following table is a guide to cushion chamber and accumulator pressure values adjusted to ambient temperature differences.

- Allow the hydraulic breaker and the nitrogen bottle temperatures to normalize to room temperature in a shop environment.
- Adjust the accumulator and cushion chamber pressure as indicated in the tables below for the ambient temperature expected.

Cushion Chamber Nitrogen Gas Pressure



Accumulator Nitrogen Gas Pressure



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Maintenance Schedule

Pre Shift

	Verify correct operation of all machine functions.
	Check for leaks, damaged hoses or clamps.
	Check that all electrical components are in operational condition.
	Grease the breaker tool, retainer pins and plugs with Chisel Paste. If equipped with auto lube system, ensure there is adequate grease in the reservoir.

Every 2 Hours

	Verify correct operation of all machine functions.
	Grease breaker tool bushing. Pump grease in until it is visible around tool and retainer pins.
	Check general condition of machine and surrounding work area.

Every 8 Hours – Daily

	Check all screw connections for tightness (during first 50 hours of operation).
	Check hydraulic oil level in carrier reservoir.
	Check lubrication system.
	Check all hardware and bolts for tightness.
	Check all hydraulic lines, fittings and clamps for leaks or damage.
	Check breaker for damage, loose fittings, or hydraulic leaks.

Every 50 Hours – Weekly

	Check torque on all fasteners every 50 hours of operation or after any major maintenance.
	Check mounting pins for wear.
	Check impact surface of tool for deformation.
	Remove the breaker tool and retaining pins. Inspect the wearing surfaces. Remove any burrs before reinstalling. Refer to Service section if scuffing marks are found on the tool.
	Inspect upper isolator.
	Use a hammer to ping (knock) the tie rods. The same tone will resonate if the tie rods are torqued equally. A loose tie rod will be immediately evident.

Every 100 Hours

	Remove the breaker tool and inspect the wearing surface. Remove any burrs before reinstalling.
	Inspect the tool retainer pins. Remove the pins, rotate 180 degrees and reinstall.
	After initial 100 hours of operation, change hydraulic pressure and return line filter elements.
	Check tool bushing clearance. See page 52.
	Check that the pressure/return filter indicators on the carrier hydraulic system are functioning correctly and not in by-pass.

Every 500 Hours

	Take a sample of the hydraulic oil. Review the results and determine if an increase in filter change interval and/or oil change is required. File the results.
	Check cushion chamber nitrogen gas pressure. Refer to "Cushion Chamber Gas Pressure – Checking" on page 54.
	Check accumulator nitrogen gas pressure. Refer to "Accumulator Gas Pressure – Adjusting" on page 58.
	Perform all breaker checks above as required.
	Check that the retainer pins, cross pins and stopper plugs are not damaged and are in place.
	Check that the upper isolator and tie rod nuts are in place and tight. Check for wear.

Every 1000 Hours or Yearly

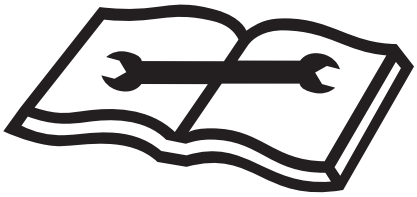
	Replace the retainer pins.
	Perform all breaker checks listed above as required.
	Disassemble the breaker to replace all seals. Replace upper and lower breaker isolators inside the housing. Refer to page 87.
	Measure the wear limit on the Front and Rear Bushings. Replace each bushing if the allowable tolerances are exceeded. Refer to page 52.
	Check Hydraulic flow to breaker and operating pressure. Adjust as necessary.

NOTES

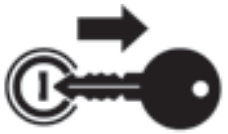
Service

Safety Warnings

⚠ WARNING!



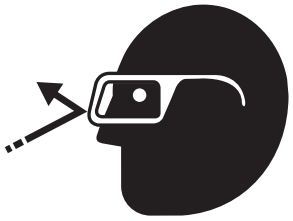
- Only trained mechanics should repair or disassemble the hydraulic breaker. Be sure you understand a service procedure before beginning any work; if you are uncertain, contact your BTI representative.
- Avoid unauthorized machine modifications – never substitute alternate parts not intended for the application. This could create hazardous situations or machine failure. BTI Engineering must approve all machine modifications; they can affect product reliability and machine stability.
- Before performing any work on the machine, attach a DO NOT OPERATE or similar tag in the operator's cab to alert others of service work being performed. Remove engine key and master key switch. Unexpected machine movement can cause serious injury.



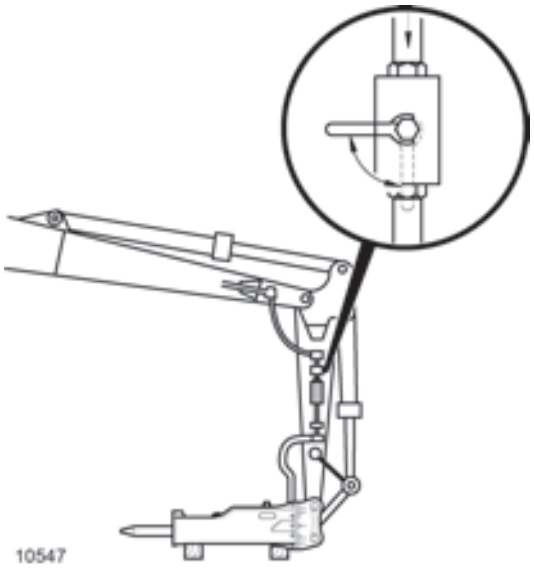
- The accumulator and cushion chamber are charged with nitrogen (N_2) – a non-explosive inert gas. Only use N_2 when refilling them. Charging with any other gas could trigger an explosion and lead to serious or possibly fatal injuries.

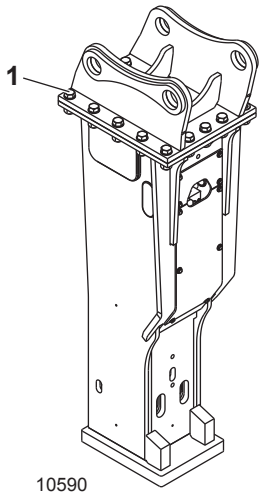
- Relieve all gas pressure in the accumulator and cushion chamber before beginning disassembly procedures to avoid the potential for accidents or injury. They remain under pressure even after the hydraulic system is depressurized. Refer to the maintenance section of this manual.

- Stay clear of the tool when charging the breaker cushion chamber. Gas pressure may cause unexpected piston movement and force the tool to jump against the tool retainer pins.
- Use only lifting devices with sufficient capacity to safely support the expected weight you are lifting.
- All lifting devices (straps, slings, chains, ratchet blocks, etc.) must comply with applicable local regulations and certifications. BTI cannot accept responsibility for the use of sub-standard equipment and work practices.
- When lifting or supporting the breaker or its parts, use equipment with a sufficient lifting capacity.

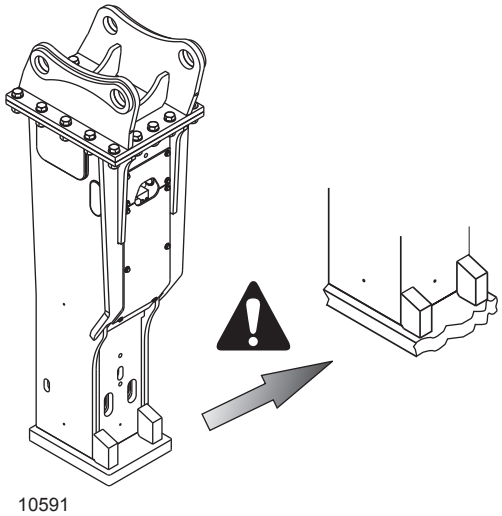


- Use the lifting eyes or lifting points that are located on certain breaker components.
- Do not work under a hanging or suspended load!
- If a jack is used, the floor or ground must be flat and of sufficient strength to support the expected load.
- Wear protective clothing – know and use the protective equipment that is to be worn when servicing the hydraulic breaker. Hard hats, protective glasses, protective shoes, gloves, reflector type vests, respirators and ear protection are types of equipment that may be required.





1. Top mount bracket bolts



Breaker Disassembly

⚠ WARNING!

Hydraulic breakers and their components are heavy! Plan carefully how you will handle them when removing, disassembling, or installing the breaker. Stand clear when slinging the breaker off the ground.

⚠ CAUTION!

Use extreme care to prevent dirt from entering the hydraulic circuit when disconnecting or reconnecting hydraulic lines. Cap or plug lines when disconnecting; clean thoroughly before reconnecting. Even the smallest dirt particles will cause damage to the internal workings of the breaker.

⚠ WARNING!

Risk of personal injury! Wear safety glasses, boots, and protective gloves.

Relieve all trapped pressure in the breaker hydraulic circuit. Pressure can be maintained in hydraulic circuits long after the power source and pump have been shut down.

1) Relieve all pressure before disconnecting hoses or tubes.

2) Use a lifting crane of suitable capacity to remove the breaker from the carrier. Refer to page 104 to page 114 for breaker operating weights.

NOTE: Breaker disassembly must be carried out in a clean shop environment.

3) Remove the tool from the breaker. Refer to "Tool and Front Tool Bushing Clearance" on page 52. Measure and record the clearance value between the tool and the tool bushing.

4) Position the breaker upright on a clean, level shop floor surface.

5) Restrain the breaker upright in this position while keeping the crane in place. Restrain the breaker with chains, straps or other suitable method to prevent it from tipping over if knocked or hit from an external load (forklift, cranes, loads on cranes, etc.).

⚠ CAUTION!

Be aware of worn housings.

As the breaker is used, the lower portion of the housing becomes worn. Worn housings can be unstable.

6) Ensure breaker is supported and restrained to prevent tipping over.

7) The breaker housing must also be restrained against upward movement produced by the lift crane.

8) Remove crane rigging from the breaker housing only AFTER the breaker housing has been fully restrained.

CAUTION!

Upper and lower isolators inside the breaker housing are compressed to provide a preload on the breaker body to support it within the housing. Loosen bolts gradually and equally to remove pre-load and prevent injury.

9) Loosen top mount bracket bolts gradually and equally to reduce spring pre-load from isolators. Once all bolts have been loosened, the spring pre-load will be gone and it is safe to remove the bolts.

10) Remove top mount bracket bolts and bracket. Store in a safe place away from the work area.

The upper and lower isolators have a minimum thickness requirement for reuse. Refer to "Upper and lower Isolator Limits" on page 87. If they do not meet the minimum requirement, they must be replaced.

11) Remove the upper isolator from the breaker and check for cracking, heat damage, wear etc. If the isolator is in poor condition it must be replaced.

NOTE: Upper and lower isolators must be replaced after 1000 hours of operation.

Removing Breaker Body from Housing

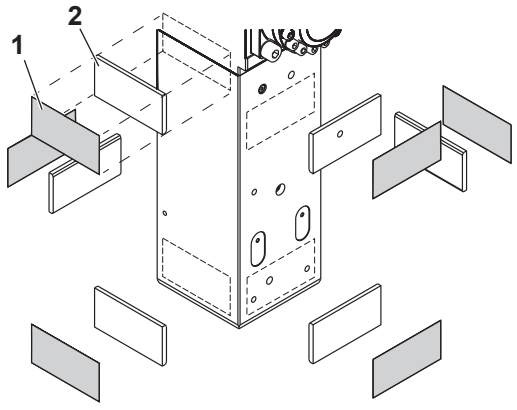
NOTE: All lifting eyes required for breaker disassembly are found in the breaker tool kit.

Besides the upper and lower isolators, the BXR breaker body has nylon support pads shimmed between it and the inside of the housing to keep it supported on all sides. They can be reused if in good condition.

IMPORTANT! Secure wear pads and shims to prevent damage before removing the breaker body from the housing.

1) Secure the wear pads and shims on all four sides of the breaker housing. A wood screw can be inserted through the access holes in the sides of the breaker housing. Ensure the screws DO NOT fully penetrate the wear pad.

1. Shims
2. Nylon Support Pad
3. Access Holes



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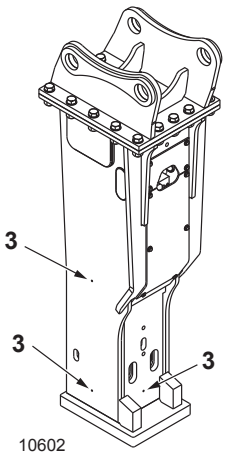

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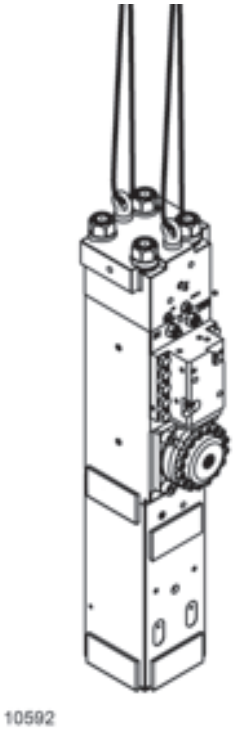


Bare Breaker Weight

Model	Weight lb (kg)	Lifting Eye Size
BXR50	1,804 (818)	M24
BXR65	2,163 (981)	M24
BXR85	2,934 (1 331)	M24
BXR100	3,474 (1 576)	M30
BXR120	4,010 (1 819)	M30
BXR160	5,540 (2 513)	M30

⚠ CAUTION!

Ensure breaker is restrained to prevent tipping over.

2) Insert the appropriate lifting eyes into the rear head.

3) Using an overhead crane, pull the breaker body straight up out of the housing.

4) Carefully lower the bare breaker onto a smooth, clean, level surface.

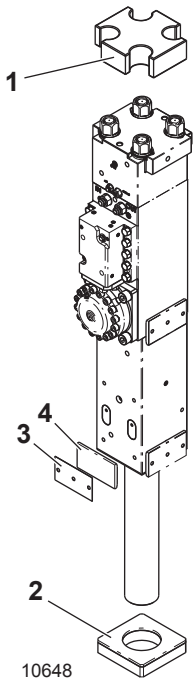
5) Mark the location of the wear pads and shims inside the housing and then remove them. They could be placed back in the same location upon reassembly.

6) Clean inside of the housing. Inspect for weld cracks, damage etc. inside and outside of the housing. Repair as required.

7) Clean and inspect the front head area of the bare breaker.

8) Clean and inspect the shims and nylon support pads for wear, warping, cracking etc. then set them aside for reuse. Wear pads must be replaced after 1000 hours of operation.

NOTE: The upper/lower isolators and wear pads are considered wear parts and are not covered under the breaker warranty.



1. Upper Isolator
2. Lower Isolator (install with nylon side towards breaker)
3. Shim
4. Nylon Wear Pad

Breaker Body Disassembly

The breaker body can be disassembled standing up or laying down. The following instructions describe the standing method.

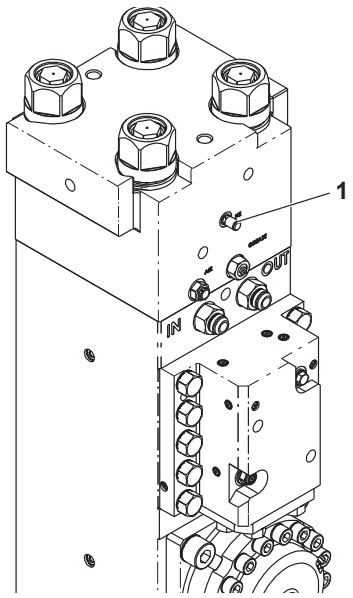
⚠ WARNING!

Release cushion chamber gas pressure before disassembly.

The cushion chamber in the rear head contains nitrogen gas under pressure. Do not remove the tie rod nuts or gas valve until this pressure is released.

⚠ WARNING!

DO NOT use impact tools to disassemble or reassemble the breaker body. The tie rods and control valve bolts use heliserts (steel threaded inserts) that can be damaged by the use of impact tools.



1. Gas Valve

Rear Head Removal

1) Use the charging hose in tool kit to fully vent the N_2 gas from the cushion chamber.

2) Insert lifting eyes into the rear head and stand the breaker on a safety stand.

3) Remove the gas valve assembly to avoid accidental damage during bushing replacement. Put it in a safe place for reuse later.

4) Back off the tie rod nuts a couple of turns. This can be done using a torque multiplier if the breaker is standing up. If the breaker is lying down, use the sledge-wrench method.

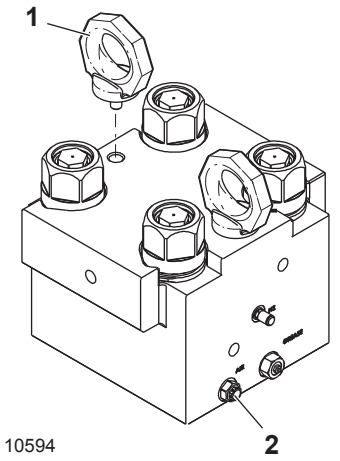
5) Using a hoist, jerk the assembly upwards slightly, which should loosen the rear head from the cylinder.

6) Place the rear head on a clean protective surface.

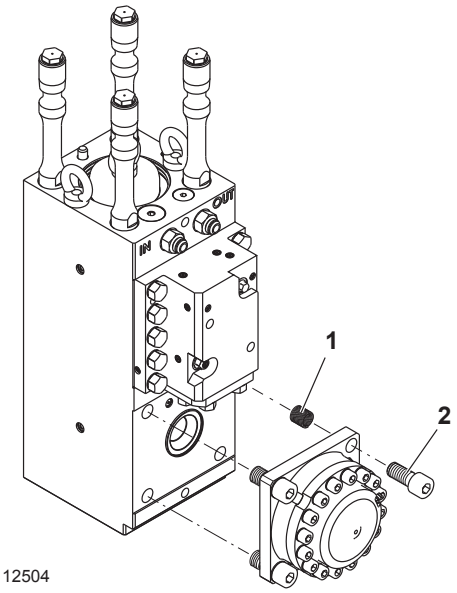
7) If the rear head is stuck, it may be necessary to tap the cylinder cover on alternate sides with a soft-faced mallet. Remove the nuts and washers from the four tie rods.

8) Remove the rear head from the cylinder using lifting eyes.

In some cases, the nuts may be seized onto the tie rod and may come out as a unit.



1. Lifting Eye
2. Air Valve Assembly



1. Helisert
2. Accumulator Mounting Bolts

Accumulator Removal

⚠ WARNING!

Release accumulator gas pressure before disassembly.

The accumulator contains nitrogen gas under pressure. Do not remove the bolts until this pressure is released.

⚠ WARNING!

DO NOT use impact tools to remove the accumulator from the breaker body. The accumulator mounting bolts use heliserts (steel threaded inserts) that can be damaged by the use of impact tools.

1) Take an initial reading of the nitrogen gas pressure in the accumulator. A higher than normal reading may indicate a problem.

⚠ WARNING!

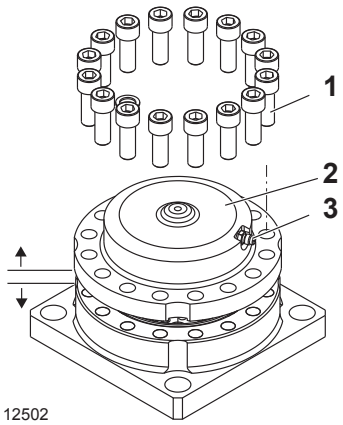
A gas pressure reading in the accumulator higher than the last time it was charged indicates the diaphragm may have ruptured. Pressurized oil may exist in the accumulator. Proceed with caution.

2) Bleed off the nitrogen gas with the charging kit hose. Fully vent the accumulator. Confirm with the gauge in the charging kit.

3) Loosen the 4 bolts in a staggered pattern. Use multiple steps.

4) Remove the accumulator from the breaker body.

Diaphragm Replacement



1. Retainer bolts and washers
2. Cover
3. Accumulator bleed nozzle

⚠ CAUTION!

Nitrogen gas must be fully vented before disassembly.

1) Confirm the gas pressure has been fully vented with the charging kit hose and gauge.

2) Loosen the bolts holding the accumulator halves together in a staggered pattern.

3) Loosen the bolts off in 1/8 in (3 mm) increments; watch for movement. Movement of the halves may mean residual pressure remains.

4) Continue loosening the bolts in a staggered pattern.

5) Remove the cover to replace the diaphragm.

Accumulator Assembly

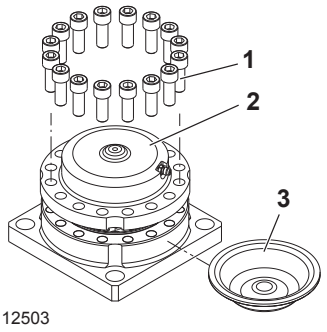
1) Install the accumulator diaphragm into the accumulator base. Make sure the groove is clean and free of any debris.

2) Lubricate the cover bolt threads with MoS_2 grease.

3) Install the cover bolts and washers. Tighten in stages in a staggered pattern.

Model	Accumulator Cover Bolt Torque ft•lb (N•m)
BXR50	289 (391)
BXR65	398 (539)
BXR85	398 (539)
BXR100	398 (539)
BXR120	738 (1 000)
BXR160	738 (1 000)

If no further disassembly of the breaker is required, refer to Accumulator Installation on page 81.



1. Accumulator Cover Bolts
2. Accumulator Cover
3. Accumulator Diaphragm

Control Valve Removal and Disassembly

CAUTION!

Handle these components with care. Damaging them will cause breaker malfunction.

WARNING!

DO NOT use impact tools to disassemble the control valve. Control valve bolts use heliserts (steel threaded inserts) that can be damaged by the use of impact tools.

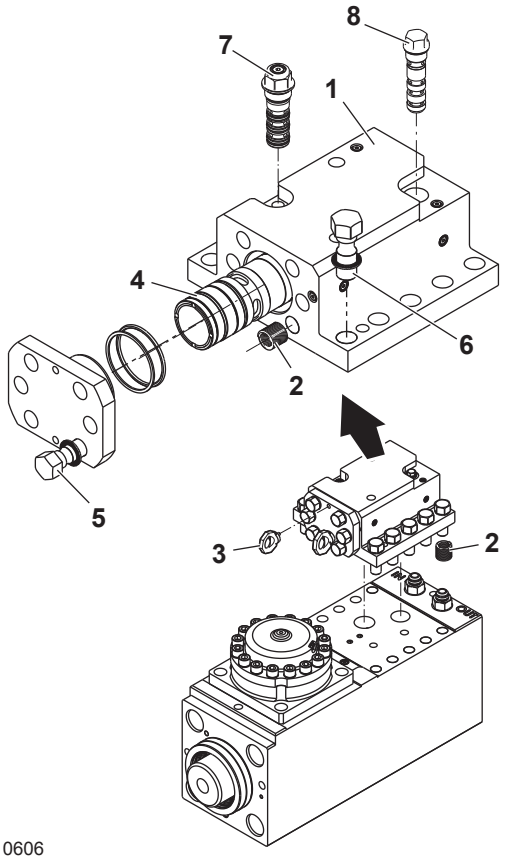
The control valve is responsible for directing oil within the breaker to move the piston within the cylinder. The external control valve is mounted to the side of the cylinder body.

1) Remove the control valve bolts and washers, then lift the control valve from the cylinder body.

2) Prepare the control valve for disassembly by washing it thoroughly and clamping it in a vise.

3) Remove control valve cap.

4) If spool is not seized, it can be easily removed. A puller can assist in removing a seized spool.



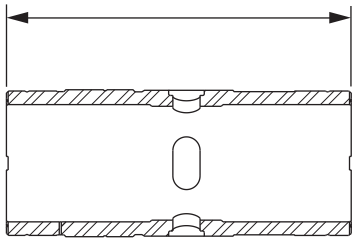
1. Control Valve
2. Helisert
3. Lifting Eye
4. Valve Spool
5. Cover Bolts and Washers
6. Mounting Bolts and Washers
7. Stroke Adjuster Valve Assembly
8. Regeneration Valve Assembly

5) Inspect the control valve spool for any signs of scoring, binding, and cavitation. Pay particular attention to the spool holes. Small scratches and marks may be removed with a fine oilstone or fine emery cloth and oil. Also check the control valve cap and valve body for marks or scratches, and remove them if they are not too severe. If the score marks are too deep or large, the complete control valve assembly must be replaced.

6) Examine the control valve ports for cavitation and erosion. Check all oil passage holes in the control valve and be sure they are not plugged. Clean them with a fine wire if necessary to remove any dirt particles.

7) While the cover seals are still in place, inspect for nicks, score marks or damage. Replace if necessary.

8) At this time, the stroke adjuster and regeneration valves can be removed, cleaned and inspected as required.

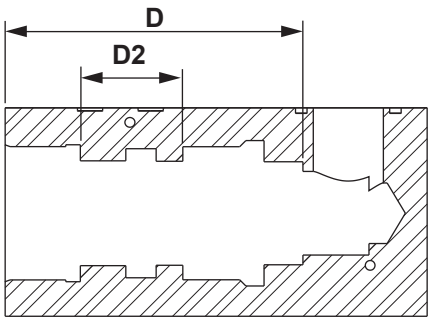


10607

Control Valve Spool

Control Valve Inspection

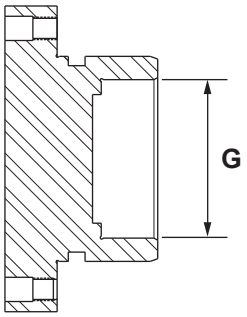
- If the valve spool surface is scuffed, remove it with 800-1200 grit emery cloth. If the area is extremely damaged, replace the valve.



10608

Control Valve Body

- If the valve body has flaws in area D, smooth the surface with 800–1200 grit emery cloth. Do not use a buffing grinder on this area.
- If area D2 is scuffed so badly that it is hard to de burr, the use of a buffing grinder is permitted, then finish the face with emery cloth.



Control Valve Cap

- In case of scuffing on the inner diameter G, finish by buffing with a flap wheel.
- Clean all parts of the control valve in clean solvent and dry them with compressed air.

Control Valve Assembly

⚠ WARNING!

DO NOT use impact tools to reassemble the control valve. Control valve bolts use heliserts (steel threaded inserts) that can be damaged by the use of impact tools.

1) Lightly oil the control valve spool with clean hydraulic oil.

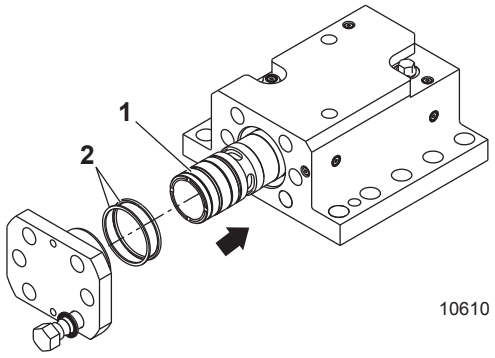
2) Slide the spool into the valve body–smallest diameter first.

3) Lubricate the grooves in the valve cap and install the o-ring and backup ring.

4) Place the valve body in a vise.

5) Lubricate bolts with MoS_2 grease or Never Seize.

6) Install the valve cap, bolts and washers.

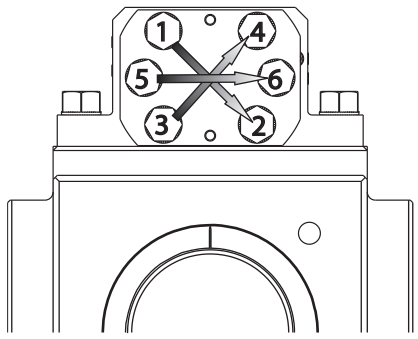


1. Valve Spool
2. O-ring and Backup Ring

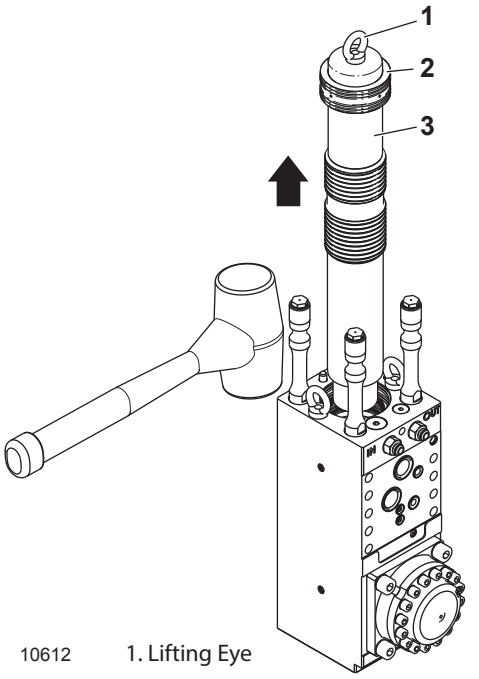
7) Torque the fasteners in a diagonal pattern. Use stages of 60%, 80%, and 100%.

Valve Cap Bolt Torque

Model	Torque Value
BXR50	450 ft•lb (610 N•m)
BXR65	575 ft•lb (780 N•m)
BXR85	575 ft•lb (780 N•m)
BXR100	1,160 ft•lb (1 572 N•m)
BXR120	1,160 ft•lb (1 572 N•m)
BXR160	1,160 ft•lb (1 572 N•m)



To reinstall the control valve when no further disassembly is required, refer to "Control Valve Installation" on page 81.



10612

1. Lifting Eye
2. Seal Bushing
3. Piston

Piston Removal

⚠ CAUTION!

Handle these components with care. Damaging them will cause breaker malfunction.

1) Install a lifting eye into the top of the piston.

2) Lift the piston straight up and out of the cylinder.

NOTE: Avoid scratching the piston's polished surface. Tapping the cylinder with a soft-faced mallet may ease the removal of the piston.

The seal bushing will come out with the piston.

3) Place the piston and seal bushing on a clean protective surface.

4) The piston should be carefully cleaned and inspected for corrosion, cavitation, pitting, and scoring.

5) Check the grooves in the piston for metal that has been pulled-in due to galling. If this has occurred, clean the grooves. Small marks can be removed with an oilstone or fine emery cloth and oil. Check the corresponding mating part as well and treat in the same manner.

6) Look for pitting and deformation of the impact face. This indicates that the tool has been operated with too much wear on the tool bushings.

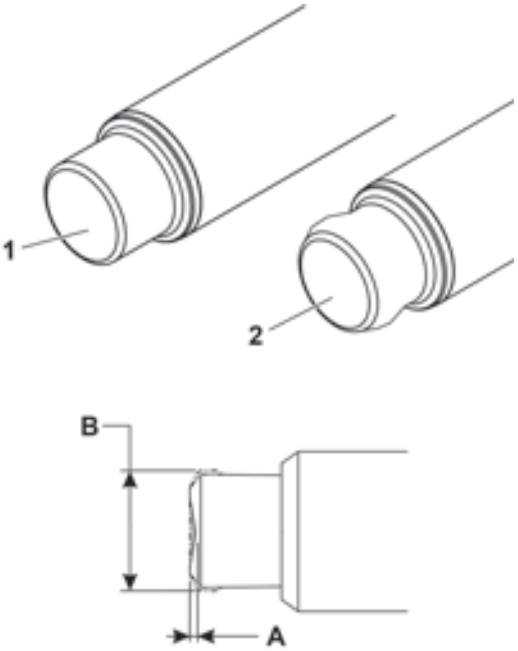
7) If the face is dished, carefully measure the amount of deformation. Compare to the table below.

Maximum Allowable Piston Deformation

Breaker Model	Allowable Deformation on Face 'A'	Maximum Deformation Diameter 'B'
BXR50	1/8 in (3 mm)	4.33 +1/16 in (110 +1,6 mm)
BXR65	1/8 in (3 mm)	4.72 +1/16 in (120 +1,6 mm)
BXR80	1/8 in (3 mm)	5.04 +1/16 in (125 +1,6 mm)
BXR100	1/8 in (3 mm)	5.39 +1/16 in (137 +1,6 mm)
BXR120	1/8 in (3 mm)	5.59 +1/16 in (142 +1,6 mm)
BXR160	1/8 in (3 mm)	5.98 +1/16 in (152 +1,6 mm)

8) Thoroughly clean and dry the piston to protect it from dirt, then set it aside.

9) If the piston is not going to be installed immediately, coat it with oil and store it protected in a clean, dry place.



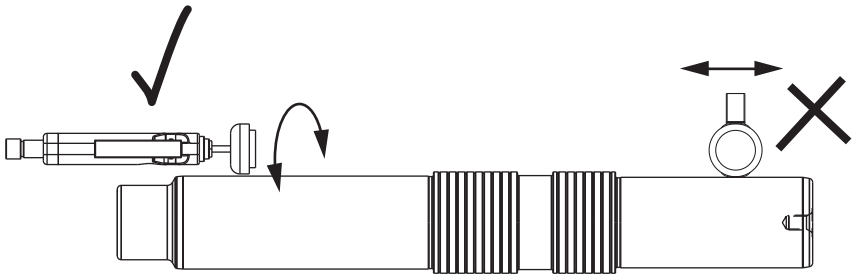
10613

1. Normal Impact Face
2. Impact Face with Deformation

If the piston face is scuffed, finish it with a buffing grinder, then 800–1200 grit emery cloth. Refer to "Clearances Between Cylinder and Piston" on page 75.

IMPORTANT: When using a buffing grinder, apply the flap wheel around the circumference of the part only. If applied along the axis, roundness of the part will be affected.

Wash the parts after finishing them.



10614

Cylinder Removal

CAUTION!

Handle this component with care. Damage will cause breaker malfunction.

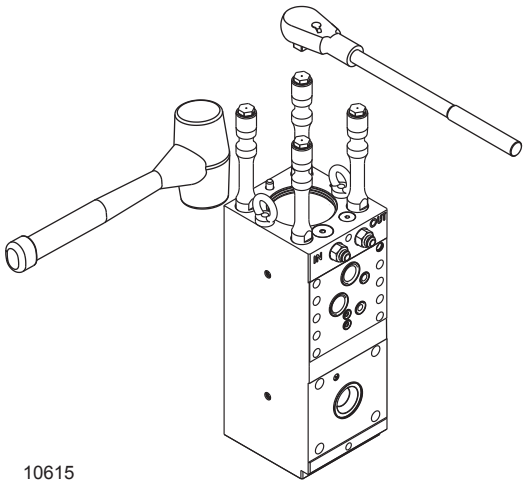
1) Install 2 lifting eyes into the top of the cylinder.

2) Lift the cylinder straight up off the tie rods.

3) Loosen and remove the tie rods. It may be necessary to secure the front head to prevent it from rotating.

4) Loosen the tie rods by rotating them counter-clockwise. Use an adjustable wrench and a soft faced mallet or a sledge wrench on the tie rod flats to loosen them.

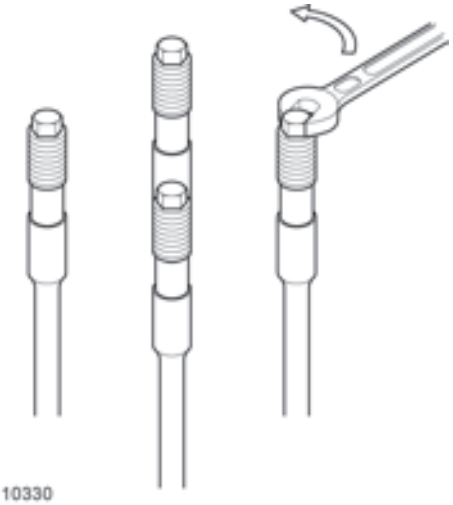
The cylinder should slip out of the front head. If not, tap the front head with a soft-faced mallet until the cylinder and front head come apart.



10615

Cylinder Inspection

- Thoroughly clean the cylinder bore, and remove the dust seal, oil seal, and slide ring. Check the seals for signs of extension and excessive wear both before and after removal.
- Thoroughly inspect inside walls of the cylinder for corrosion, cavitation, or scoring. Check grooves above seal area for small pieces of metal, due to galling. If these are not cleaned out they will chip off and go between the piston and cylinder, and galling will occur again.
- Check for any damage to the heliserts that secure the control valve. Repair or replace as necessary to ensure the valve can be installed properly.
- Inspect the main inlet and outlet adapter threads for damage. Always replace the seals if they are removed.



10330

CAUTION!

Do not install the hydraulic adapters in the wrong port.

The pressure adapter has a smaller through hole than the tank adapter.

The cylinder is marked "IN" beside the pressure adapter and "OUT" beside the tank adapter.

Cylinder Clean-up

Any slight galling and other irregularities on the cylinder wall must be removed before reassembly. Use a cylinder hone to ensure the cylindricity of the bore is maintained. After using a hone, deburr the edges of all the lands.

The preferred method to remove irregularities is to use a blade (fixed type) hone. A second method is to use a flexible hone. The amount of deburring required will be reduced with the flexible hone.

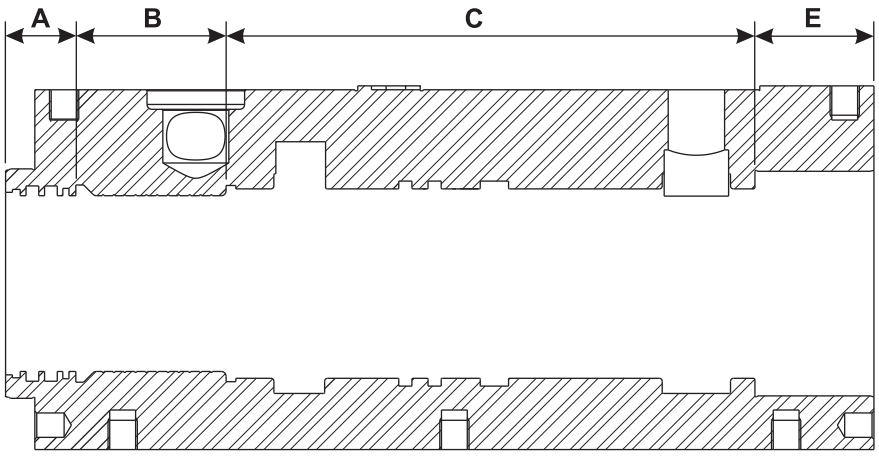
A die grinder should only be used for deburring edges and severe local points of galling.

If damage is too great, call your BTI representative.

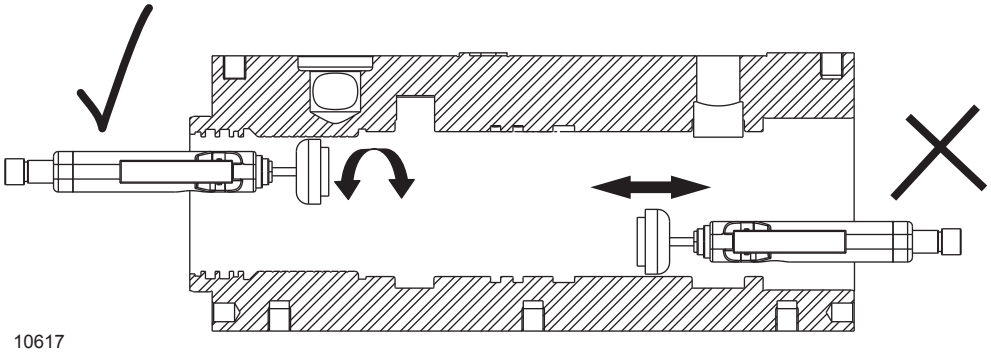
- Check the slide areas A, B and C for flaws. If there are scuffing flaws, finish the surface smooth with a cylinder hone.
- If there are flaws in area D, use 800–1200 grit emery cloth. Never use a buffing grinder in this area.
- Area E can be finished by buffing with a grinder.

Refer to "Clearances Between Cylinder and Piston".

Wash the parts after finishing them.



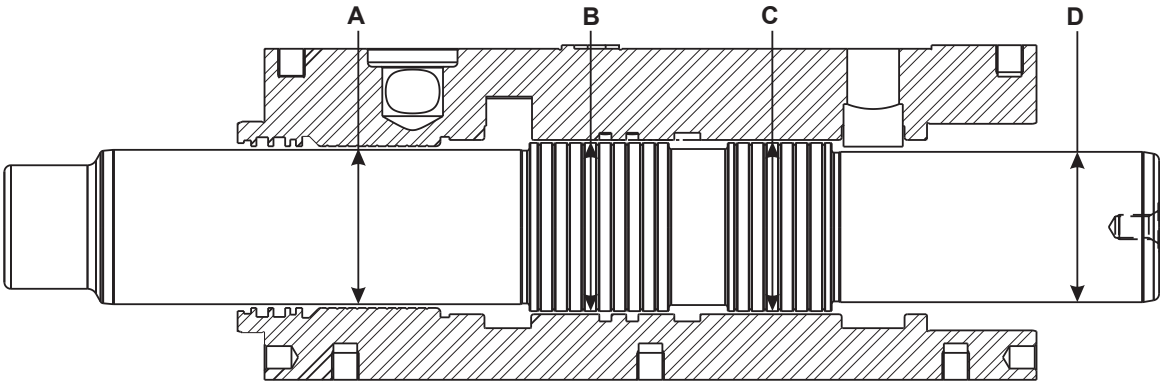
10616



10617

IMPORTANT: When using a buffing grinder, apply flap around the inside diameter of the part only. If applied along the axis, roundness will be affected.

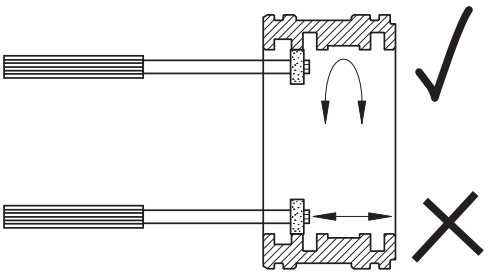
Maximum Clearances Between Cylinder and Piston



10618

in (mm)

Breaker Model		BXR50	BXR65	BXR85	BXR100	BXR120	BXR160
A	Nominal Dimension:	Ø5.705 (145)	Ø5.902 (150)	Ø6.496 (165)	Ø6.890 (175)	Ø7.087 (180)	Ø7.480 (190)
	Maximum Clearance:	.0067 (0,17)	.0067 (0,17)	.0067 (0,17)	.0067 (0,17)	.0067 (0,17)	.0067 (0,17)
B	Nominal Dimension:	Ø6.102 (155)	Ø6.299 (160)	Ø6.929 (176)	Ø7.343 (186,5)	Ø7.683 (194)	Ø8.150 (207)
	Maximum Clearance:	.0067 (0,17)	.0067 (0,17)	.0067 (0,17)	.0067 (0,17)	.0067 (0,17)	.0067 (0,17)
C	Nominal Dimension:	Ø6.102 (155)	Ø6.299 (160)	Ø6.929 (176)	Ø7.323 (186)	Ø7.683 (194)	Ø8.150 (207)
	Maximum Clearance:	.0067 (0,17)	.0067 (0,17)	.0067 (0,17)	.0067 (0,17)	.0067 (0,17)	.0067 (0,17)
D	Nominal Dimension:	Ø5.591 (142)	Ø5.746 (146)	Ø6.378 (162)	Ø6.732 (171)	Ø6.890 (175)	Ø7.283 (185)
	Maximum Clearance:	.0067 (0,17)	.0067 (0,17)	.0067 (0,17)	.0067 (0,17)	.0067 (0,17)	.0067 (0,17)



10338

Seal Bushing Inspection

Clean and inspect the cylinder seal bushing.

The seal bushing carries several specially designed seals. Pay attention to the condition and orientation of the old seals as they are removed. This may help to identify any operating problems that the breaker had before it was dismantled.

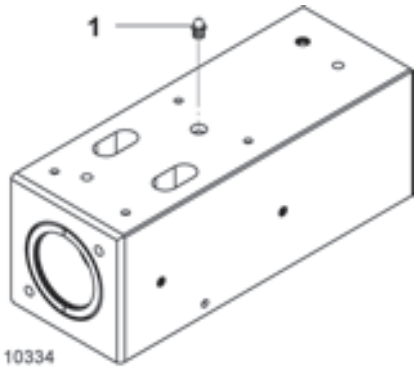
If burrs are found on the seal bushing, use a buffing grindstone to remove them.

IMPORTANT: When using a buffing grinder, apply the flap wheel around the inside diameter of the part only. If applied along the axis, roundness will be affected.

⚠ CAUTION!

Handle this component with care. Damage will cause breaker malfunction.

All parts should be thoroughly washed in clean solvent and dried with compressed air. Once the seal bushing is clean and dry, protect it from dirt and set it aside.



1. Grease Fitting

Tool Bushing Removal

⚠ CAUTION!

The tool bushings are a shrink-fit in the front head and the following procedure must be followed for removal. Do not gouge the bushings out with an oxyacetylene torch or other method.

NOTE: The front tool bushing can be removed without disassembling the breaker.

NOTE: The breaker must be disassembled to change the rear tool bushing. If it is not disassembled, refer to "Breaker Disassembly" on page 64. Disassembly is necessary to protect the internal components of the breaker.

NOTE: If new bushings are to be installed immediately after removing the old ones, place them in dry ice before starting the removal procedure.

Dry ice can take up to four hours to achieve the desired results. The bushings will be fully chilled then, and the front head will still be hot enough from the welding to receive them.

If using liquid nitrogen to shrink the bushings, it can take as little as fifteen minutes to properly chill them.

1) Remove the grease fitting to avoid accidental damage during bushing replacement. Put it in a safe place for reuse later.

The tool bushings are held in position by four retainer pins.

2) Remove these pins by driving them out with a drift, from the side opposite the stopper plugs.

3) Lay the front head on it's side.

The recommended method of shrinking the bushings is to lay crescent-shaped beads of weld inside the tool bushings. Use an arc welder and a very hot weld.

4) Start with the front tool bushing.

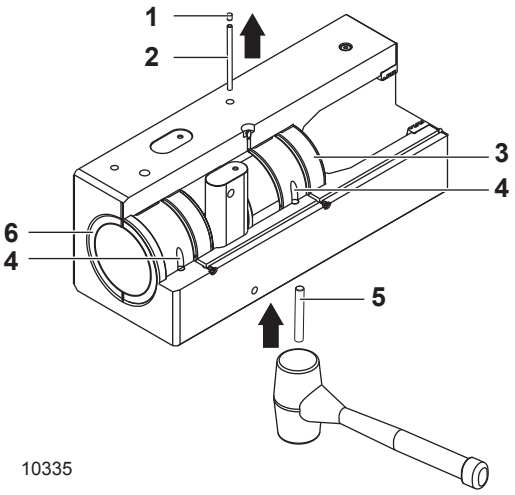
5) Lay beads of weld to completely cover the inside of the bushing. (Depending on the breaker bushing size, this could take from one-half to three hours.)

6) Allow the bushing to cool for about one-half hour so the weld will contract and shrink the bushing. This time will be less for smaller breakers.

IMPORTANT! Do not quench the bushing to cool it faster.

7) Knock the bushing out with a bar from the top end of the front head.

Repeat the procedure for the upper bushing.



1. Stopper Plug
2. Retainer Pin
3. Rear Tool Bushing
4. Tool Bushing Alignment Slot
5. Drift
6. Front Tool Bushing

Breaker Body Assembly

NOTE: Torque Specifications are listed for BXR breakers starting on page 116.

Tool Bushing Installation

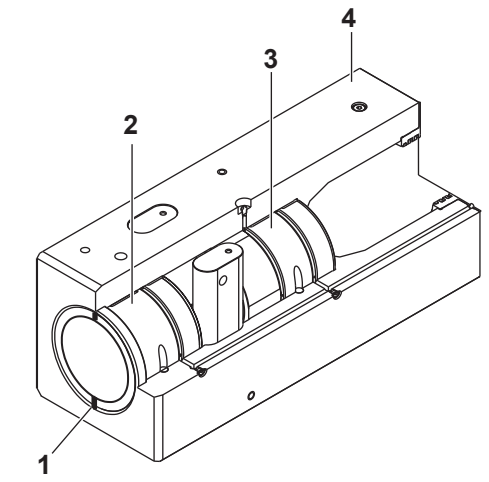
The rear and front bushings are installed from the tool side of the front head. Clean the inside of the front head thoroughly. Use a wire rotary brush to clean and smooth the surfaces in the areas where the bushings seat.

IMPORTANT! The bushings are a shrink fit in the front head. Use extreme care when installing the tool bushings. To obtain this fit, the front head must be heated so that it will expand, and the bushings placed in liquid nitrogen or dry ice, so they will contract. As the pieces return to room temperature, they become tightly fitted together.

IMPORTANT! The rear tool bushing must go in first.

1) Mark the front head and bushings for correct alignment during assembly.

2) Place the tool bushings in dry ice for 4 hours or liquid nitrogen for 30 minutes.



1. Mark Front Head and Bushing
2. Front Tool Bushing
3. Rear Tool Bushing
4. Front Head

⚠ CAUTION!

Wear appropriate gloves when handling these parts. Bare skin will freeze on contact.

⚠ CAUTION!

If the bushings are not installed properly before this point is reached, they must be taken out and replaced with new ones. With liquid nitrogen, there is about one minute to align the retainers.

3) If the front head has cooled, it must be heated to 300 °F (150 °C). This will expand the housing a small amount.

4) Apply a coat of Never-Seize to the retaining pins and have them ready nearby.

5) Line up the slots in the rear tool bushing with the retainer holes and insert it into the front head.

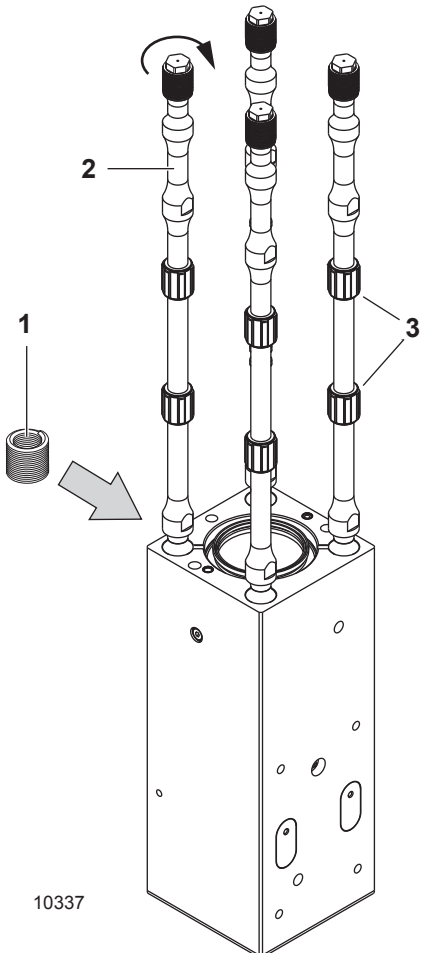
IMPORTANT! Care must be taken to ensure that the grooves in the tool bushings line up with the retainer pin holes in the front head.

When fully inserted, the rear tool bushing will seat against the step in the bore of the front head.

6) Fully insert the retaining pins into the retaining pin holes. Do not install the stopper plugs until the front head has cooled to room temperature.

7) Repeat the procedure for the front bushing.

8) Install the previously removed grease fitting in the front head.



1. Helisert
2. Tie Rod
3. Apply grease

Tie Rod Installation

⚠ WARNING!

DO NOT use impact tools to reinstall the tie rods. The tie rods use heliserts (steel threaded inserts) that can be damaged by the use of impact tools.

Inspect the tie rod threads. If they are damaged beyond repair, the tie rod must be replaced.

1) Lubricate the tie rods and threads thoroughly using MoS_2 (moly-based) grease or Never Seize.

2) Install the tie rods and tighten until they bottom out in the front head.

3) The tie rods should turn in smoothly and easily until they seat themselves. If they do not bottom out or there is excessive resistance, the threads on the tie rods or the helisert may be damaged. Remove damaged heliserts and restore the front head threads with conventional thread dies and taps.

4) Insert new heliserts with an insertion tool.

NOTE: As a reference, tie rod torque is listed in torque Specifications starting on page 116.

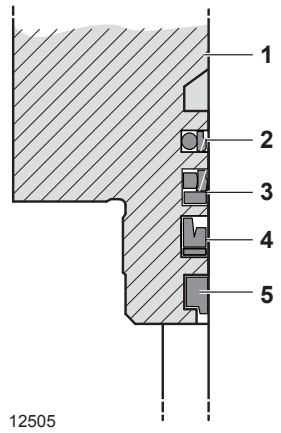
Cylinder Installation

1) Check the cylinder for burrs.

2) Liberally oil the inside surface of the cylinder and the new seals, then install the seals and rings into the grooves at the lower end of the cylinder.

Pay close attention to the correct placement and orientation of the seals. Improper seal installation will cause premature leakage and premature wear.

3) Lower the cylinder carefully onto the tie rods. The control valve mounting holes on the cylinder must face the same direction as the grease fitting on the front head.



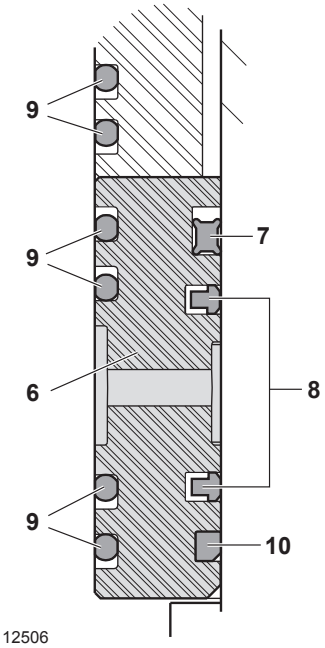
1. Lower Cylinder
2. Buffer Seal
3. U-packing
4. Dust Seal

Seal Bushing – Re-sealing

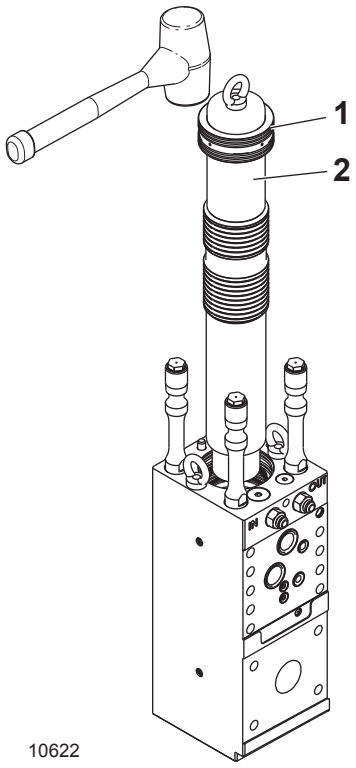
Ensure the bushing is clean and there are no burrs.

1) Oil the seal bushing and seals.

2) Install the seals and o-rings in the correct positions and orientations.



6. Seal Bushing
7. Quad Ring
8. Step Seal
9. O-ring
10. Buffer Seal



10622

1. Seal Bushing
2. Piston

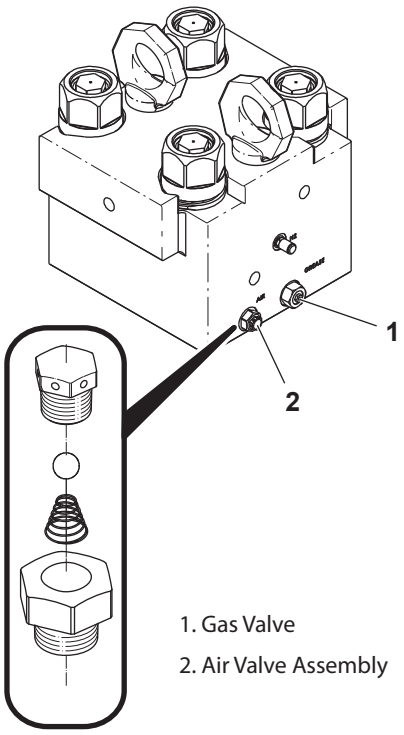
Piston Installation

1) Lubricate the top end of the piston, and slide the seal bushing into place, with the chamfer or step towards the center of the piston.

2) Lift the piston with the lifting eye, lubricate it thoroughly, and lower it carefully into the cylinder. It may need a tap to push it through the lower seals.

3) When the piston is all the way into the cylinder bore, use a soft mallet to tap the seal bushing into position in the cylinder. The bushing will stop when it reaches the support flange on the front head.

Replace the o-rings and back-up rings on the top of the cylinder where the rear head makes contact.



1. Gas Valve
2. Air Valve Assembly

10623

Inspect Gas and Air Valve

Inspecting the Gas Valve

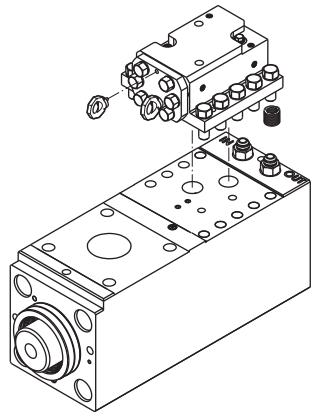
- Remove the gas valve plug (if present) and the gas valve from the rear head.
- Thoroughly clean the cover and valve, and inspect them for damage.
- Do not install gas valve yet. (Refer to page 83.)

Inspecting the Air Valve

The air valve maintains a positive pressure in the impact chamber to help exclude dirt, oil, and other contaminants.

- Clean and inspect the previously removed air valve for damage. Reinstall or replace as necessary.
- Re-apply Loctite or thread tape to the air valve whenever it is removed.
- Insert the spring before the check ball, for proper operation.

Control Valve Installation



10624

WARNING!

DO NOT use impact tools to install the control valve. Control valve bolts use heliserts (steel threaded inserts) that can be damaged by the use of impact tools.

NOTE: Nordlock washers cannot be reused. They must be replaced.

1) Before attaching the control valve to the cylinder, make sure all the seals are in place. Refer to the Parts Section for correct orientation.

Use only hand tools to tighten the bolts as they thread into special hardened heliserts that can be damaged by impact tools.

2) Use MoS_2 grease to lubricate bolt threads.

3) Tightened in a staggered pattern from one side to other to prevent binding. Tighten in stages of 60%, 80%, 100% of torque value.

Model	Valve Case Bolt Torque
BXR50	450 ft•lb (610 N•m)
BXR65	575 ft•lb (780 N•m)
BXR85	575 ft•lb (780 N•m)
BXR100	1,160 ft•lb (1 572 N•m)
BXR120	1,160 ft•lb (1 572 N•m)
BXR160	1,301 ft•lb (1 762 N•m)

Accumulator Installation

WARNING!

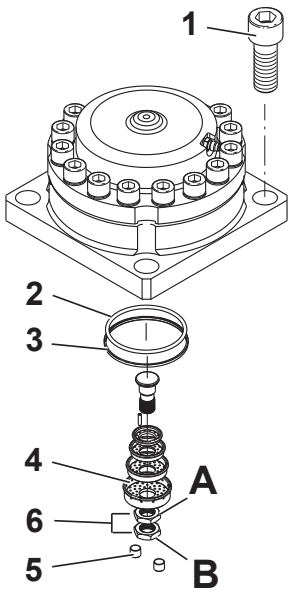
DO NOT use impact tools to install the accumulator. Accumulator bolts use heliserts (steel threaded inserts) that can be damaged by the use of impact tools.

Use only hand tools to tighten the bolts as they thread into special hardened heliserts that can be damaged by impact tools.

1) If the diffuser was disassembled, reassemble it.

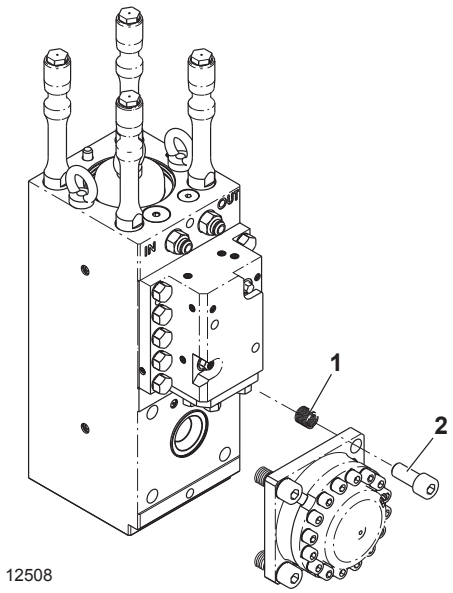
Diffuser Nut Torques*	A	B
BXR50	434 ft•lb (588 N•m)	470 ft•lb (637 N•m)
BXR65	434 ft•lb (588 N•m)	470 ft•lb (637 N•m)
BXR85	434 ft•lb (588 N•m)	470 ft•lb (637 N•m)
BXR100	434 ft•lb (588 N•m)	470 ft•lb (637 N•m)
BXR120	810 ft•lb (1 098 N•m)	846 ft•lb (1 147 N•m)
BXR160	810 ft•lb (1 098 N•m)	846 ft•lb (1 147 N•m)

* Lubricated – cleaned, dry threads lubricated with standard medium viscosity machine oil.



12507

1. Accumulator Cover Bolts
2. O-ring
3. Back-up Ring
4. Orifice Assembly
5. PLUG
6. Diffuser Nuts

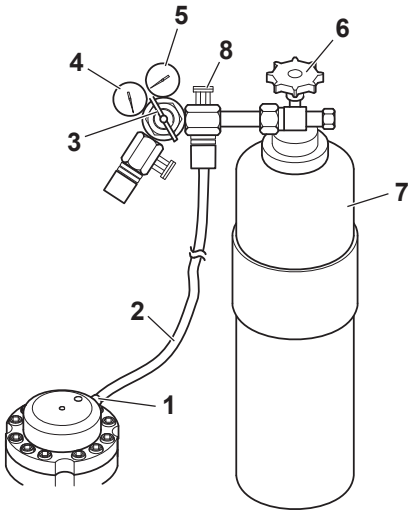


1. Helisert
2. Accumulator Mounting Bolt

2) Lubricate the accumulator mounting bolt threads with MoS_2 grease or Never Seize.

3) Install the mounting bolts and washers. Tighten in a staggered pattern.

Model	Accumulator Mounting Bolt Torque
BXR50	738 ft•lb (1 000 N•m)
BXR65	1,364 ft•lb (1 848 N•m)
BXR85	1,364 ft•lb (1 848 N•m)
BXR100	1,364 ft•lb (1 848 N•m)
BXR120	1,374 ft•lb (1 863 N•m)
BXR160	1,374 ft•lb (1 863 N•m)



1. Gas Valve – Accumulator
2. Hose
3. Gas Regulator Handle
4. Accumulator Gas Gauge
5. Nitrogen Tank Gas Gauge
6. Nitrogen Tank Valve
7. Nitrogen Tank
8. Drain Valve

Charging the Accumulator

Before the breaker is put into service, the accumulator must be recharged with N_2 gas.

Before proceeding, refer to "Safety Rules" on page 27.

Refer to "Accumulator Gas Pressure - Adjusting" on page 58 for proper procedure.

Installing the Rear Head

The cushion chamber in the rear head needs a small amount of oil to function properly. Just before installing the rear head, make a circular dam of grease on the top of the piston, just high enough to contain the required amount of oil (see table below).

1) Lower the rear head over the tie rods. The gas valve must face the same direction as the control valve on the cylinder.

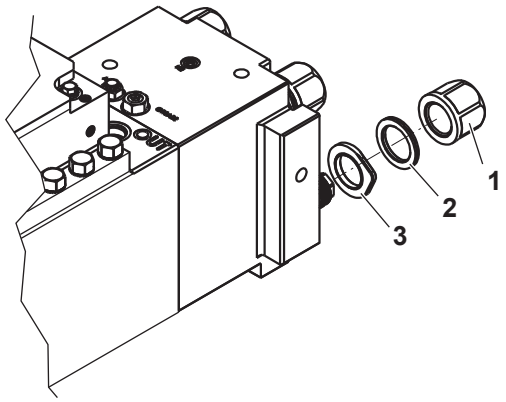
2) Install the tie rod washers.

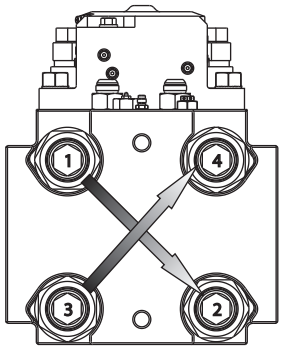
3) Lubricate the tie rod nuts with MoS_2 grease, and tighten them in a crossing pattern to draw the breaker components together evenly.

4) Finish tightening the nuts to the correct torque in four stages –40%, 60%, 80% and 100% using the same crossing pattern.

Tie rod Nut Torque

Model	Torque Value
BXR50	1,808 ft•lb (2 452 N•m)
BXR65	1,808 ft•lb (2 452 N•m)
BXR85	2,604 ft•lb (3 528 N•m)
BXR100	3,617 ft•lb (4 900 N•m)
BXR120	3,617 ft•lb (4 900 N•m)
BXR160	4,702 ft•lb (6 371 N•m)





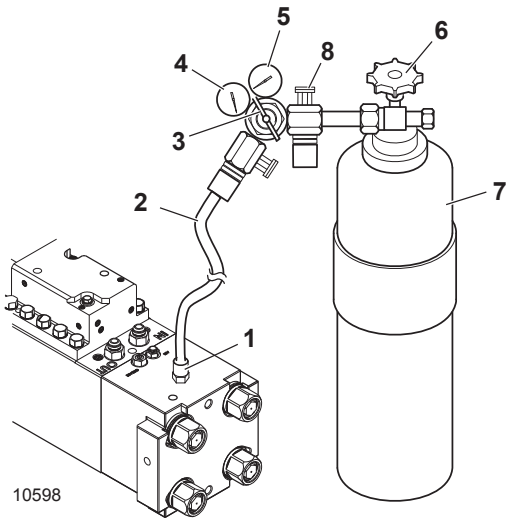
10632

1. Tie Rod Nut
2. Nordlock Washer
3. Centralizer Washer

5) Pour in the required amount of oil into the cushion chamber through the gas valve port. Use a medium viscosity hydraulic oil.

Cushion Chamber Oil Volume		
Model	oz	ml
BXR50	10	300
BXR65	12	350
BXR85	13.5	400
BXR100	15.2	450
BXR120	20.2	600
BXR160	27	800

6) Cover the gas valve threads with a good quality thread sealer and install the gas valve. Torque to **26 ft•lb (35 N•m)**.



1. Gas Valve – Cushion Chamber
2. Hose
3. Gas Regulator Handle
4. Cushion Chamber Gas Gauge
5. Nitrogen Tank Gas Gauge
6. Nitrogen Tank Valve
7. Nitrogen Tank
8. Drain Valve

Charging the Cushion Chamber

Before the breaker is put into service, the cushion chamber must be recharged with N_2 (nitrogen) gas.

Before proceeding, refer to "Safety Warnings" on page 63.

Refer to "Cushion Chamber Gas Pressure – Adjusting" on page 56 for proper procedure.

Breaker Assembly

(Installing body into boxed frame)

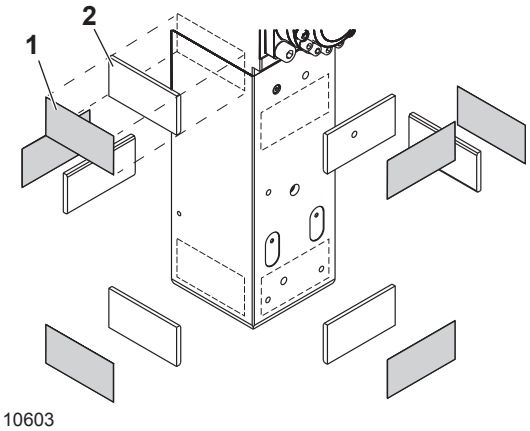
⚠ WARNING!

Hydraulic breakers and their components are heavy! Plan carefully how you will handle them when removing, disassembling, or installing the breaker. Stand clear when slinging the breaker off the ground.

Besides the upper and lower isolators, the lower portion of the BXR breaker body is shimmed in two places on all sides for a close fit inside the housing. Nylon support pads keep the body supported and help to dampen vibration. Shims are used to attain the required fit inside the housing.

Before installing the breaker body into the housing, the correct number of shims must be determined and support pads fixed in place inside the housing.

Verify the quantity and condition of the support pads and shims. Eight support pads are required—two per side of the breaker body. Shims and support pads can be reused if in good condition.



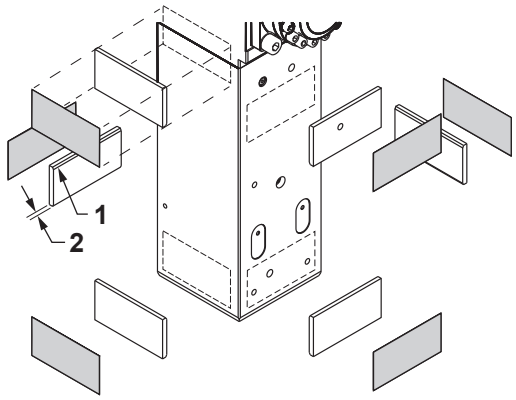
1. Shims
2. Nylon Support Pad

Nylon Support Pads

Check the thickness of the nylon support pads. If the pads are below the minimum thickness, they either must be replaced or re-shimmed. Refer to the table below for pad minimum and maximum thicknesses.

Front and back pads wear more quickly than the side pads. Not all pads may have to be replaced at the same time. Pads can be repositioned into different locations. This can be done to prolong pad usage.

Wear may produce a taper on the inside surface of the pad. Replace the pad if the taper is more than 1/2 of the thickness. If the taper is less than that, rotate the pad 180º and shim accordingly.



10601

1. Taper
2. Pad Thickness

Support Pad Thickness Limits

Model	Limit in (mm)
BXR50	1–15/16 (25,4–23,8)
BXR65	1–15/16 (25,4–23,8)
BXR85	3/4–11/16 (19–17)
BXR100	3/4–11/16 (19–17)
BXR120	3/4–11/16 (19–17)
BXR160	3/4–11/16 (19–17)

Determining Shims Required

Tools required: Inside and outside Vernier calipers, accurate to three decimal places.

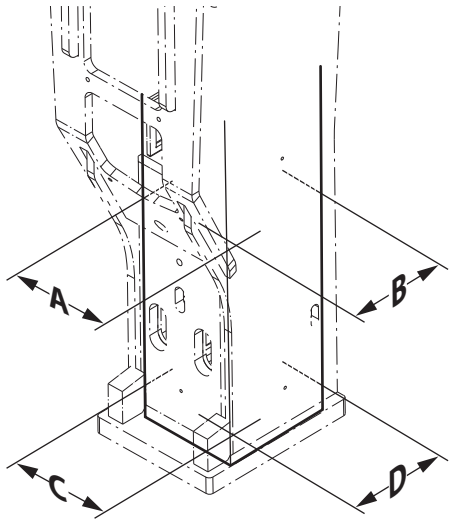
NOTE: Once the required number of shims has been established, the breaker body can be installed into the housing.

The number of shims required will be such that the clearance between the breaker body and the inside of the housing is **.006–.012 in (0,15–0,3 mm)**.

Use this method to determine shims required:

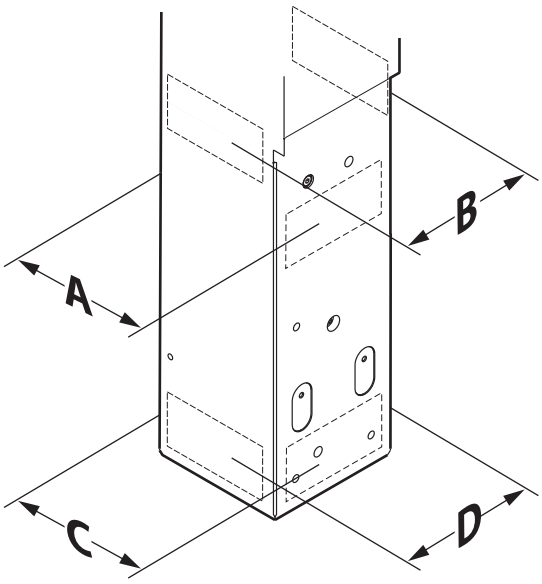
Refer to "Box Housing Measurement Data Sheet" on page 209.

1) Determine the MINIMUM dimension inside the breaker housing at each location A, B, C and D where the support pads contact. Measure both front and back at each position, then record the smallest dimension (eg. the smallest inside dimension at position A, etc.).



10652

Measure Inside Housing



Measure Breaker Body

10654

2) Measure breaker body where the support pads will contact in both directions. Record measurements from positions A, B, C, and D.

3) Measure the combined thickness of the two support pads available for use in each area A, B, C, and D. Record this information.

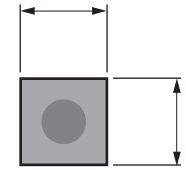
4) Add measurements from Step 2, Step 3 and a Clearance Dimension of .006 in (0,15 mm) together, for each position A, B, C, and D. Record this number.

5) Subtract the result of Step 4 from Step 1 for each position A, B, C, and D.

This result is the total shim thickness required.

The nominal thickness of one shim is 3/64 in [**0.047 in] (0,3 mm)**.

Try to balance the shims in an equal number for both sides.



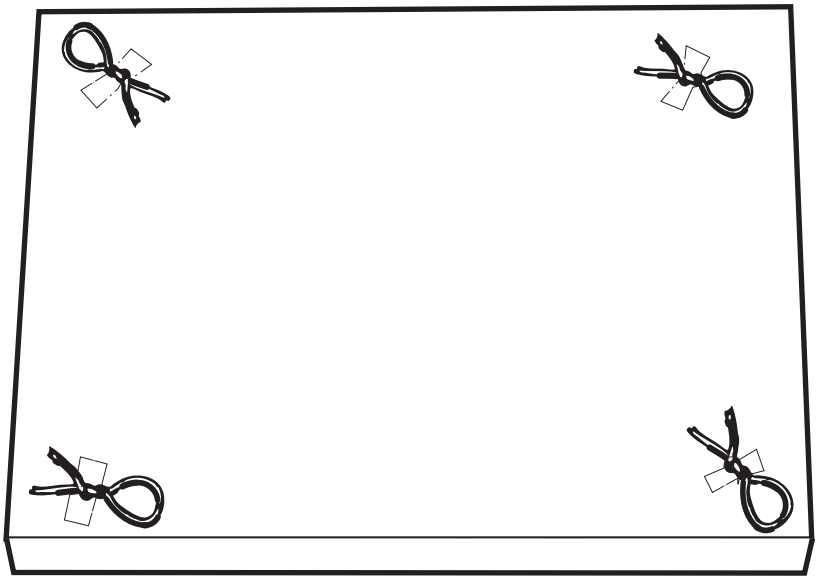
10653

10657

Alternate Method

1) Use pieces of lead solder .025 in (0,6 mm) thick, 1.5 in (38 mm) long twisted into the shape shown.

2) Tape four pieces to one side of each support pad, about 2 in (50 mm) in from the corners. This will be the measurement point after they have been compressed.



10656

3) Install the wear pads with the solder pieces between the housing and the support pad.

4) Secure the support pads in place using wood screws through the holes provided in the housing.

5) Perform this operation for 2 sets of pads at a time, eg. front to back.

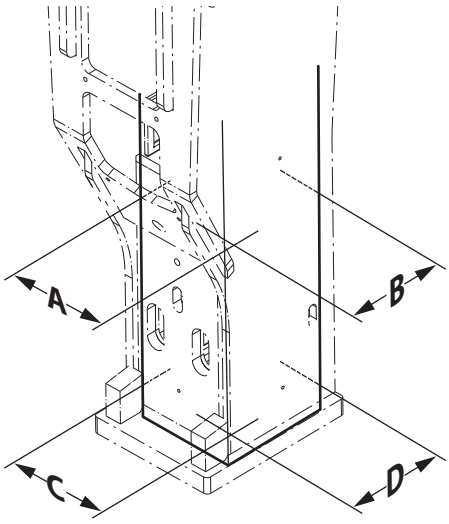
6) Make sure the lower isolator is in place, then carefully lower the breaker into the housing.

7) Remove the breaker, then measure the compressed thickness of the solder pieces at each position A, C, or B, D.

8) Record this information on the data sheet.

9) Repeat the procedure for the other direction and record the data.

The average thickness of these pieces in pockets A, B, C and D is **total shim thickness required** for that pocket.



10652

Upper and lower Isolator Limits

The BXR breaker uses upper and lower isolators to support the breaker body within the housing.

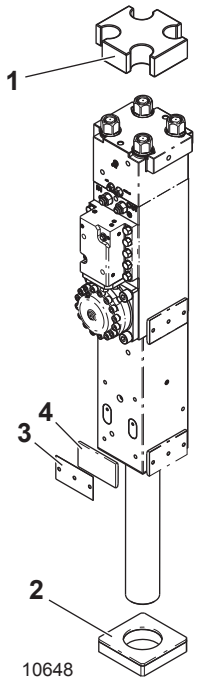
IMPORTANT! After the top mount bracket is installed, the upper and lower isolators must compress to form a spring pre-load on the breaker body within the housing. If the breaker body has been disassembled to be rebuilt, replace the isolators.

As a reference, see the table to follow. If the isolators are in good condition, and fall within the thickness limits shown, they can be reused Isolators must protrude above the breaker housing (dimension A) when assembled.

⚠ CAUTION!

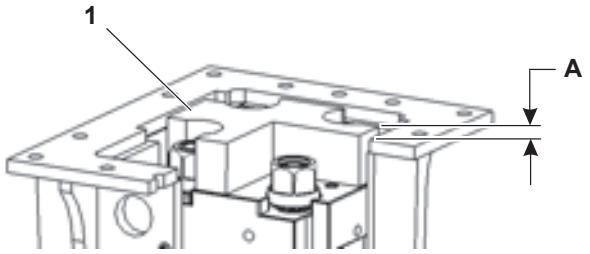
Ensure there is a positive preload on the isolators at final assembly.

If the upper and lower isolator's thickness has been permanently deformed and falls outside of the limits shown below, they must be replaced.



10648

1. Upper Isolator
2. Lower Isolator (install with nylon side towards breaker)
3. Shim
4. Nylon Support Pad

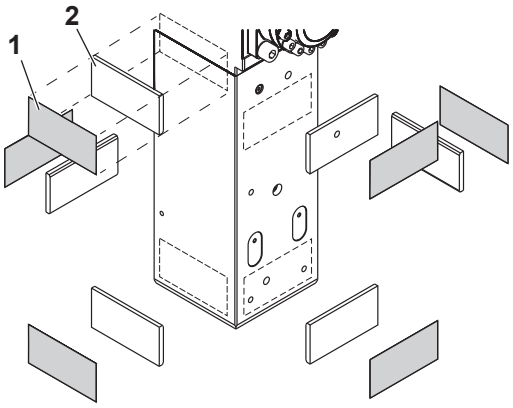


	A
BXR50 – BXR100	3/16 ±1/16 in (5 ±1,6 mm)
BXR120	1/4 ±1/16 in (6 ±1,6 mm)
BXR160	5/16 ±1/16 in (8 ±1,6 mm)

10600

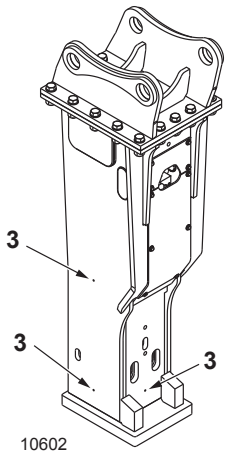
1. Upper Isolator

Model	Isolator	Limit in (mm)
BXR50	Upper	4.94–4.81 (125–122)
	Lower	2.37–2.25 (60–57)
BXR65	Upper	4.94–4.81 (125–122)
	Lower	2.37–2.25 (60–57)
BXR85	Upper	4.94–4.81 (125–122)
	Lower	2.37–2.25 (60–57)
BXR100	Upper	4.94–4.81 (125–122)
	Lower	3.12–3.0 (80–77)
BXR120	Upper	4.94–4.81 (125–122)
	Lower	2.56–2.31 (64,5–59)
BXR160	Upper	4.94–4.81 (125–122)
	Lower	2.56–2.31 (64,5–59)



10603

1. Shims
2. Nylon Support Pad
3. Access Holes



10602

Installing the Breaker Body Into the Housing

NOTE: The upper/lower isolators and nylon support pads are considered wear parts and are not covered under the breaker warranty. It is recommended that they be replaced after every 1000 hours of operation or as required.

⚠ CAUTION!

Check to make sure the housing is upright, secure, and fully restrained.

1) Install the support pads with the required number of shims in each of the eight positions. Place the shims behind the support pads.

2) Secure the support pads and shims in place on the housing using wood screws. Insert the screws through the access holes provided.

IMPORTANT! Ensure the wood screws do not fully penetrate the support pad. They could interfere with the breaker body when it is lowered into the housing.

3) Install the lower isolator into the breaker housing—nylon side up.

NOTE: Do not lubricate the wear pads to ease installation of the breaker body.

NOTE: If the breaker body is new, check to make sure nothing is protruding to hinder insertion into the housing.

4) Install the lifting eyes into the top of the breaker, then lift the breaker body up and center it for entry into the housing. Check the orientation of the body–the pressure and return ports must face the access openings in the housing.

5) Slowly lower the breaker into the housing. The breaker may have to be slightly tapped in using a dead blow. If the breaker binds or seizes in the housing, remove it and determine the cause.

6) Keep the lower isolator centered.

7) Lower the breaker until it fully bottoms out in the housing. Check by comparing the position of the retaining pins and the clearance holes in the bottom of the housing. The retaining pins should be just above the centerline of the clearance holes.

8) Use a leverage bar to check for play between the breaker body and the housing. There should be no visible movement.

If there is movement at the top of the breaker in excess of .08 in (2 mm) in any direction, remove the breaker and add additional shims.

9) Position the upper isolator on the rear head. Verify it protrudes above the finished face of the breaker housing. See previous page.

10) Position the mounting bracket on the top of the breaker. Ensure bracket is not put on backwards.

11) Lubricate the bolts with MoS_2 grease and install them.

12) Tighten bolts in a cross pattern to provide even loading to the upper isolator.

Top Mount Bracket Bolt Torque

Model	Torque Value
BXR50	1,335 ft•lb (1 810 N•m)
BXR65	1,335 ft•lb (1 810 N•m)
BXR85	1,733 ft•lb (2 350 N•m)
BXR100	1,733 ft•lb (2 350 N•m)
BXR120	1,733 ft•lb (2 350 N•m)
BXR160	1,733 ft•lb (2 350 N•m)

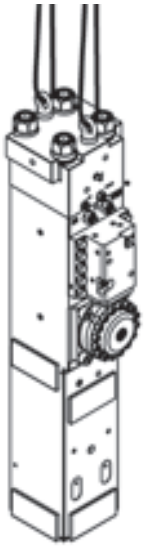
13) Reinstall the tool.

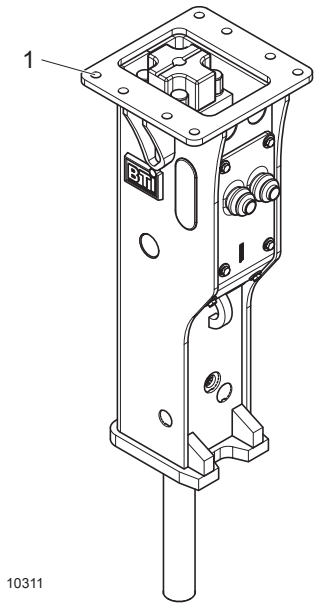
14) Refer to "Tool Installation" on page 54 for procedure.

⚠ CAUTION!

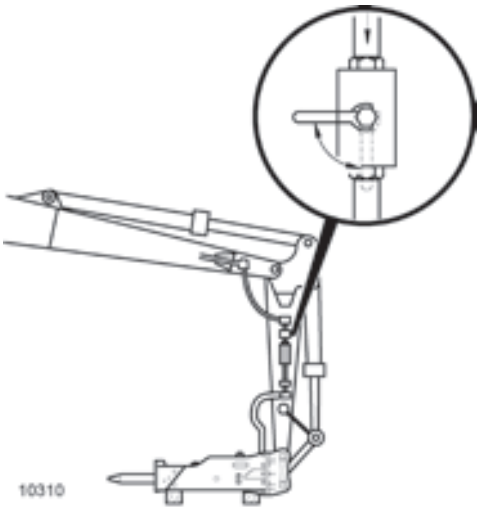
Use extreme care to prevent dirt from entering the hydraulic circuit when disconnecting or reconnecting hydraulic lines. Cap or plug lines when disconnecting; clean thoroughly before reconnecting. Even the smallest dirt particles will cause damage to the internal workings of the breaker.

15) Install the breaker onto the carrier and reconnect the pressure and return lines.





1. Top mount bracket bolts



Start-up

Air may have been introduced to the hydraulic circuit and may cause a malfunction. Warm the carrier hydraulic system up to operating temperature, then cycle the oil to remove the air:

1) Lift the unit off the ground.

2) Press the start button or pedal to fire the breaker momentarily.

3) Continue to turn the breaker ON and OFF in this manner for 10 minutes.

4) Work the breaker in soft material in short bursts for 10 minutes.

5) Check for any loose bolts or oil leakage.

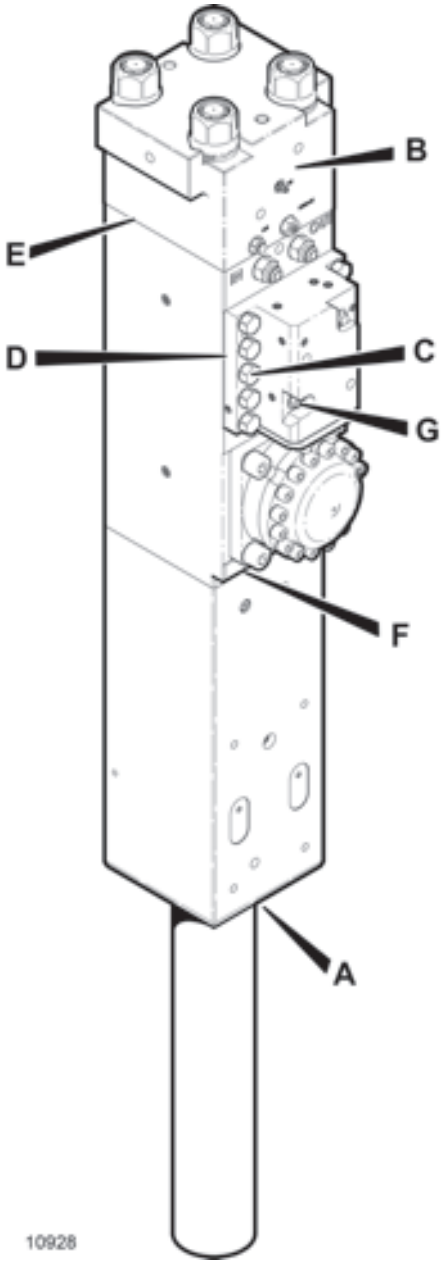
The breaker is now ready to operate.

Troubleshooting Guide

Oil Leakage

If oil leakage develops, it may not be necessary to replace parts. Check the following points in the table below before calling your BTI representative. A slight amount of oil seepage around the breaker connecting parts is normal during the first 200 hours of operation.

Area of Leakage	Probable Cause	Correction
A		
The space between the tool and the bushing. Large amounts of oil coming out.	Damaged seals.	Re-seal as necessary.
B		
Oil over the surface of the breaker.	Loose hydraulic hoses or adapters.	Check condition of hydraulic hoses and adapters. Tighten as necessary.
C		
Control valve cap bolts.	Oil ooze after breaker overhaul.	Normal oozing of assembly lubricants.
D		
Between control valve and surface of cylinder.	Oil ooze after breaker overhaul.	Normal oozing of assembly lubricants.
E		
Joining surface of cylinder and rear head.	Loose tie rod nut.	Tighten tie rod.
Oil oozing. New oil leaking.	Damaged o-ring.	Replace damaged o-ring.
F		
Joining surface of cylinder and front head.	Loose plugs on face of cylinder.	Tighten loose plugs.
New oil leaking.	Damaged seals.	Replace damaged seals as necessary.
G		
Two-speed valve.	Loose nut or damaged O-ring.	Tighten locking nut.
Oil running down breaker.		Replace O-ring.



Hydraulic Breaker

Does not hammer

Probable Cause	Correction
Anti-blank fire has activated.	Push breaker down on tool to disengage blank fire mode.
Base carrier selector valve does not operate correctly.	Check connection from cab controls to selector valve.
Poor performance of the hydraulic pump.	Check pump outlet. Repair or replace.
Pressure relief valve set too low.	Check relief settings and adjust.
Clogged or restricted hoses.	Clean or replace.
Cushion chamber filled with oil.	Replace seals.
Seizure of breaker.	Overhaul and replace worn parts.
Back-pressure too high in circuit.	Find source causing increased back-pressure in return circuit and remove.
Control valve bolts loose.	Tighten bolts to correct torque in a staggered pattern.
Check all ball valves.	Open ball valve.

Does Not Impact

Probable Cause	Correction
Temperature of the hydraulic oil is too low.	Warm up the hydraulic excavator.
The nitrogen gas pressure in the cushion chamber is too high.	Adjust the nitrogen gas to the correct pressure.
Pressure setting for the relief valve is too low.	Set the relief valve to the correct pressure setting.
Poor performance of the hydraulic pump on the excavator.	Have the hydraulic excavator manufacturer check the pump performance. If the performance is poor, repair or replace.
Back-pressure too high in circuit.	Find source causing increased back-pressure in return circuit and remove.

Lack of Power

Probable Cause	Correction
Insufficient oil flow or oil pressure.	Check hydraulics of the base carrier.
Broken tool.	Replace tool, check piston for damage.
Cushion chamber gas pressure is too low.	Check and adjust.
Back-pressure too high in circuit.	Find source causing increased back-pressure in return circuit and remove.

Erratic hammering

Probable Cause	Correction
Hydraulic oil temperature is too high.	Oil temperature must not exceed 158 °F (70 °C).
Insufficient oil flow and/or pressure.	Check base carrier hydraulic system.
Clogged or restricted hoses, or pipes.	Clean or replace.
Not enough down force on the tool.	Increase the down pressure acting on the tool.
Pressure too high in cushion chamber.	Adjust pressure.
Too much grease in the impact chamber.	Remove tool and clean out excess grease. Follow proper greasing instructions.
Excessive clearance between tool and tool bushing.	Check clearance and replace worn parts.
Excess wear at top of tool.	Remove and inspect the tool. Replace if necessary.
Foreign matter in the breaker control valve.	Disassemble and clean.
Seizure of piston and cylinder.	Overhaul the breaker.
Back-pressure too high in circuit.	Find source causing increased back-pressure in return circuit and remove.
Control valve bolts loose	Tighten bolts to correct torque in a staggered pattern.

Leakage

Probable Cause	Correction
The space between the tool and bushing has large amounts of oil coming out.	Damaged seals. Re-seal as necessary.
Possible loose hoses or adapter fittings cause oil over the surface of the breaker.	Check condition of hoses and fittings, tighten as necessary.
Oil oozing after overhaul of breaker, between the control valve and surface of the cylinder.	Normal oozing of assembly lubricants.
Oil ooze after overhaul of breaker, between the joining surfaces of cylinder and rear head.	Loosen tie rod nuts, and retighten. Damaged o-ring, replace.
New oil leaking from surface between cylinder and front head.	Loosen plugs on face of the cylinder, then re-tighten. Damaged seals in the cylinder, replace as necessary.
Between the cylinder and hose adapter.	Replace worn or damaged o-ring. Check and re-tighten the hose adapter to the specified torque.
Leakage at stroke adjuster cap.	Replace worn or damaged o-ring. Loosen the stroke adjuster cap, then re-tighten to specified torque.
Leakage at pilot valve cap.	Replace worn or damaged o-ring. Loosen the pilot valve cap, then re-tighten to specified torque
Control valve bolts loose	Tighten bolts to correct torque in a staggered pattern.

Gas Leakage

Probable Cause	Correction
Gas leakage from the gas valve.	Replace worn or damaged seals. Check gas valve for damage repair or replace.
Leakage from gas valve body.	Worn or damaged o-ring. Replace.
Gas leakage from between the cylinder and the cylinder cover.	Worn or damaged o-ring. Replace.
Tie rods loose.	Tighten to correct torque value in a cross pattern.

Erratic Blows After Breaker has been Operating Normally

Probable Cause	Correction
Seizure of control valve.	Repair or replace control valve.
Seizure of piston and cylinder.	Remove and inspect piston, and inside of cylinder body.
Regeneration Valve Sticking.	Repair or replace control valve.
Relief valve for the excavator is set too low.	Set the relief valve to correct pressure setting.
Poor performance of the hydraulic pump on the excavator.	Have the hydraulic excavator manufacturer check the pump performance. If the performance is poor, repair or replace.
Lack of down pressure on the tool.	Operate the arm and bucket so that pressure is applied to the tool. Anti-blank fire is working.
Nitrogen gas pressure in the rear head is too low.	Adjust the nitrogen gas to the correct pressure.
Back-pressure too high in circuit.	Find source causing increased back-pressure in return circuit and remove.
Control valve bolts loose	Tighten bolts to correct torque in a staggered pattern.

Blows/min Decreased

Probable Cause	Correction
Nitrogen gas pressure in the rear head is too high.	Adjust the nitrogen gas to the correct pressure.
Lack of down pressure on the tool.	Operate the boom and bucket cylinders so that pressure is applied to the tool.
Pressure setting for the relief valve is too low.	Set the relief valve to the correct pressure setting.

Blows/min Decreased

Probable Cause	Correction
Poor performance of the hydraulic pump on the excavator.	Have the excavator manufacturer check the pump performance.
Clogged or restricted hoses, pipes.	Investigate the blocked area and repair or replace.
Back-pressure too high in circuit.	Find source causing increased back-pressure in return circuit and remove.

Tool Breaking

Probable Cause	Correction
Abuse of tool and prying with tool.	Apply down force in the direction of tool only. Check for excess play in arms, links, and pins.

Tool Mushrooming

Probable Cause	Correction
Continuous hammering in one place.	Use short bursts. Re-position breaker every 20 seconds.

Rapid Increase in Oil Temperature

Probable Cause	Correction
Insufficient oil cooling.	Check oil cooler.
Insufficient oil flow.	Check pump output.
Incorrect oil pressure.	Check relief valve setting.

Emulsification of Oil

Probable Cause	Correction
Oil contaminated with water.	Locate source of water and repair. Replace oil.

Breaker Tool

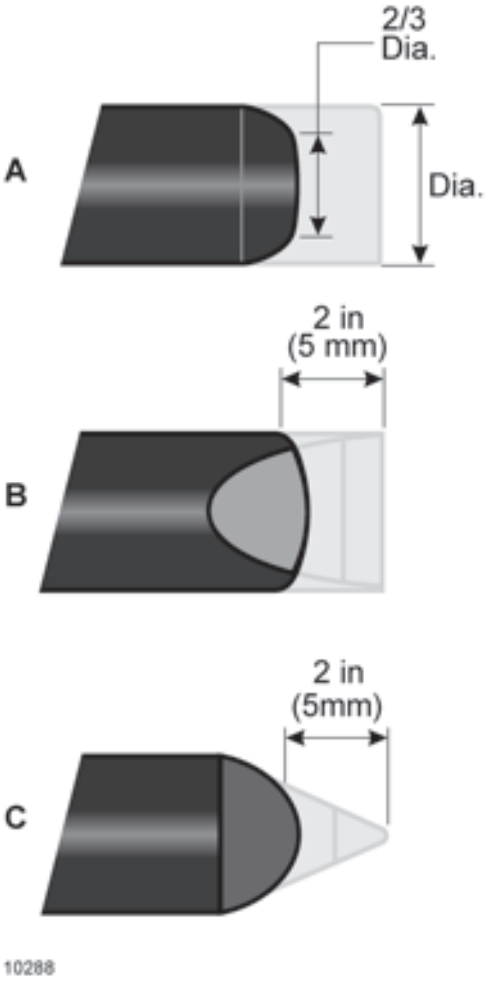
Normal Breaker Tool Wear

Wear depends on rock conditions. Hard, abrasive rock wears the tool down faster. Working in softer materials will keep the point shape longer.

Blunt tools (A) will wear back 1/3 of the diameter to be shaped as shown. Moil and Chisel tools (B and C) will wear back 2 inches (51 mm) or more to be shaped as shown.

As a general guide, this is considered normal wear and reasonable tool life.

Warranty claims are not accepted for normal wear.



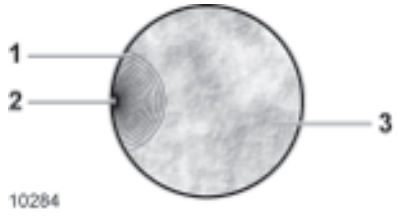
Breaker Tool Fatigue Failures

Metal Fatigue

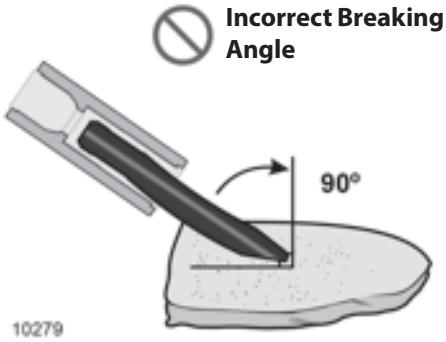
Metal fatigue is the sudden fracture of a component. This effect occurs on metal after a period of repeated cycles of stress. Normally, there will be no obvious warning. A crack forms without any visual change making it difficult to detect the presence of growing cracks. Fractures usually start from small nicks or scratches or fillets that cause a localized concentration of stress.

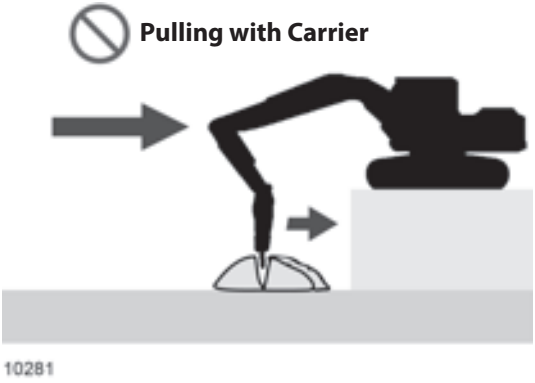
The fracture face itself normally appears as a semi-circular polished area with the remainder looking uneven and rough. The polished semi-circle is the fatigue area, originating from a damage mark or other stress event outside of the tool.

The fatigue area spreads slowly into the tool, until the stress causes sudden failure to the section. Generally, the size of the fatigue area indicates the level of stress applied to the tool, i.e. the smaller the fatigue area, the higher the stress level. Once a fatigue crack begins, it takes less stress to make it grow.



1. Polished fatigue Rings
2. Stress Concentration Point
3. Rough Gray Area





Cause and Effect of Fatigue

In normal operation, a cycle of compressive and tensile stresses flow up and down the tool with each piston blow as the breaker fires.

The main cause of increased tool fatigue stress is any side force applied during operation that bends the tool. Prying with the tool, using the incorrect working angle, or attempting to break ground using the pull of the carrier machine will shorten tool life and must be avoided.

Anything that interferes with these normal stresses increases the risk of early tool fatigue failure.

Other Causes of Increased Tool fatigue Stress

Blank Firing

Blank firing is any situation where the breaker piston strikes the top of the tool, but the tool is not in proper contact with the material. This can happen when the tool slides off the work and also when breaking through thin concrete slabs or boulders.

Cold

Low temperature makes the tool more susceptible to fatigue failure. Warm the tool first with moderate or light breaking.

Mechanical and Thermal Damage

Any type of damage to the tool surface makes it more likely to suffer fatigue failure.

Care must be taken to:

- **Prevent scratches, gouges, weld marks.**
- **Keep tool well lubricated.**
- **Operate properly and avoid excessive bending of the tool.**

Poor Lubrication

Metal to metal contact causes material pick up that can scrape deep damage marks. These will develop into fatigue cracks, causing tool failure. Ensure the tool shank is well lubricated before inserting into the tool holder. Molybdenum disulfide grease or BTI's own brand of Chisel Paste (containing copper, graphite and silica) is recommended at 2 hour intervals.

- **Make sure tool is pushed up fully inside the breaker.**
- **Grease until clean grease runs freely from cavities.**

Corrosion

Keep spare tools well greased and sheltered from the weather when not in use. A rusty tool is more prone to fatigue failure.

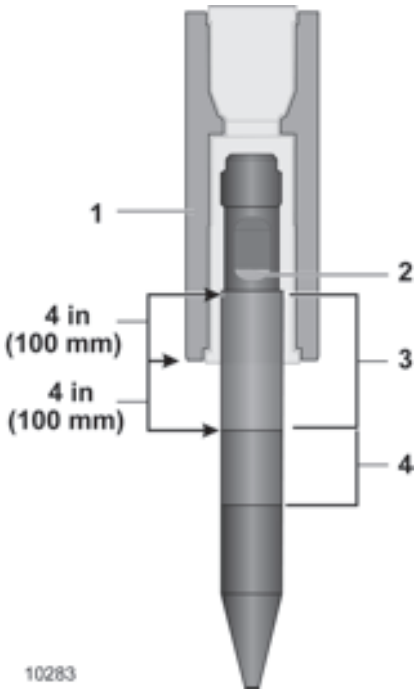
Area of Typical Tool Failures

Guide to Warranty Claims

BTI tools are manufactured from top quality materials and heat-treated to produce a fatigue and wear resistant tool.

When a tool fails to give satisfactory service life, a brief visual inspection usually reveals the cause.

- A tool metal "fatigue" failure generally occurs within 4 in (100 mm) above and below the face of the front head, or at the retainer pin flat.
- A less common failure area is about 8 in (200 mm) from the face of the front end, depending on the work the breaker is doing.



1. Front Head
2. Retainer Pin Flat
3. High Risk Fatigue Area
4. Lower Risk Fatigue Area

Typical fractures caused by excessive bending of the tool.

Fractures like this are not covered by warranty.

Typical fracture caused by prying with the tool while it was buried in the work piece.

Fractures like this are not covered by warranty.

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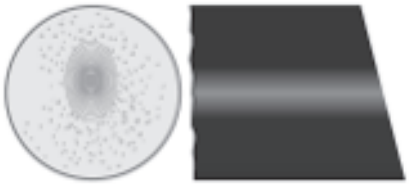
Mushrooming

Hammering the tool too long in hard dense material without penetrating through causes mushrooming. This generates intense heat that softens and mushrooms the point. This is not a fault of the tool. If the rock or stone shows no sign of breaking within 20 seconds, reposition the breaker.

Warranty claims made for mushrooming on the ends of the tool will be rejected.



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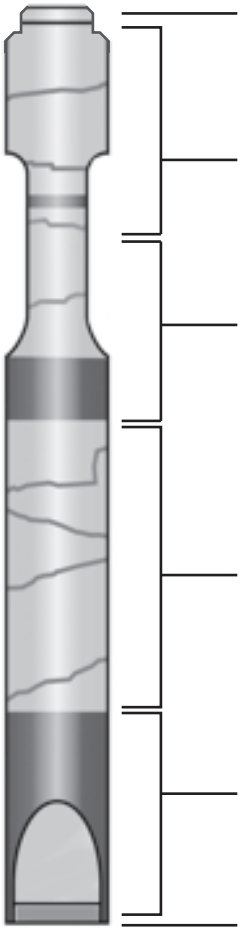
Steel Defect Failure

This failure has fatigue lines originating from an internal point, and not from the outer surface. This is a very rare failure caused by a defect in the steel.

This type of defect is covered under the normal warranty period.



Mushrooming from operating with worn bushings, or firing the breaker too long at one time.
No Warranty

Failure from blank-firing or excessive wear to bushings and/or fronthead.
No Warranty

Failure from operating with worn-out retainer pins, blank-firing, or twisting the tool.
No Warranty

Failure caused by misalignment of down-pressure, breaker and the tool (prying,levering,etc.).
No Warranty

Tool Breakage: improper contact with tool tip and material to be broken.
No Warranty

Mushrooming: fast wear caused by breaking too long on the same spot.
No Warranty

Removal and Storage

⚠ CAUTION!

Use extreme care to prevent dirt from entering the hydraulic circuit when disconnecting or reconnecting hydraulic lines. Cap or plug lines when disconnecting; clean thoroughly before reconnecting. Even the smallest dirt particles will cause damage to the internal workings of the breaker.

Short-term Storage

Storing your breaker up to a week is considered Short-term Storage. Follow this procedure:

1) If shut-off valves are used with the breaker, turn them to the OFF position.

2) Disconnect the pressure and return lines. Plug the lines and the breaker ports to prevent contamination.

3) Use your excavator to lay the breaker on wooden blocks with the mounting bracket end lying higher than the tool end. Support the breaker before proceeding.

4) Remove the pins to disconnect the breaker from the carrier.

5) Remove the tool and ensure the retaining pins, bushings and piston bottom (inside breaker) are well greased.

6) Reinstall the tool and cover the breaker with a tarp. Use a waterproof cover if storing outdoors.

Long-term Storage

Storing the breaker over a week is considered Long-term Storage.

Breaker Stored Lying Down

Use the following procedure:

1) Release the cushion chamber gas pressure.

2) Remove the tool and liberally grease the piston bottom, retaining pins and inside the front head.

3) Ensure inlet ports are open to allow piston to move up to the top.

4) Push the piston up inside the breaker and reinstall the tool.

5) Lay the breaker on wooden blocks (using your excavator). Mounting bracket end should lie higher than the tool end.

6) Cover the breaker with a tarp (waterproof if outdoors).

Breaker Stored Standing Up

If the breaker is to be stored standing up, place in a safety stand. Use the following procedure:

1) Release the cushion chamber gas pressure.

2) Remove the tool and liberally grease the piston bottom, retaining pins and inside the front head.

3) Ensure inlet ports are open to allow piston to move up to top.

4) Reinstall the tool and place the breaker in the vertical stand. This will allow the breaker's weight to push the tool and piston up inside the breaker.

5) Cover the breaker with a tarp (waterproof if outdoors).

Initial Start-up after Storage

⚠ CAUTION!

Use extreme care to prevent dirt from entering the hydraulic circuit when disconnecting or reconnecting hydraulic lines. Cap or plug lines when disconnecting; clean thoroughly before reconnecting. Even the smallest dirt particles will cause damage to the internal workings of the breaker.

Storage can introduce air into the hydraulic circuit. If air is present in the hydraulic circuit during operation, it may cause a malfunction.

Circulating the oil will remove air and other foreign substances from the system. If the breaker was stored lying down, seals can deform. Follow these steps to circulate the hydraulic oil, and correct these problems:

1) First, recharge cushion chamber with nitrogen gas.

With the breaker mounted and oil warmed to operating temperatures:

2) Lift the unit of the ground.

3) Press the Start button or pedal to fire the breaker momentarily.

4) Continue to turn the breaker ON and OFF in this manner for ten minutes.

The breaker is now ready to be put into service.

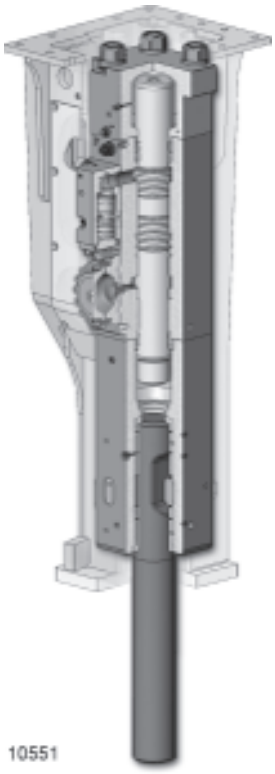
NOTES

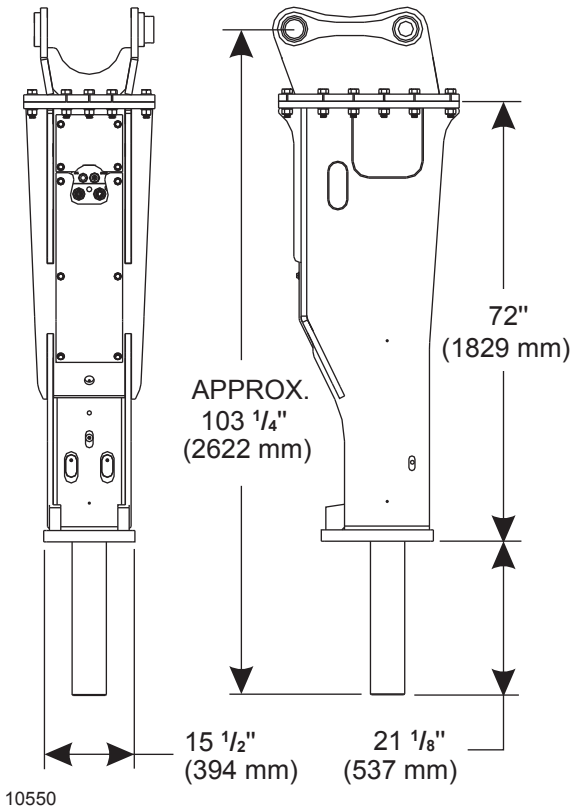
Specifications

Model BXR50

NOTE: Relief valve setting is based on 100 psi (7 bar) back pressure. For higher back pressures, raise the relief valve setting accordingly. Consult BTI if the back pressure is greater than 450 psi (30 bar).

Energy Class	5,000 ft•lb (6 800 joule)
Operating Weight	4,200 lb (1 905 kg)
Tool Diameter	5.5 in (140 mm)
Exposed Tool Length	25.1 in (635 mm)
Recommended Carrier Weight	39,700–77,200 lb (18–35 tonne)
Relief Pressure Setting (See note)	4,000 psi (275 bar)
Cushion Chamber Nitrogen Pressure	145 psi (10 bar)
Accumulator Nitrogen Pressure	754 psi (52 bar)
Hydraulic Hose Size	1 in JIC (25 mm)
Remote Grease Connection	1/4 in NPT
Remote Air Breather Connection	1/2 in BSPT
Oil Regeneration System	Standard
Anti-blank Fire Interlock	Standard
Two-speed Control	Operator Controlled Hydraulic Pilot
Low Noise Box Housing	Standard
Severe Duty Wear Kit	Optional
Carrier Mounted Automatic Greasing System	Optional
Breaker Mounted Auto Greasing System	Optional
Tool Types	Blunt / Moil / Chisel





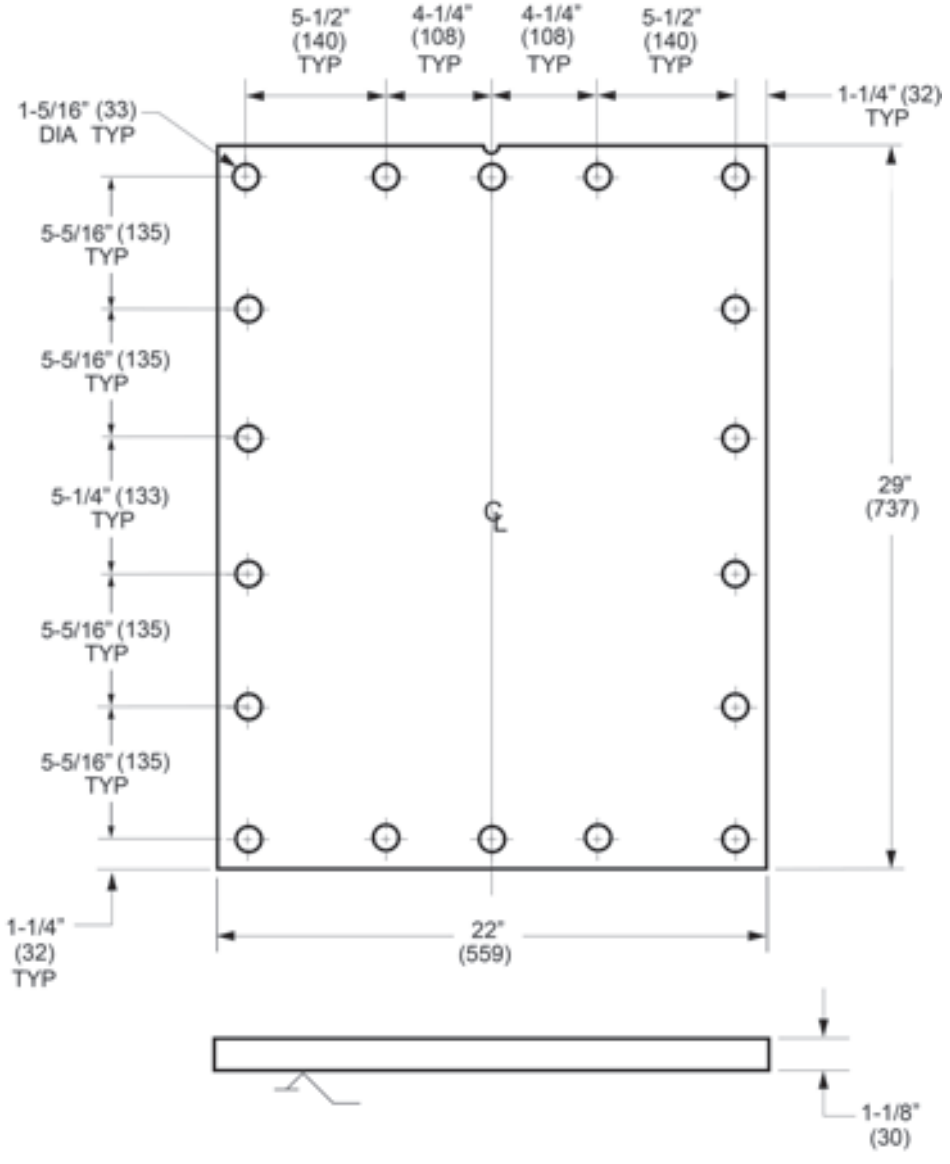
BXR50 Breaker Configured With Oil Regeneration System On	
Pressure Orifice Diameter	16 mm
Choke Orifice Diameter	9,5 mm
Nitrogen Pressure In Rear Head with Regen	145 psi (10 bar)
Maximum Flow Rate with Regen	53 gpm (200 lpm)
Minimum Flow Rate with Regen (75% Of Max)	40 gpm (150 lpm)
Operating Pressure at Full Flow with Regen Design for 35 Bar Pressure Rise at Maximum Regen	2,250–2,755 psi (155–190 bar)
Low Speed BPM at Max Flow @ 85% Vol Eff – No Regen	512
Low Speed BPM at Max Flow @ 85% Vol Eff and 15% Regen Speed	589
High Speed BPM at Max Flow 85% Vol Eff – No Regen	699
High Speed BPM at Max Flow @ 85% Vol Eff and 15% Regen	804
Low Speed BPM at Low Flow @ 85% Vol Eff – No Regen	387
High Speed BPM at Low Flow @ 85% Vol Eff – No Regen	445

BXR50 Breaker Configured for Oil Regeneration Mode OFF With Spool Locked Out or in By-pass Mode	
Pressure Orifice Diameter	16 mm
Choke Orifice Diameter	9,5 mm
Nitrogen Pressure in Rear Head – Regen Lockout	160 psi (11 bar)
Maximum Flow Rate – Regen Lockout	58 gpm (220 lpm)
Minimum Flow Rate without Regen (75% Of Max)	44 gpm (165 lpm)
Operating Pressure at Full Flow Regen Lockout. There is No Pressure Rise – Regen Lockout	2,250–2,755 psi (155–190 bar)
Low Speed BPM at Max Flow @ 85% Vol Eff Regen Lockout	561
High Speed BPM at Max Flow @ 85% Vol Eff Regen Lockout	766
Low Speed BPM at Low Flow @ 85% Vol Eff Regen Lockout	425
High Speed BPM at Low Flow @ 85% Vol Eff Regen Lockout	581

Regen = Oil Regeneration

Vol Eff = Volumetric Efficiency

BXR50 Mounting Plate



NOTES:
All Dimensions shown inches (mm)
Machine bottom of mount flat after welding

Tolerances

Fractions:	±1/16 [±1,6]
Two-place Decimal:	±.03 [±0,8]
Surface Finish:	125 µin [3,2 µm]

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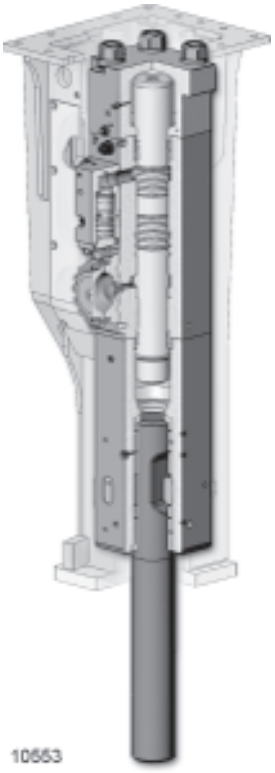
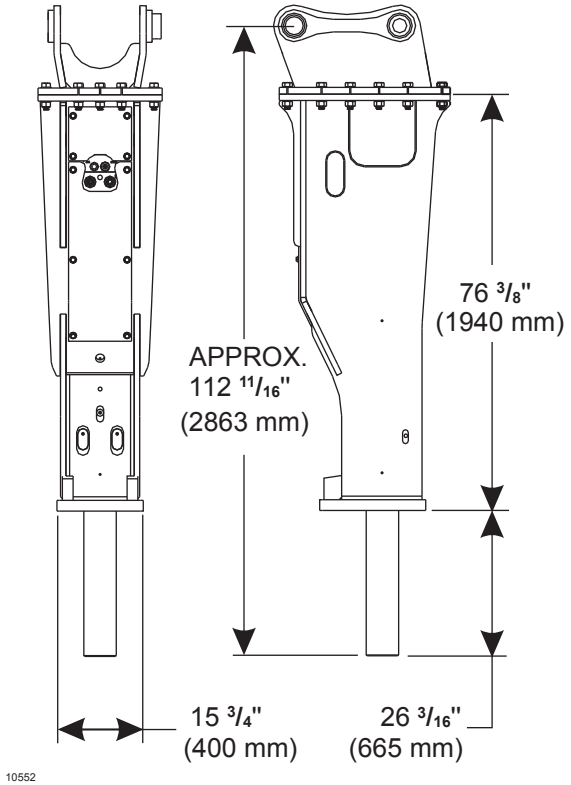
Model BXR65

NOTE: Relief valve setting is based on 100 psi (7 bar) back pressure. For higher back pressures, raise the relief valve setting accordingly. Consult BTI if the back pressure is greater than 450 psi (30 bar).

Energy Class	6,500 ft•lb (8 800 joule)
Operating Weight	4,880 lb (2 200 kg)
Tool Diameter	6 in (150 mm)
Exposed Tool Length	26.2 in (665 mm)
Recommended Carrier Weight	41,900–92,600 lb (19–42 tonne)
Relief Pressure Setting (see note)	4,000 psi (275 bar)
Cushion Chamber Nitrogen Pressure	145 psi (10 bar)
Accumulator Nitrogen Pressure	754 psi (52 bar)
Hydraulic Hose Size	1 in JIC (25 mm)
Remote Grease Connection	1/4 in NPT
Remote Air Breather Connection	1/2 in BSPT
Oil Regeneration System	Standard
Anti-blank Fire Interlock	Standard
Two-speed Control	Operator Controlled Hydraulic Pilot
Low Noise Box Housing	Standard
Severe Duty Wear Kit	Optional
Carrier Mounted Automatic Greasing System	Optional
Breaker Mounted Auto Greasing System	Optional
Tool Types	Blunt / Moil / Chisel





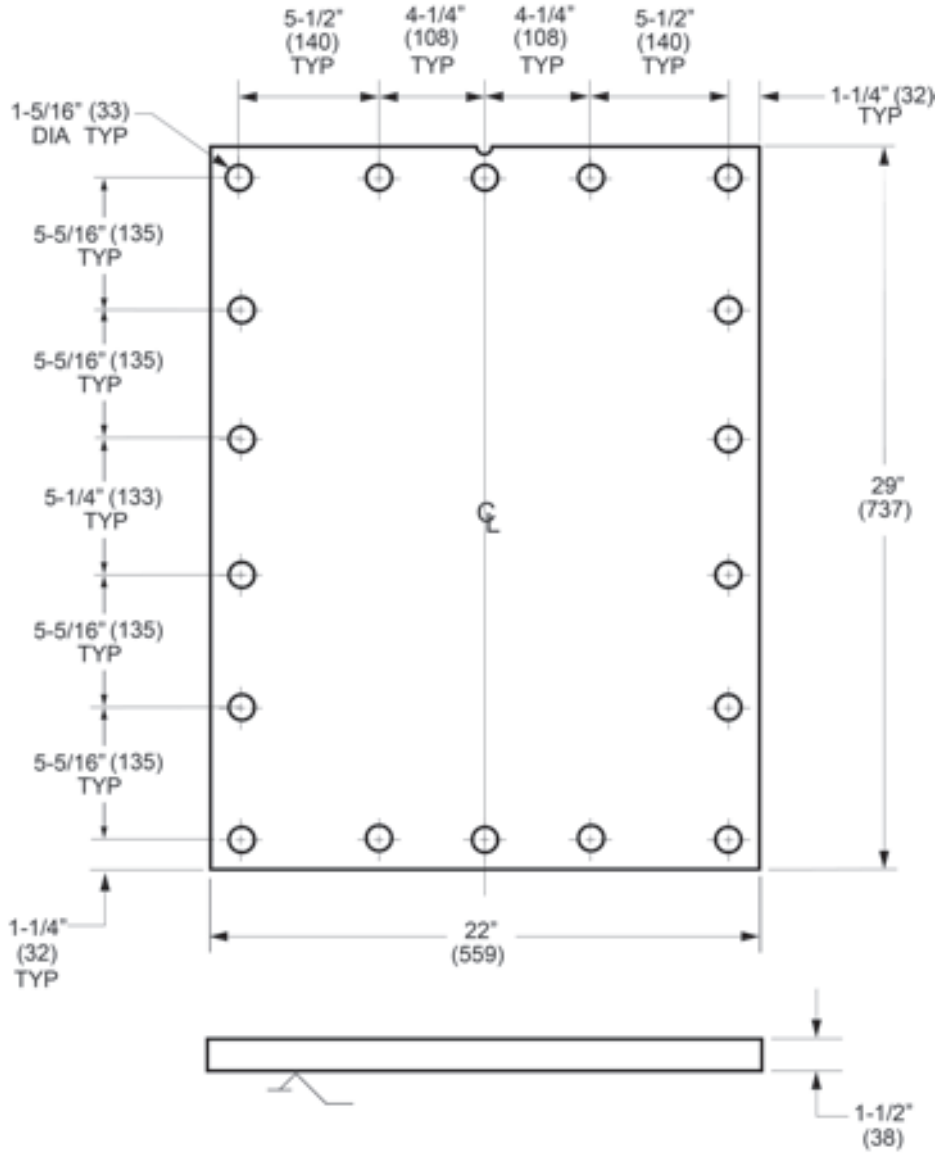
BXR65 Breaker Configured With Oil Regeneration System On	
Pressure Orifice Diameter	16 mm
Choke Orifice Diameter	10 mm
Nitrogen Pressure In Rear Head with Regen	145 psi (10 bar)
Maximum Flow Rate with Regen	56 gpm (210 lpm)
Minimum Flow Rate with Regen (75% Of Max)	42 gpm (158 lpm)
Operating Pressure at Full Flow with Regen Design for 35 Bar Pressure Rise at Maximum Regen	2,250–2,755 psi (155–190 bar)
Low Speed BPM at Max Flow @ 85% Vol Eff – No Regen	447
Low Speed BPM at Max Flow @ 85% Vol Eff and 15% Regen Speed	514
High Speed BPM at Max Flow 85% Vol Eff – No Regen	595
High Speed BPM at Max Flow @ 85% Vol Eff and 15% Regen	684
Low Speed BPM at Low Flow @ 85% Vol Eff – No Regen	335
High Speed BPM at Low Flow @ 85% Vol Eff – No Regen	385

BXR65 Breaker Configured for Oil Regeneration Mode OFF With Spool Locked Out or in By-pass Mode	
Pressure Orifice Diameter	16 mm
Choke Orifice Diameter	10 mm
Nitrogen Pressure in Rear Head – Regen Lockout	160 psi (11 bar)
Maximum Flow Rate – Regen Lockout	61 gpm (230 lpm)
Minimum Flow Rate without Regen (75% Of Max)	46 gpm (172,5 lpm)
Operating Pressure at Full Flow Regen Lockout. There is No Pressure Rise – Regen Lockout	2,250–2,755 psi (155–190 bar)
Low Speed BPM at Max Flow @ 85% Vol Eff Regen Lockout	487
High Speed BPM at Max Flow @ 85% Vol Eff Regen Lockout	648
Low Speed BPM at Low Flow @ 85% Vol Eff Regen Lockout	367
High Speed BPM at Low Flow @ 85% Vol Eff Regen Lockout	488

Regen = Oil Regeneration

Vol Eff = Volumetric Efficiency

BXR65 Mounting Plate



NOTES:
All Dimensions shown inches (mm)
Machine bottom of mount flat after welding

Tolerances

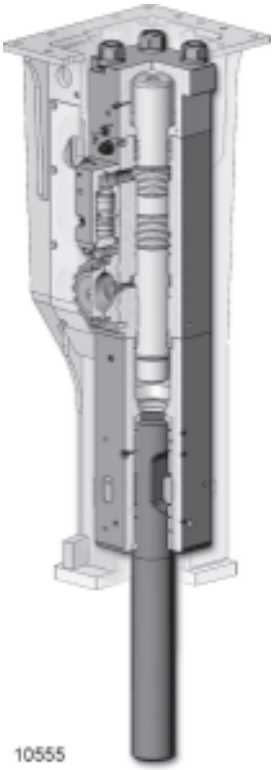
Fractions:	±1/16 [±1,6]
Two-place Decimal:	±.03 [±0,8]
Surface Finish:	125 µin [3,2 µm]

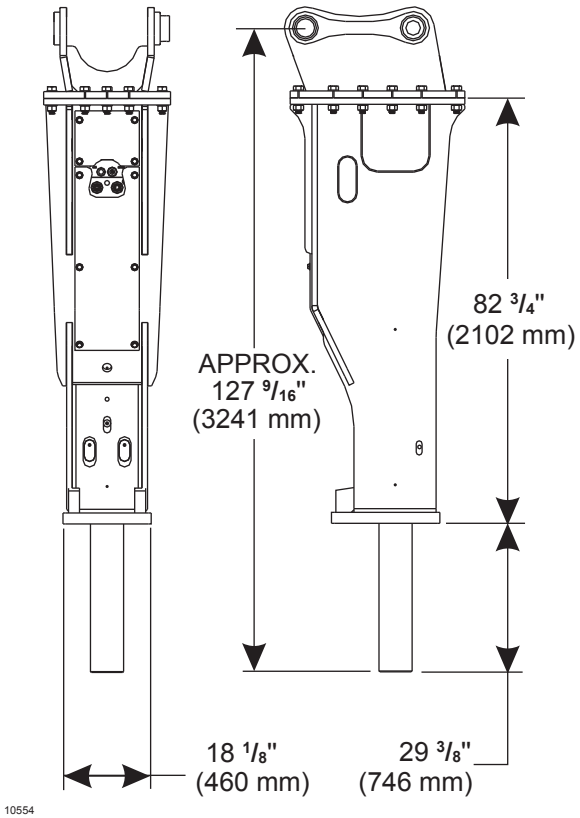
10933

Model BXR85

NOTE: Relief valve setting is based on 100 psi (7 bar) back pressure. For higher back pressures, raise the relief valve setting accordingly. Consult BTI if the back pressure is greater than 450 psi (30 bar).

Energy Class	8,500 ft•lb (11 500 joule)
Operating Weight	6,500 lb (2 950 kg)
Tool Diameter	6.3 in (160 mm)
Exposed Tool Length	29 in (745 mm)
Recommended Carrier Weight	61,700–105,800 lb (28–48 tonne)
Relief Pressure Setting (see note)	4,000 psi (275 bar)
Cushion Chamber Nitrogen Pressure	131 psi (9 bar)
Accumulator Nitrogen Pressure	754 psi (52 bar)
Hydraulic Hose Size	1 1/4 in JIC (32 mm)
Remote Grease Connection	1/4 in NPT
Remote Air Breather Connection	1/2 in BSPT
Oil Regeneration System	Standard
Anti-blank Fire Interlock	Standard
Two-speed Control	Operator Controlled Hydraulic Pilot
Low Noise Box Housing	Standard
Severe Duty Wear Kit	Optional
Carrier Mounted Automatic Greasing System	Optional
Breaker Mounted Auto Greasing System	Optional
Tool Types	Blunt / Moil / Chisel





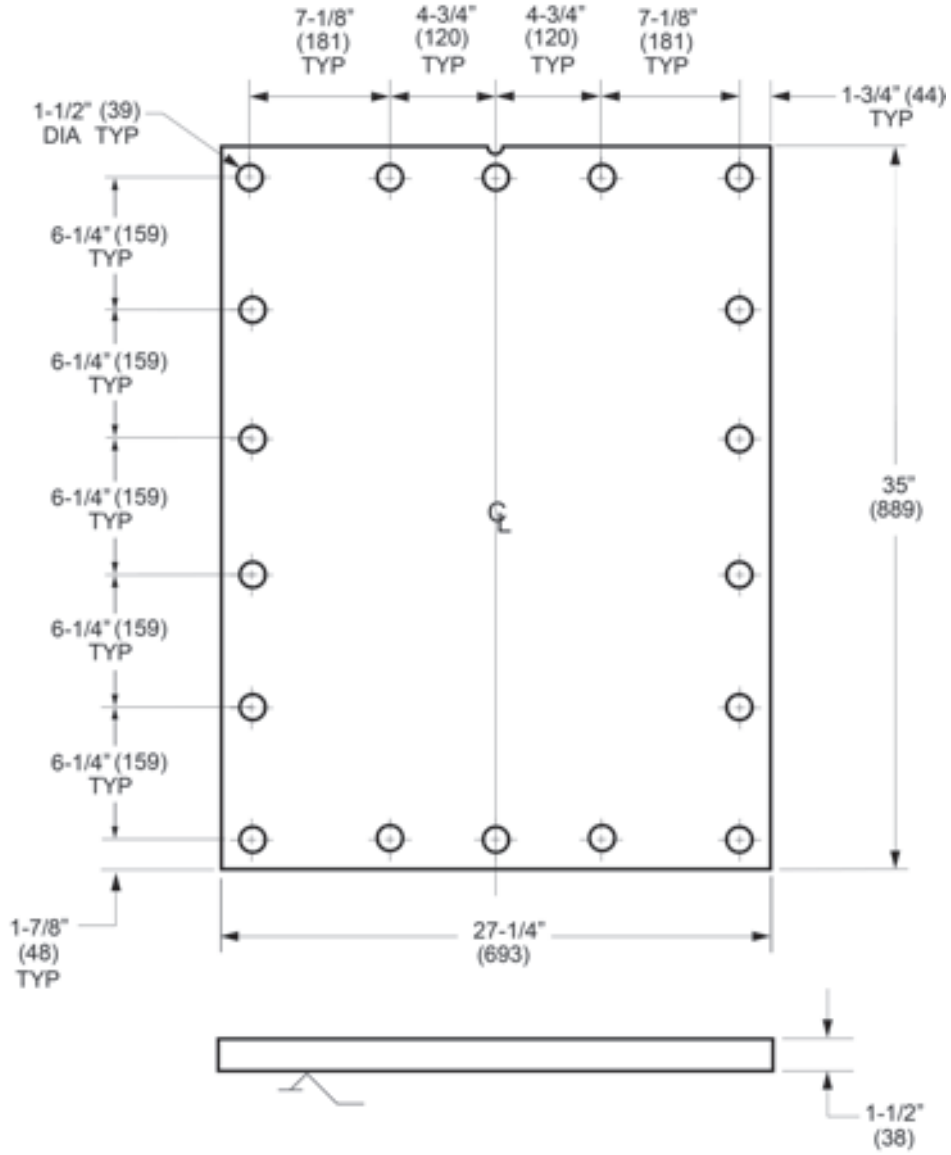
BXR85 Breaker Configured With Oil Regeneration System On	
Pressure Orifice Diameter	16 mm
Choke Orifice Diameter	11,5 mm
Nitrogen Pressure In Rear Head with Regen	131 psi (9 bar)
Maximum Flow Rate with Regen	61 gpm (230 lpm)
Minimum Flow Rate with Regen (75% Of Max)	46 gpm (173 lpm)
Operating Pressure at Full Flow with Regen Design for 35 Bar Pressure Rise at Maximum Regen	2,250–2,755 psi (155–190 bar)
Low Speed BPM at Max Flow @ 85% Vol Eff – No Regen	378
Low Speed BPM at Max Flow @ 85% Vol Eff and 15% Regen Speed	435
High Speed BPM at Max Flow 85% Vol Eff – No Regen	503
High Speed BPM at Max Flow @ 85% Vol Eff and 15% Regen	578
Low Speed BPM at Low Flow @ 85% Vol Eff – No Regen	285
High Speed BPM at Low Flow @ 85% Vol Eff – No Regen	328

BXR85 Breaker Configured for Oil Regeneration Mode OFF With Spool Locked Out or in By-pass Mode	
Pressure Orifice Diameter	16 mm
Choke Orifice Diameter	11,5 mm
Nitrogen Pressure in Rear Head – Regen Lockout	160 psi (11 bar)
Maximum Flow Rate – Regen Lockout	66 gpm (250 lpm)
Minimum Flow Rate without Regen (75% Of Max)	50 gpm (187,5 lpm)
Operating Pressure at Full Flow Regen Lockout. There is No Pressure Rise – Regen Lockout	2,250–2,755 psi (155–190 bar)
Low Speed BPM at Max Flow @ 85% Vol Eff Regen Lockout	426
High Speed BPM at Max Flow @ 85% Vol Eff Regen Lockout	567
Low Speed BPM at Low Flow @ 85% Vol Eff Regen Lockout	322
High Speed BPM at Low Flow @ 85% Vol Eff Regen Lockout	428

Regen = Oil Regeneration

Vol Eff = Volumetric Efficiency

BXR85 Mounting Plate



NOTES:
All Dimensions shown inches (mm)
Machine bottom of mount flat after welding

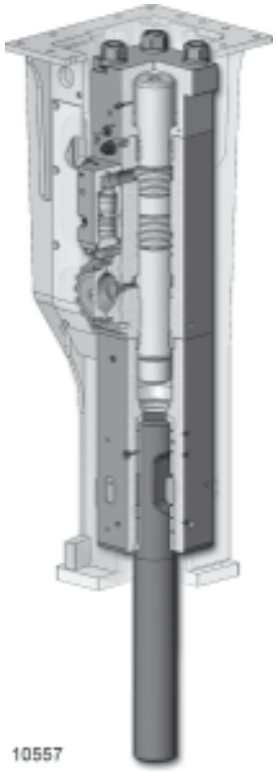
Tolerances

Fractions:	±1/16 [±1,6]
Two-place Decimal:	±.03 [±0,8]
Surface Finish:	125 µin [3,2 µm]

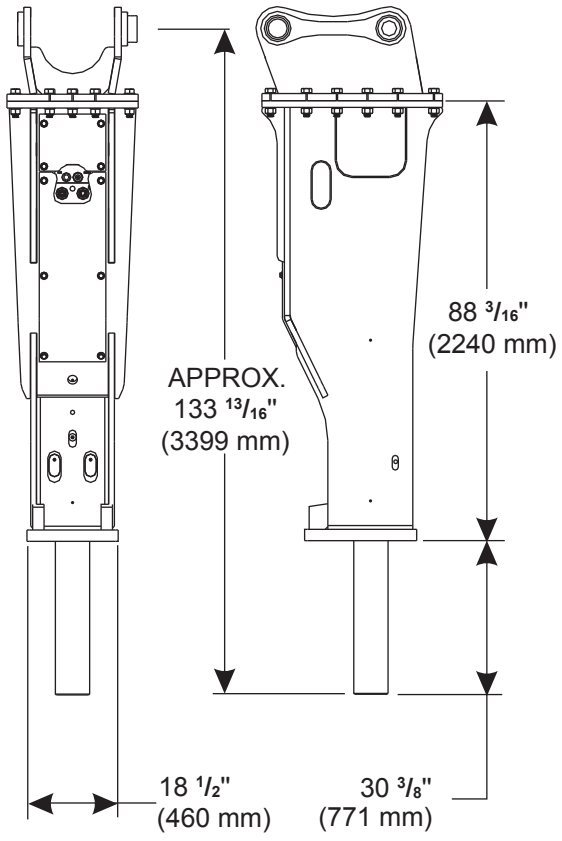
10934

Model BXR100

NOTE: Relief valve setting is based on 100 psi (7 bar) back pressure. For higher back pressures, raise the relief valve setting accordingly. Consult BTI if the back pressure is greater than 450 psi (30 bar).



Energy Class	10,000 ft•lb (13 500 joule)
Operating Weight	7,800 lb (3 550 kg)
Tool Diameter	6.7 in (170 mm)
Exposed Tool Length	30 in (770 mm)
Recommended Carrier Weight	75,000–150,000 lb (34–68 tonne)
Relief Pressure Setting (see note)	4,000 psi (275 bar)
Cushion Chamber Nitrogen Pressure	145 psi (10 bar)
Accumulator Nitrogen Pressure	754 psi (52 bar)
Hydraulic Hose Size	1 1/4 in JIC(32 mm)
Remote Grease Connection	1/4 in NPT
Remote Air Breather Connection	1/2 in BSPT
Oil Regeneration System	Standard
Anti-blank Fire Interlock	Standard
Two-speed Control	Operator Controlled Hydraulic Pilot
Low Noise Box Housing	Standard
Severe Duty Wear Kit	Optional
Carrier Mounted Automatic Greasing System	Optional
Breaker Mounted Auto Greasing System	Optional
Tool Types	Blunt / Moil / Chisel



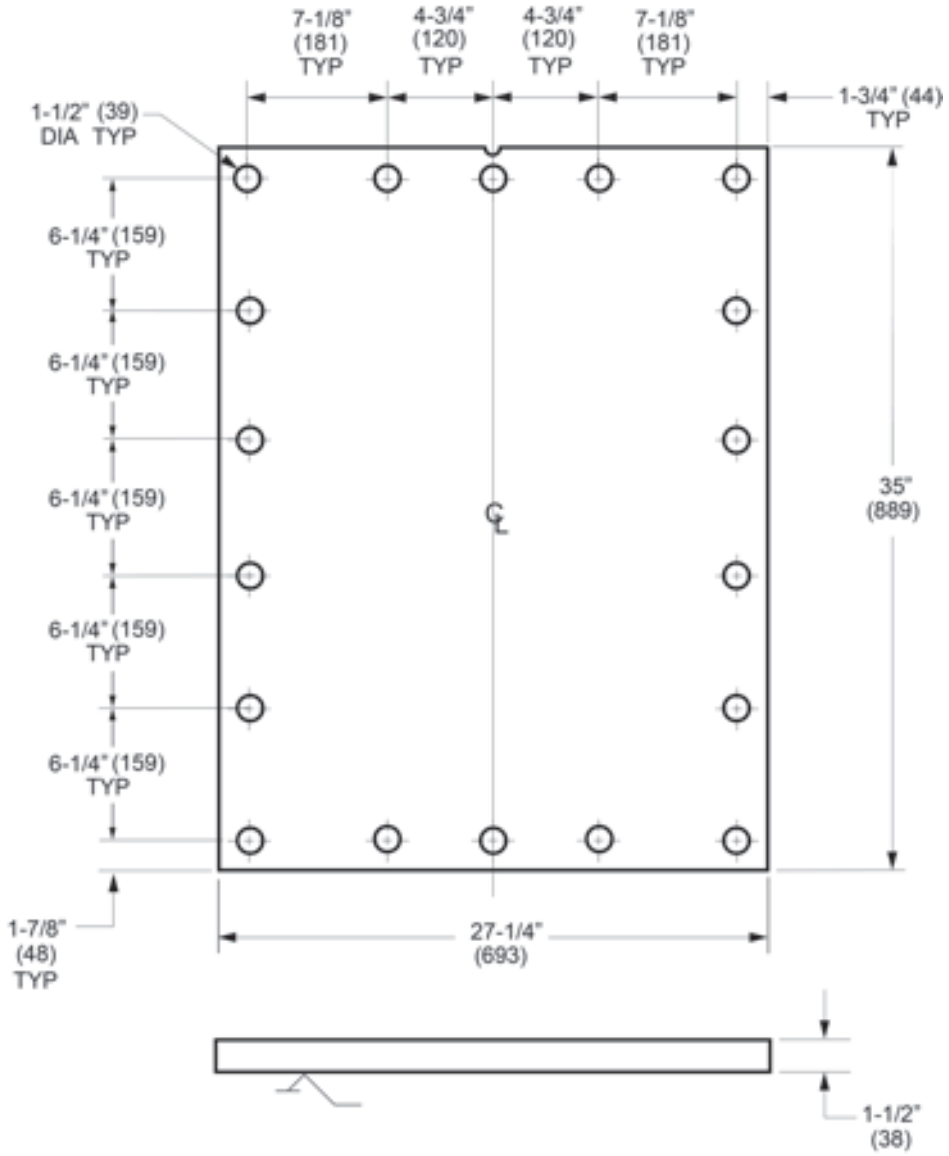
BXR100 Breaker Configured With Oil Regeneration System On	
Pressure Orifice Diameter	16 mm
Choke Orifice Diameter	12,5 mm
Nitrogen Pressure In Rear Head with Regen	145 psi (10 bar)
Maximum Flow Rate with Regen	82 gpm (310 lpm)
Minimum Flow Rate with Regen (75% Of Max)	62 gpm (233 lpm)
Operating Pressure at Full Flow with Regen Design for 35 Bar Pressure Rise at Maximum Regen	2,250–2,755 psi (155–190 bar)
Low Speed BPM at Max Flow @ 85% Vol Eff – No Regen	419
Low Speed BPM at Max Flow @ 85% Vol Eff and 15% Regen Speed	482
High Speed BPM at Max Flow 85% Vol Eff – No Regen	553
High Speed BPM at Max Flow @ 85% Vol Eff and 15% Regen	636
Low Speed BPM at Low Flow @ 85% Vol Eff – No Regen	317
High Speed BPM at Low Flow @ 85% Vol Eff – No Regen	365

BXR100 Breaker Configured for Oil Regeneration Mode OFF With Spool Locked Out or in By-pass Mode	
Pressure Orifice Diameter	16 mm
Choke Orifice Diameter	12,5 mm
Nitrogen Pressure in Rear Head – Regen Lockout	160 psi (11 bar)
Maximum Flow Rate – Regen Lockout	90 gpm (340 lpm)
Minimum Flow Rate without Regen (75% Of Max)	67 gpm (255 lpm)
Operating Pressure at Full Flow Regen Lockout. There is No Pressure Rise – Regen Lockout	2,250–2,755 psi (155–190 bar)
Low Speed BPM at Max Flow @ 85% Vol Eff Regen Lockout	460
High Speed BPM at Max Flow @ 85% Vol Eff Regen Lockout	607
Low Speed BPM at Low Flow @ 85% Vol Eff Regen Lockout	342
High Speed BPM at Low Flow @ 85% Vol Eff Regen Lockout	451

Regen = Oil Regeneration

Vol Eff = Volumetric Efficiency

BXR100 Mounting Plate



NOTES:
All Dimensions shown inches (mm)
Machine bottom of mount flat after welding

Tolerances

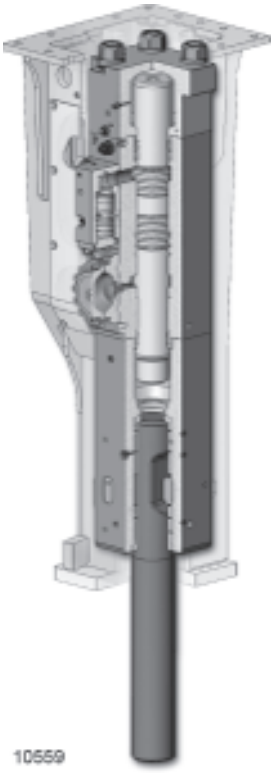
Fractions:	±1/16 [±1,6]
Two-place Decimal:	±.03 [±0,8]
Surface Finish:	125 µin [3,2 µm]

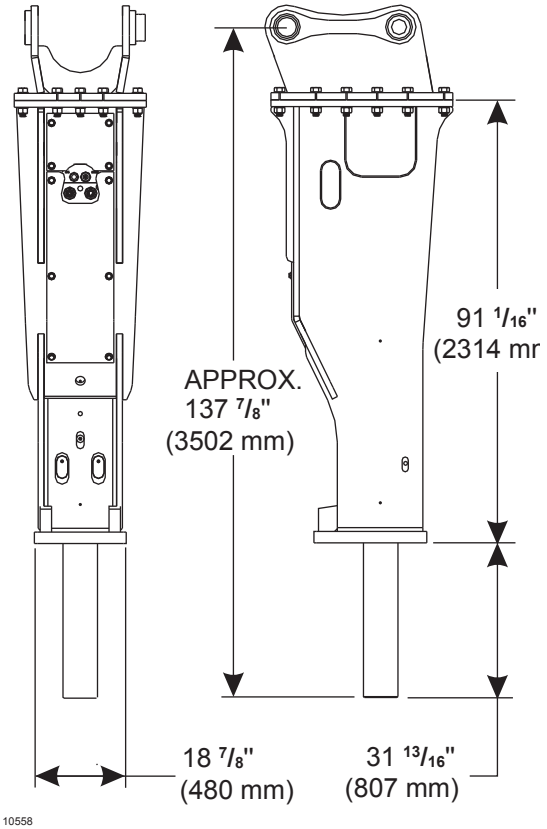
10934

Model BXR120

NOTE: Relief valve setting is based on 100 psi (7 bar) back pressure. For higher back pressures, raise the relief valve setting accordingly. Consult BTI if the back pressure is greater than 450 psi (30 bar).

Energy Class	12,000 ft•lb (16 300 joule)
Operating Weight	9,050 lb (4 100 kg)
Tool Diameter	7.1 in (180 mm)
Exposed Tool Length	31 in (810 mm)
Recommended Carrier Weight	92,600–178,600 lb (42–81 tonne)
Relief Pressure Setting (see note)	4,000 psi (275 bar)
Cushion Chamber Nitrogen Pressure	159 psi (11 bar)
Accumulator Nitrogen Pressure	754 psi (52 bar)
Hydraulic Hose Size	1 1/4 in JIC (32 mm)
Remote Grease Connection	1/4 in NPT
Remote Air Breather Connection	1/2 in BSPT
Oil Regeneration System	Standard
Anti-blank Fire Interlock	Standard
Two-speed Control	Operator Controlled Hydraulic Pilot
Low Noise Box Housing	Standard
Severe Duty Wear Kit	Optional
Carrier Mounted Automatic Greasing System	Optional
Breaker Mounted Auto Greasing System	Optional
Tool Types	Blunt / Moil / Chisel





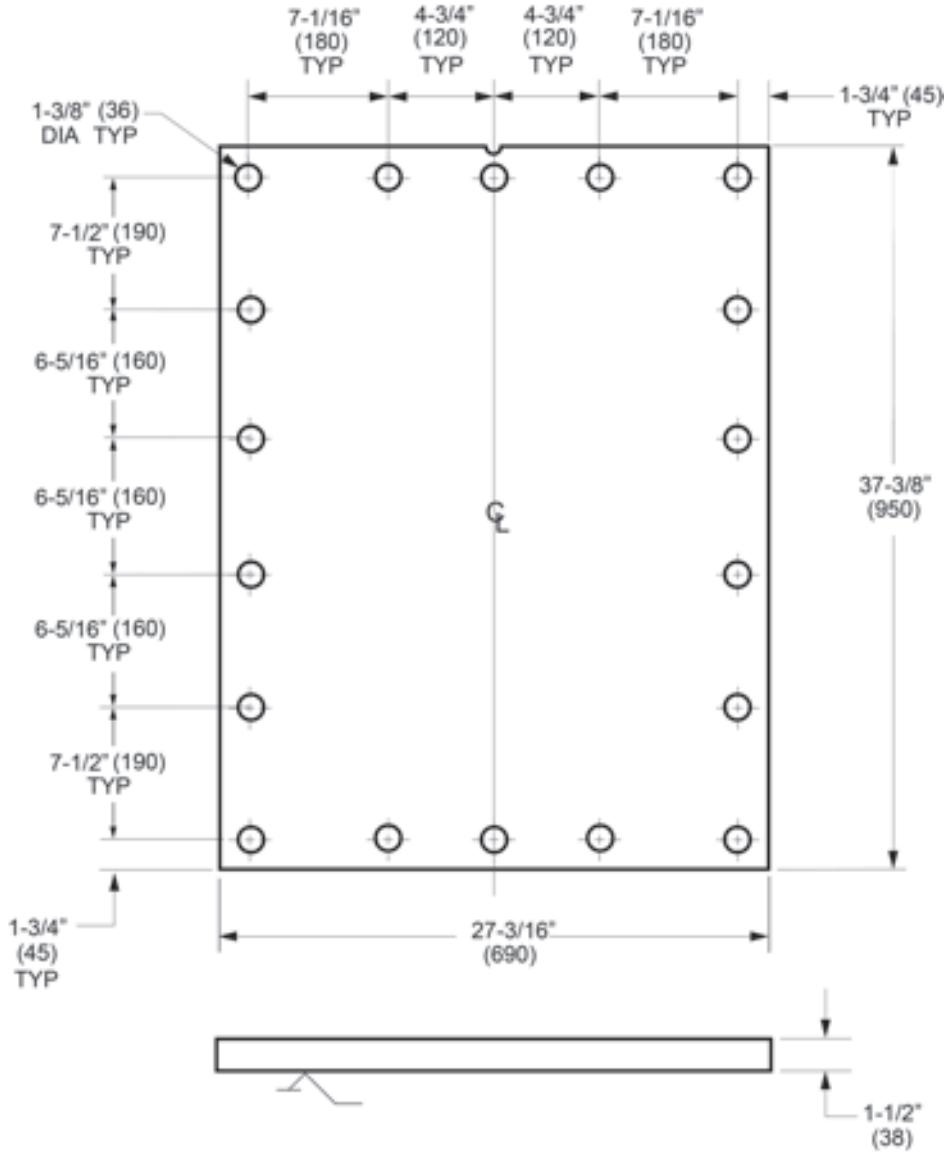
BXR120 Breaker Configured With Oil Regeneration System On	
Pressure Orifice Diameter	22 mm
Choke Orifice Diameter	12,5 mm
Nitrogen Pressure In Rear Head with Regen	160 psi (11 bar)
Maximum Flow Rate with Regen	106 gpm (400 lpm)
Minimum Flow Rate with Regen (75% Of Max)	79 gpm (300 lpm)
Operating Pressure at Full Flow with Regen Design for 35 Bar Pressure Rise at Maximum Regen	2,250–2,755 psi (155–190 bar)
Low Speed BPM at Max Flow @ 85% Vol Eff – No Regen	412
Low Speed BPM at Max Flow @ 85% Vol Eff and 15% Regen Speed	474
High Speed BPM at Max Flow 85% Vol Eff – No Regen	515
High Speed BPM at Max Flow @ 85% Vol Eff and 15% Regen	592
Low Speed BPM at Low Flow @ 85% Vol Eff – No Regen	308
High Speed BPM at Low Flow @ 85% Vol Eff – No Regen	354

BXR120 Breaker Configured for Oil Regeneration Mode OFF With Spool Locked Out or in By-pass Mode	
Pressure Orifice Diameter	16 mm
Choke Orifice Diameter	12,5 mm
Nitrogen Pressure in Rear Head – Regen Lockout	160 psi (11 bar)
Maximum Flow Rate – Regen Lockout	106 gpm (400 lpm)
Minimum Flow Rate without Regen (75% Of Max)	79 gpm (300 lpm)
Operating Pressure at Full Flow Regen Lockout. There is No Pressure Rise – Regen Lockout	1,810–2,320 psi (125–160 bar)
Low Speed BPM at Max Flow @ 85% Vol Eff Regen Lockout	413
High Speed BPM at Max Flow @ 85% Vol Eff Regen Lockout	516
Low Speed BPM at Low Flow @ 85% Vol Eff Regen Lockout	308
High Speed BPM at Low Flow @ 85% Vol Eff Regen Lockout	385

Regen = Oil Regeneration

Vol Eff = Volumetric Efficiency

BXR120 Mounting Plate



NOTES:
All Dimensions shown inches (mm)
Machine bottom of mount flat after welding

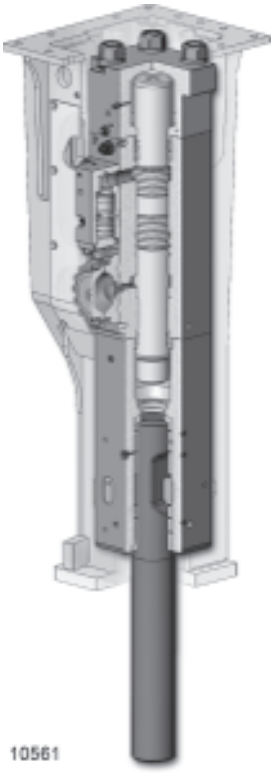
Tolerances

Fractions:	±1/16 [±1,6]
Two-place Decimal:	±.03 [±0,8]
Surface Finish:	125 µin [3,2 µm]

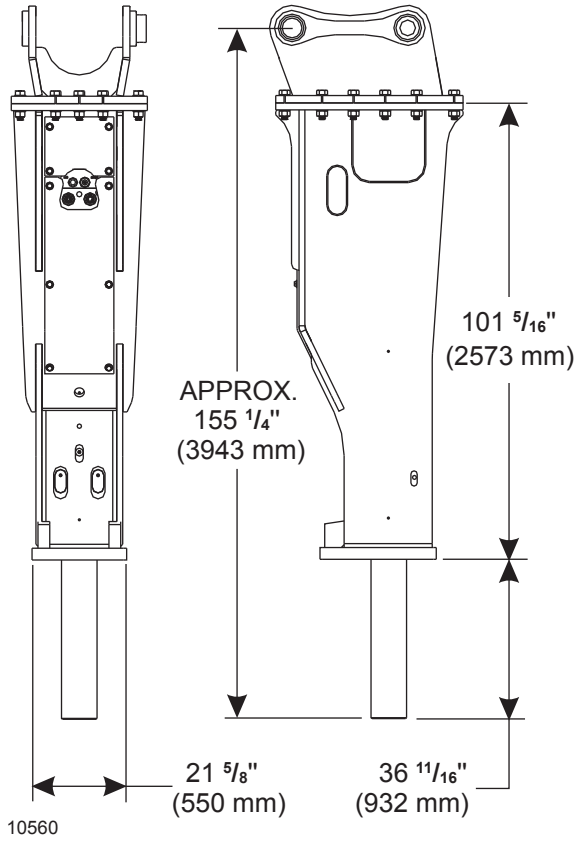
10935

Model BXR160

NOTE: Relief valve setting is based on 100 psi (7 bar) back pressure. For higher back pressures, raise the relief valve setting accordingly. Consult BTI if the back pressure is greater than 450 psi (30 bar).



Energy Class	16,000 ft•lb (21 500 joule)
Operating Weight	12,400 lb (5 630 kg)
Tool Diameter	7.9 in (200 mm)
Exposed Tool Length	36.5 in (930 mm)
Recommended Carrier Weight	121,300–220,500 lb (55–100 tonne)
Relief Pressure Setting (see note)	4,000 psi (275 bar)
Cushion Chamber Nitrogen Pressure	159 psi (11 bar)
Accumulator Nitrogen Pressure	754 psi (52 bar)
Hydraulic Hose Size	1 1/4 in JIC (32 mm)
Remote Grease Connection	1/4 in NPT
Remote Air Breather Connection	1/2 in BSPT
Oil Regeneration System	Standard
Anti-blank Fire Interlock	Standard
Two-speed Control	Operator Controlled Hydraulic Pilot
Low Noise Box Housing	Standard
Severe Duty Wear Kit	Optional
Carrier Mounted Automatic Greasing System	Optional
Breaker Mounted Auto Greasing System	Optional
Tool Types	Blunt / Moil / Chisel



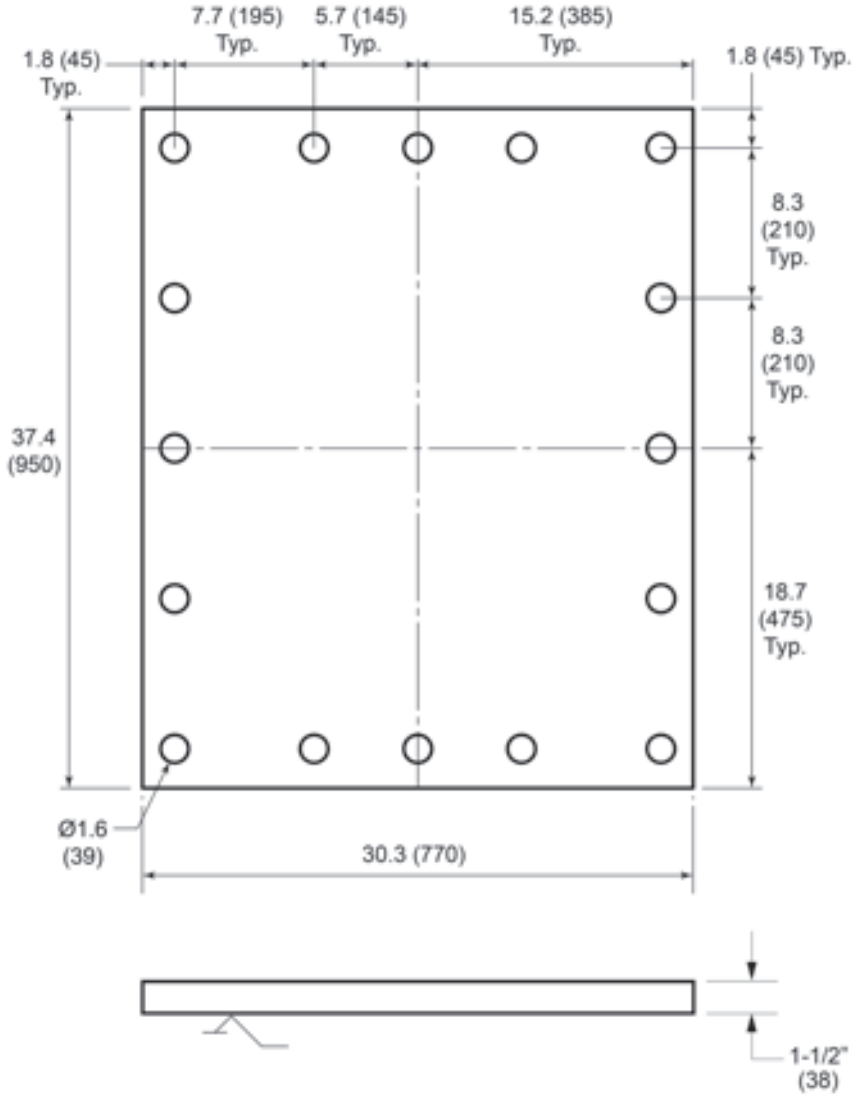
BXR160 Breaker Configured With Oil Regeneration System On	
Pressure Orifice Diameter	22 mm
Choke Orifice Diameter	12,5 mm
Nitrogen Pressure In Rear Head with Regen	160 psi (11 bar)
Maximum Flow Rate with Regen	119 gpm (450 lpm)
Minimum Flow Rate with Regen (75% Of Max)	89 gpm (338 lpm)
Operating Pressure at Full Flow with Regen Design for 35 Bar Pressure Rise at Maximum Regen	2,250–2,755 psi (155–190 bar)
Low Speed BPM at Max Flow @ 85% Vol Eff – No Regen	318
Low Speed BPM at Max Flow @ 85% Vol Eff and 15% Regen Speed	366
High Speed BPM at Max Flow 85% Vol Eff – No Regen	413
High Speed BPM at Max Flow @ 85% Vol Eff and 15% Regen	475
Low Speed BPM at Low Flow @ 85% Vol Eff – No Regen	238
High Speed BPM at Low Flow @ 85% Vol Eff – No Regen	274

BXR160 Breaker Configured for Oil Regeneration Mode OFF With Spool Locked Out or in By-pass Mode	
Pressure Orifice Diameter	16 mm
Choke Orifice Diameter	12,5 mm
Nitrogen Pressure in Rear Head – Regen Lockout	160 psi (11 bar)
Maximum Flow Rate – Regen Lockout	119 gpm (450 lpm)
Minimum Flow Rate without Regen (75% Of Max)	89 gpm (337,5 lpm)
Operating Pressure at Full Flow Regen Lockout. There is No Pressure Rise – Regen Lockout	1,810–2,320 psi (125–160 bar)
Low Speed BPM at Max Flow @ 85% Vol Eff Regen Lockout	318
High Speed BPM at Max Flow @ 85% Vol Eff Regen Lockout	413
Low Speed BPM at Low Flow @ 85% Vol Eff Regen Lockout	238
High Speed BPM at Low Flow @ 85% Vol Eff Regen Lockout	309

Regen = Oil Regeneration

Vol Eff = Volumetric Efficiency

BXR160 Mounting Plate



NOTES:
All Dimensions shown inches (mm)
Machine bottom of mount flat after welding

Tolerances

Fractions:	±1/16 [±1,6]
Two-place Decimal:	±.03 [±0,8]
Surface Finish:	125 µin [3,2 µm]

11112

Torque Specifications

BXR50

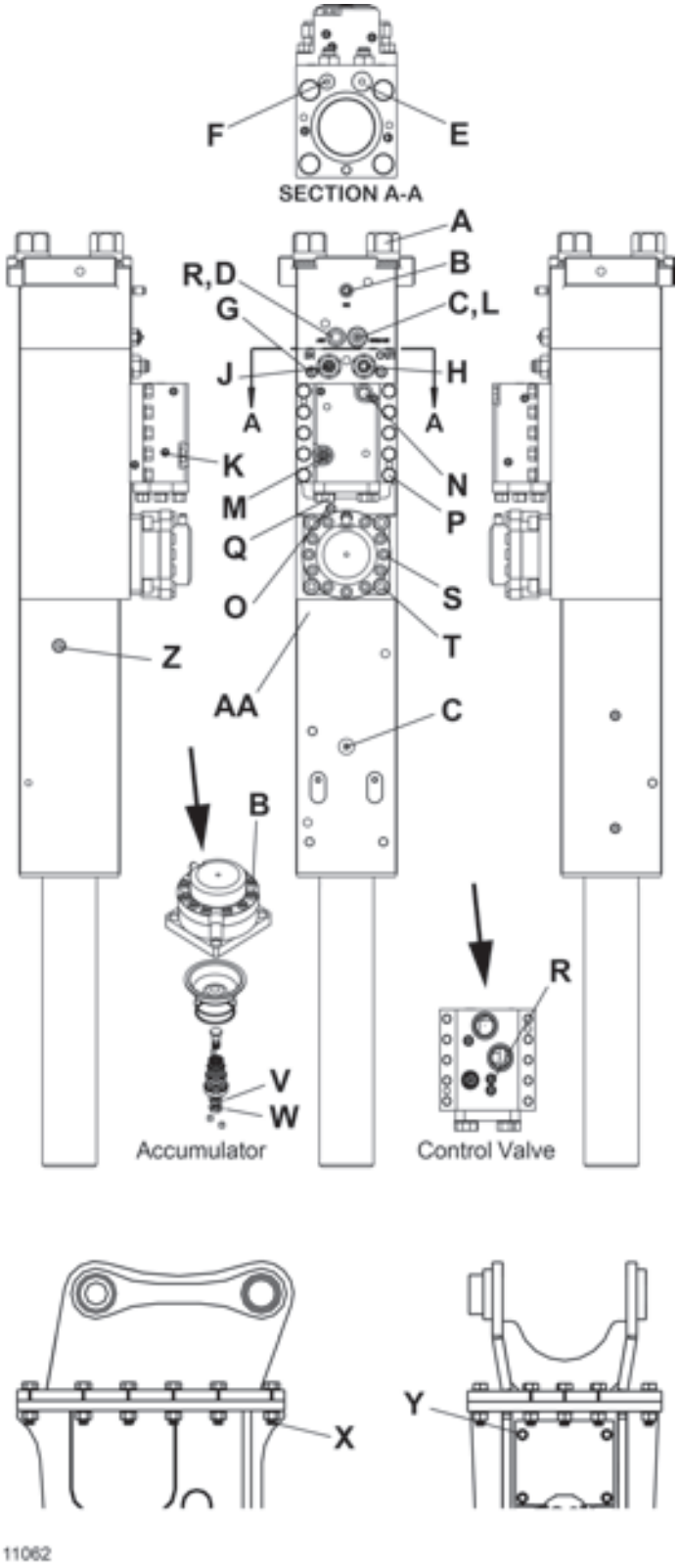
NOTE: All Torques shown in lubricated state.

T.F.F.T. – Turns From Finger Tight. Tighten item by hand, then wrench-tighten to number of turns shown from finger tight.

LUBRICATED – cleaned, dry bolts lubricated with standard medium viscosity machine oil.

ITEM	DESCRIPTION - SIZE	TORQUE ft•lb (N•m)	LUBRICANT
AA	TIE ROD- ROLLED THREAD – R48	100 (136)	MoS2 LUBRICATED
A	TIE ROD NUT- ROLLED THREAD – R48	1,808 (2 452)	MoS2 LUBRICATED
B	GAS VALVE ASSEMBLY – BSPP - PF 1/4	26 (35)	LUBRICATED
C	GREASE ZERK & ADAPTER – PT 1/4	2-3 T.F.F.T.	PIPE SEALANT
D	AIR VALVE ASSEMBLY – PT 1/2	2-3 T.F.F.T.	PIPE SEALANT
E	PRESSURE PLUG – M42 x P1.5	266 (360)	LUBRICATED
F	TANK PORT PLUG – M30 x P1.5	180 (245)	LUBRICATED
G	HEX PLUG – PF 3/8	52 (70)	LUBRICATED
H	RETURN ADAPTER - BSPP – PF 1-1/4	332 (450)	LUBRICATED
J	PRESSURE ADAPTER – BSPP – PF 1-1/4	332 (450)	LUBRICATED
K	HEX SOCKET PLUG - BSPP – PF1/8	13 (18)	LUBRICATED
L	GREASE ZERK ADAPTER – BSPP - PF 1	229 (310)	LUBRICATED
M	STROKE ADJUSTER ASSY – BSPP - PF 1	229 (310)	LUBRICATED
N	REGENERATION VALVE ASSY – BSPP -PF 3/4	170 (230)	LUBRICATED
O	HEX SOCKET PLUG – BSPP - PF 1/4	26 (35)	LUBRICATED
P	VALVE TENSION BOLT – M22 x P1.5	450 (610)	MoS2 LUBRICATED
Q	VALVE CAP TENSION BOLT – M22 x P1.5	450 (610)	MoS2 LUBRICATED
R	CHOKE PLUG & AIR VALVE ADAPTOR – PT 3/4	2-3 T.F.F.T.	PIPE SEALANT
S	ACCUMULATOR COVER CAPSCREW – M18 x P1.5	289 (391)	LUBRICATED
T	ACCUMULATOR CAPSCREW – M24 x P2.0	738 (1 000)	LUBRICATED
V	DIFFUSER NUT – M20 x P1.5 - LOWER TORQUE	434 (588)	LUBRICATED
W	DIFFUSER NUT – M20 x P1.5 - HIGHER TORQUE	470 (687)	LUBRICATED
X	BRACKET BOLT – 1-1/4 UNC or (M33)	1,335 (1 810)	MoS2 LUBRICATED
Y	HEX CAPSCREW – M16 x P2.0	108 (146)	MoS2 LUBRICATED
Z	HEX SOCKET PLUG – BSPP - PF 1/2	66 (90)	LUBRICATED

BXR50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Control Valve
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BXR65

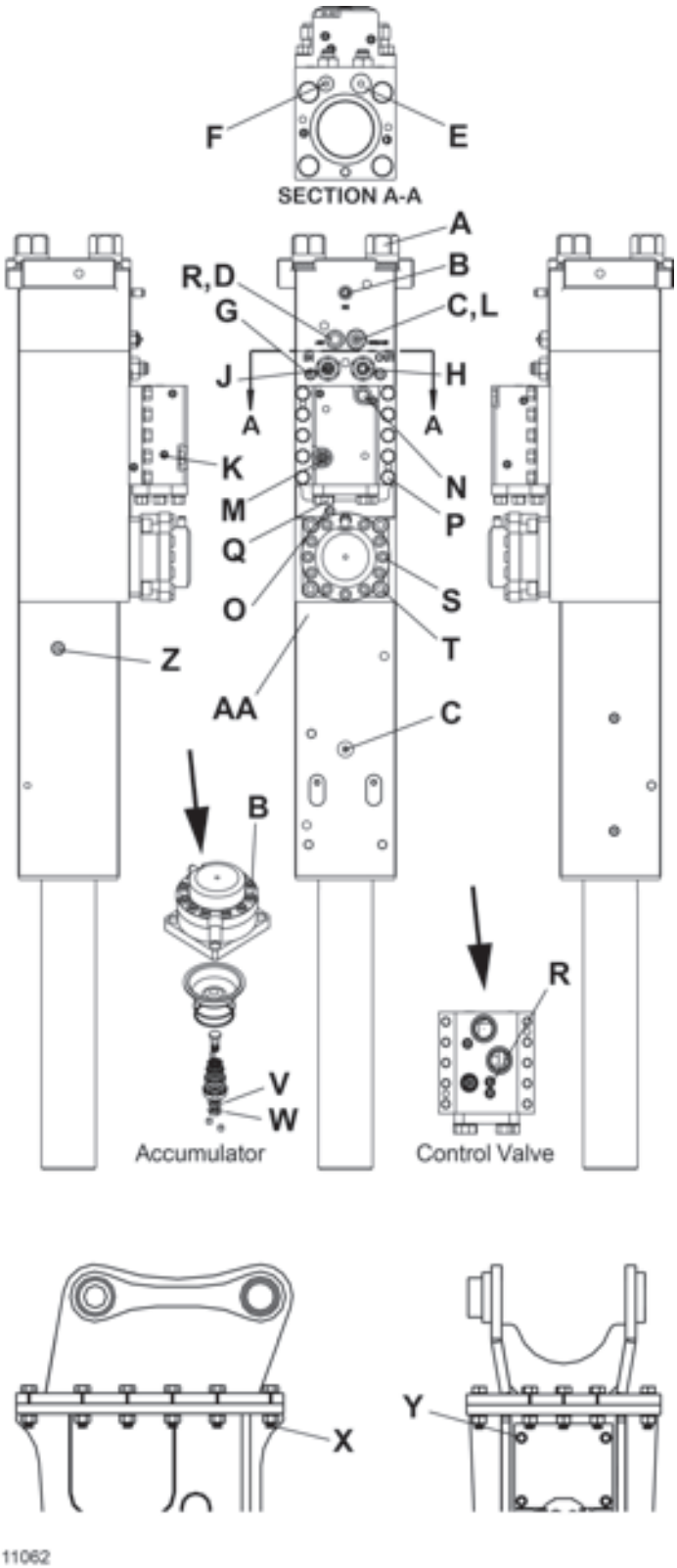
NOTE: All Torques shown in lubricated state.

T.F.F.T. – Turns From Finger Tight. Tighten item by hand, then wrench-tighten to number of turns shown from finger tight.

LUBRICATED – cleaned, dry bolts lubricated with standard medium viscosity machine oil.

ITEM	DESCRIPTION - SIZE	TORQUE ft•lb (N•m)	LUBRICANT
AA	TIE ROD- ROLLED THREAD – R48	100 (136)	MoS2 LUBRICATED
A	TIE ROD NUT- ROLLED THREAD –R48	1,808 (2 452)	MoS2 LUBRICATED
B	GAS VALVE ASSEMBLY – BSPP - PF 1/4	26 (35)	LUBRICATED
C	GREASE ZERK & ADAPTER – PT 1/4	2-3 T.F.F.T.	PIPE SEALANT
D	AIR VALVE ASSEMBLY – PT 1/2	2-3 T.F.F.T.	PIPE SEALANT
E	PRESSURE PLUG – M42 x P1.5	266 (360)	LUBRICATED
F	TANK PORT PLUG – M30 x P1.5	180 (245)	LUBRICATED
G	HEX PLUG – PF 3/8	52 (70)	LUBRICATED
H	RETURN ADAPTER - BSPP – PF 1-1/4	332 (450)	LUBRICATED
J	PRESSURE ADAPTER - BSPP – PF 1-1/4	332 (450)	LUBRICATED
K	HEX SOCKET PLUG - BSPP – PF1/8	13 (18)	LOCTITE
L	GREASE ZERK ADAPTER – BSPP - PF 1	229 (310)	LUBRICATED
M	STROKE ADJUSTER ASSY – BSPP - PF 1	229 (310)	LUBRICATED
N	REGENERATION VALVE ASSY – BSPP -PF 3/4	170 (230)	LUBRICATED
O	HEX SOCKET PLUG – BSPP - PF 1/4	26 (35)	LUBRICATED
P	VALVE TENSION BOLT – M24 x P2.0	575 (780)	MoS2 LUBRICATED
Q	VALVE CAP TENSION BOLT – M24 x P2.0	575 (780)	MoS2 LUBRICATED
R	CHOKE PLUG & AIR VALVE ADAPTOR – PT 3/4	2-3 T.F.F.T.	PIPE SEALANT
S	ACCUMULATOR COVER CAPSCREW – M20 x P2.0	398 (539)	LUBRICATED
T	ACCUMULATOR CAPSCREW – M30 x P2.0	1,364 (1 848)	LUBRICATED
V	DIFFUSER NUT – M20 x P1.5 - LOWER TORQUE	434 (588)	LUBRICATED
W	DIFFUSER NUT – M20 x P1.5 - HIGHER TORQUE	470 (637)	LUBRICATED
X	BRACKET BOLT – 1-1/4 UNC or (M33)	1,335 (1 810)	MoS2 LUBRICATED
Y	HEX CAPSCREW – M16 x P2.0	108 (146)	MoS2 LUBRICATED
Z	HEX SOCKET PLUG – BSPP - PF 1/2	66 (90)	LUBRICATED

BXR65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Control Valve
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BXR85

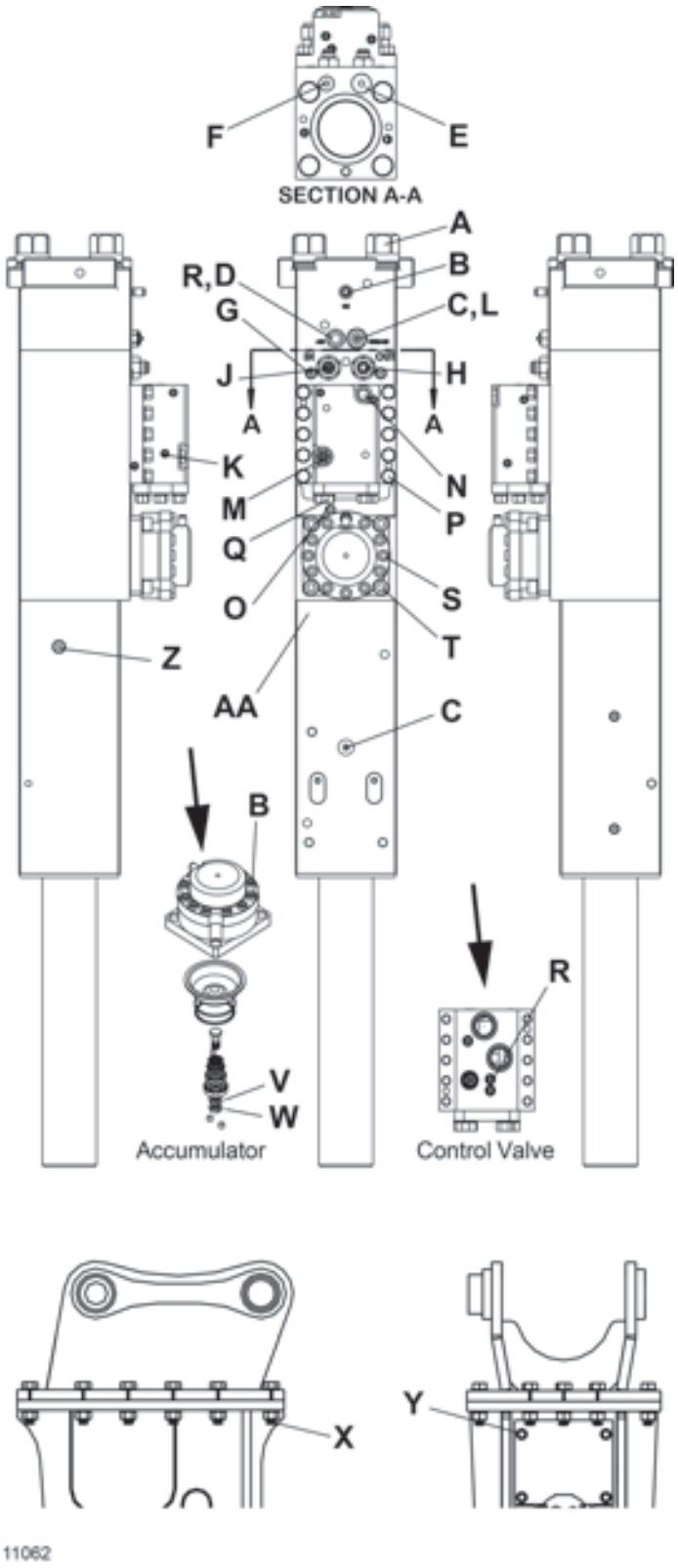
NOTE: All Torques shown in lubricated state.

T.F.F.T. – Turns From Finger Tight. Tighten item by hand, then wrench-tighten to number of turns shown from finger tight.

LUBRICATED – cleaned, dry bolts lubricated with standard medium viscosity machine oil.

ITEM	DESCRIPTION - SIZE	TORQUE ft•lb (N•m)	LUBRICANT
AA	TIE ROD- ROLLED THREAD – R55	100 (136)	MoS2 LUBRICATED
A	TIE ROD NUT- ROLLED THREAD – R55	2,604 (3 528)	MoS2 LUBRICATED
B	GAS VALVE ASSEMBLY – BSPP - PF 1/4	26 (35)	LUBRICATED
C	GREASE ZERK & ADAPTER – PT 1/4	2-3 T.F.F.T.	PIPE SEALANT
D	AIR VALVE ASSEMBLY – PT 1/2	2-3 T.F.F.T.	PIPE SEALANT
E	PRESSURE PLUG – M48 x P1.5	310 (420)	LUBRICATED
F	TANK PORT PLUG – M30 x P1.5	180 (245)	LUBRICATED
G	HEX PLUG – PF 3/8	52 (70)	LUBRICATED
H	RETURN ADAPTER - BSPP – PF 1-1/4	332 (450)	LUBRICATED
J	PRESSURE ADAPTER - BSPP – PF 1-1/4	332 (450)	LUBRICATED
K	HEX SOCKET PLUG - BSPP – PF1/8	13 (18)	LOCTITE
L	GREASE ZERK ADAPTER – BSPP - PF 1	229 (310)	LUBRICATED
M	STROKE ADJUSTER ASSY – BSPP - PF 1	229 (310)	LUBRICATED
N	REGENERATION VALVE ASSY – BSPP -PF 3/4	170 (230)	LUBRICATED
O	HEX SOCKET PLUG – BSPP - PF 1/4	26 (35)	LUBRICATED
P	VALVE TENSION BOLT – M24 x P2.0	575 (780)	MoS2 LUBRICATED
Q	VALVE CAP TENSION BOLT – M24 x P2.0	575 (780)	MoS2 LUBRICATED
R	CHOKE PLUG & AIR VALVE ADAPTOR – PT 3/4	2-3 T.F.F.T.	PIPE SEALANT
S	ACCUMULATOR COVER CAPSCREW – M20 x P2.0	398 (539)	LUBRICATED
T	ACCUMULATOR CAPSCREW – M30 x P2.0	1,364 (1 848)	LUBRICATED
V	DIFFUSER NUT – M20 x P1.5 - LOWER TORQUE	434 (588)	LUBRICATED
W	DIFFUSER NUT – M20 x P1.5 - HIGHER TORQUE	470 (637)	LUBRICATED
X	BRACKET BOLT – 1-1/2 UNC or (M36)	1,733 (2 350)	MoS2 LUBRICATED
Y	HEX CAPSCREW – M16 x P2.0	108 (146)	MoS2 LUBRICATED
Z	HEX SOCKET PLUG – BSPP - PF 1/2	66 (90)	LUBRICATED

BXR85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Accumulator
Control Valve
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11062

BXR100

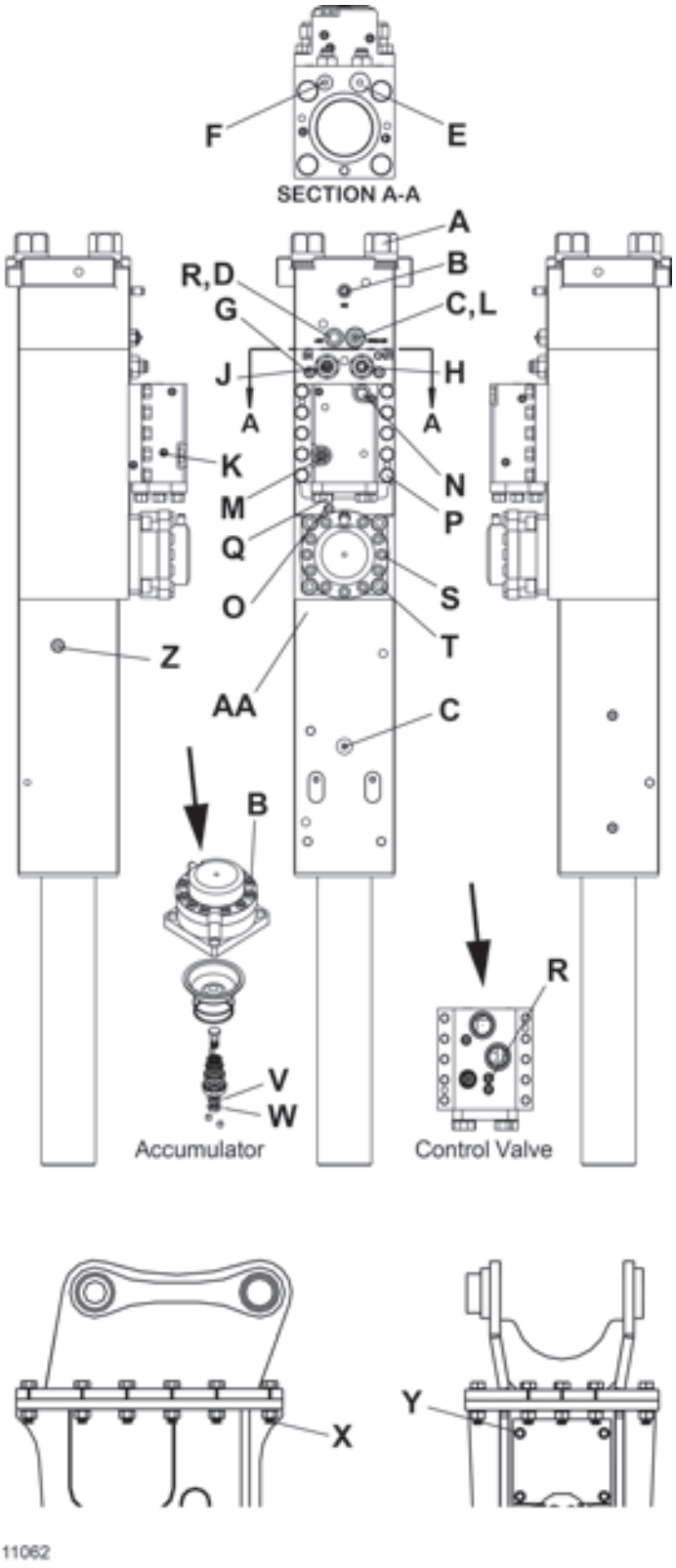
NOTE: All Torques shown in lubricated state.

T.F.F.T. – Turns From Finger Tight. Tighten item by hand, then wrench-tighten to number of turns shown from finger tight.

LUBRICATED – cleaned, dry bolts lubricated with standard medium viscosity machine oil.

ITEM	DESCRIPTION - SIZE	TORQUE ft•lb (N•m)	LUBRICANT
AA	TIE ROD- ROLLED THREAD – R64	100 (136)	MoS2 LUBRICATED
A	TIE ROD NUT- ROLLED THREAD – R64	3,617 (4 900)	MoS2 LUBRICATED
B	GAS VALVE ASSEMBLY – BSPP - PF 1/4	26 (35)	LUBRICATED
C	GREASE ZERK & ADAPTER – PT 1/4	2-3 T.F.F.T.	PIPE SEALANT
D	AIR VALVE ASSEMBLY – PT 1/2	2-3 T.F.F.T.	PIPE SEALANT
E	PRESSURE PLUG – M48 x P1.5	310 (420)	LUBRICATED
F	TANK PORT PLUG – BSPP - PF 1	229 (310)	LUBRICATED
G	HEX PLUG – PF 3/8	52 (70)	LUBRICATED
H	RETURN ADAPTER - BSPP – PF 1-1/2	399 (540)	LUBRICATED
J	PRESSURE ADAPTER - BSPP – PF 1-1/2	399 (540)	LUBRICATED
K	HEX SOCKET PLUG - BSPP – PF1/8	13 (18)	LOCTITE
L	GREASE ZERK ADAPTER – BSPP - PF 1	229 (310)	LUBRICATED
M	STROKE ADJUSTER ASSY – BSPP - PF 1	229 (310)	LUBRICATED
N	REGENERATION VALVE ASSY – BSPP -PF 3/4	170 (230)	LUBRICATED
O	HEX SOCKET PLUG – BSPP - PF 1/4	26 (35)	LUBRICATED
P	VALVE TENSION BOLT – M30 x P2.0	1,160 (1 572)	MoS2 LUBRICATED
Q	VALVE CAP TENSION BOLT – M30 x P2.0	1,160 (1 572)	MoS2 LUBRICATED
R	CHOKE PLUG & AIR VALVE ADAPTOR – PT 3/4	2-3 T.F.F.T.	PIPE SEALANT
S	ACCUMULATOR COVER CAPSCREW – M20 x P2.0	398 (539)	LUBRICATED
T	ACCUMULATOR CAPSCREW – M30 x P2.0	1,364 (1 848)	LUBRICATED
V	DIFFUSER NUT – M20 x P1.5 - LOWER TORQUE	434 (588)	LUBRICATED
W	DIFFUSER NUT – M20 x P1.5 - HIGHER TORQUE	470 (637)	LUBRICATED
X	BRACKET BOLT – 1-1/2 UNC or (M36)	1,733 (2 350)	MoS2 LUBRICATED
Y	HEX CAPSCREW – M16 x P2.0	108 (146)	MoS2 LUBRICATED
Z	HEX SOCKET PLUG – BSPP - PF 1/2	66 (90)	LUBRICATED

BXR100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Accumulator
Control Valve
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11062

BXR120

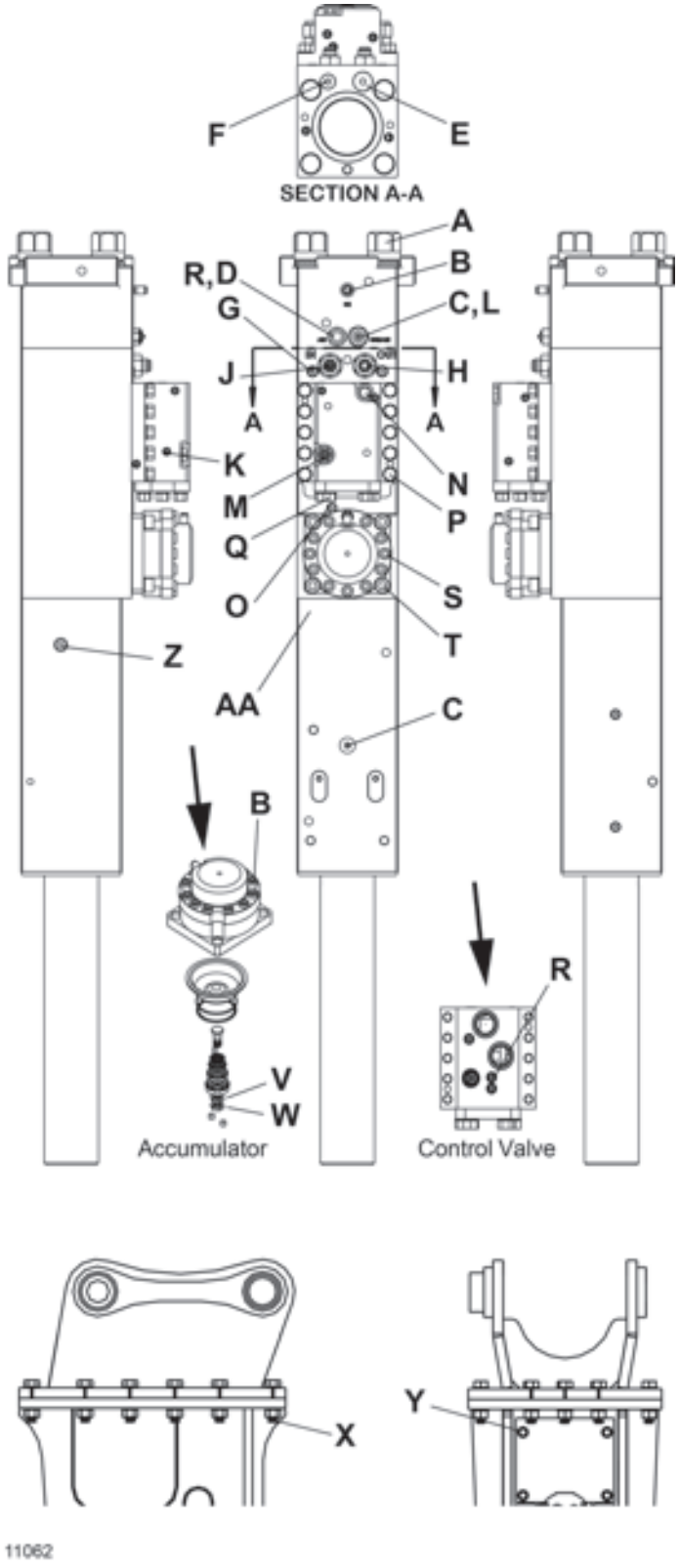
NOTE: All Torques shown in lubricated state.

T.F.F.T. – Turns From Finger Tight. Tighten item by hand, then wrench-tighten to number of turns shown from finger tight.

LUBRICATED – cleaned, dry bolts lubricated with standard medium viscosity machine oil.

ITEM	DESCRIPTION - SIZE	TORQUE ft•lb (N•m)	LUBRICANT
AA	TIE ROD- ROLLED THREAD – R64	100 (136)	MoS2 LUBRICATED
A	TIE ROD NUT- ROLLED THREAD – R64	3,617 (4 900)	MoS2 LUBRICATED
B	GAS VALVE ASSEMBLY – BSPP - PF 1/4	26 (35)	LUBRICATED
C	GREASE ZERK & ADAPTER – PT 1/4	2-3 T.F.F.T.	PIPE SEALANT
D	AIR VALVE ASSEMBLY – PT 1/2	2-3 T.F.F.T.	PIPE SEALANT
E	PRESSURE PLUG – M60 x P1.5	370 (500)	LUBRICATED
F	TANK PORT PLUG – M48 x P1.5	310 (420)	LUBRICATED
G	HEX PLUG – PF 3/8	52 (70)	LUBRICATED
H	RETURN ADAPTER - BSPP – PF 1-1/2	399 (540)	LUBRICATED
J	PRESSURE ADAPTER - BSPP – PF 1-1/2	399 (540)	LUBRICATED
K	HEX SOCKET PLUG - BSPP – PF1/8	13 (18)	LOCTITE
L	GREASE ZERK ADAPTER – BSPP - PF 1	229 (310)	LUBRICATED
M	STROKE ADJUSTER ASSY – BSPP - PF 1	229 (310)	LUBRICATED
N	REGENERATION VALVE ASSY – BSPP -PF 3/4	170 (230)	LUBRICATED
O	HEX SOCKET PLUG – BSPP - PF 1/4	26 (35)	LUBRICATED
P	VALVE TENSION BOLT – M30 x P2.0	1,160 (1 572)	MoS2 LUBRICATED
Q	VALVE CAP TENSION BOLT – M30 x P2.0	1,160 (1 572)	MoS2 LUBRICATED
R	CHOKE PLUG & AIR VALVE ADAPTOR – PT 3/4	2-3 T.F.F.T.	PIPE SEALANT
S	ACCUMULATOR COVER CAPSCREW – M24 x P2.0	738 (1 000)	LUBRICATED
T	ACCUMULATOR CAPSCREW – M39 x P3.0	1,374 (1 863)	LUBRICATED
V	DIFFUSER NUT – M24 x P2.0 - LOWER TORQUE	810 (1 098)	LUBRICATED
W	DIFFUSER NUT – M24 x P2.0 - HIGHER TORQUE	846 (1 147)	LUBRICATED
X	BRACKET BOLT – 1-1/2 UNC or (M36)	1,733 (2 350)	MoS2 LUBRICATED
Y	HEX CAPSCREW – M16 x P2.0	108 (146)	MoS2 LUBRICATED
Z	HEX SOCKET PLUG – BSPP - PF 1/2	66 (90)	LUBRICATED

BXR120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BXR160

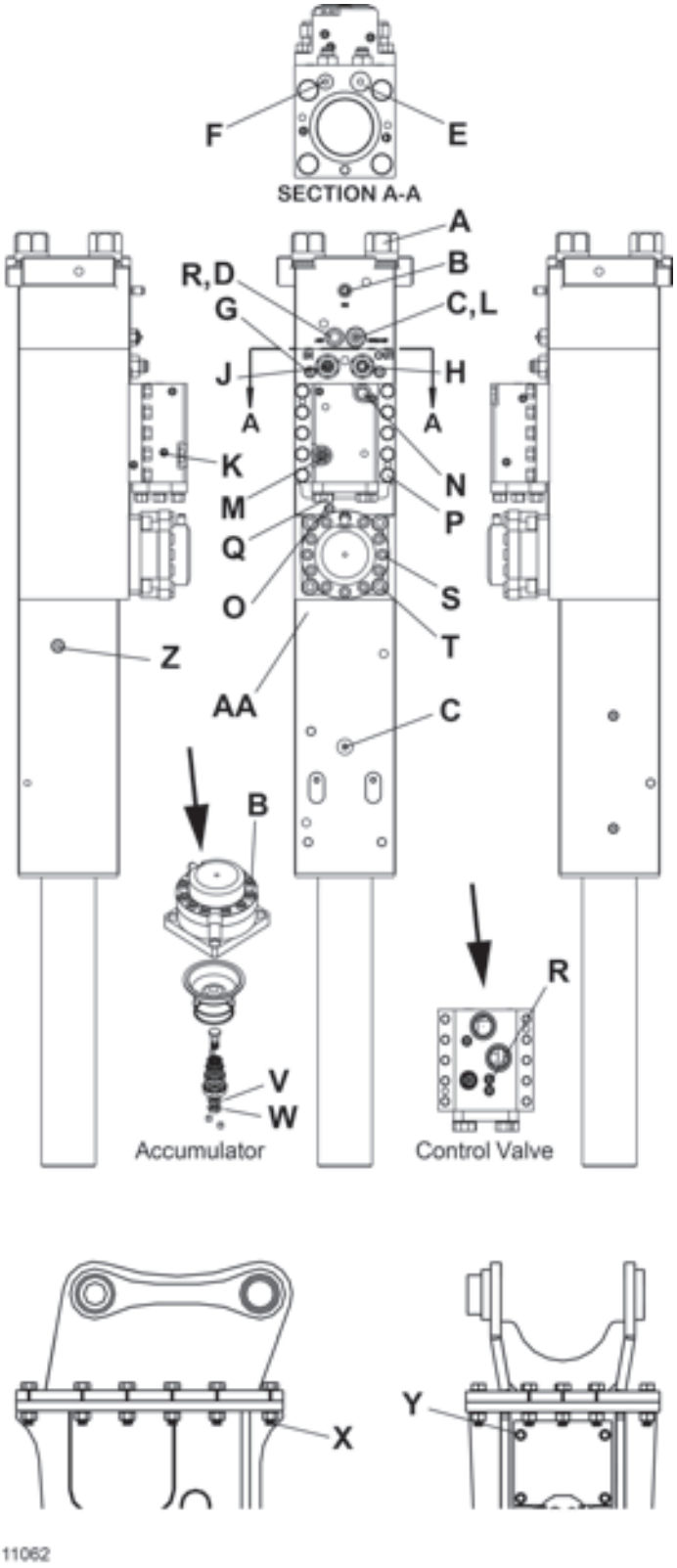
NOTE: All Torques shown in lubricated state.

T.F.F.T. – Turns From Finger Tight. Tighten item by hand, then wrench-tighten to number of turns shown from finger tight.

LUBRICATED – cleaned, dry bolts lubricated with standard medium viscosity machine oil.

ITEM	DESCRIPTION - SIZE	TORQUE ft•lb (N•m)	LUBRICANT
AA	TIE ROD- ROLLED THREAD – R70	100 (136)	MoS2 LUBRICATED
A	TIE ROD NUT- ROLLED THREAD – R70	4,702 (6 371)	MoS2 LUBRICATED
B	GAS VALVE ASSEMBLY – BSPP - PF 1/4	26 (35)	LUBRICATED
C	GREASE ZERK & ADAPTER – PT 1/4	2-3 T.F.F.T.	PIPE SEALANT
D	AIR VALVE ASSEMBLY – PT 1/2	2-3 T.F.F.T.	PIPE SEALANT
E	PRESSURE PLUG – M60 x P1.5	370 (500)	LUBRICATED
F	TANK PORT PLUG – M48 x P1.5	310 (420)	LUBRICATED
G	HEX PLUG – PF 3/8	52 (70)	LUBRICATED
H	RETURN ADAPTER - BSPP – PF 1-1/2	399 (540)	LUBRICATED
J	PRESSURE ADAPTER - BSPP – PF 1-1/2	399 (540)	LUBRICATED
K	HEX SOCKET PLUG - BSPP – PF1/8	13 (18)	LOCTITE
L	GREASE ZERK ADAPTER – BSPP - PF 1	229 (310)	LUBRICATED
M	STROKE ADJUSTER ASSY – BSPP - PF 1	229 (310)	LUBRICATED
N	REGENERATION VALVE ASSY – BSPP -PF 3/4	170 (230)	LUBRICATED
O	HEX SOCKET PLUG – BSPP - PF 1/4	26 (35)	LUBRICATED
P	VALVE TENSION BOLT – M33 x P2.0	1,301 (1 762)	MoS2 LUBRICATED
Q	VALVE CAP TENSION BOLT – M30 x P2.0	1,160 (1 572)	MoS2 LUBRICATED
R	CHOKE PLUG & AIR VALVE ADAPTOR – PT 3/4	2-3 T.F.F.T.	PIPE SEALANT
S	ACCUMULATOR COVER CAPSCREW – M24 x P2.0	738 (1 000)	LUBRICATED
T	ACCUMULATOR CAPSCREW – M39 x P3.0	1,374 (1 863)	LUBRICATED
V	DIFFUSER NUT – M24 x P2.0 - LOWER TORQUE	810 (1 098)	LUBRICATED
W	DIFFUSER NUT – M24 x P2.0 - HIGHER TORQUE	846 (1 147)	LUBRICATED
X	BRACKET BOLT – 1-1/2 UNC or (M36)	1,733 (2 350)	MoS2 LUBRICATED
Y	HEX CAPSCREW – M16 x P2.0	108 (146)	MoS2 LUBRICATED
Z	HEX SOCKET PLUG – BSPP - PF 1/2	66 (90)	LUBRICATED

BXR160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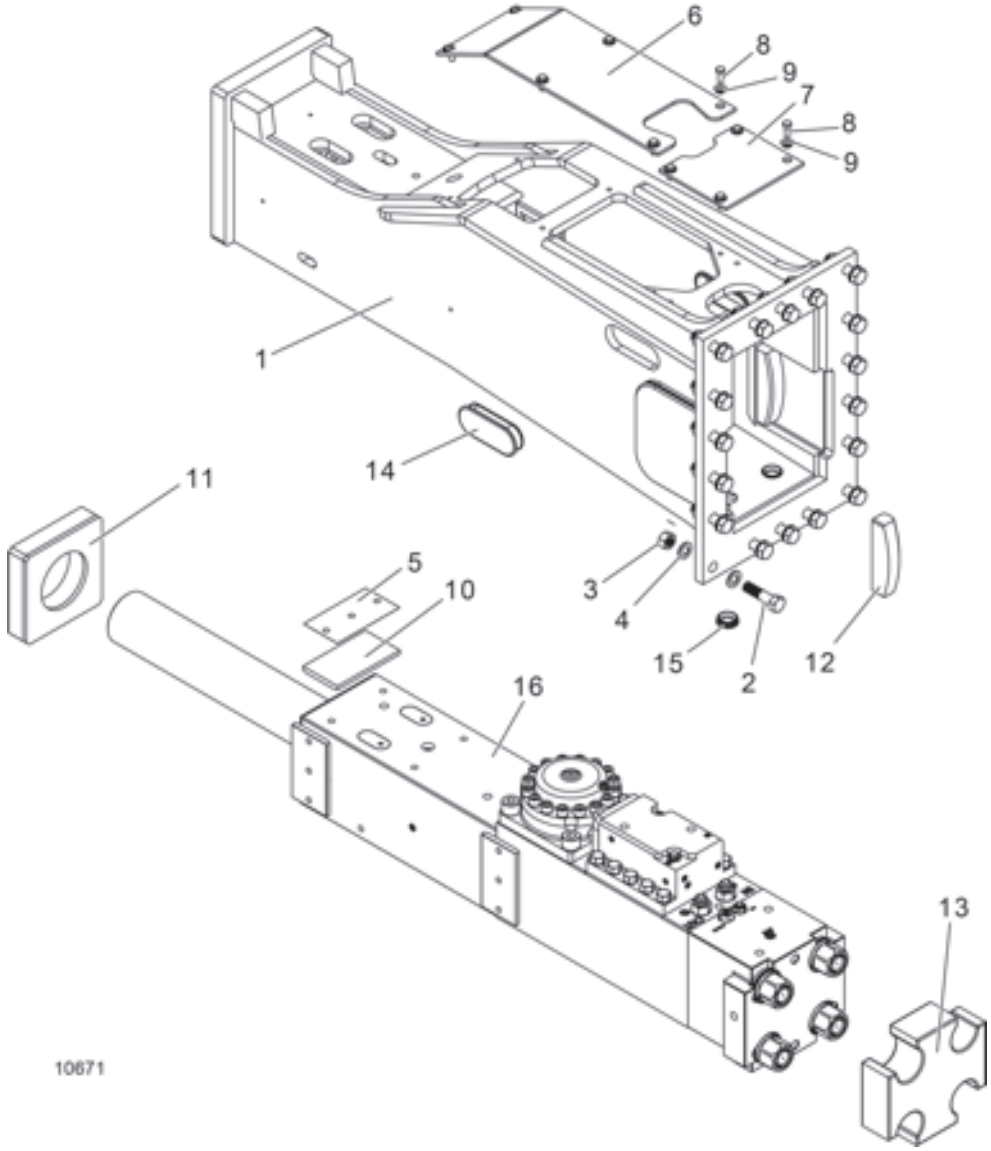
NOTES

BXR50	MAIN BREAKER ASSEMBLY

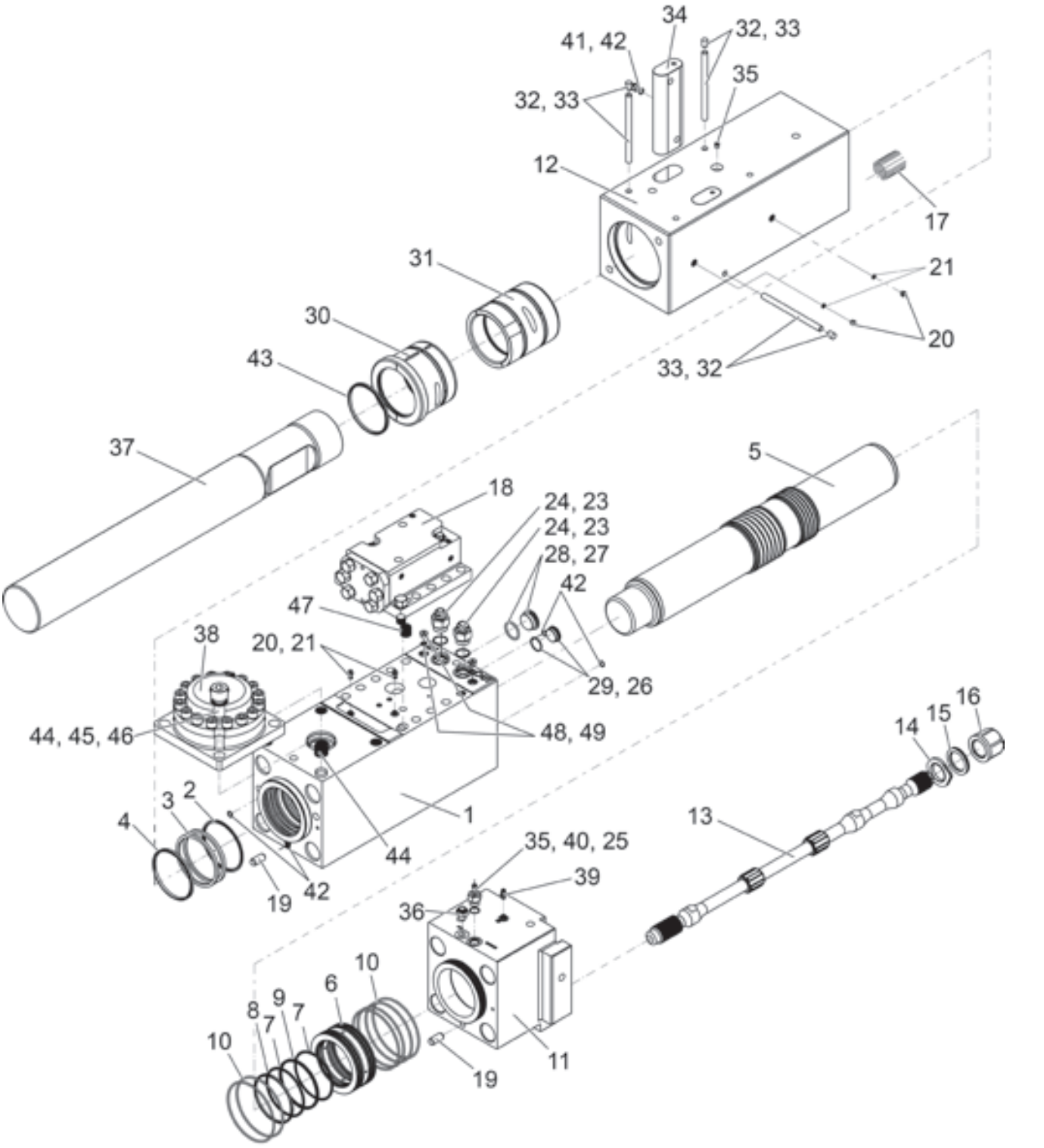


Item	Part No.	Description	Qty.
1	444-0030	BOX HOUSING WELDMENT	1
2	1912073	BOLT	18
3	1931042	NUT	18
4	1941017	TENSION WASHER	36
5	444-0020	SHIM PACK ASSEMBLY	8
6	444-0025	LOWER ACCESS COVER	1
7	444-0034	UPPER ACCESS COVER	1
8	1912491	BOLT	10
9	470-0026	RETAINER COVER	10
10	444-0021	SUPPORT PAD	8
11	444-0041	LOWER ISOLATOR ASS'Y	1
12	444-0044	SIDE EAR ISOLATOR	2
13	444-0040	UPPER ISOLATOR	1
14	454-0041	MOLDED CAP	2
15	B00020050	INSPECTION HOLE PLUG	2

Item	Part No.	Description	Qty.
16	**BXR50B**	**BARE BREAKER** (See page 131)	1
	500-1164	**DECAL KIT**	1

NOTE: For mounting bracket and hardware, contact your BTI representative.

BXR50	BARE BREAKER



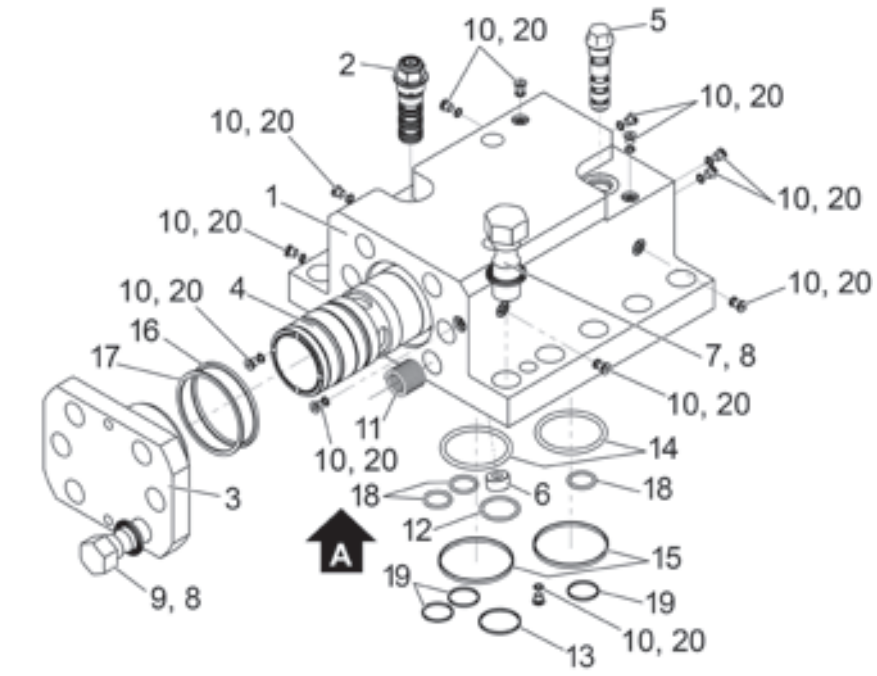
10672

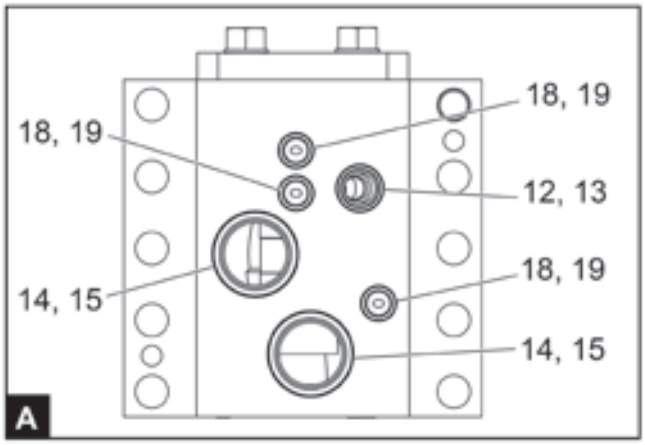
BXR50 — BARE BREAKER

Item	Part No.	Description	Qty.
	BXR50B	**BARE BREAKER** Includes items 1–49	
1	6750051	CYLINDER	1
2	6750083	BUFFER SEAL*	1
3	6750084	U-PACKING*	1
4	6750086	DUST SEAL*	1
5	6750053	PISTON	1
6	6750060	PACKING BUSHING	1
7	6750180	STEP SEAL*	2
8	6757083	BUFFER SEAL*	1
9	6750181	GAS SEAL, QUAD RING*	1
10	6750033	O-RING*	6
11	6750052	REAR HEAD	1
12	6750054	FRONT HEAD	1
13	6750061	TIE ROD C/W ISOLATOR	4
14	6600011	CENTRALIZER WASHER	4
15	6600019	NORDLOCK WASHER	4
16	6600013	TIE ROD NUT	4
17	6600525	HELICOIL INSERT	4
18	**6751064**	**CONTROL VALVE** (See page 132)	1
19	6600014	DOWEL PIN	2
20	6701539	PLUG	4
21	6700007	O-RING*	4
23	6250019	O-RING*	2
24	6600094	ADAPTER	2
25	6131539	O-RING*	1
26	6130002	O-RING*	1
27	6230046	O-RING*	1
28	6257539	STOPPER PLUG	1
29	6257139	PORT PLUG	1
30	6750055	FRONT BUSHING	1
31	6750006	REAR BUSHING	1
32	6750009	KEEPER PIN	4
33	6550507	STOPPER PLUG	4
34	6750039	RETAINING PIN	2
35	6551529	GREASE ZERK	2
36	**6557527**	**AIR VALVE ASSEMBLY** (See page 193)	1
37	BXR50-B-1200	BLUNT TOOL	REF
37	BXR50-M-1200	MOIL TOOL	REF
37	BXR50-C-1200	CHISEL TOOL	REF
38	**6750075**	**ACCUMULATOR ASSEMBLY** (See page 133)	1
39	6257070	GAS VALVE	1
40	6550005	GREASE ZERK ADAPTER	1
41	6150024	PLUG	1
42	6500088	O-RING*	5
43	6750200	DUST SEAL*	1
44	6230180	HELICOIL INSERT	4
45	6600541	CONICAL WASHER	4
46	6230035	BOLT	4
47	6750525	HELICOIL INSERT	10
48	6700027	PLUG	2
49	6500007*	O-RING	2
	6750098	**MASTER SEAL KIT** Includes 6750065, 6750100, & 6750099 (See page 134)	REF
	6750065	**ACCUMULATOR SEAL KIT** (See page 137)	REF
	6750100	**CONTROL VALVE SEAL KIT** (See page 135)	REF
	6750099	**CYLINDER SEAL KIT** (See page 136)	REF

*** NOTE**: Seals not available separately.

BXR50	CONTROL VALVE



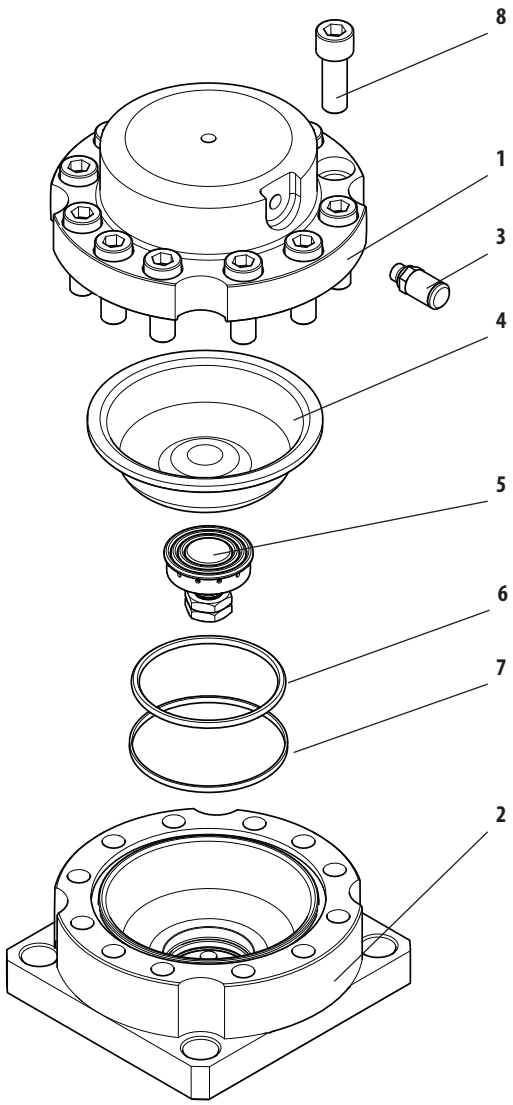


10673

Item	Part No.	Description	Qty.
	6751064	**CONTROL VALVE** Includes the following items:	
1	6750064	CONTROL VALVE BOX	1
2	**6550120**	**STROKE ADJUSTER ASSEMBLY** (See page 192)	1
3	6750066	CONTROL VALVE CAP	1
4	6750063	CONTROL VALVE SPOOL	1
5	**6550018**	**REGENERATION VALVE** (See page 194)	1
6	6750072	FLUSH ORIFICE NPT PLUG	1
7	6750539	TENSION BOLT	10
8	6750541	CONICAL WASHER	16
9	6750540	TENSION BOLT	6
10	6550700	PLUG	13
11	6750525	HELICOIL INSERT	6
12	*	O-RING	1
13	*	BACKUP RING	1
14	*	O-RING	2
15	*	BACKUP RING	2
16	*	O-RING	1
17	*	BACKUP RING	1
18	*	O-RING	3
19	*	BACKUP RING	3
20	*	O-RING	13

* See Control Valve Seal Kit, page 135

BXR50 | ACCUMULATOR ASSEMBLY

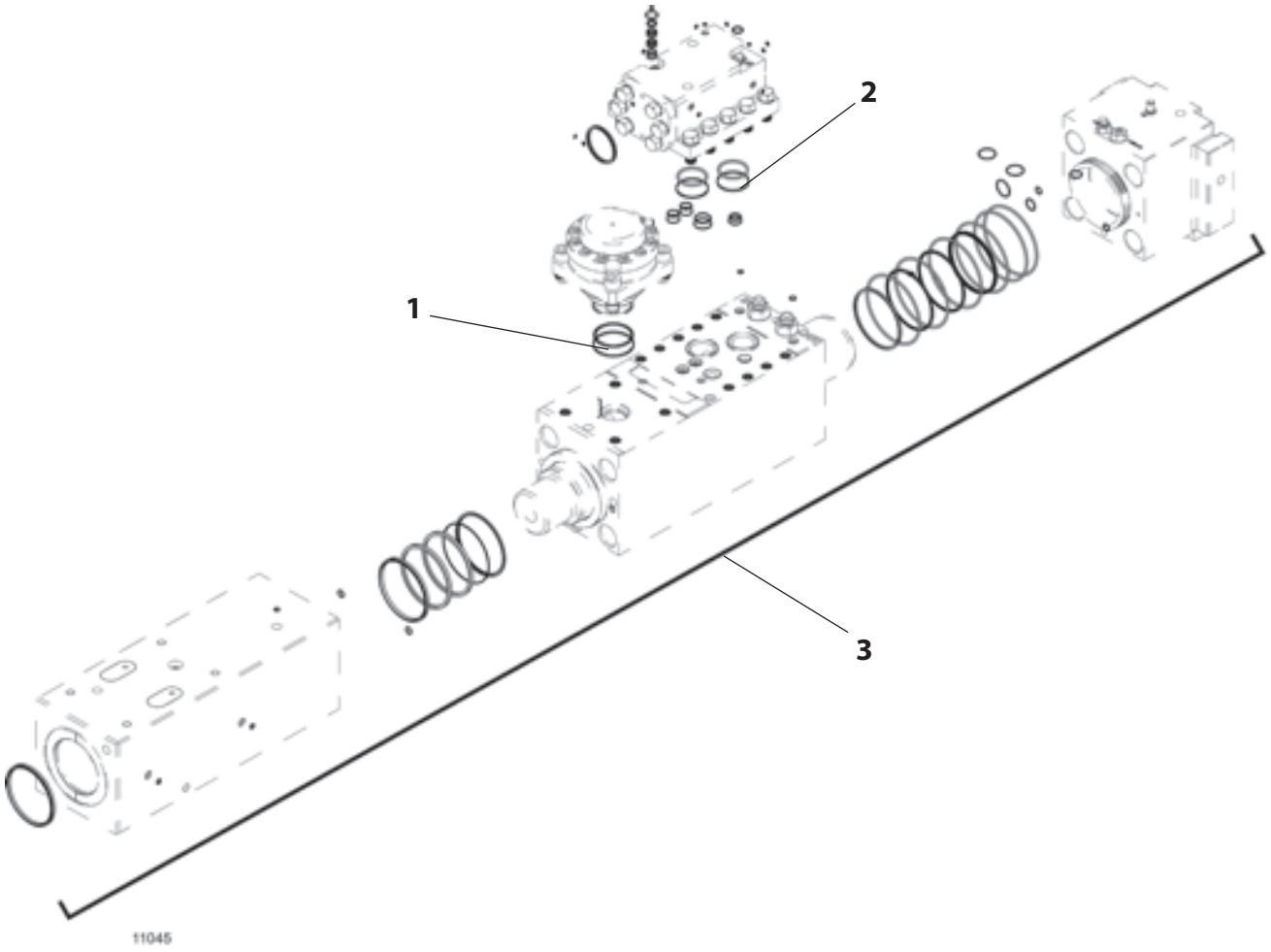


12509

Item	Part No.	Description	Qty.
	6750075	**ACCUMULATOR ASSEMBLY** Includes the following items:	
1	6257557	ACCUMULATOR COVER	1
2	6750555	ACCUMULATOR BASE	1
3	6257070	GAS VALVE	1
4	6230045	DIAPHRAGM	1
5	6600164	ORIFICE ASSEMBLY	1
6	*	O-RING	1
7	*	BACKUP RING	1
8	6230137	BOLT	12

* See Accumulator Seal Kit, page 137.

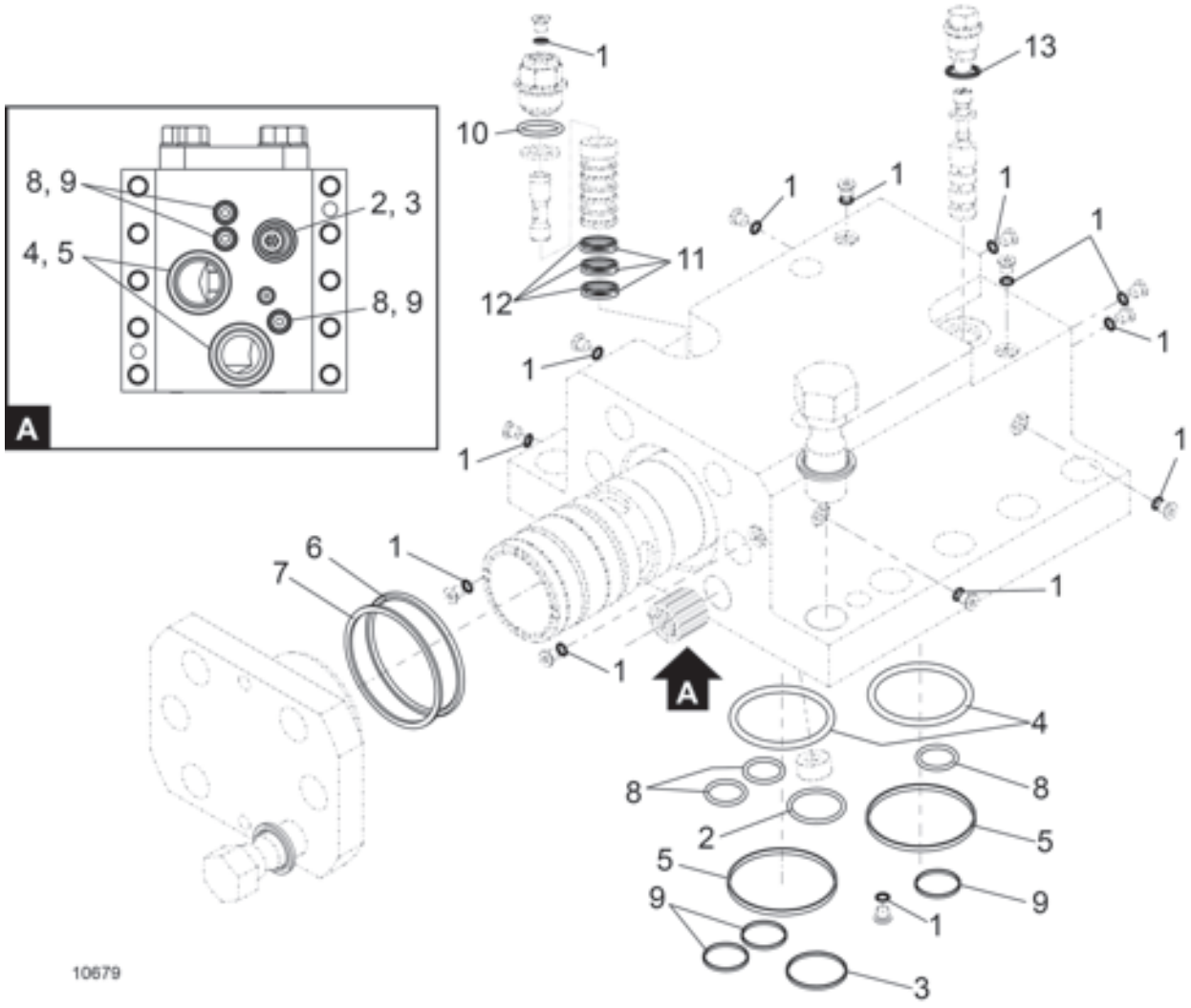
BXR50	MASTER SEAL KIT



Item	Part No.	Description	Qty.
	6750098	**MASTER SEAL KIT** Includes the following items:	
1	**6750065**	**ACCUMULATOR SEAL KIT** (See page 137)	1
2	**6750100**	**CONTROL VALVE SEAL KIT** (See page 135)	1
3	**6750099**	**INTERNAL SEAL KIT** (See page 136)	1

* **NOTE:** Seals not available separately
Bladder sold separately

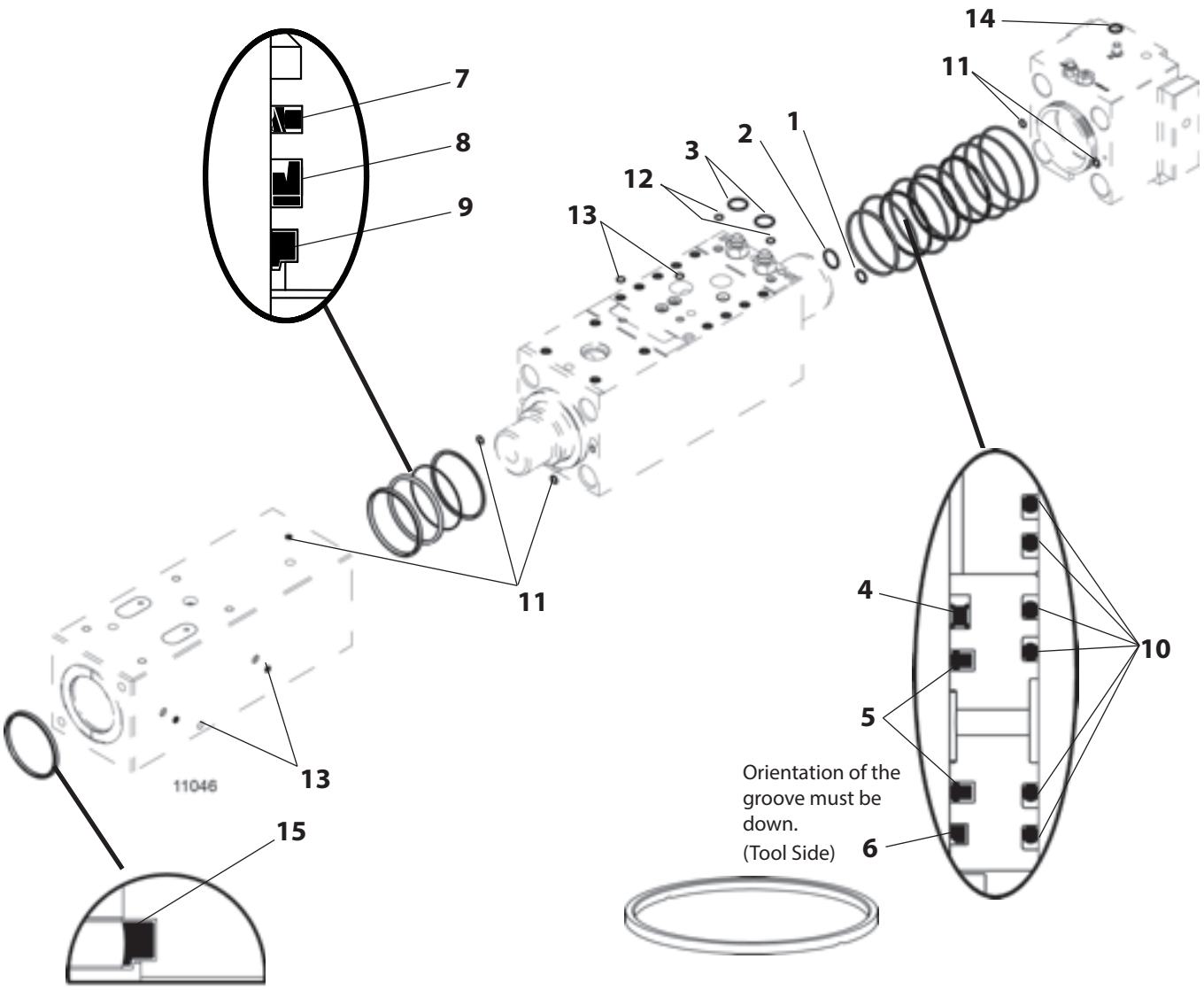
BXR50	CONTROL VALVE SEAL KIT



Item	Part No.	Description	Qty.
	6750100	**CONTROL VALVE SEAL KIT**	
		Includes the following items:	
1	6550302	O-RING	14
2	6550303	O-RING	1
3	6550402	BACKUP RING	1
4	6360088	O-RING	2
5	6600400	BACKUP RING	2
6	6150033	O-RING	1
7	6150133	BACKUP RING	1
8	6600500	O-RING	3
9	6600501	BACKUP RING	3
10	6131539	O-RING	1
11	6550309	O-RING	3
12	6550407	BACKUP RING	3
13	6501563	O-RING	1

NOTE: Items not available separately

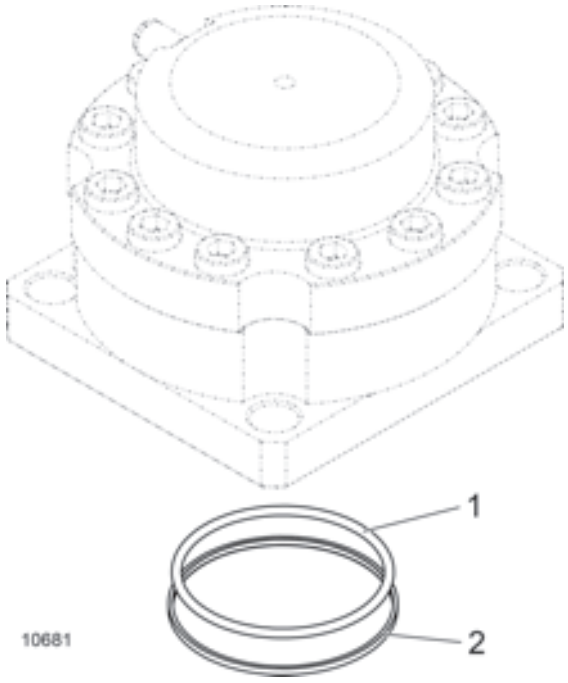
BXR50 — INTERNAL SEAL KIT



Item	Part No.	Description	Qty.
	6750099	**INTERNAL SEAL KIT** Includes the following items:	
1	6130002	O-RING	1
2	6230046	O-RING	1
3	6250702	O-RING	2
4	6750181	QUAD RING	1
5	6750180	STEP SEAL	2
6	6757083	BUFFER SEAL	1
7	6750083OMS	BUFFER SEAL	1
8	6750084	U-PACKING	1
9	6750086	DUST SEAL	1
10	6750033	O-RING	6
11	6500088	O-RING	5
12	6500007	O-RING	2
13	6700007	O-RING	4
14	6131539	O-RING	1
15	6750200	DUST SEAL	1

NOTE: Items not available separately

BXR50 — ACCUMULATOR SEAL KIT

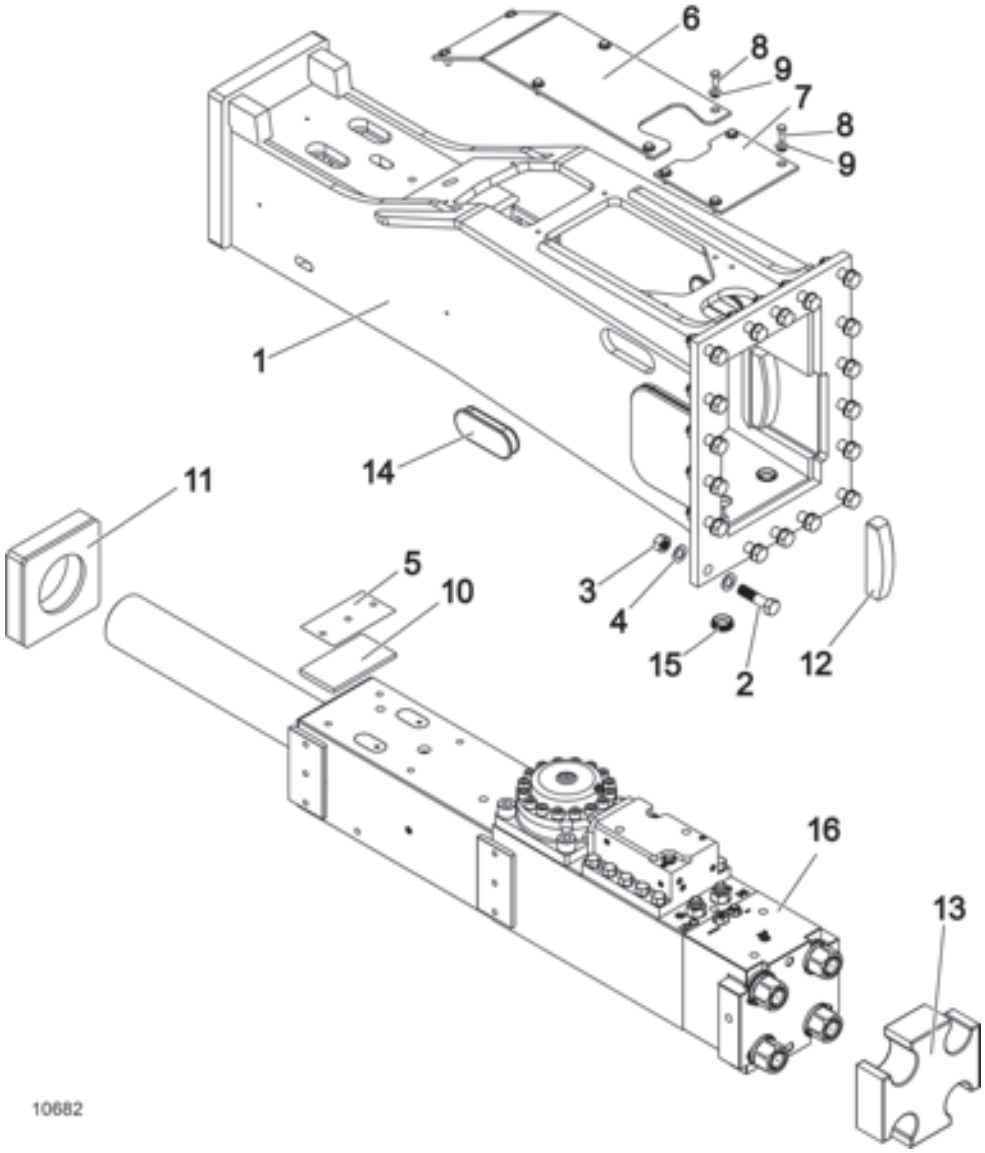


Item	Part No.	Description	Qty.
	6750065	**ACCUMULATOR SEAL KIT** Includes the following items:	
1	6230546	O-RING	1
2	6230567	BACKUP RING	1

NOTE: Items not available separately

NOTES

BXR65	MAIN BREAKER ASSEMBLY

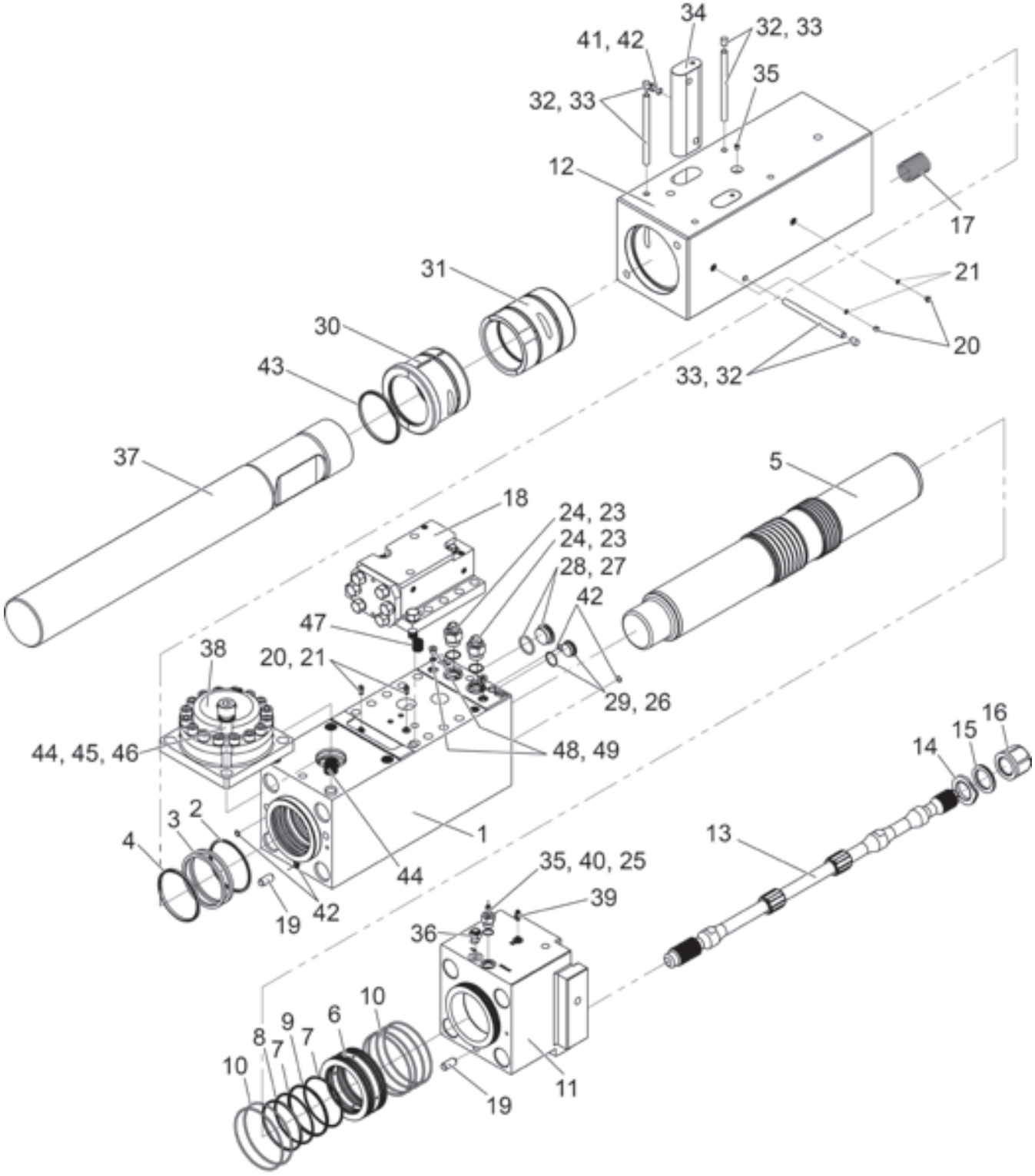


Item	Part No.	Description	Qty.
1	454-0030	BOX HOUSING WELDMENT	1
2	1912164	BOLT	18
3	1931042	NUT	18
4	1941017	TENSION WASHER	36
5	444-0020	SHIM PACK ASSEMBLY	8
6	454-0025	LOWER ACCESS COVER	1
7	454-0034	UPPER ACCESS COVER	1
8	1911025	BOLT	10
9	470-0026	RETAINER COVER	10
10	444-0021	SUPPORT PAD	8
11	454-0048	LOWER ISOLATOR ASS'Y	1
12	444-0044	SIDE EAR ISOLATOR	2
13	454-0037	UPPER ISOLATOR	1
14	454-0041	MOLDED CAP	2
15	B00020050	INSPECTION HOLE PLUG	2

Item	Part No.	Description	Qty.
16	**BXR65B**	**BARE BREAKER** (See page 141)	1
	500-1151	**BXR65 DECAL KIT**	1

NOTE: For mounting bracket and hardware, contact your BTI representative.

BXR65	BARE BREAKER



10683

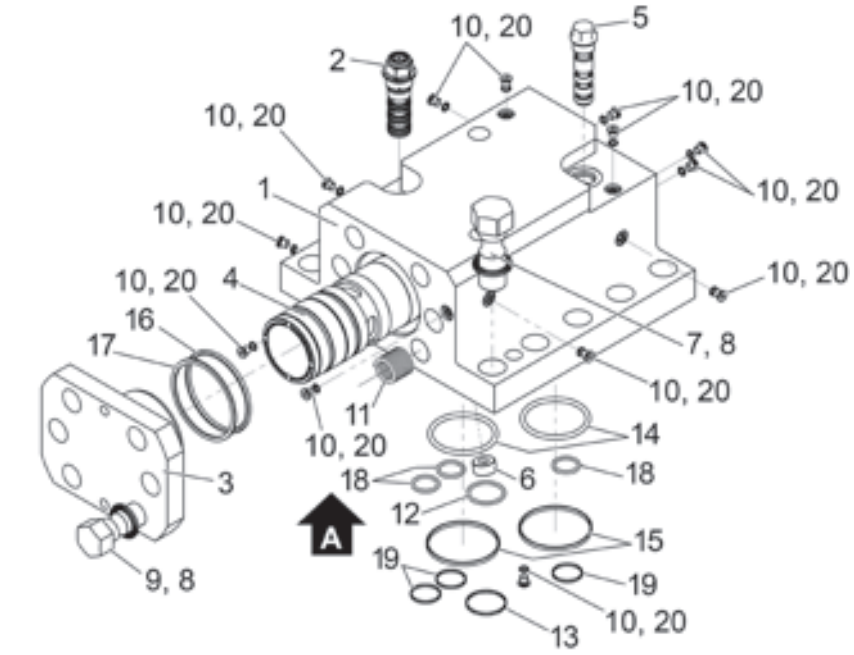
BXR65 — BARE BREAKER

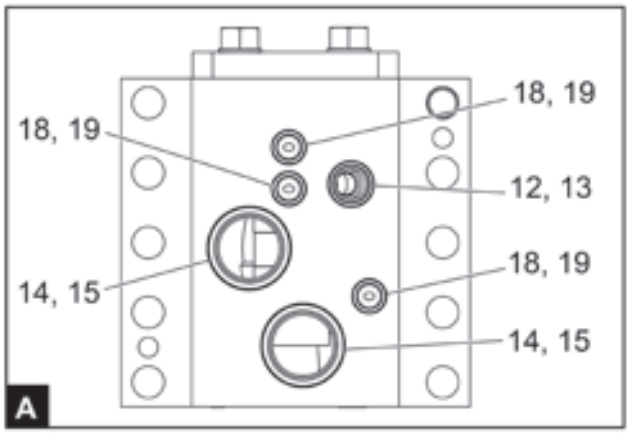
Item	Part No.	Description	Qty.
	BXR65B	**BARE BREAKER** Includes items 1–49	
1	6600051	CYLINDER	1
2	6250083	BUFFER SEAL *	1
3	6250084	U-PACKING *	2
4	6250086	DUST SEAL *	1
5	6600053	PISTON	1
6	6600060	PACKING BUSHING	1
7	6600180	STEP SEAL *	2
8	6607083	BUFFER SEAL *	1
9	6600181	GAS SEAL, QUAD RING *	1
10	6250033	O-RING *	6
11	6600052	REAR HEAD	1
12	6600054	FRONT HEAD	1
13	6600061	TIE ROD C/W ISOLATOR	4
14	6600011	CENTRALIZER WASHER	4
15	6600019	NORDLOCK WASHER	4
16	6600013	TIE ROD NUT	4
17	6600525	HELICOIL INSERT	4
18	**6601064**	**CONTROL VALVE** (See page 142)	1
19	6600014	DOWEL PIN	2
20	6701539	PLUG	4
21	6700007	O-RING *	4
23	6250019	O-RING *	2
24	6600094	ADAPTER	2
25	6131539	O-RING *	1
26	6130002	O-RING *	1
27	6230046	O-RING *	1
28	6257539	PORT PLUG	1
29	6257139	PORT PLUG	1
30	6600055	FRONT BUSHING	1
31	6600006	REAR BUSHING	1
32	6600009	KEEPER PIN	4
33	6550507	STOPPER PLUG	4
34	6600039	RETAINING PIN	2
35	6551529	GREASE ZERK	2
36	**6557527**	**AIR VALVE ASSEMBLY** (See page 193)	1
37	BXR65-B-1250	BLUNT TOOL	REF
37	BXR65-M-1250	MOIL TOOL	REF
37	BXR65-C-1250	CHISEL TOOL	REF
38	**6600075**	**ACCUMULATOR ASSEMBLY** (See page 143)	1
39	6257070	GAS VALVE	1
40	6550005	GREASE ZERK ADAPTER	1
41	6150024	PLUG	1
42	6500088	O-RING *	5
43	6600200	DUST SEAL *	1
44	6550526	HELICOIL INSERT	4
45	6550541	CONICAL WASHER	4
46	6360037	BOLT	4
47	6239180	HELICOIL INSERT	10
48	6700027	PLUG	2
49	6500007	O-RING *	2

6600098	**MASTER SEAL KIT** Includes 6600065, 6600100, & 6600099 (See page 144)	REF
6600099	**INTERNAL SEAL KIT** (See page 146)	REF
6600100	**CONTROL VALVE SEAL KIT** (See page 145)	REF
6600065	**ACCUMULATOR SEAL KIT** (See page 147)	REF

*** NOTE:** Seals not available separately.

BXR65	CONTROL VALVE



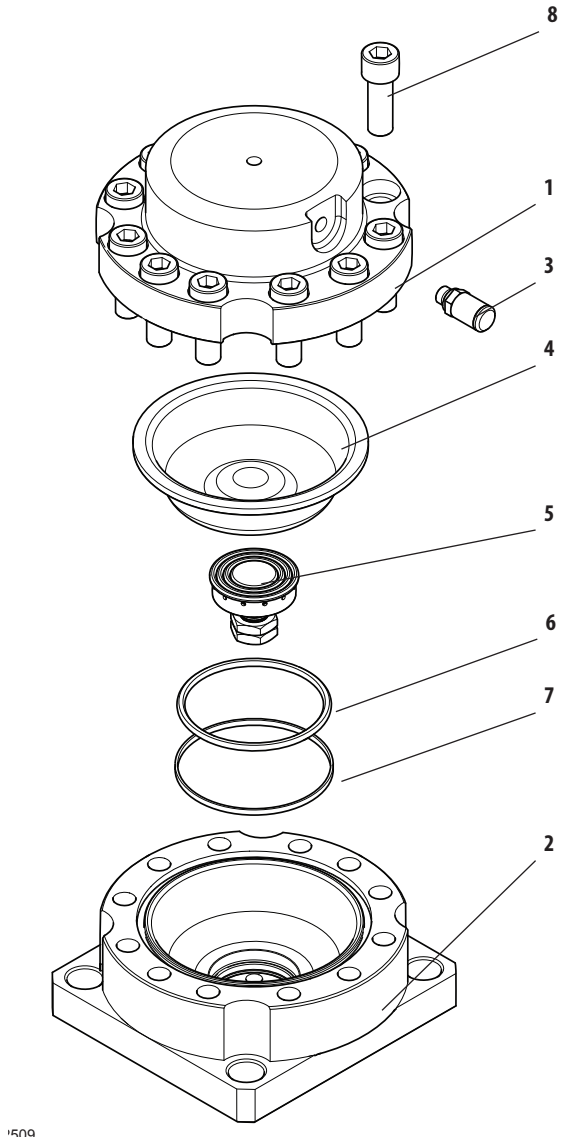


10673

Item	Part No.	Description	Qty.
	6601064	**CONTROL VALVE**	
		Includes the following items:	
1	6600064	CONTROL VALVE BOX	1
2	**6550120**	**STROKE ADJUSTER ASSEMBLY**	1
		(See page 192)	
3	6600066	CONTROL VALVE CAP	1
4	6600063	CONTROL VALVE SPOOL	1
5	**6550018**	**REGENERATION VALVE**	1
		(See page 194)	
6	6600072	FLUSH ORIFICE NPT PLUG	1
7	6600539	TENSION BOLT	10
8	6600541	CONICAL WASHER	16
9	6600540	TENSION BOLT	6
10	6550700	PLUG	12
11	6239180	HELICOIL INSERT	6
12	*	O-RING	1
13	*	BACKUP RING	1
14	*	O-RING	2
15	*	BACKUP RING	2
16	*	O-RING	1
17	*	BACKUP RING	1
18	*	O-RING	3
19	*	BACKUP RING	3
20	*	O-RING	12

* See Control Valve Seal Kit page 145.

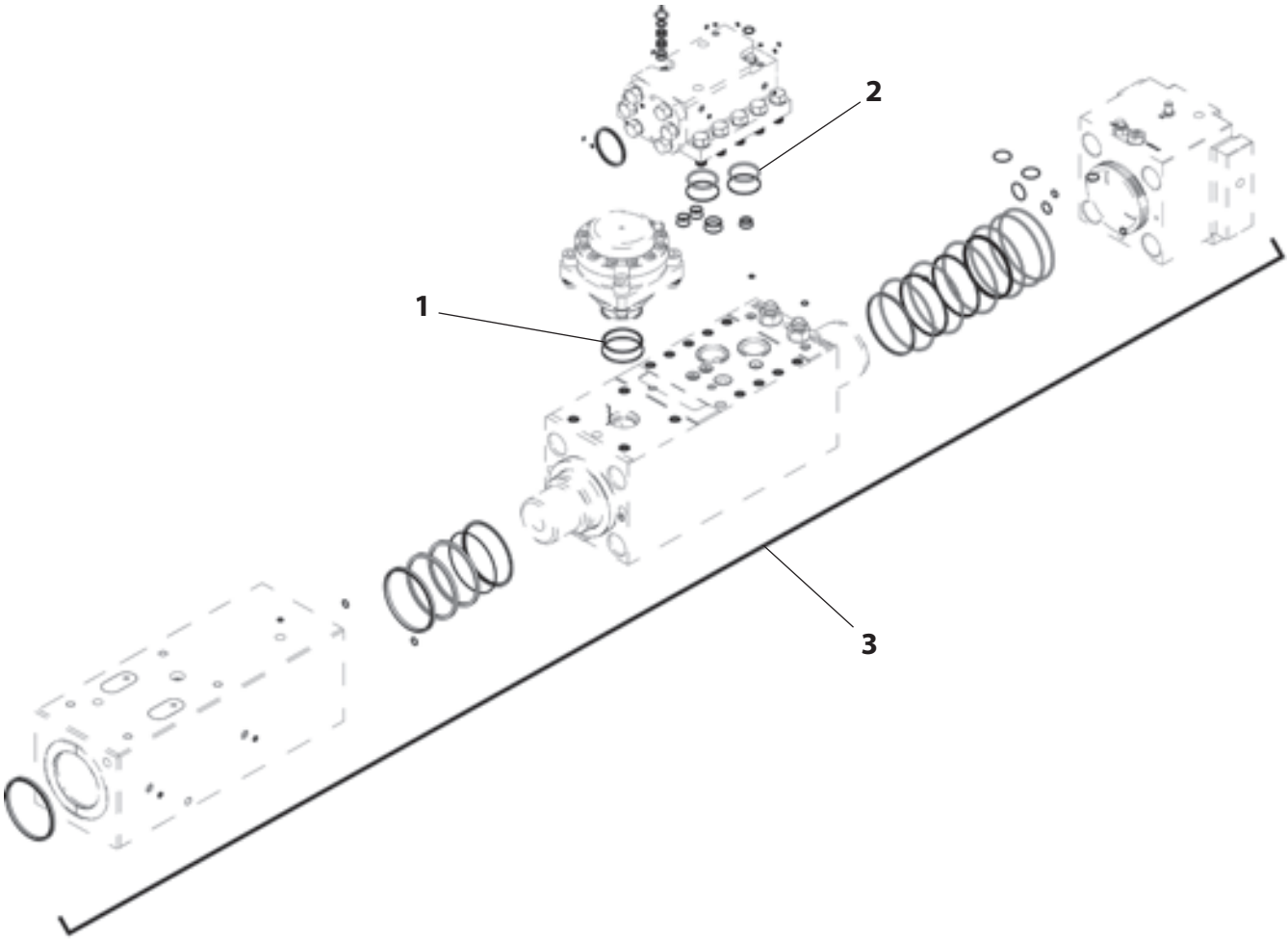
BXR65 — ACCUMULATOR ASSEMBLY



Item	Part No.	Description	Qty.
	6600075	**ACCUMULATOR ASSEMBLY** Includes the following items:	
1	6367557	ACCUMULATOR COVER	1
2	6600555	ACCUMULATOR BASE	1
3	6257070	GAS VALVE	1
4	6360045	DIAPHRAGM	1
5	6600164	ORIFICE ASSEMBLY	1
6	*	O-RING	1
7	*	BACKUP RING	1
8	6360137	BOLT	12

* See Accumulator Seal Kit page 147

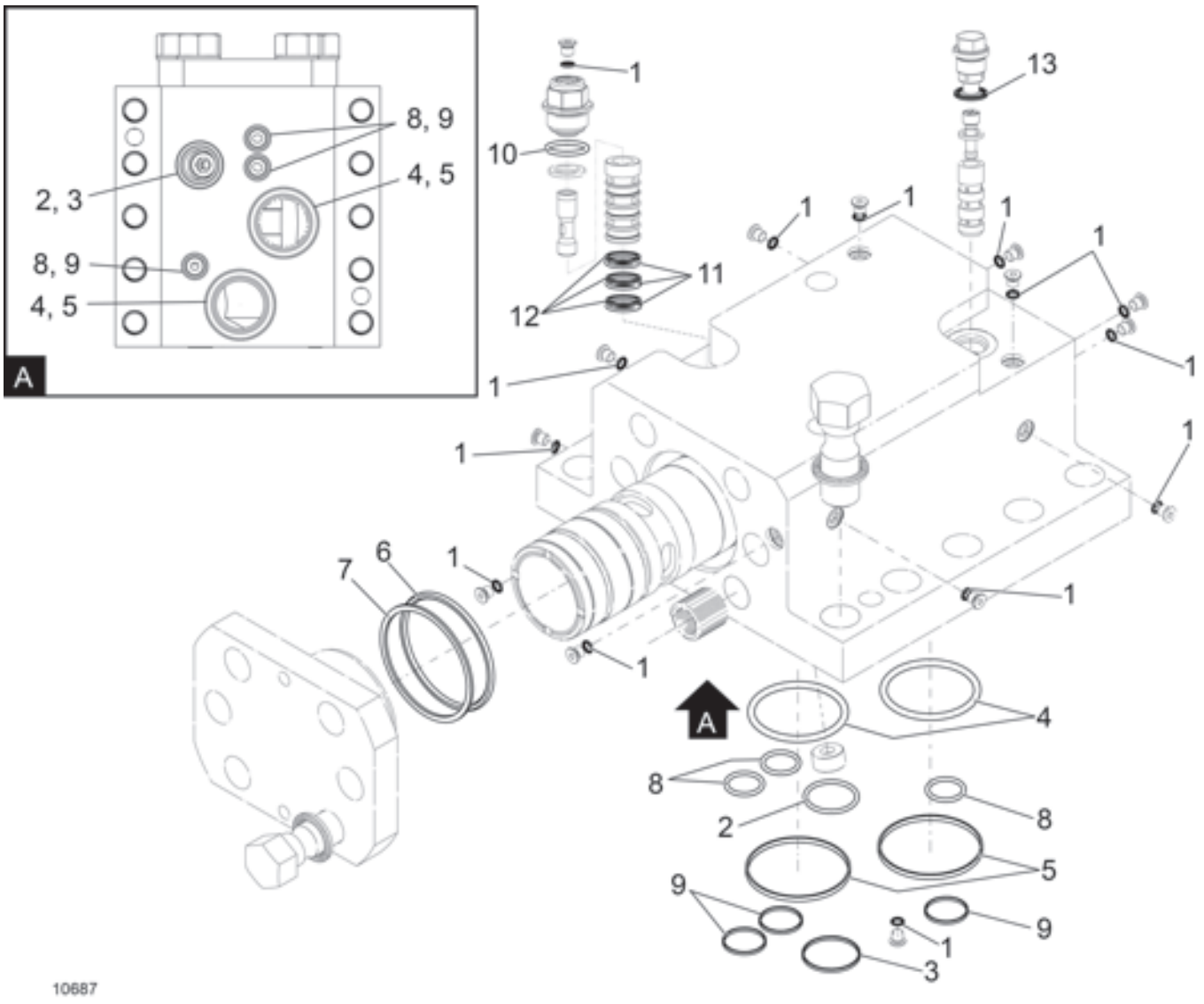
BXR65	MASTER SEAL KIT



Item	Part No.	Description	Qty.
	6600098	**MASTER SEAL KIT** Includes the following items:	
1	**6600065**	**ACCUMULATOR SEAL KIT** (See page 147)	1
2	**6600100**	**CONTROL VALVE SEAL KIT** (See page 145)	1
3	**6600099**	**CYLINDER SEAL KIT** (See page 146)	1

*__NOTE:__ Seals not available separately.
Bladder sold separately

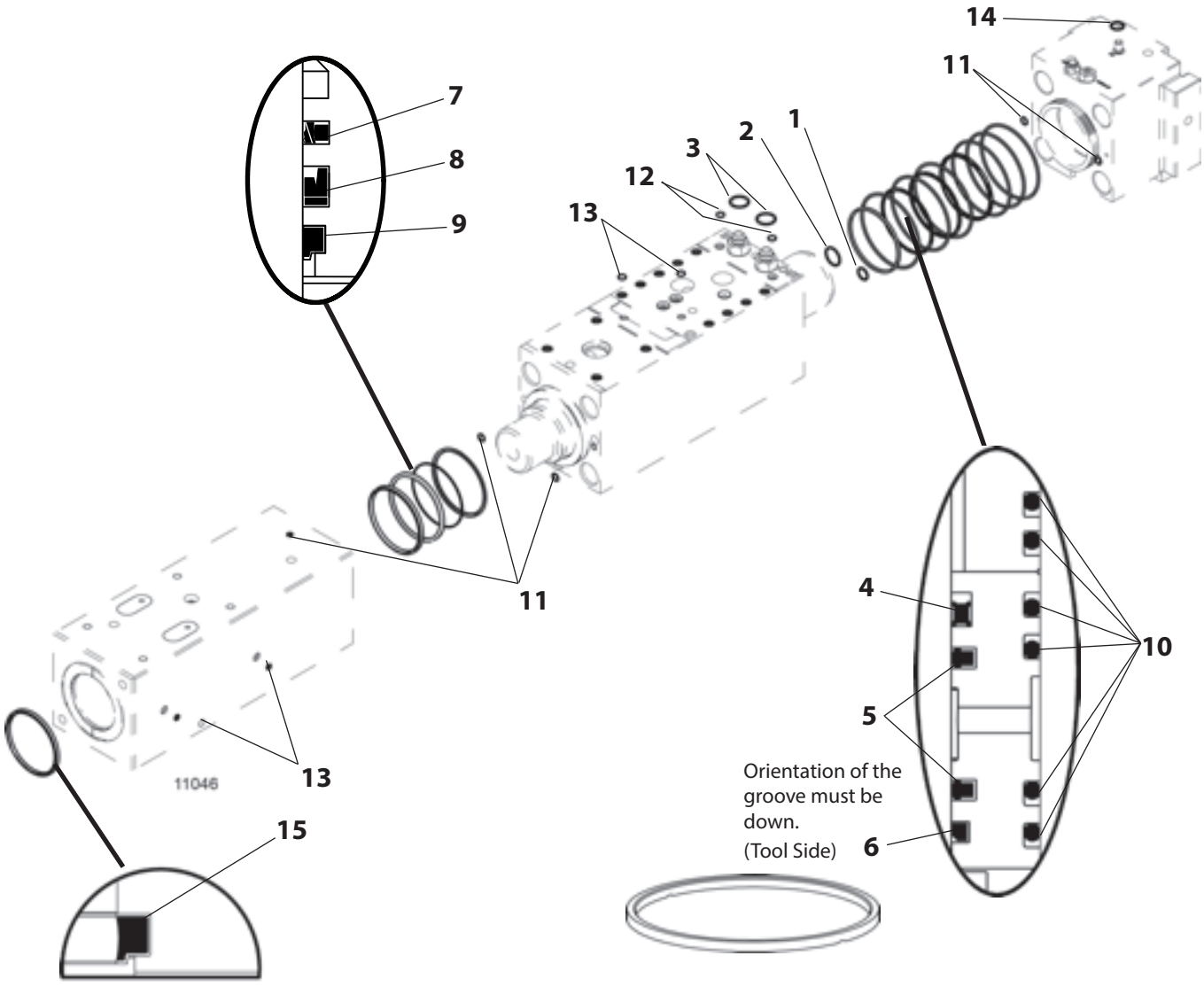
BXR65 | CONTROL VALVE SEAL KIT



Item	Part No.	Description	Qty.
	6600100	**CONTROL VALVE SEAL KIT** Includes the following items:	
1	6550302	O-RING *	13
2	6550303	O-RING *	1
3	6550402	BACKUP RING *	1
4	6360088	O-RING *	2
5	6600400	BACKUP RING *	2
6	6360033	O-RING *	1
7	6360067	BACKUP RING *	1
8	6600500	O-RING *	3
9	6600501	BACKUP RING *	3
10	6131539	BACKUP RING *	1
11	6550309	O-RING *	3
12	6550407	BACKUP RING *	3
13	6501563	O-RING *	1

***NOTE:** Items not available separately.

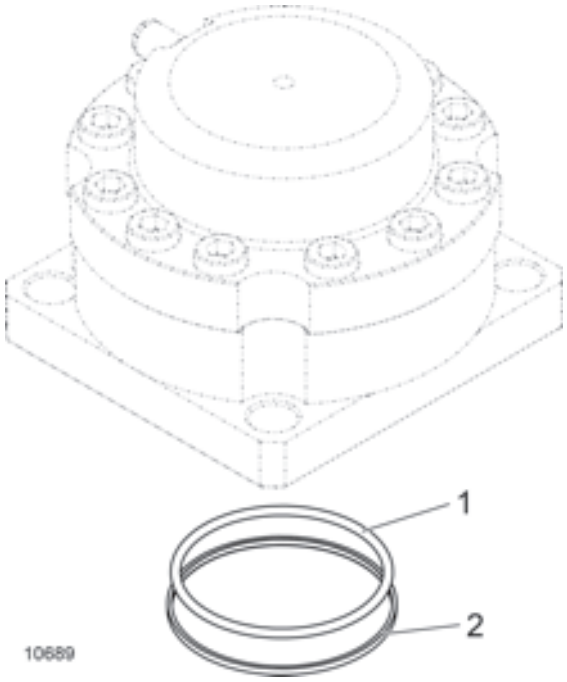
BXR65 | INTERNAL SEAL KIT



Item	Part No.	Description	Qty.
	6600099	**CYLINDER SEAL KIT** Includes the following items:	
1	6130002	O-RING	1
2	6230046	O-RING	1
3	6250702	O-RING	2
4	6600181	QUAD RING	1
5	6600180	STEP SEAL	2
6	6600083	BUFFER SEAL	1
7	6250083OMS	BUFFER SEAL	1
8	6250084	U-PACKING	1
9	6250086	DUST SEAL	1
10	6250033	O-RING	6
11	6500088	O-RING	5
12	6500007	O-RING	2
13	6700007	O-RING	4
14	6131539	O-RING	1
15	6600200	DUST SEAL	1

***NOTE:** Items not available separately.

BXR65	ACCUMULATOR SEAL KIT

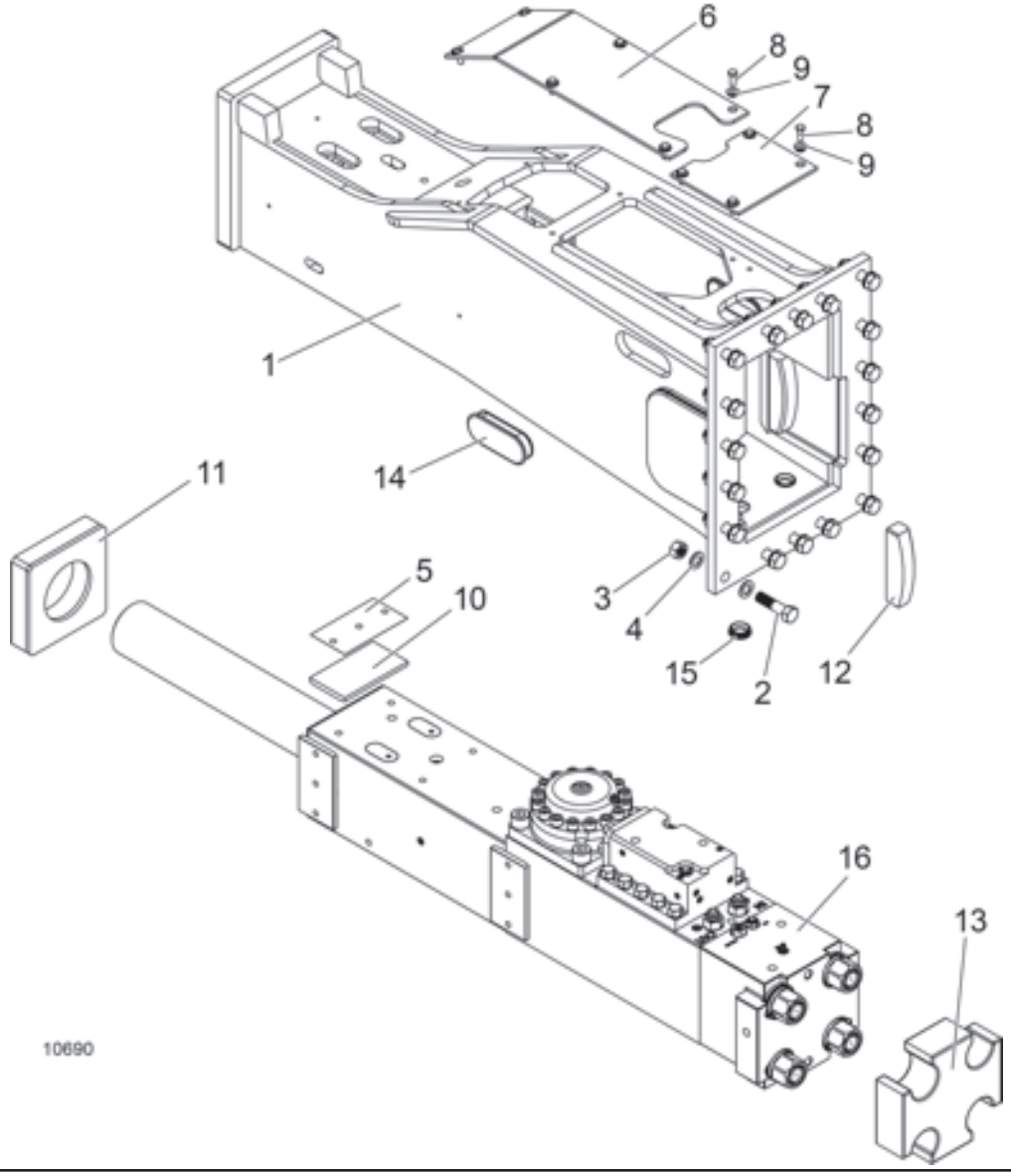


Item	Part No.	Description	Qty.
	6600065	**ACCUMULATOR SEAL KIT** Includes the following items:	
1	6230546	O-RING *	1
2	6230567	BACKUP RING *	1

*__NOTE:__ Items not available separately.

NOTES

BXR85 | MAIN BREAKER ASSEMBLY

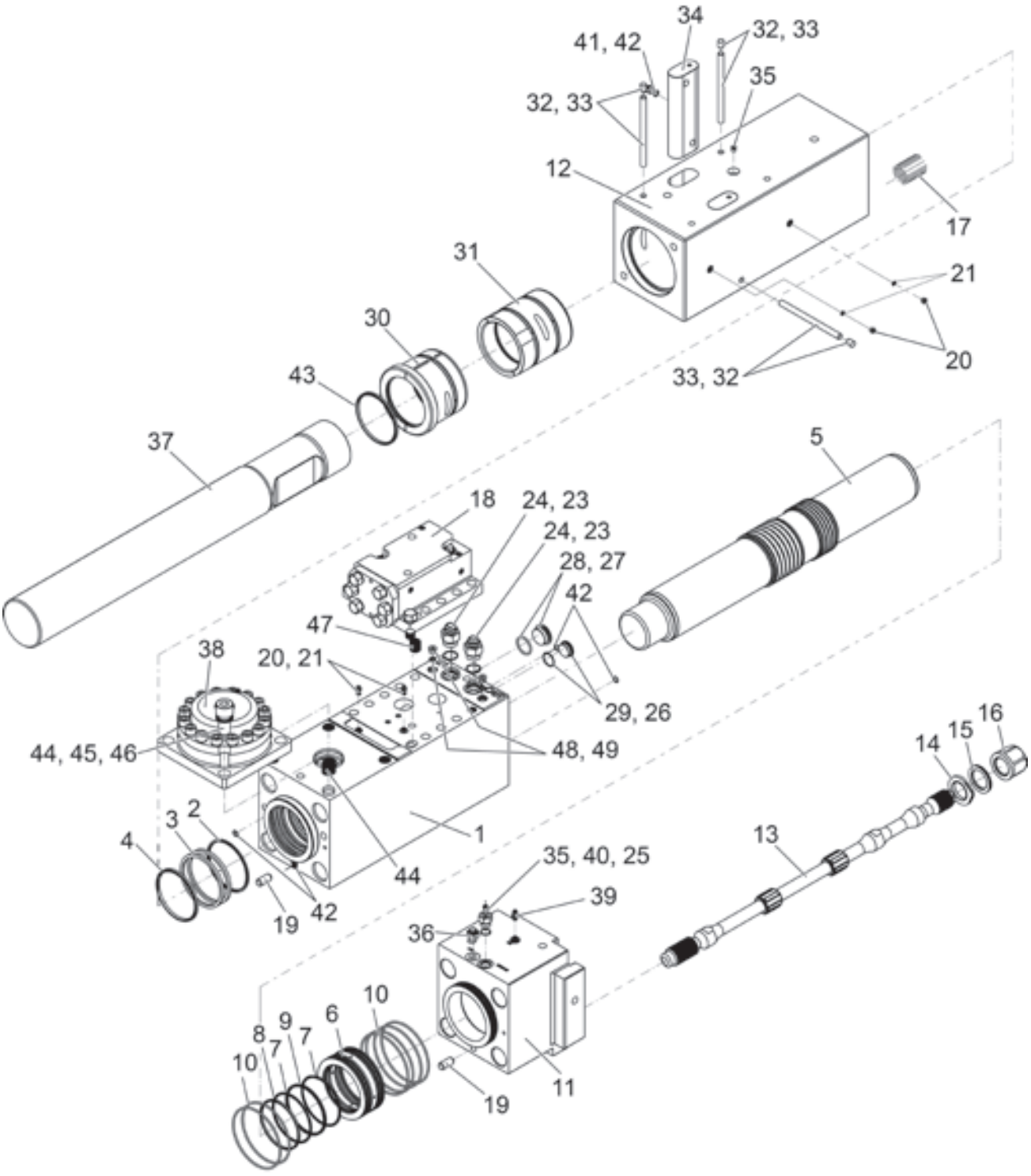


Item	Part No.	Description	Qty.
1	464-0030	BOX HOUSING WELDMENT	1
2	1912258	BOLT	18
3	1932059	NUT	18
4	1941039	TENSION WASHER	36
5	464-0045	SHIM PACK ASSEMBLY	8
6	464-0027	LOWER ACCESS COVER	1
7	464-0028	UPPER ACCESS COVER	1
8	1912491	BOLT	10
9	470-0026	RETAINER COVER	10
10	464-0021	SUPPORT PAD	8
11	464-0035	LOWER ISOLATOR ASS'Y	1
12	481-0027	SIDE EAR ISOLATOR	2
13	464-0036	UPPER ISOLATOR	1
14	481-0041	MOLDED CAP	2
15	474-0039	INSPECTION HOLE PLUG	2

Item	Part No.	Description	Qty.
16	**BXR85B**	**BARE BREAKER** (See page 151)	1
	500-1161	**BXR85 DECAL KIT**	1

NOTE: For mounting bracket and hardware, contact your BTI representative.

BXR85	BARE BREAKER



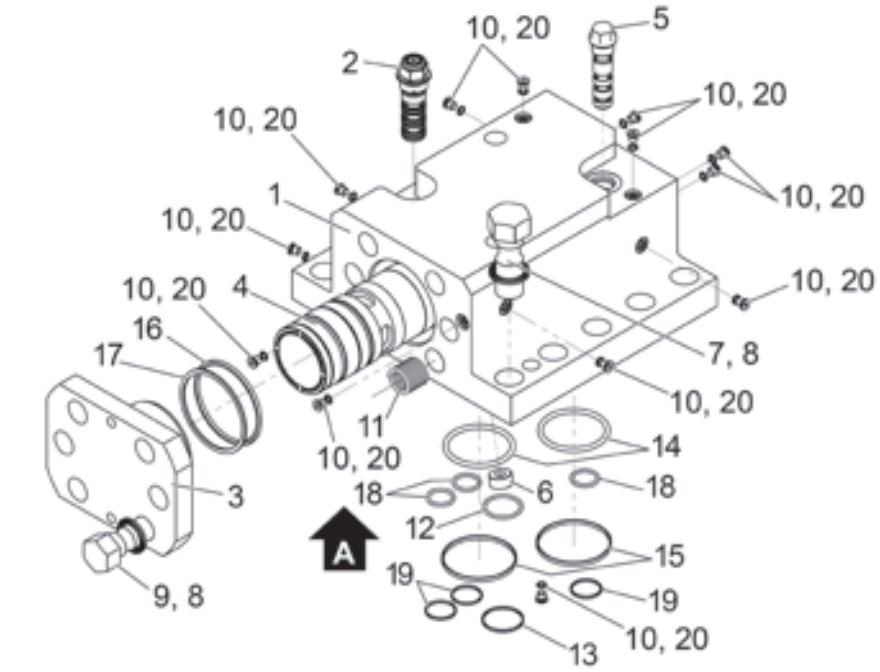
10691

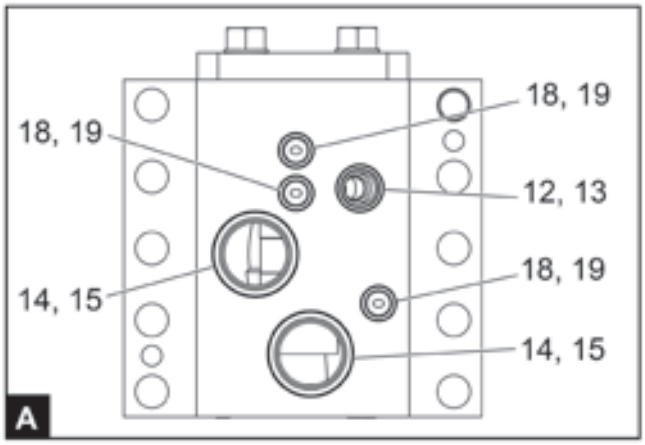
BXR85 — BARE BREAKER

Item	Part No.	Description	Qty.
	BXR85	**BARE BREAKER** Includes items 1–49	
1	6850051	CYLINDER	1
2	6850083	BUFFER SEAL *	1
3	6850084	U-PACKING *	2
4	6850086	DUST SEAL *	1
5	6850053	PISTON	1
6	6850060	PACKING BUSHING	1
7	6850085	STEP SEAL *	2
8	6857083	BUFFER SEAL *	1
9	6850082	GAS SEAL, QUAD RING *	1
10	6850134	O-RING *	6
11	6850052	REAR HEAD	1
12	6850054	FRONT HEAD	1
13	6850061	TIE ROD C/W ISOLATOR	4
14	6850011	CENTRALIZER WASHER	4
15	6850019	NORDLOCK WASHER	4
16	6850013	TIE ROD NUT	4
17	6850525	HELICOIL INSERT	4
18	**6601064**	**CONTROL VALVE** (See page 152)	1
19	6600014	DOWEL PIN	2
20	6701539	PLUG	4
21	6700007	O-RING *	4
23	6250702	O-RING *	2
24	6850094	ADAPTER	2
25	6131539	O-RING *	1
26	6130002	O-RING *	1
27	6360046	O-RING *	1
28	6361561	PORT PLUG	1
29	6257139	PORT PLUG	1
30	6850055	FRONT BUSHING	1
31	6850006	REAR BUSHING	1
32	6850009	KEEPER PIN	5
33	6550507	STOPPER PLUG	5
34	6850039	RETAINING PIN	2
35	6551529	GREASE ZERK	2
36	**6557527**	**AIR VALVE ASSEMBLY** (See page 193)	1
37	BXR85-B-1350	BLUNT TOOL	REF
37	BXR85-M-1350	MOIL TOOL	REF
37	BXR85-C-1350	CHISEL TOOL	REF
38	**6600075**	**ACCUMULATOR ASSEMBLY** (See page 143)	1
39	6257070	GAS VALVE	1
40	6550005	GREASE ZERK ADAPTER	1
41	6150024	PLUG	1
42	6500088	O-RING *	5
43	6850200	DUST SEAL *	1
44	6550526	HELICOIL INSERT	4
45	6550541	CONICAL WASHER	4
46	6360037	BOLT	4
47	6239180	HELICOIL INSERT	10
48	6700027	PLUG	2
49	6500007	O-RING *	2
	6850098	**MASTER SEAL KIT** Includes: 6600065, 6600100, & 6850099 (See page 154)	REF
	6600065	**ACCUMULATOR SEAL KIT** (See page 159)	REF
	6600100	**CONTROL VALVE SEAL KIT** (See page 156)	REF
	6850099	**INTERNAL SEAL KIT** (See page 157)	REF

***NOTE:** Seals not available separately.

BXR85	CONTROL VALVE



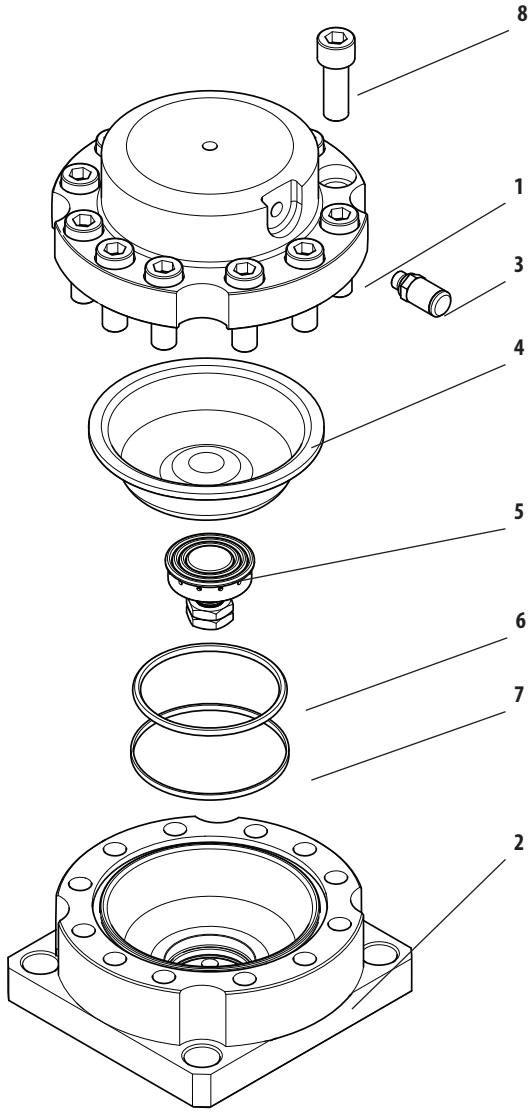


10673

Item	Part No.	Description	Qty.
	6851064	**CONTROL VALVE**	
		Includes the following items:	
1	6600064	CONTROL VALVE BOX	1
2	**6550120**	**STROKE ADJUSTER ASSEMBLY**	1
		(See page 192)	
3	6600066	CONTROL VALVE CAP	1
4	6600063	CONTROL VALVE SPOOL	1
5	**6550018**	**REGENERATION VALVE**	1
		(See page 194)	
6	6850072	FLUSH ORIFICE NPT PLUG	1
7	6600539	TENSION BOLT	10
8	6600541	CONICAL WASHER	16
9	6600540	TENSION BOLT	6
10	6550700	PLUG	12
11	6230180	HELICOIL INSERT	6
12	*	O-RING	1
13	*	BACKUP RING	1
14	*	O-RING	2
15	*	BACKUP RING	2
16	*	O-RING	1
17	*	BACKUP RING	1
18	*	O-RING	3
19	*	BACKUP RING	3
20	*	O-RING	12

* See Control Valve Seal Kit, page 156.

BXR85 — ACCUMULATOR ASSEMBLY

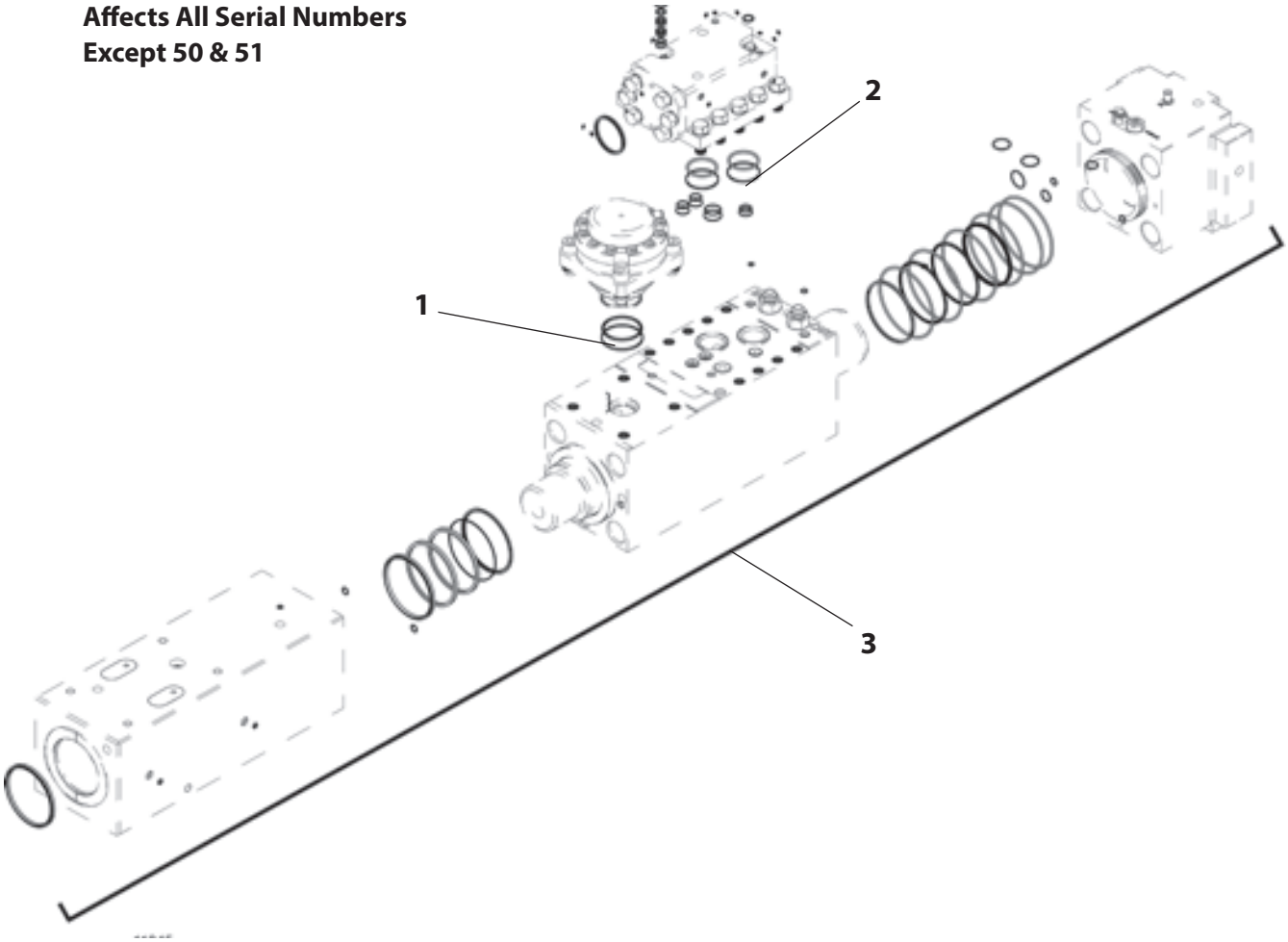


Item	Part No.	Description	Qty.
	6600075	**ACCUMULATOR ASSEMBLY** Includes the following items:	
1	6367557	ACCUMULATOR COVER	1
2	6600555	ACCUMULATOR BASE	1
3	6257070	GAS VALVE	1
4	6360045	DIAPHRAGM	1
5	6600164	ORIFICE ASSEMBLY	1
6	*	O-RING	1
7	*	BACKUP RING	1
8	6360137	BOLT	12

* Refer to Accumulator Seal Kit, page 159

BXR85	MASTER SEAL KIT

Affects All Serial Numbers Except 50 & 51

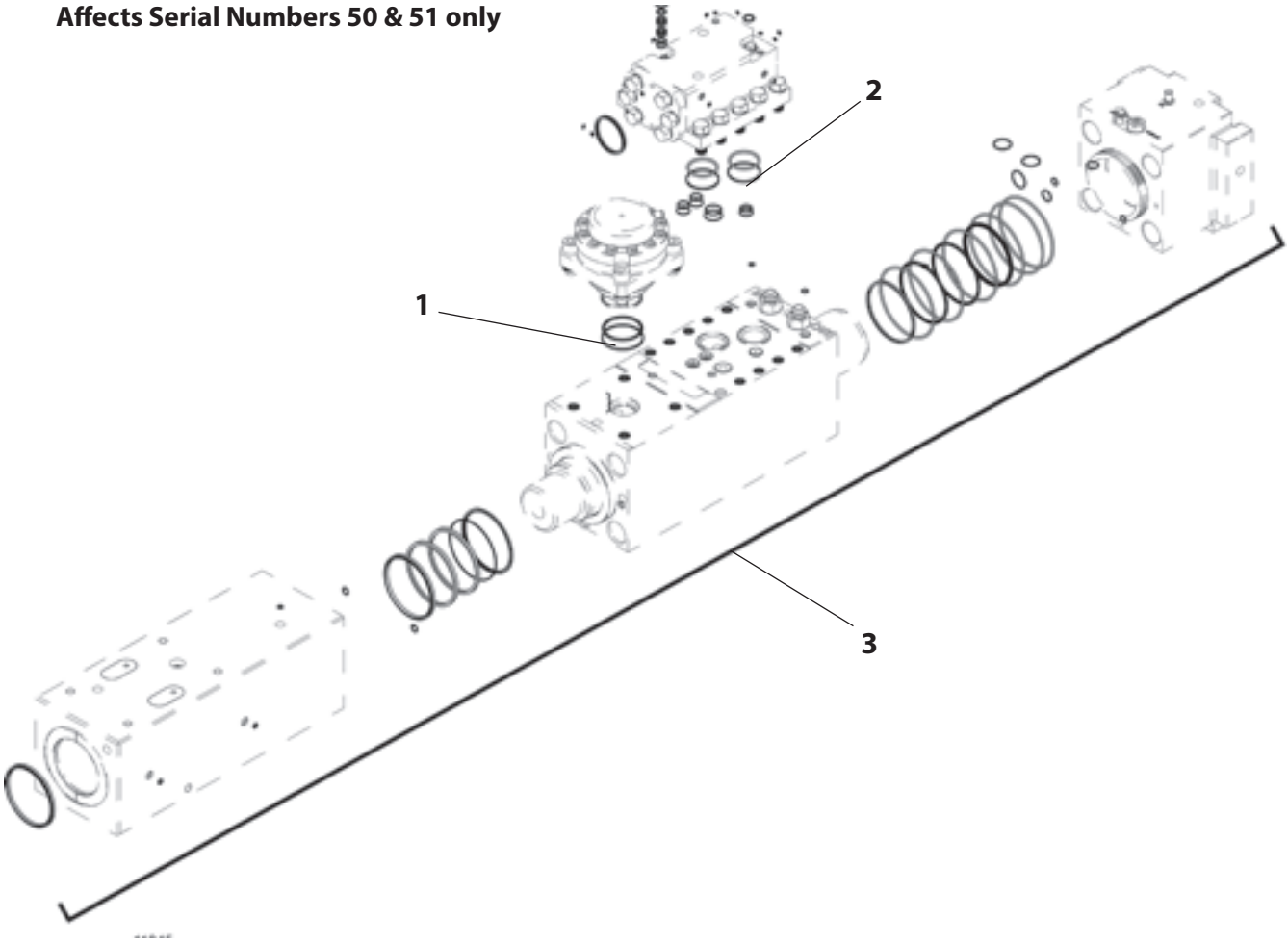


Item	Part No.	Description	Qty.
	6850098	**MASTER SEAL KIT** Includes the following items:	
1	**6600065**	**ACCUMULATOR SEAL KIT** (See page 159)	1
2	**6600100**	**CONTROL VALVE SEAL KIT** (See page 156)	1
3	**6850099**	**INTERNAL SEAL KIT** (See page 157)	1

*** NOTE**: Seals not available separately.
Bladder sold separately

BXR85	MASTER SEAL KIT

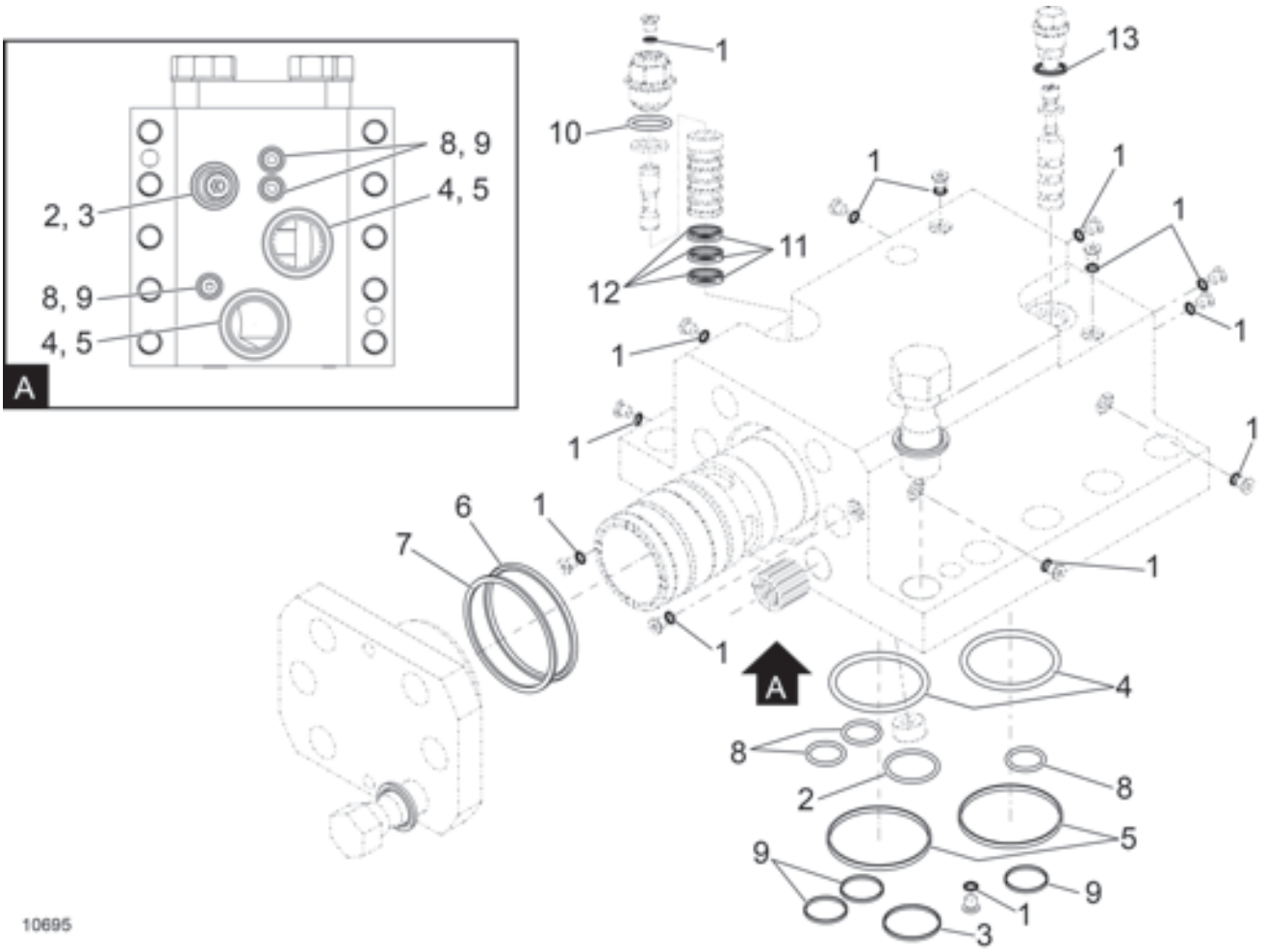
Affects Serial Numbers 50 & 51 only



Item	Part No.	Description	Qty.
	6850098PT	**MASTER SEAL KIT** Includes the following items:	
1	**6600065**	**ACCUMULATOR SEAL KIT** (See page 159)	1
2	**6600100**	**CONTROL VALVE SEAL KIT** (See page 156)	1
3	**6850099PT**	**INTERNAL SEAL KIT**	1

*** NOTE**: Seals not available separately.
Bladder sold separately

BXR85 | CONTROL VALVE SEAL KIT

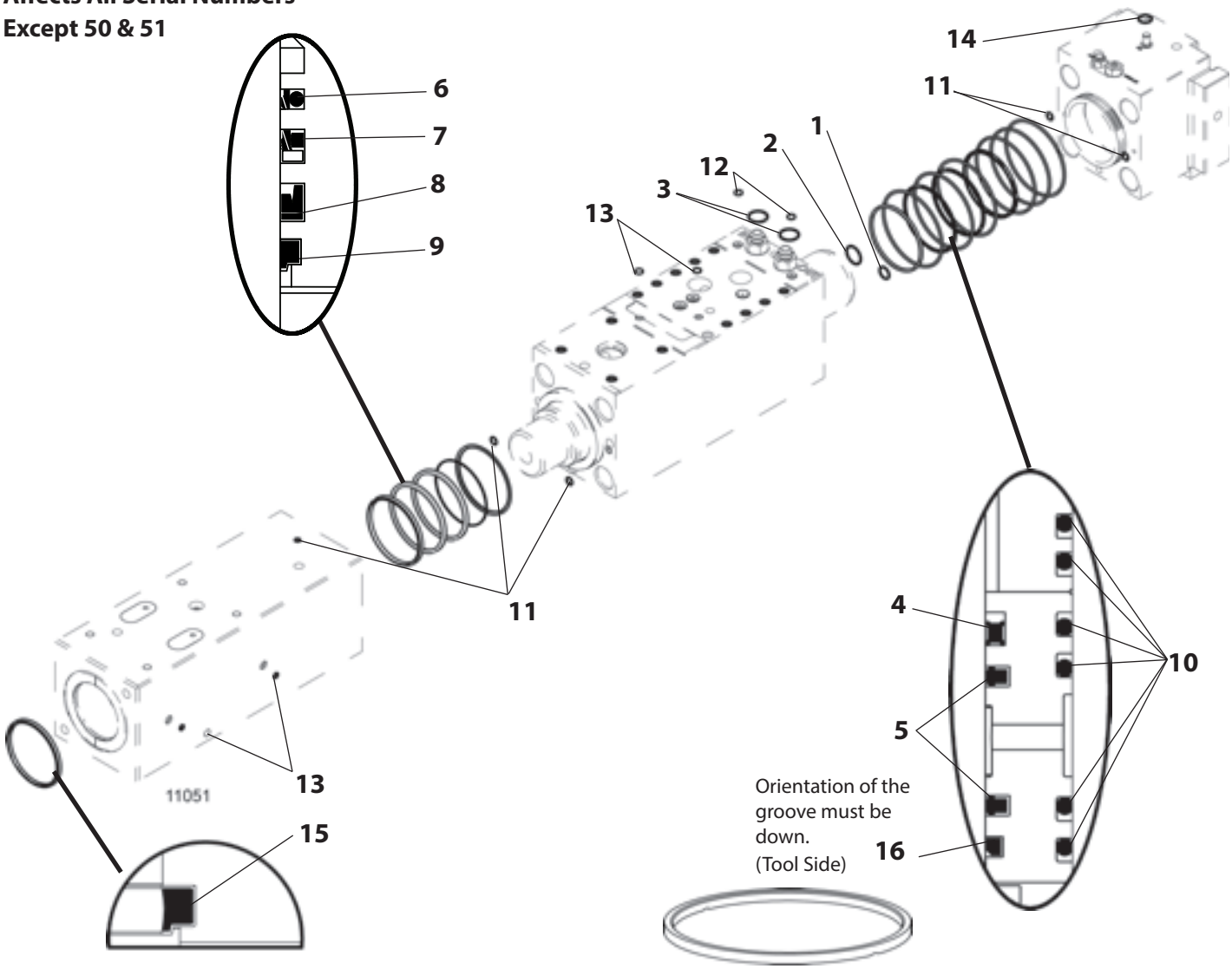


Item	Part No.	Description	Qty.
	6600100	**CONTROL VALVE SEAL KIT** Includes the following items:	
1	6550302	O-RING *	13
2	6550303	O-RING *	1
3	6550402	BACKUP RING *	1
4	6360088	O-RING *	2
5	6600400	BACKUP RING *	2
6	6360033	O-RING *	1
7	6360067	BACKUP RING *	1
8	6600500	O-RING *	3
9	6600501	BACKUP RING *	3
10	6131539	BACKUP RING *	1
11	6550309	O-RING *	3
12	6550407	BACKUP RING *	3
13	6501563	O-RING *	1

***NOTE:** Items not available separately.

BXR85 — INTERNAL SEAL KIT

Affects All Serial Numbers
Except 50 & 51

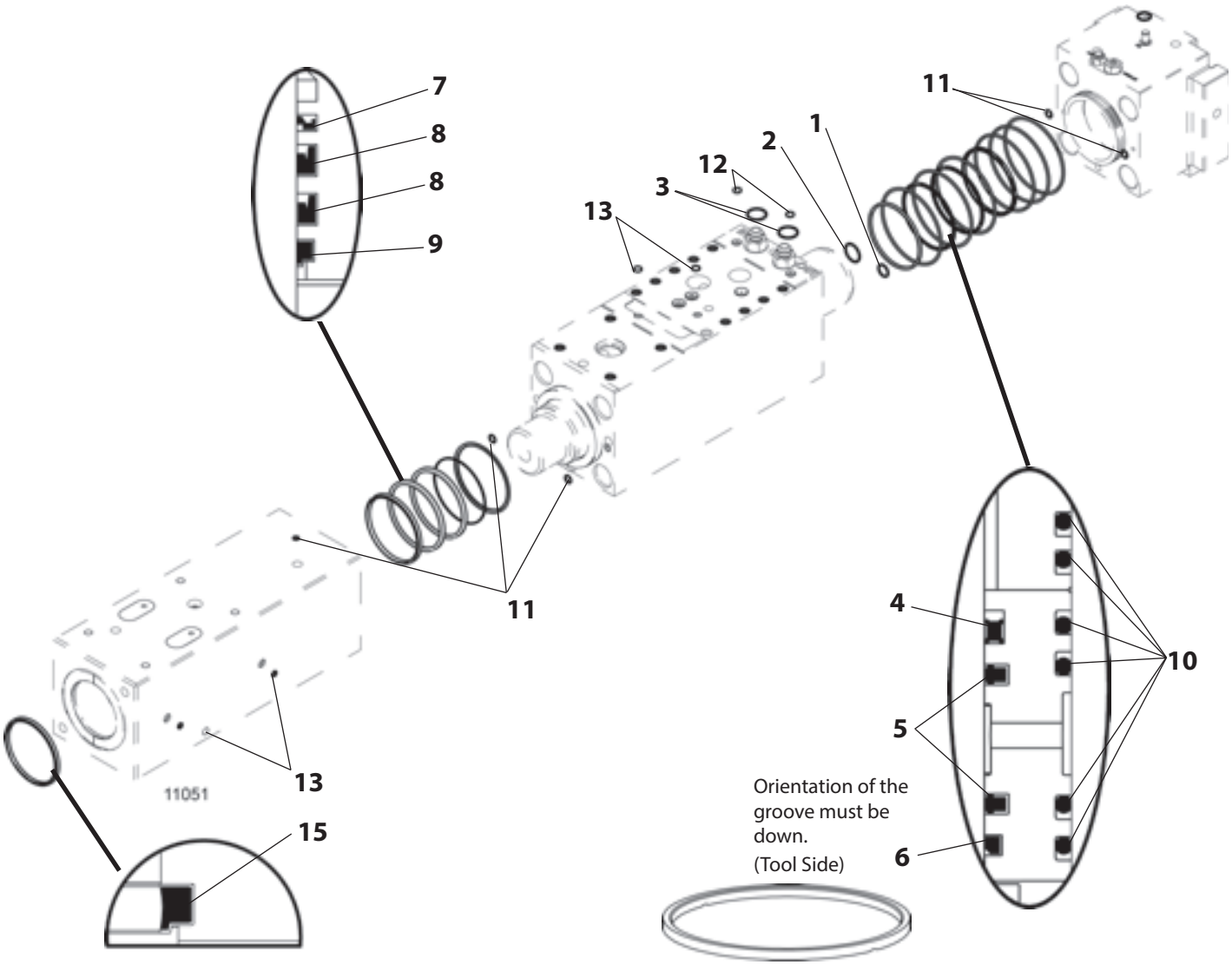


Item	Part No.	Description	Qty.
	6850099	**INTERNAL SEAL KIT** Includes the following items:	
1	6130002	O-RING	1
2	6360046	O-RING	1
3	6250702	O-RING	2
4	6850082	QUAD RING	1
5	6850085	STEP SEAL	2
6	6850083OMS	BUFFER SEAL	1
7	6850084OMS	BUFFER SEAL	1
8	6850084	U-PACKING	1
9	6850086	DUST SEAL	1
10	6850134	O-RING	6
11	6500088	O-RING	5
12	6500007	O-RING	2
13	6700007	O-RING	4
14	6131539	O-RING	1
15	6850200	DUST SEAL	1
16	6857083	BUFFER SEAL	1

NOTE: Items not available separately.

BXR85 | INTERNAL SEAL KIT

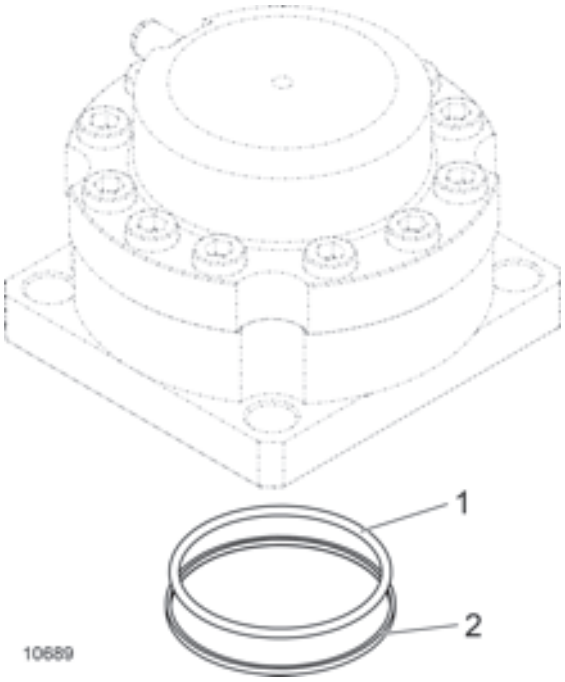
Affects Serial Numbers 50 & 51 only



Item	Part No.	Description	Qty.
	6850099PT	**INTERNAL SEAL KIT** Includes the following items:	
1	6130002	O-RING	1
2	6360046	O-RING	1
3	6250702	O-RING	2
4	6850082	QUAD RING	1
5	6850085	STEP SEAL	2
6	6857083	BUFFER SEAL	1
7	6850083	BUFFER SEAL	1
8	6850084PT	U-PACKING	2
9	6850086	DUST SEAL	1
10	6850134	O-RING	6
11	6500088	O-RING	5
12	6500007	O-RING	2
13	6700007	O-RING	4
14	6131539	O-RING	1
15	6850200	DUST SEAL	1

NOTE: Items not available separately

BXR85	ACCUMULATOR SEAL KIT

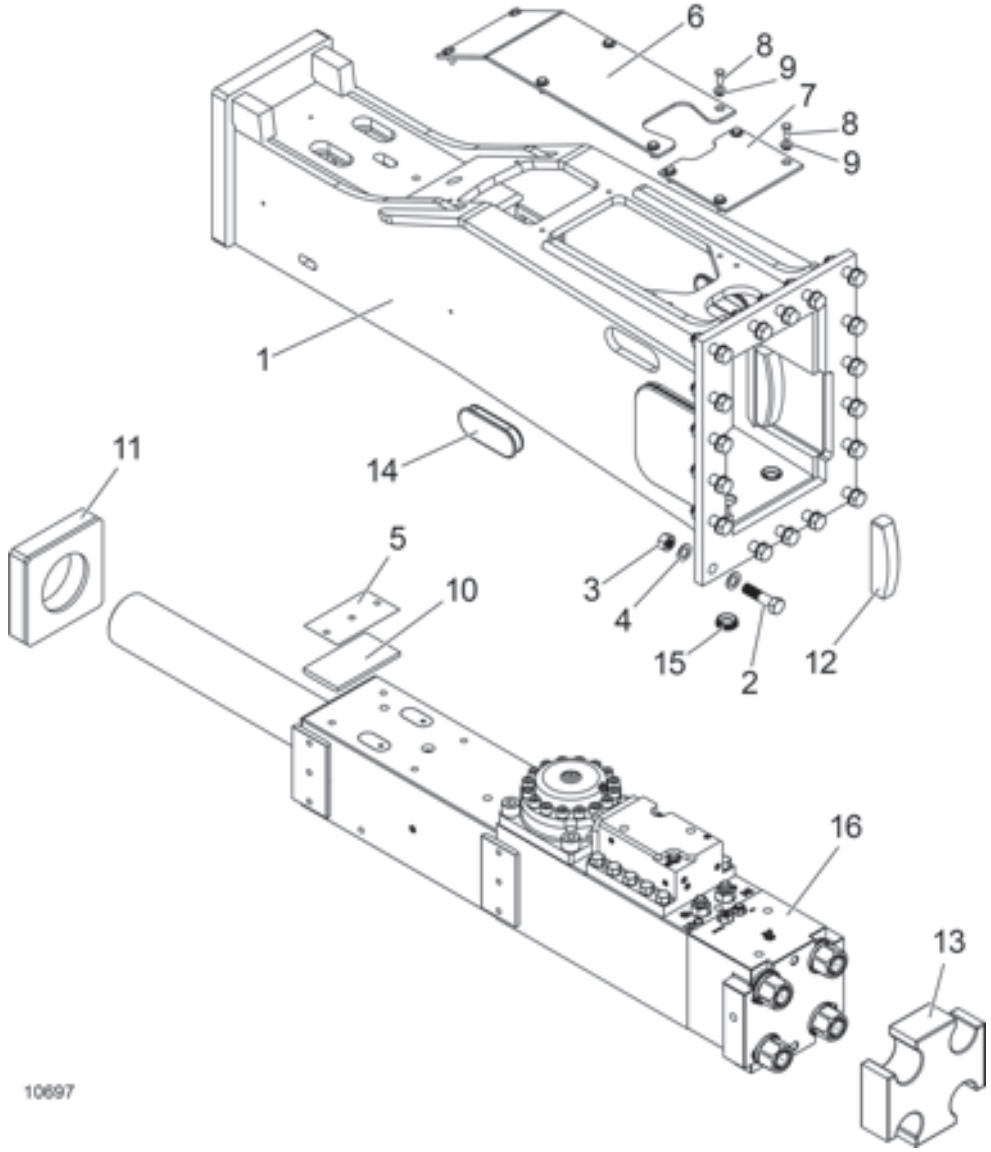


Item	Part No.	Description	Qty.
	6600065	**ACCUMULATOR SEAL KIT** Includes the following items:	
1	6230546	O-RING	1
2	6230567	BACKUP RING	1

NOTE: Items not available separately.

NOTES

BXR100 — MAIN BREAKER ASSEMBLY

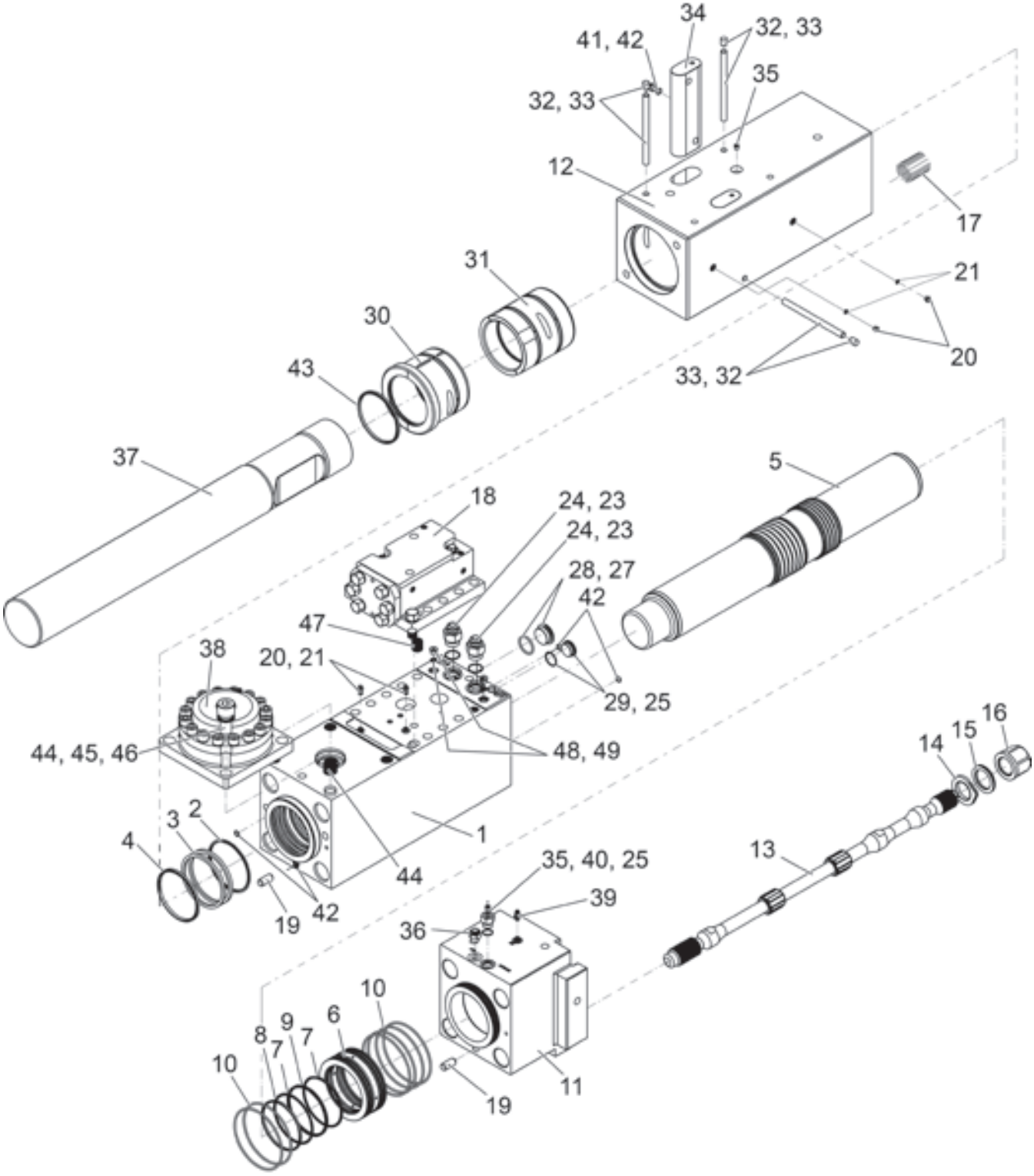


Item	Part No.	Description	Qty.
1	475-0030	BOX HOUSING WELDMENT	1
2	1912258	BOLT	18
3	1932059	NUT	18
4	1941039	TENSION WASHER	36
5	474-0045	SHIM PACK ASSEMBLY	8
6	475-0027	LOWER ACCESS COVER	1
7	475-0028	UPPER ACCESS COVER	1
8	1912491	BOLT	10
9	470-0026	RETAINER COVER	10
10	474-0021	SUPPORT PAD	8
11	475-0035	LOWER ISOLATOR ASS'Y	1
12	481-0027	SIDE EAR ISOLATOR	2
13	475-0037	UPPER ISOLATOR	1
14	481-0041	MOLDED CAP	2
15	474-0039	INSPECTION HOLE PLUG	2

Item	Part No.	Description	Qty.
16	**BXR100B**	**BARE BREAKER** (See page 163)	1
	500-1154	**BXR100 DECAL KIT**	1

NOTE: For mounting bracket and hardware, contact your BTI representative.

BXR100	BARE BREAKER



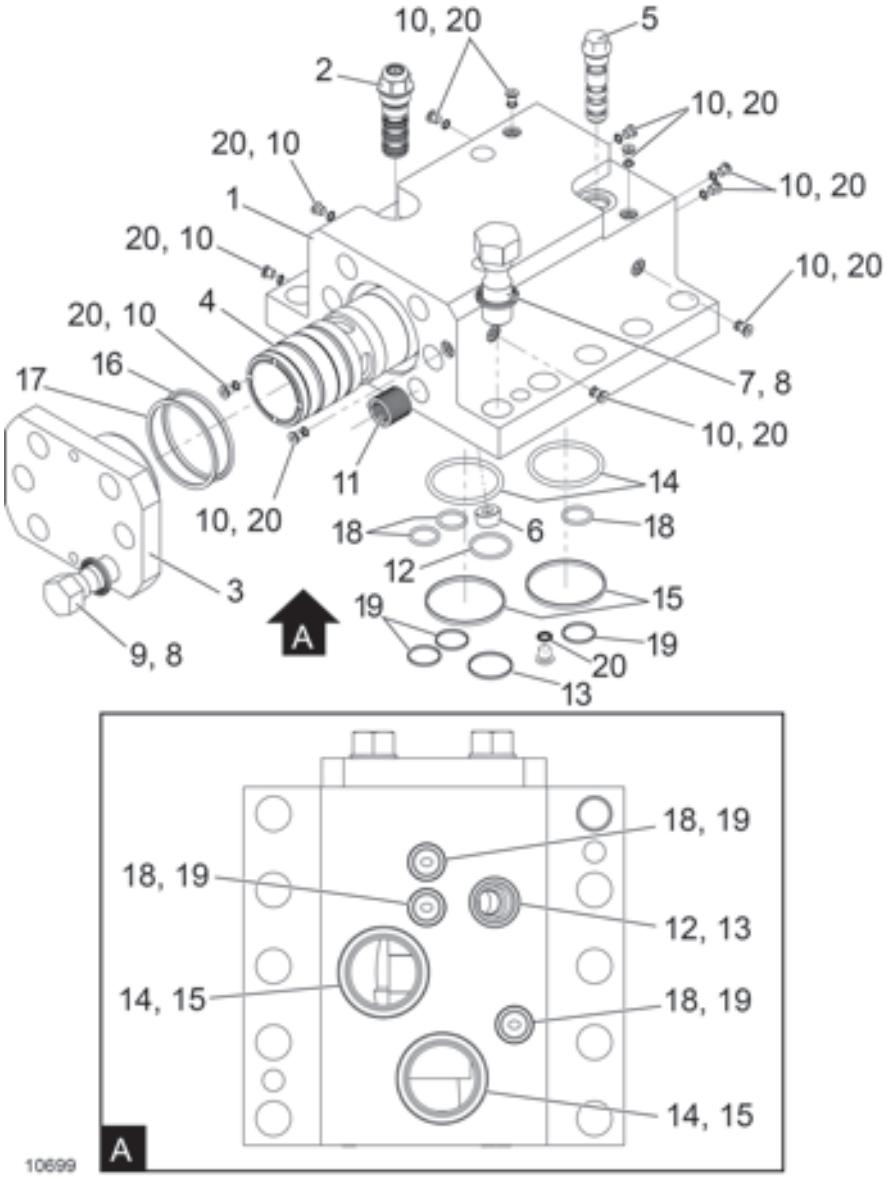
10698

BXR100 — BARE BREAKER

Item	Part No.	Description	Qty.
	BXR100B	**BARE BREAKER** Includes items 1–49	1
1	6100051	CYLINDER	1
2	6050083	BUFFER SEAL *	1
3	6050084	U-PACKING *	2
4	6050086	DUST SEAL *	1
5	6100053	PISTON	1
6	6100060	PACKING BUSHING	1
7	6100085	STEP SEAL *	2
8	6107083	BUFFER SEAL *	1
9	6100082	GAS SEAL, QUAD RING *	1
10	6050134	O-RING *	6
11	6100052	REAR HEAD	1
12	6100054	FRONT HEAD	1
13	6100061	TIE ROD C/W ISOLATOR	4
14	6400011	CENTRALIZER WASHER	4
15	6400019	NORDLOCK WASHER	4
16	6400013	TIE ROD NUT	4
17	6400525	HELICOIL INSERT	4
18	**6101064**	**CONTROL VALVE** (See page 164)	1
19	6600014	DOWEL PIN	2
20	6701539	PLUG	4
21	6700007	O-RING *	4
23	6550307	O-RING *	2
24	6550094	ADAPTER	2
25	6131539	O-RING *	2
27	6360046	O-RING *	1
28	6361561	PORT PLUG	1
29	6050024	PORT PLUG	1
30	6100055	FRONT BUSHING	1
31	6100006	REAR BUSHING	1
32	6100009	KEEPER PIN	5
33	6550507	STOPPER PLUG	5
34	6100039	RETAINING PIN	2
35	6551529	GREASE ZERK	2
36	**6557527**	**AIR VALVE ASSEMBLY** (See page 193)	1
37	BXR100-B-1450	BLUNT TOOL	REF
37	BXR100-M-1450	MOIL TOOL	REF
37	BXR100-C-1450	CHISEL TOOL	REF
38	**6600075**	**ACCUMULATOR ASSEMBLY** (See page 165)	1
39	6257070	GAS VALVE	1
40	6550005	GREASE ZERK ADAPTER	1
41	6150024	PLUG	1
42	6500088	O-RING *	5
43	6100200	DUST SEAL *	1
44	6550526	HELICOIL INSERT	4
45	6550541	CONICAL WASHER	4
46	6360037	BOLT	4
47	6100526	HELICOIL INSERT	10
48	6700027	PLUG	2
49	6500007	O-RING *	2
	6100098	**MASTER SEAL KIT** Includes 6600065, 6400100, & 6100099 (See page 166)	REF
	6600065	**ACCUMULATOR SEAL KIT** (See page 171)	REF
	6400100	**CONTROL VALVE SEAL KIT** (See page 168)	REF
	6100099	**INTERNAL SEAL KIT** (See page 169)	REF

*** NOTE:** Seals not available separately

BXR100	CONTROL VALVE

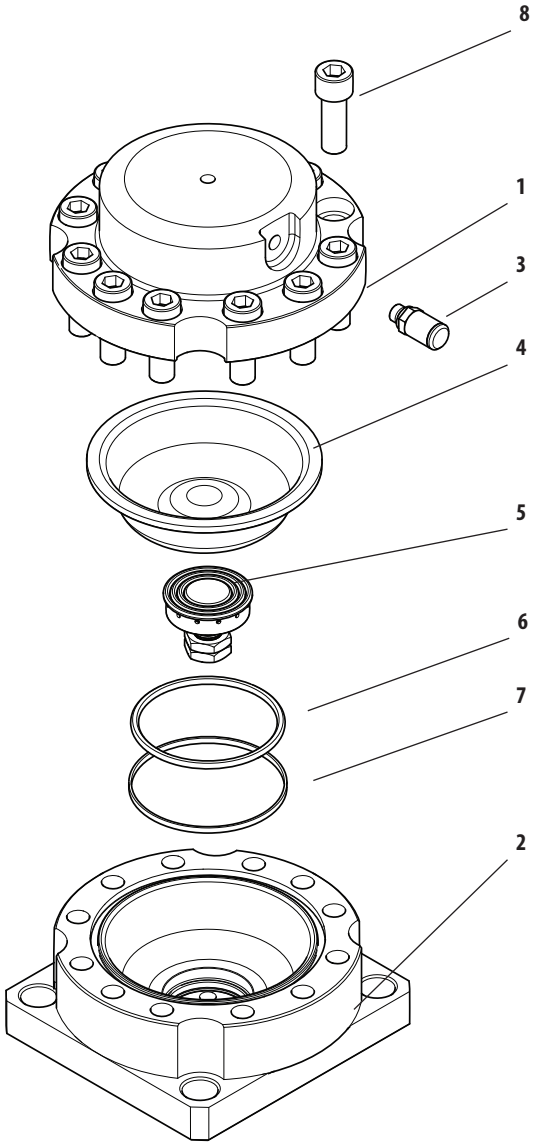


Item	Part No.	Description	Qty.
	6101064	**CONTROL VALVE**	
		Includes the following items:	
1	6400064	CONTROL VALVE BOX	1
2	**6550120**	**STROKE ADJUSTER ASSEMBLY**	1
		(See page 192)	
3	6400066	CONTROL VALVE CAP	1
4	6400063	CONTROL VALVE SPOOL	1
5	**6550018**	**REGENERATION VALVE**	1
		(See page 194)	
6	6550072	FLUSH ORIFICE NPT PLUG	1
7	6100558	TENSION BOLT	10
8	6550541	CONICAL WASHER	6
9	6550539	TENSION BOLT	6
10	6550700	PLUG	12

Item	Part No.	Description	Qty.
11	6550526	HELICOIL INSERT	6
12	*	O-RING	1
13	*	BACKUP RING	1
14	*	O-RING	2
15	*	BACKUP RING	2
16	*	O-RING	1
17	*	BACKUP RING	1
18	*	O-RING	3
19	*	BACKUP RING	3
20	*	O-RING	12

* See Control Valve Seal Kit page 168

BXR100 — ACCUMULATOR ASSEMBLY

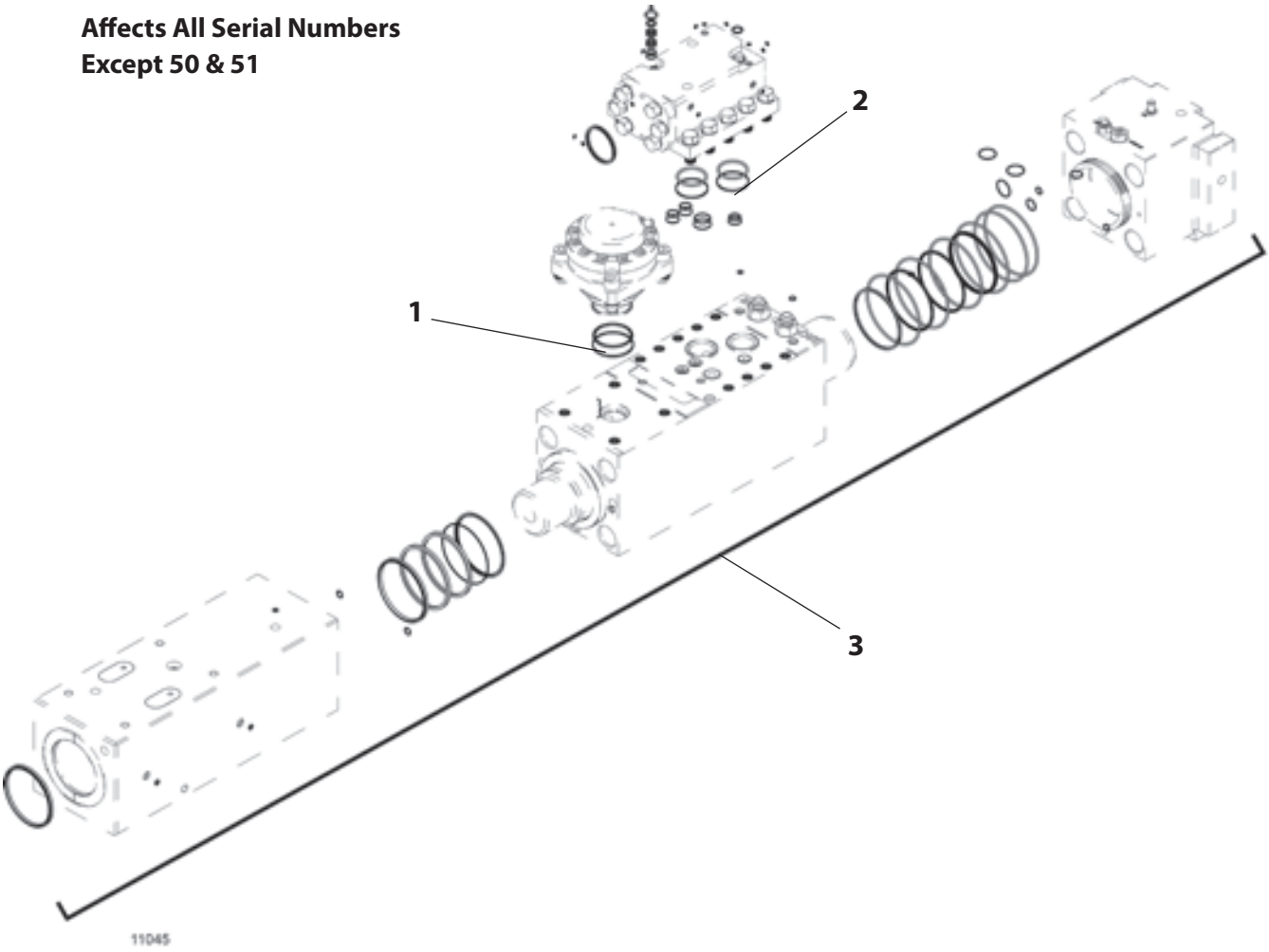


Item	Part No.	Description	Qty.
	6600075	**ACCUMULATOR ASSEMBLY** Includes the following items:	
1	6367557	ACCUMULATOR COVER	1
2	6600555	ACCUMULATOR BASE	1
3	6257070	GAS VALVE	1
4	6360045	DIAPHRAGM	1
5	6600164	ORIFICE ASSEMBLY	1
6	*	O-RING	1
7	*	BACKUP RING	1
8	6360137	BOLT	12

* Refer to Accumulator Seal Kit page 171

BXR100	MASTER SEAL KIT

Affects All Serial Numbers
Except 50 & 51

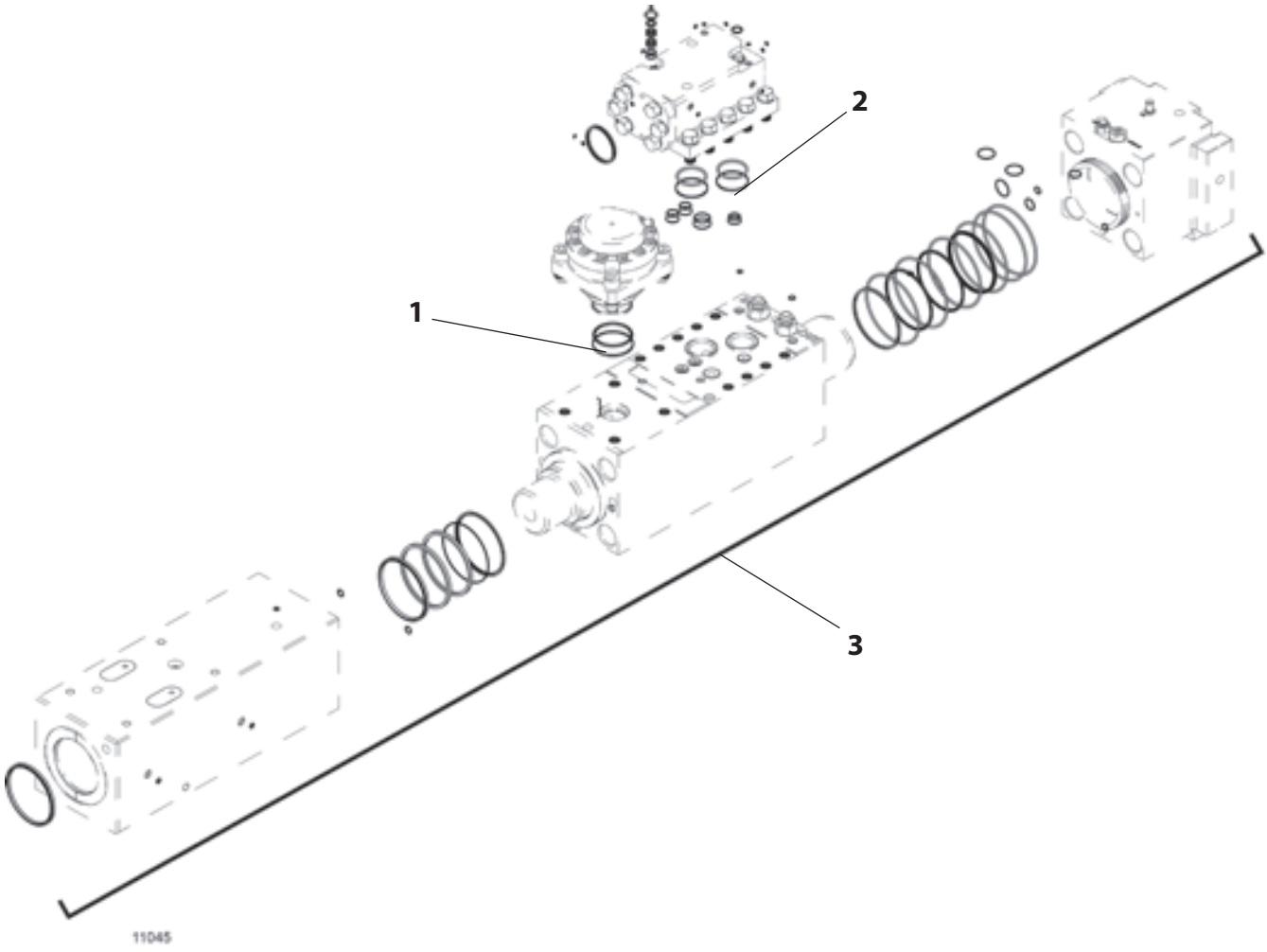


Item	Part No.	Description	Qty.
	6100098	**MASTER SEAL KIT** Includes the following items:	
1	**6600065**	**ACCUMULATOR SEAL KIT** (See page 171)	1
2	**6400100**	**CONTROL VALVE SEAL KIT** (See page 168)	1
3	**6100099**	**INTERNAL SEAL KIT** (See page 169)	1

*** NOTE**: Seals not available separately
Bladder sold separately

BXR100	MASTER SEAL KIT

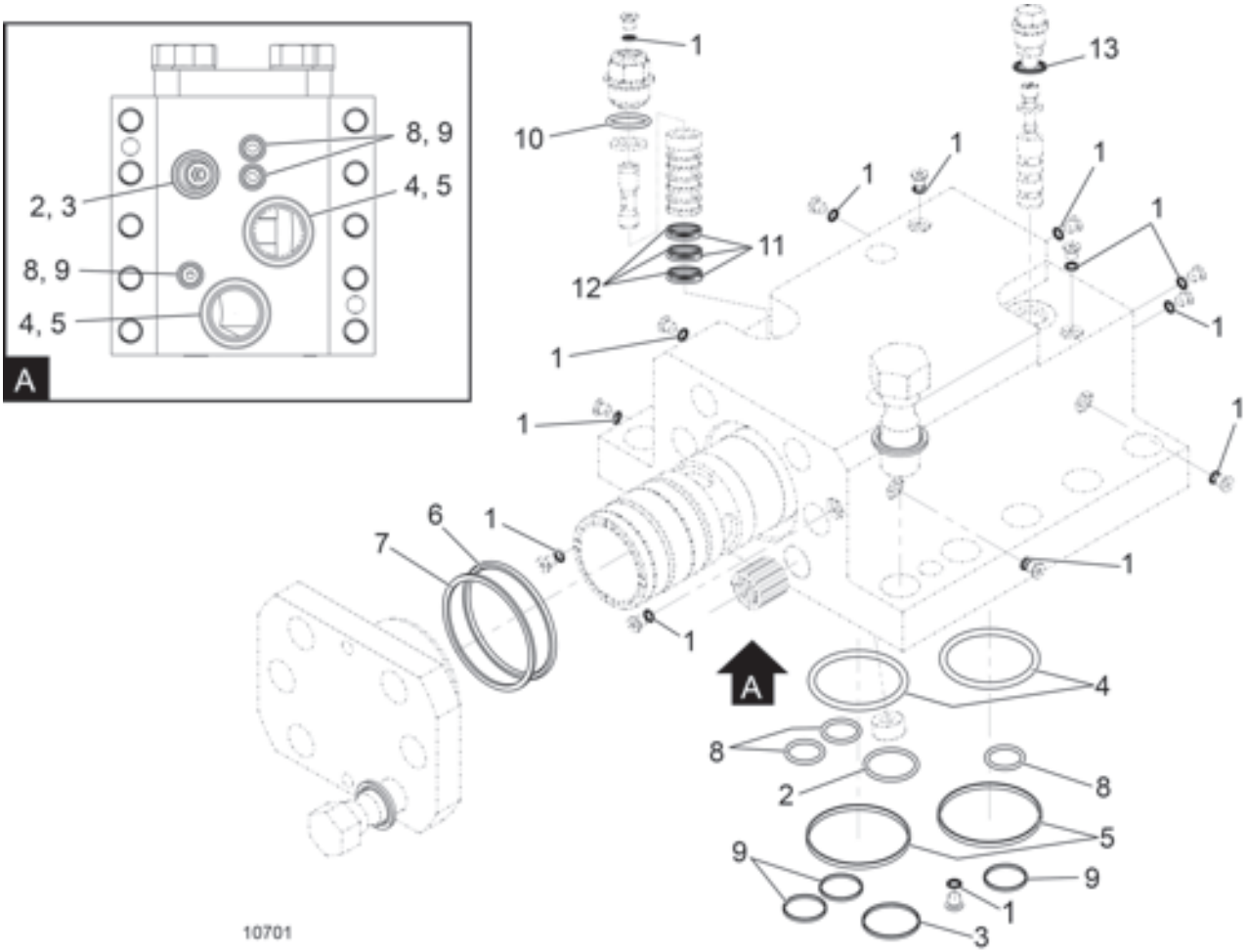
Affects Serial Numbers 50 & 51 only



Item	Part No.	Description	Qty.
	6100098PT	**MASTER SEAL KIT** Includes the following items:	
1	**6600065**	**ACCUMULATOR SEAL KIT** (See page 171)	1
2	**6400100**	**CONTROL VALVE SEAL KIT** (See page 156)	1
3	**6100099PT**	**INTERNAL SEAL KIT**	1

*** NOTE**: Seals not available separately.
Bladder sold separately

BXR100	CONTROL VALVE SEAL KIT

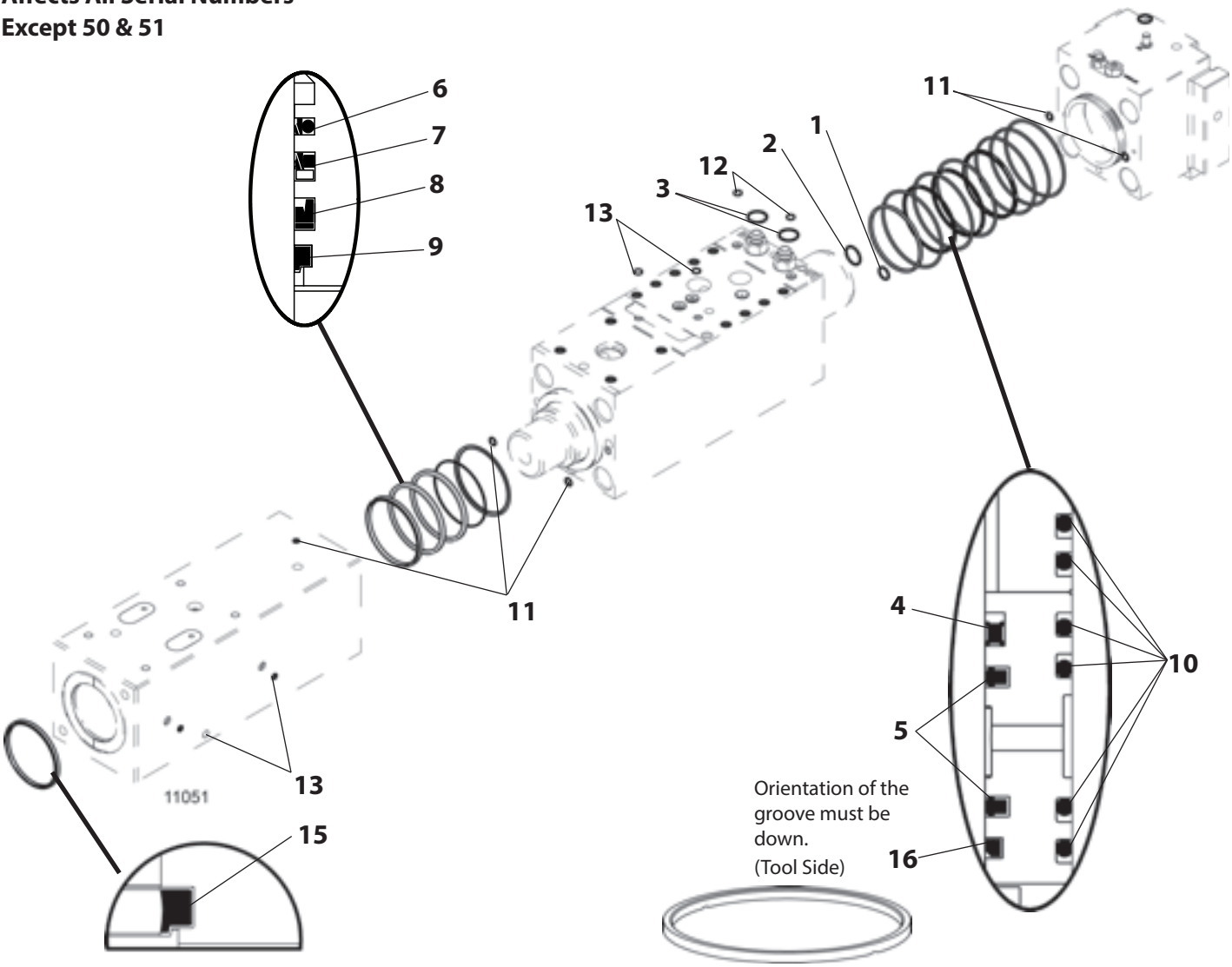


Item	Part No.	Description	Qty.
	6400100	**CONTROL VALVE SEAL KIT** Includes the following items:	
1	6550302	O-RING *	13
2	6550303	O-RING *	1
3	6550402	BACKUP RING *	1
4	6550304	O-RING *	2
5	6550403	BACKUP RING *	2
6	6230546	O-RING *	1
7	6550404	BACKUP RING *	1
8	6130002	O-RING *	3
9	6550405	BACKUP RING *	3
10	6131539	BACKUP RING *	1
11	6550309	O-RING *	3
12	6550407	BACKUP RING *	3
13	6501563	O-RING *	1

* **NOTE**: Items not available separately

BXR100 — INTERNAL SEAL KIT

Affects All Serial Numbers
Except 50 & 51

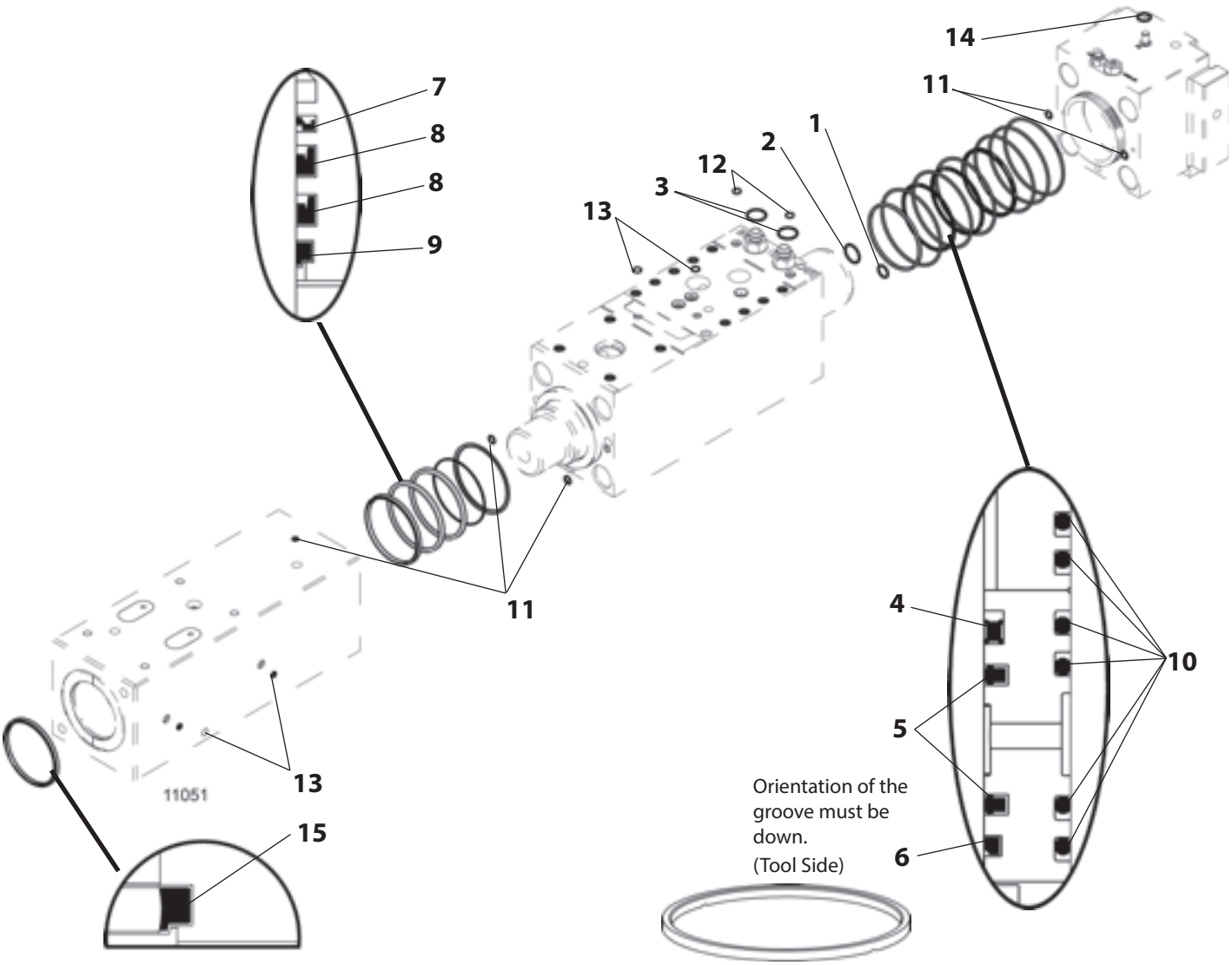


Item	Part No.	Description	Qty.
	6400099	**INTERNAL SEAL KIT** Includes the following items:	
1	6360046	O-RING	1
2	6550308	O-RING	1
3	6550307	O-RING	2
4	6550082	QUAD RING	1
5	6550085	STEP SEAL	2
6	6550083OMS	BUFFER SEAL	1
7	6550084OMS	BUFFER SEAL	1
8	6550084	U-PACKING	1
9	6550086	DUST SEAL	1
10	6551134	O-RING	6
11	6500088	O-RING	5
12	6500007	O-RING	2
13	6700007	O-RING	4
14	6131539	O-RING	1
15	6100200	DUST SEAL	1
16	6107083	BUFFER SEAL	1

NOTE: Items not available separately

BXR100 — INTERNAL SEAL KIT

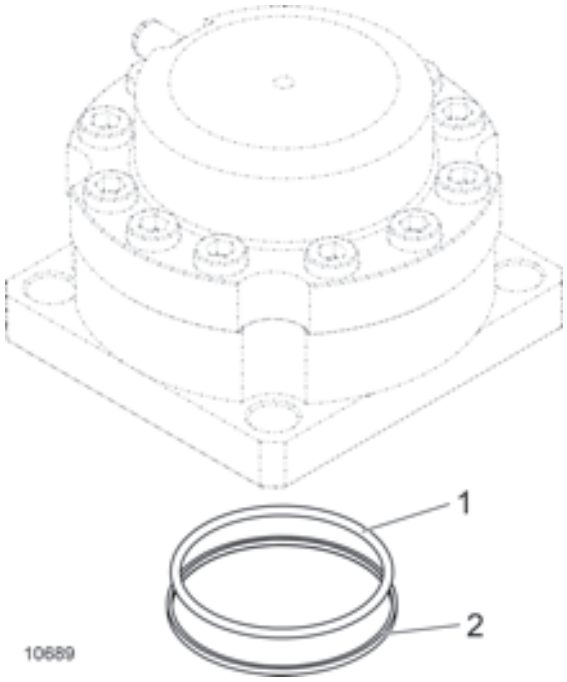
Affects Serial Numbers 50 & 51 only



Item	Part No.	Description	Qty.
	6100099PT	**INTERNAL SEAL KIT** Includes the following items:	
1	6360046	O-RING	1
3	6550307	O-RING	2
4	6100082	QUAD RING	1
5	6100085	STEP SEAL	3
6	6107083	BUFFER SEAL	1
7	6050083	BUFFER SEAL	1
8	6050084PT	U-PACKING	2
9	6050086	DUST SEAL	1
10	6050134	O-RING	6
11	6500088	O-RING	5
12	6500007	O-RING	2
13	6700007	O-RING	4
14	6131539	O-RING	2
15	6850087	OIL SEAL	1
16	6100200	DUST SEAL	1

NOTE: Items not available separately

BXR100	ACCUMULATOR SEAL KIT

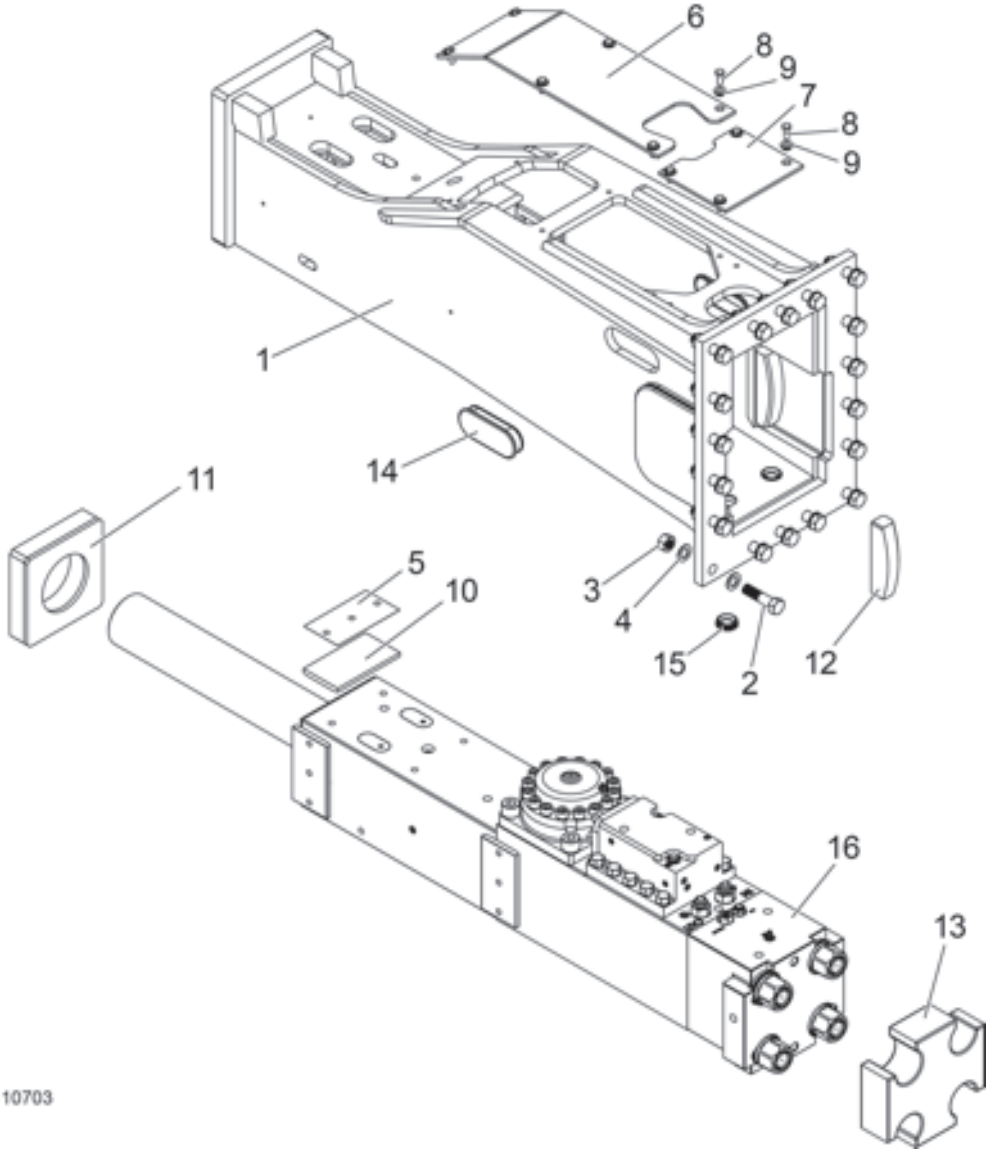


Item	Part No.	Description	Qty.
	6600065	**ACCUMULATOR SEAL KIT** Includes the following items:	
1	6230546	O-RING	1
2	6230567	BACKUP RING	1

NOTE: Items not available separately.

NOTES

BXR120 — MAIN BREAKER ASSEMBLY

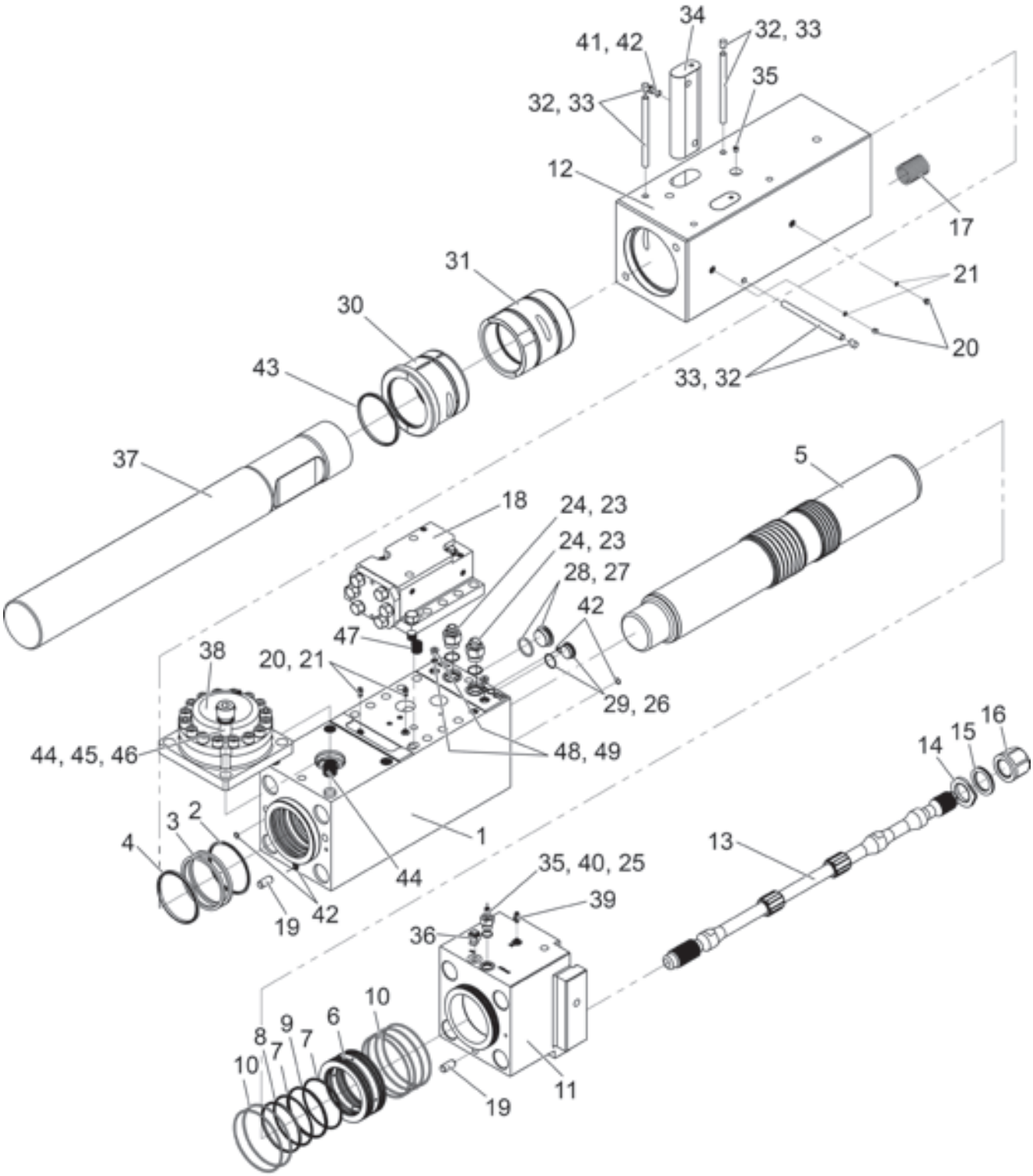


Item	Part No.	Description	Qty.
1	474-0030	BOX HOUSING WELDMENT	1
2	1912164	BOLT	18
3	1931042	NUT	18
4	1941040	TENSION WASHER	36
5	474-0045	SHIM PACK ASSEMBLY	8
6	474-0027	LOWER ACCESS COVER	1
7	474-0028	UPPER ACCESS COVER	1
8	1912491	BOLT	10
9	470-0026	RETAINER COVER	10
10	474-0021	SUPPORT PAD	8
11	474-0035	LOWER ISOLATOR ASSEMBLY	1
12	481-0027	SIDE EAR ISOLATOR	2
13	474-0037	UPPER ISOLATOR	1
14	481-0041	MOLDED CAP	2
15	474-0039	INSPECTION HOLE PLUG	2

Item	Part No.	Description	Qty.
16	**BXR120B**	**BARE BREAKER** (See page 175)	1
	500-1136	**BXR120 DECAL KIT**	1

NOTE: For mounting bracket and hardware, contact your BTI representative.

BXR120	BARE BREAKER



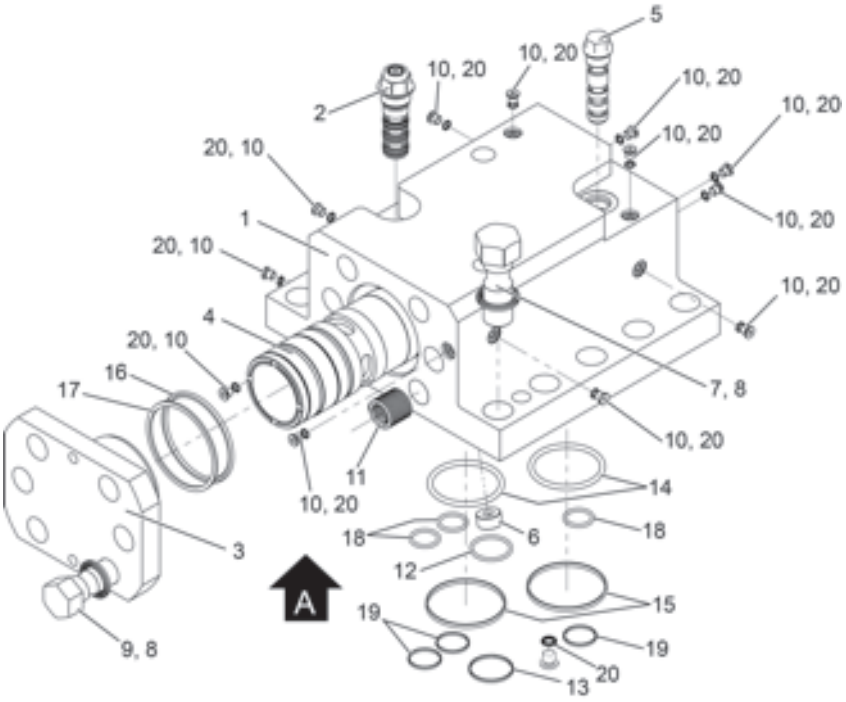
10704

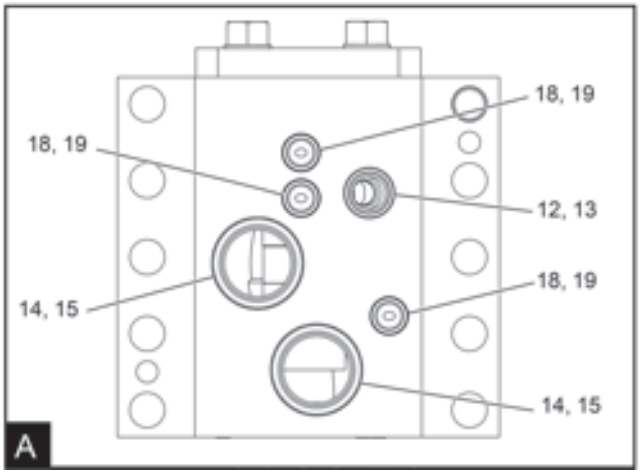
BXR120 — BARE BREAKER

Item	Part No.	Description	Qty.
	BXR120B	**BARE BREAKER** Includes items 1–49	
1	6400051	CYLINDER	1
2	6400083	BUFFER SEAL *	1
3	6400084	U-PACKING *	2
4	6400086	DUST SEAL *	1
5	6400053	PISTON	1
6	6400060	PACKING BUSHING	1
7	6400085	STEP SEAL *	2
8	6407083	BUFFER SEAL *	1
9	6400082	GAS SEAL, QUAD RING *	1
10	6400134	O-RING *	6
11	6400052	REAR HEAD	1
12	6400054	FRONT HEAD	1
13	6400061	TIE ROD C/W ISOLATOR	4
14	6400011	CENTRALIZER WASHER	4
15	6400019	NORDLOCK WASHER	4
16	6400013	TIE ROD NUT	4
17	6400525	HELICOIL INSERT	4
18	**6401064**	**CONTROL VALVE** (See page 176)	1
19	6550014	DOWEL PIN	2
20	6701539	PLUG	4
21	6700007	O-RING *	4
23	6550307	O-RING *	2
24	6550094	ADAPTER	2
25	6131539	O-RING *	1
26	6360046	O-RING *	1
27	6550308	O-RING *	1
28	6550561	PORT PLUG	1
29	6361561	PORT PLUG	1
30	6400055	FRONT BUSHING	1
31	6400006	REAR BUSHING	1
32	6400009	KEEPER PIN	5
33	6550507	STOPPER PLUG	5
34	6400039	RETAINING PIN	2
35	6551529	GREASE ZERK	2
36	**6557527**	**AIR VALVE ASSEMBLY** (See page 193)	1
37	BXR120-B-1500	BLUNT TOOL	REF
37	BXR120-M-1500	MOIL TOOL	REF
37	BXR120-C-1500	CHISEL TOOL	REF
38	**6550075**	**ACCUMULATOR ASSEMBLY** (See page 177)	1
39	6257070	GAS VALVE	1
40	6550005	GREASE ZERK ADAPTER	1
41	6150024	PLUG	1
42	6500088	O-RING *	5
43	6400200	DUST SEAL *	1
44	6400527	HELICOIL INSERT	4
45	6550543	CONICAL WASHER	4
46	6400599	BOLT	4
47	6550526	HELICOIL INSERT	10
48	6700027	PLUG	2
49	6500007	O-RING *	2
	6400098	**MASTER SEAL KIT** Includes 6550065, 6400100, & 6400099 (See page 178)	REF
	6550065	**ACCUMULATOR SEAL KIT** (See page 181)	REF
	6400100	**CONTROL VALVE SEAL KIT** (See page 179)	REF
	6400099	**INTERNAL SEAL KIT** (See page 180)	REF

* **NOTE:** Seals not available separately

BXR120	CONTROL VALVE

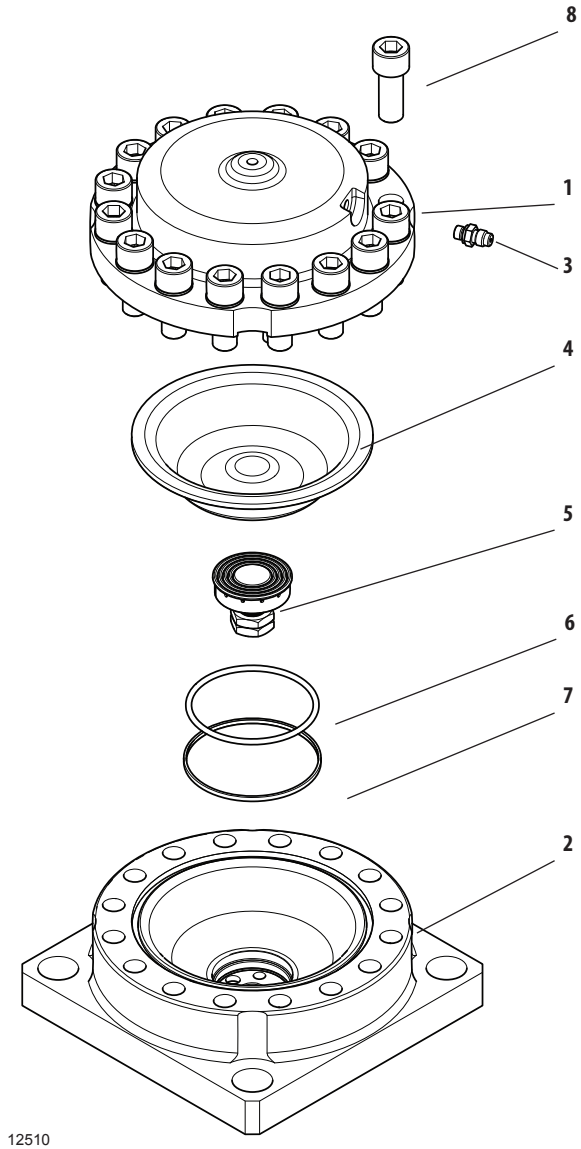




Item	Part No.	Description	Qty.
	6401064	**CONTROL VALVE**	
		Includes the following items:	
1	6400064	CONTROL VALVE BOX	1
2	**6550120**	**STROKE ADJUSTER ASSEMBLY**	1
		(See page 192)	
3	6400066	CONTROL VALVE CAP	1
4	6400063	CONTROL VALVE SPOOL	1
5	**6550018**	**REGENERATION VALVE**	1
		(See page 194)	
6	6400072	FLUSH ORIFICE NPT PLUG	1
7	6400540	TENSION BOLT	10
8	6550541	CONICAL WASHER	6
9	6550539	TENSION BOLT	6
10	6550700	PLUG	12
11	6550526	HELICOIL INSERT	6
12	*	O-RING	1
13	*	BACKUP RING	1
14	*	O-RING	2
15	*	BACKUP RING	2
16	*	O-RING	1
17	*	BACKUP RING	1
18	*	O-RING	3
19	*	BACKUP RING	3
20	*	O-RING	8

* See Control Valve Seal Kit, page 179

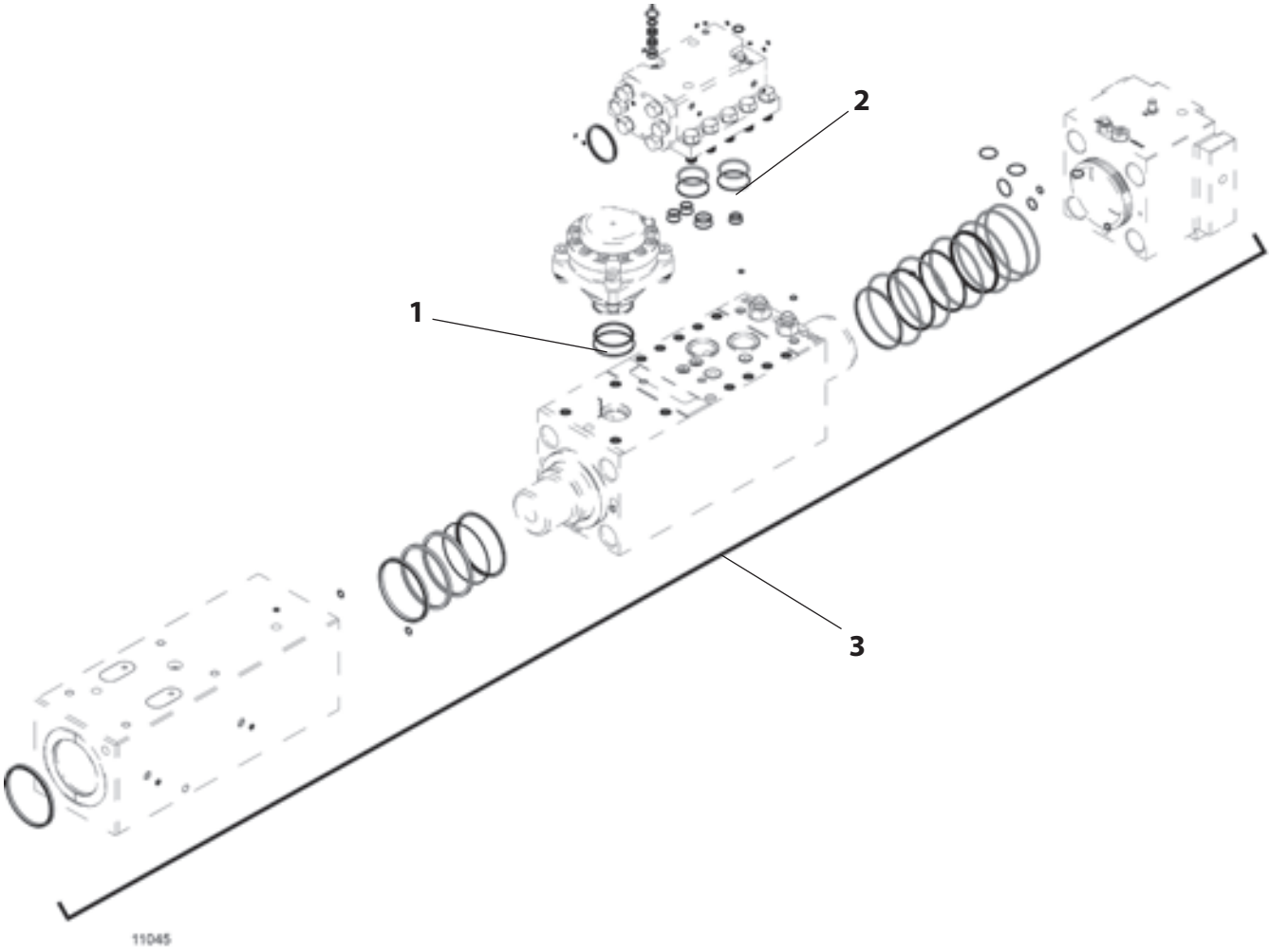
BXR120 — ACCUMULATOR ASSEMBLY



Item	Part No.	Description	Qty.
	6550075	**ACCUMULATOR ASSEMBLY** Includes the following items:	
1	6550556	ACCUMULATOR COVER	1
2	6550555	ACCUMULATOR BASE	1
3	6257070	GAS VALVE	1
4	6550045	DIAPHRAGM	1
5	6550164	ORIFICE ASSEMBLY	1
6	*	O-RING	1
7	*	BACKUP RING	1
8	6230540	BOLT	16

* See Accumulator Seal Kit, page 181

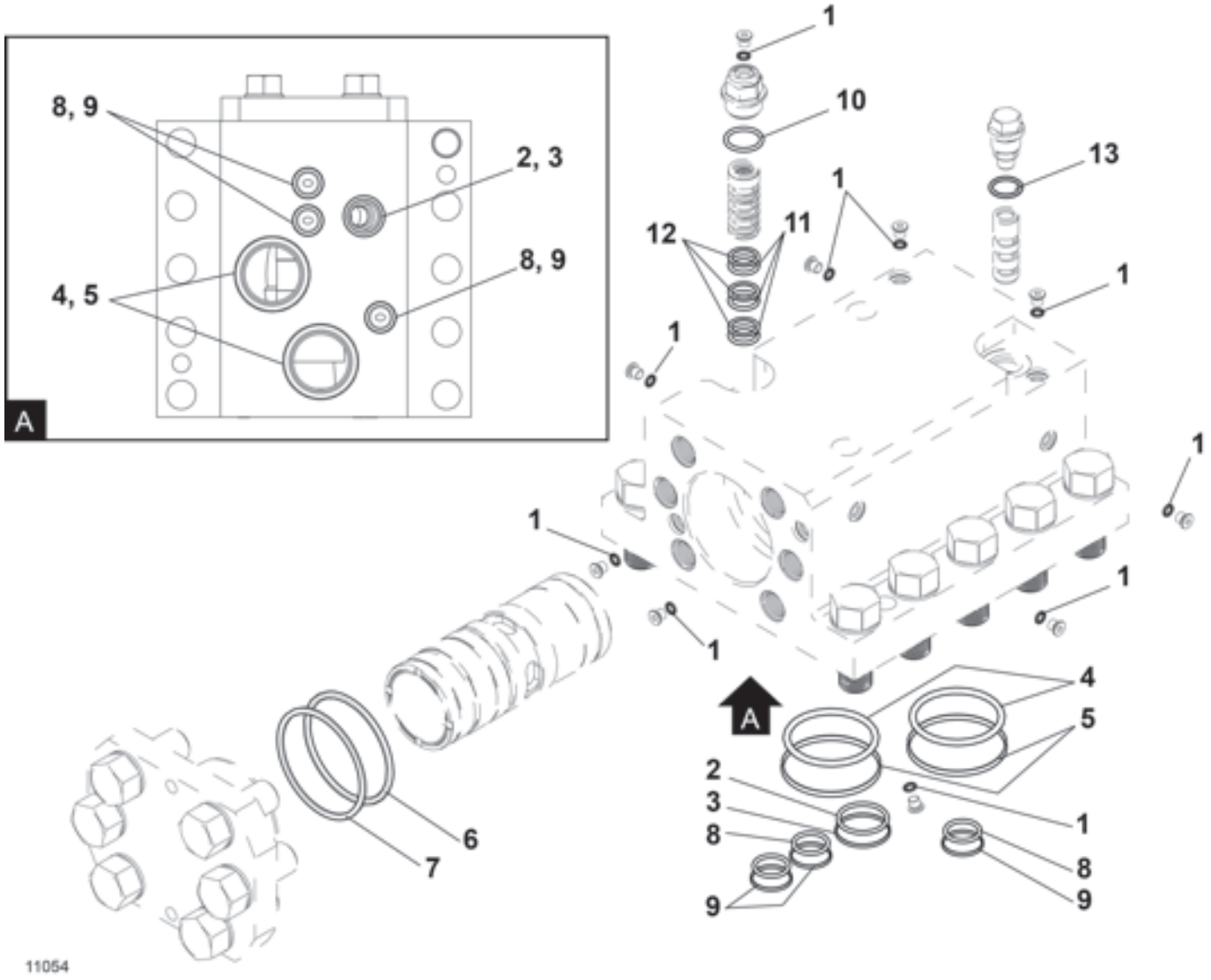
BXR120	MASTER SEAL KIT



Item	Part No.	Description	Qty.	Item	Part No.	Description	Qty.
	6400098	**MASTER SEAL KIT** Includes the following:					
1	**6550065**	**ACCUMULATOR SEAL KIT** (See page 181)	1				
2	**6400100**	**CONTROL VALVE SEAL KIT** (See page 179)	1				
3	**6400099**	**INTERNAL SEAL KIT** (See page 180)	1				

* NOTE: Seals not available separately

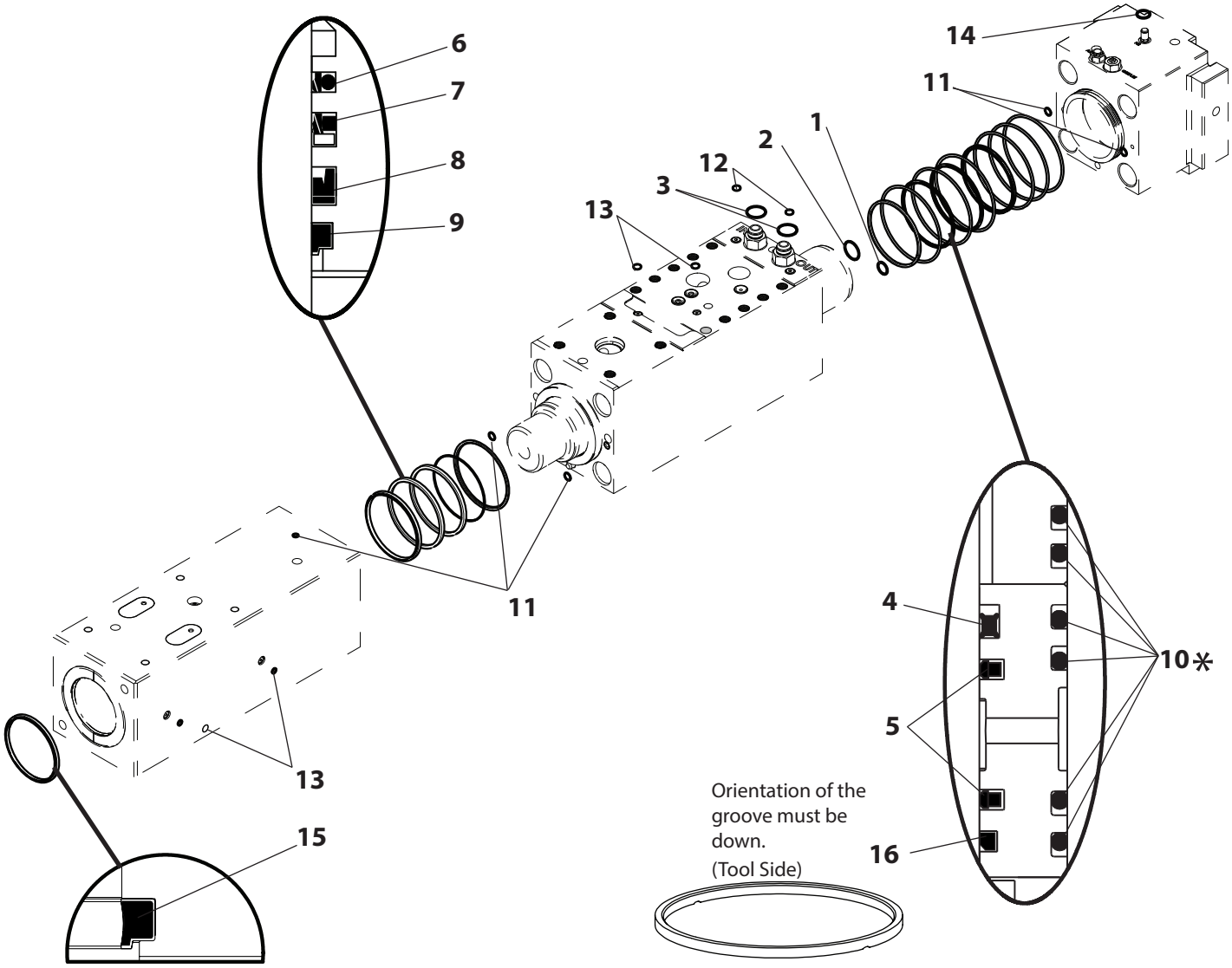
BXR120 — CONTROL VALVE SEAL KIT



Item	Part No.	Description	Qty.
	6400100	**CONTROL VALVE SEAL KIT** Includes the following items:	
1	6550302	O-RING	13
2	6550303	O-RING	1
3	6550402	BACKUP RING	1
4	6550304	O-RING	2
5	6550403	BACKUP RING	2
6	6230546	O-RING	1
7	6550404	BACKUP RING	1
8	6130002	O-RING	3
9	6550405	BACKUP RING	3
10	6131539	BACKUP RING	1
11	6550309	O-RING	3
12	6550407	BACKUP RING	3
13	6501563	O-RING	1

NOTE: Items not available separately

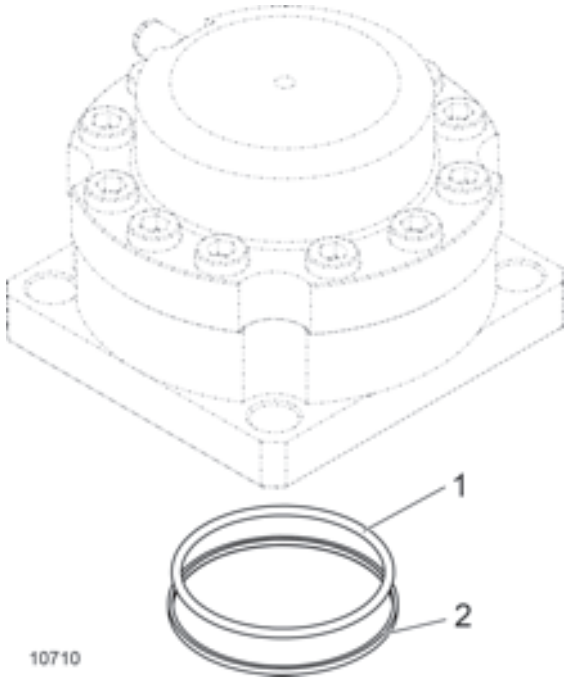
BXR120 — INTERNAL SEAL KIT



Item	Part No.	Description	Qty.
	6400099	**INTERNAL SEAL KIT** Includes the following items:	
1	6360046	O-RING	1
2	6550308	O-RING	1
3	6550307	O-RING	2
4	6400082	QUAD RING	1
5	6400085	STEP SEAL	2
6	6400083OMS	BUFFER SEAL	1
7	6400084OMS	BUFFER SEAL	1
8	6400084	U-PACKING	1
9	6400086	DUST SEAL	1
10	6400134	O-RING	6
11	6500088	O-RING	5
12	6500007	O-RING	2
13	6700007	O-RING	4
14	6131539	O-RING	1
15	6400200	DUST SEAL	1
16	6107083	BUFFER SEAL	1

NOTE: Items not available separately

BXR120	ACCUMULATOR SEAL KIT

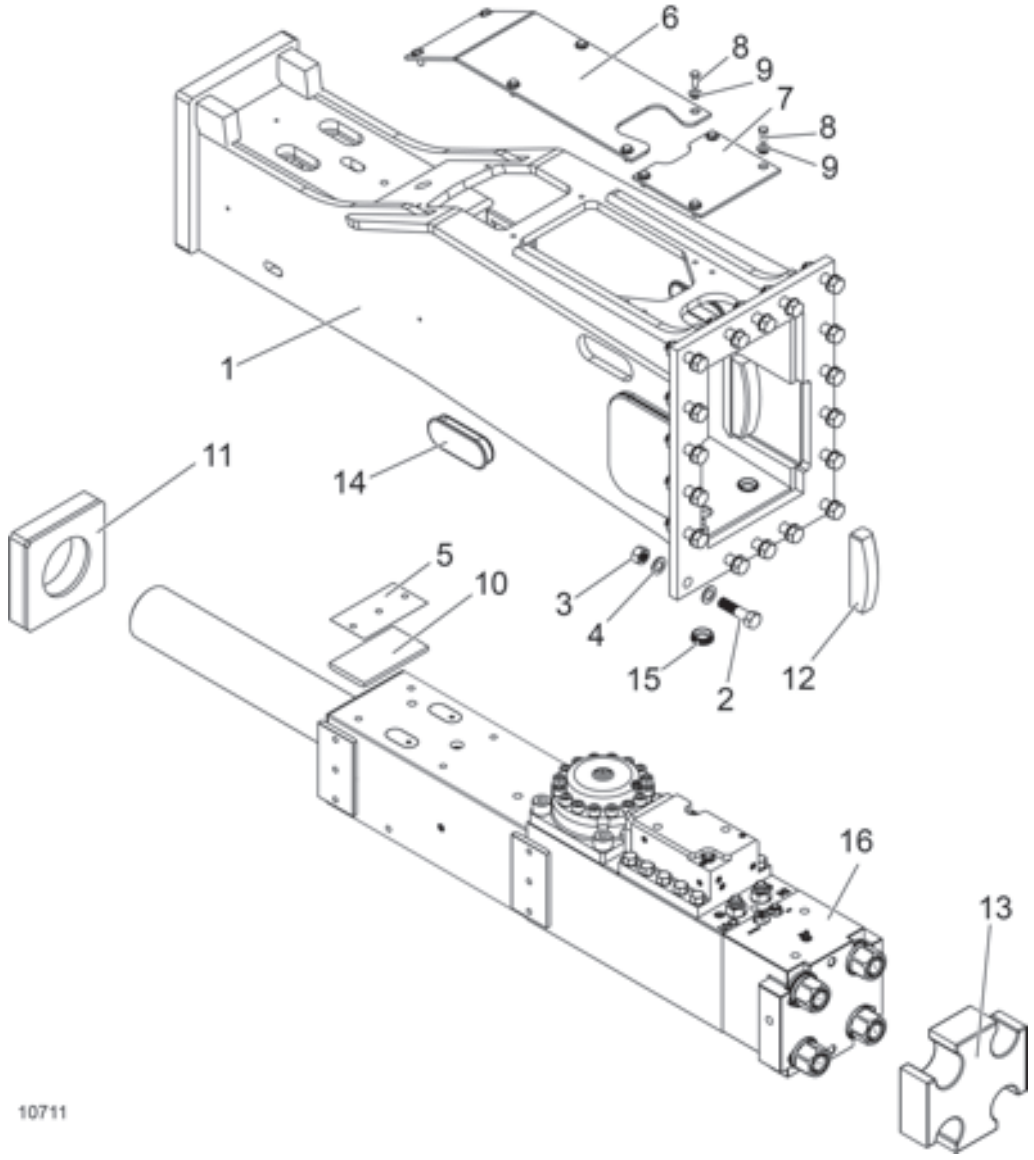


Item	Part No.	Description	Qty.
	6550065	**ACCUMULATOR SEAL KIT** Includes the following items:	
1	6550300	O-RING	1
2	6550400	BACKUP RING	1

NOTE: Items not available separately

NOTES

BXR160 — MAIN BREAKER ASSEMBLY

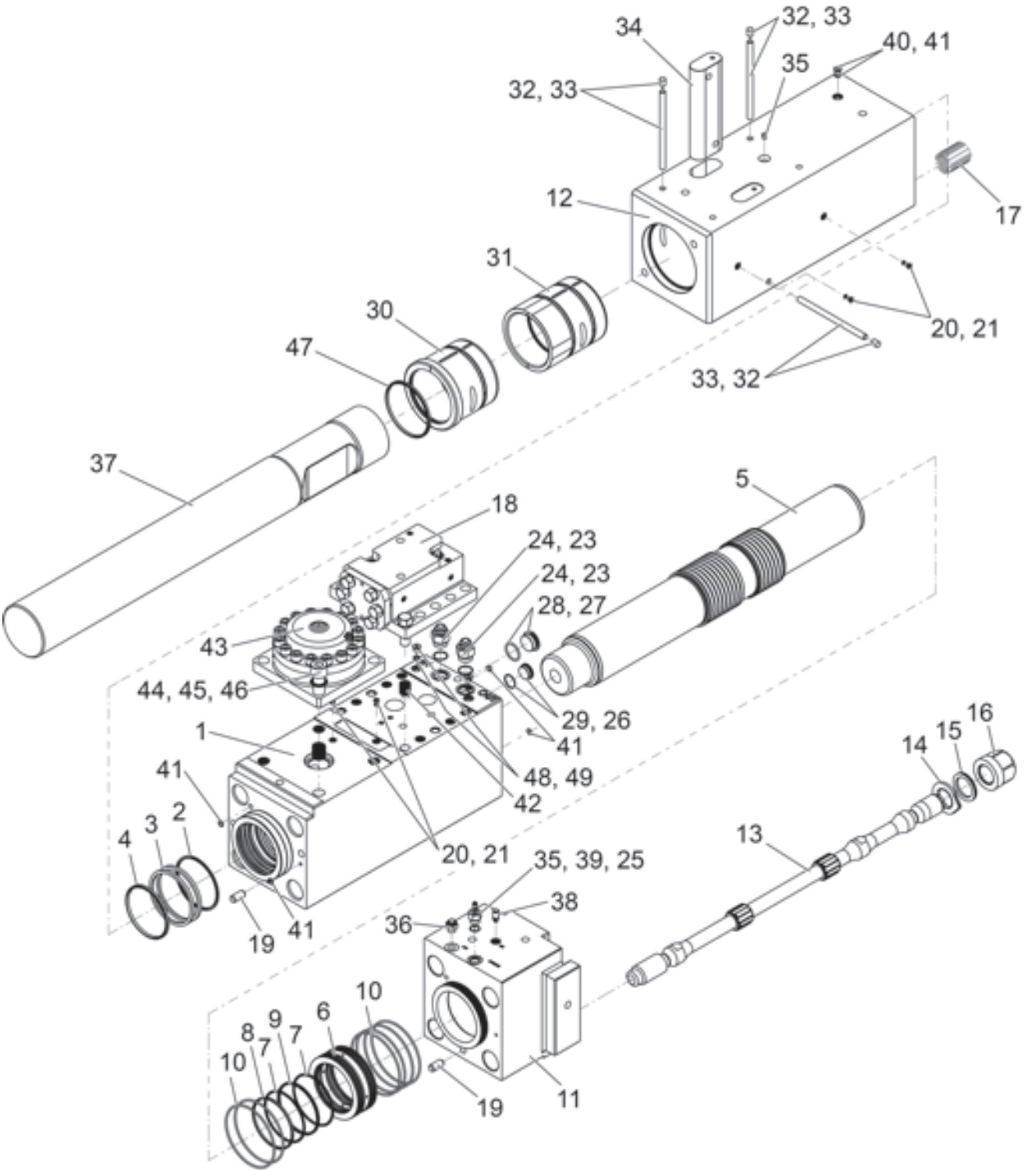


Item	Part No.	Description	Qty.
1	481-0030	BOX HOUSING WELDMENT	1
2	1912258	BOLT	16
3	1931059	NUT	16
4	1941039	TENSION WASHER	32
5	481-0045	LAMINATED SHIM	8
6	481-0025	UPPER ACCESS COVER	1
7	481-0033	UPPER COVER	1
8	1912244	BOLT	10
9	470-0026	RETAINER COVER	10
10	481-0021	SUPPORT PAD	8
11	481-0035	LOWER ISOLATOR ASSEMBLY	1
12	481-0027	SIDE EAR ISOLATOR	2
13	481-0026	UPPER ISOLATOR	1
14	481-0041	MOLDED CAP	2
15	474-0039	INSPECTION HOLE PLUG	2

Item	Part No.	Description	Qty.
16	**BXR160B**	**BARE BREAKER** See page page 185.	
	500-1111	**BXR160 DECAL KIT**	1

NOTE: For mounting bracket and hardware, contact your BTI representative.

BXR160	BARE BREAKER



10712

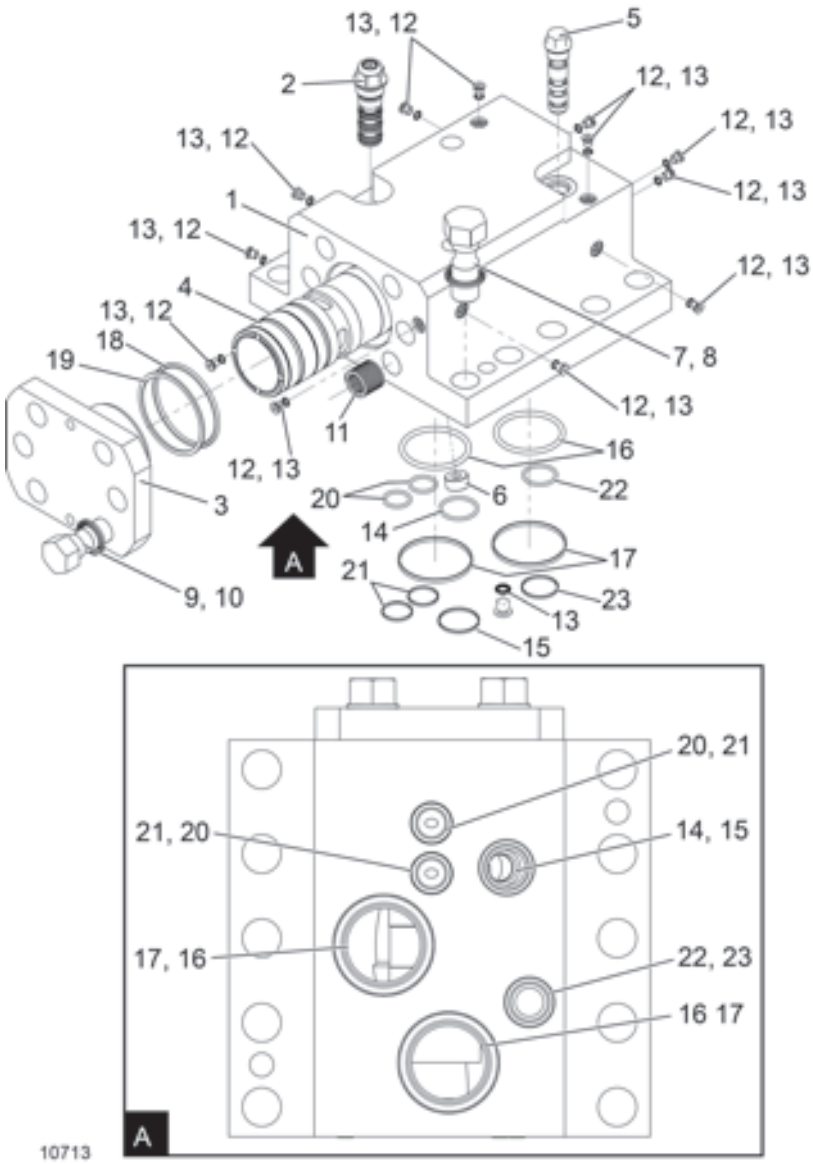
BXR160 — BARE BREAKER

Item	Part No.	Description	Qty.
	BXR160B	**BARE BREAKER** Includes items 1–49	
1	6550051	CYLINDER	1
2	6550083	BUFFER SEAL *	1
3	6550084	U-PACKING *	2
4	6550086	DUST SEAL *	1
5	6550053	PISTON	1
6	6550060	PACKING BUSHING	1
7	6550085	STEP SEAL *	2
8	6551083	BUFFER SEAL *	1
9	6550082	QUAD RING GAS SEAL *	1
10	6551134	O-RING *	6
11	6550052	REAR HEAD	1
12	6550054	FRONT HEAD	1
13	6550061	TIE ROD C/W ISOLATOR	4
14	6550011	CENTRALIZER WASHER	4
15	6550019	NORDLOCK WASHER	4
16	6550013	TIE ROD NUT	4
17	6550525	HELICOIL INSERT	4
18	**6551064**	**CONTROL VALVE** (See page 186)	1
19	6550014	DOWEL PIN	2
20	6701539	PLUG	4
21	6700007	O-RING *	4
23	6550307	O-RING *	2
24	6550094	ADAPTER	2
25	6131539	O-RING *	1
26	6360046	O-RING *	1
27	6550308	O-RING *	1
28	6550561	PORT PLUG	1
29	6361561	PORT PLUG	1
30	6550055	FRONT BUSHING	1
31	6550006	REAR BUSHING	1
32	6550009	KEEPER PIN	5
33	6550507	STOPPER PLUG	5
34	6550039	RETAINING PIN	2
35	6551529	GREASE ZERK	2
36	**6557527**	**AIR VALVE ASSEMBLY** (See page 193)	1
37	BXR160-B-1700	BLUNT TOOL	REF
37	BXR160-M-1700	MOIL TOOL	REF
37	BXR160-C-1700	CHISEL TOOL	REF
38	6257070	GAS VALVE	1
39	6550005	GREASE ZERK ADAPTER	1
40	6150024	PLUG	1
41	6500088	O-RING *	5
42	6550528	HELICOIL INSERT	10
43	**6550075**	**ACCUMULATOR ASSEMBLY** (See page 187)	1
44	6550543	CONICAL WASHER	4
45	6550599	BOLT	4
46	6400526	HELICOIL INSERT	4
47	6550200	DUST SEAL	1
48	6700027	PLUG	2
49	6500007	O-RING *	2

6550098	**MASTER SEAL KIT** Includes 6550065, 6550100, & 6400099 (See page 188)	REF
6550065	**ACCUMULATOR SEAL KIT** (See page 191)	REF
6550100	**CONTROL VALVE SEAL KIT** (See page 189)	REF
6550099	**INTERNAL SEAL KIT** (See page 190)	REF

* NOTE: Seals not available separately

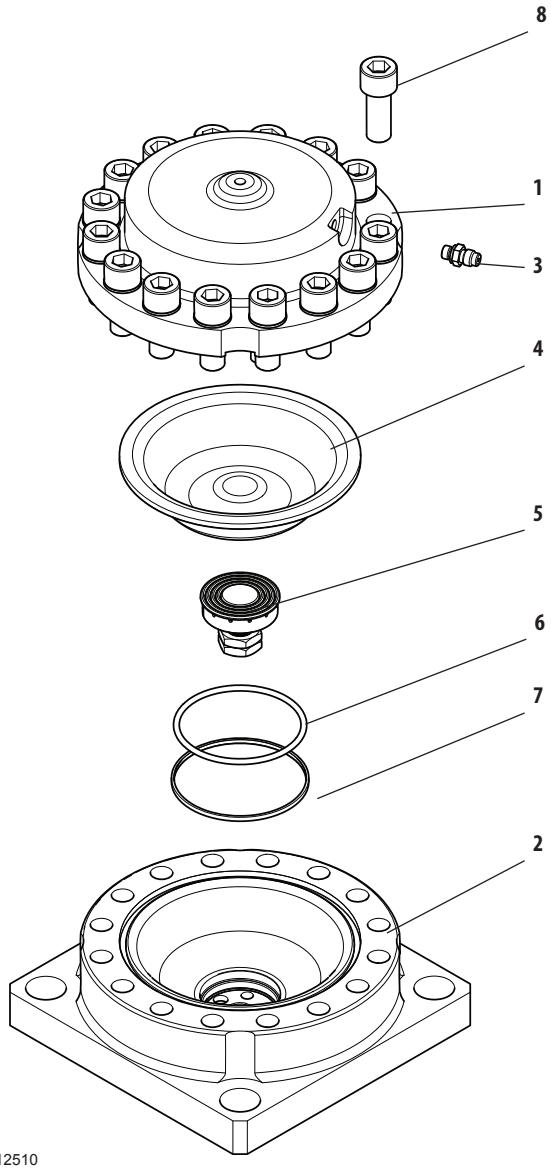
BXR160 — CONTROL VALVE



Item	Part No.	Description	Qty.
	6551064	CONTROL VALVE	
		Includes the following items:	
1	6550064	CONTROL VALVE BOX	1
2	6550120	STROKE ADJUSTER ASSY	1
		(See page 192)	
3	6550066	CONTROL VALVE CAP	1
4	6550063	CONTROL VALVE	1
5	6550018	REGENERATION VALVE	1
		(See page 194)	
6	6550072	FLUSH ORIFICE NPT PLUG	1
7	6550558	TENSION BOLT	10
8	6550540	CONICAL WASHER	10
9	6550539	TENSION BOLT	6
10	6550541	CONICAL WASHER	6
11	6550526	HELICOIL INSERT	6
12	6550700	PLUG	12
13	*	O-RING	12
14	*	O-RING	1
15	*	BACKUP RING	1
16	*	O-RING	2
17	*	BACKUP RING	2
18	*	O-RING	1
19	*	BACKUP RING	1
20	*	O-RING	2
21	*	BACKUP RING	2
22	*	O-RING	1
23	*	BACKUP RING	1

* See Control Valve Seal Kit, page 189

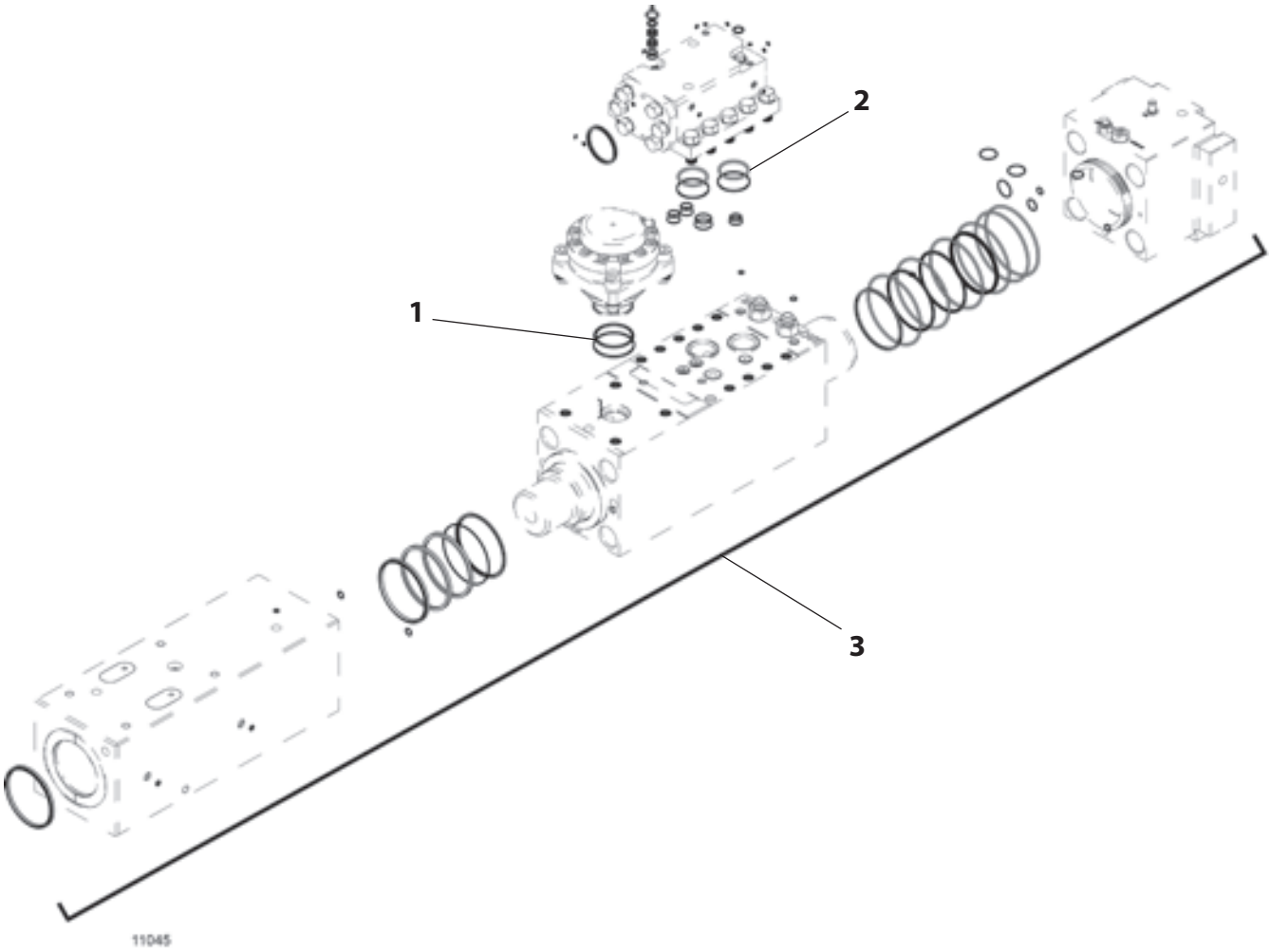
BXR160 — ACCUMULATOR ASSEMBLY



Item	Part No.	Description	Qty.
	6550075	**ACCUMULATOR ASSEMBLY** Includes the following items:	
1	6550056	ACCUMULATOR COVER	1
2	6550555	ACCUMULATOR BASE	1
3	6257070	GAS VALVE	1
4	6550045	DIAPHRAGM	1
5	6550164	ORIFICE ASSEMBLY	1
6	*	O-RING	1
7	*	BACKUP RING	1
8	6230540	BOLT	16

* See Accumulator Seal Kit page 191

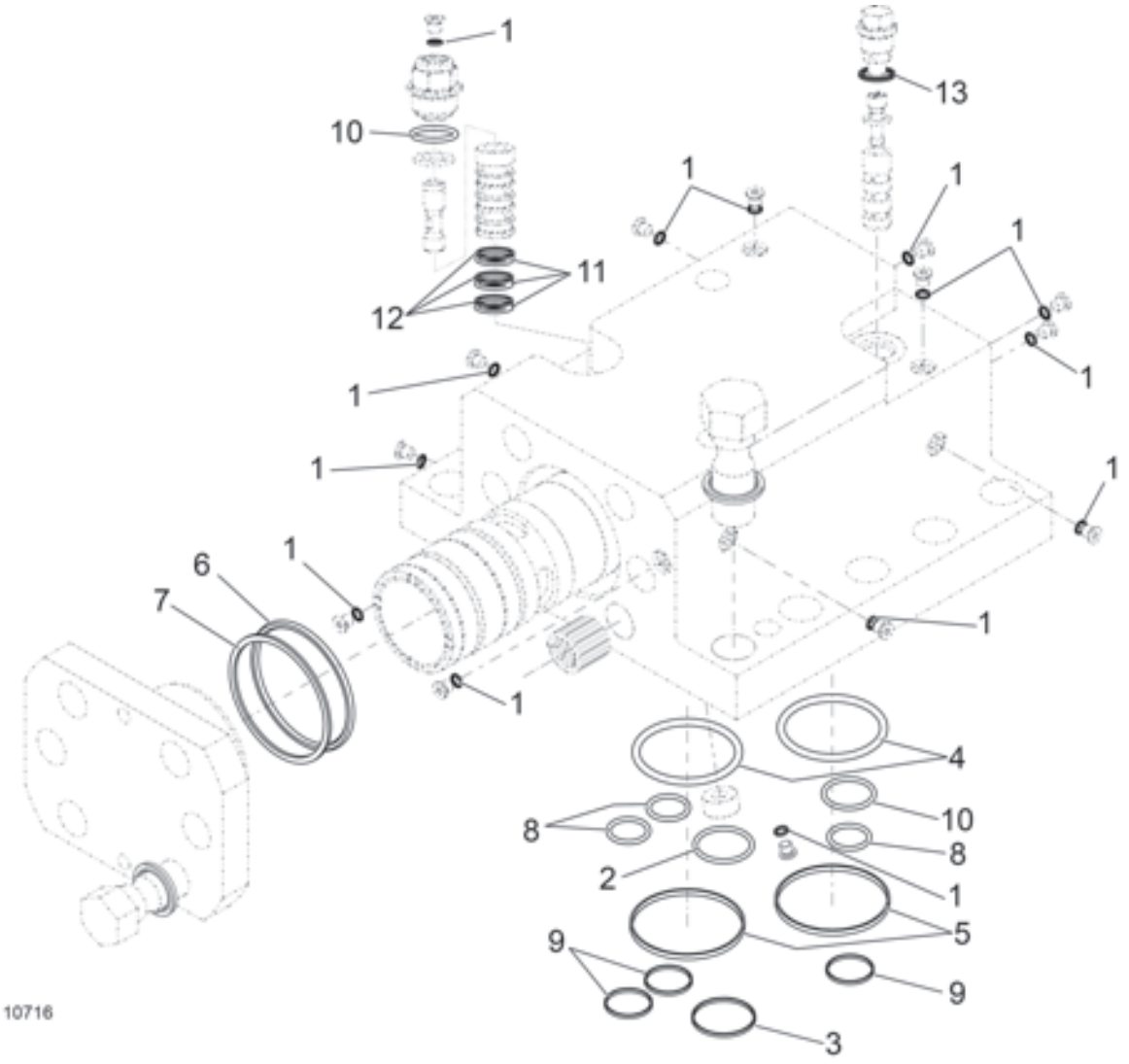
BXR160	MASTER SEAL KIT



Item	Part No.	Description	Qty.
	6550098	**MASTER SEAL KIT** Includes the following items:	
1	**6550065**	**ACCUMULATOR SEAL KIT** (See page 191)	1
2	**6550100**	**CONTROL VALVE SEAL KIT** (See page 189)	1
3	**6550099**	**INTERNAL SEAL KIT** (See page 190)	1

* **NOTE:** Seals not available separately
Bladder sold separately.

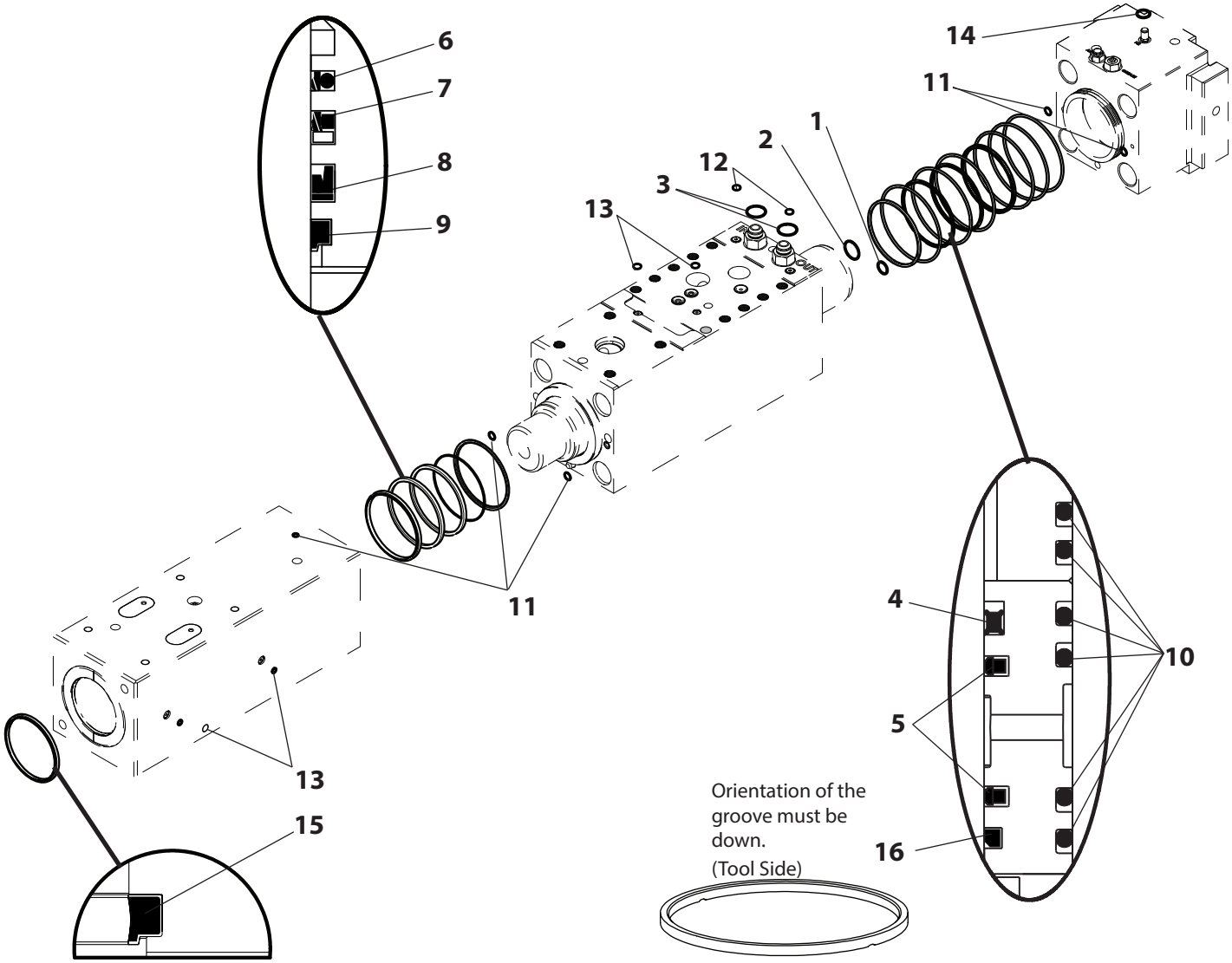
BXR160 | CONTROL VALVE SEAL KIT



Item	Part No.	Description	Qty.
	6550100	**CONTROL VALVE SEAL KIT** Includes the following items:	
1	6550302	O-RING	12
2	6550303	O-RING	1
3	6550402	BACKUP RING	1
4	6550304	O-RING	2
5	6550403	BACKUP RING	2
6	6230546	O-RING	1
7	6550404	BACKUP RING	1
8	6130002	O-RING	2
9	6550405	BACKUP RING	2
10	6550306	O-RING	1
11	6550407	BACKUP RING	3
12	6550309	O-RING	3
13	6131539	O-RING	1
14	6550406	BACKUP RING	1
15	6501563	O-RING	1

NOTE: Items not available separately

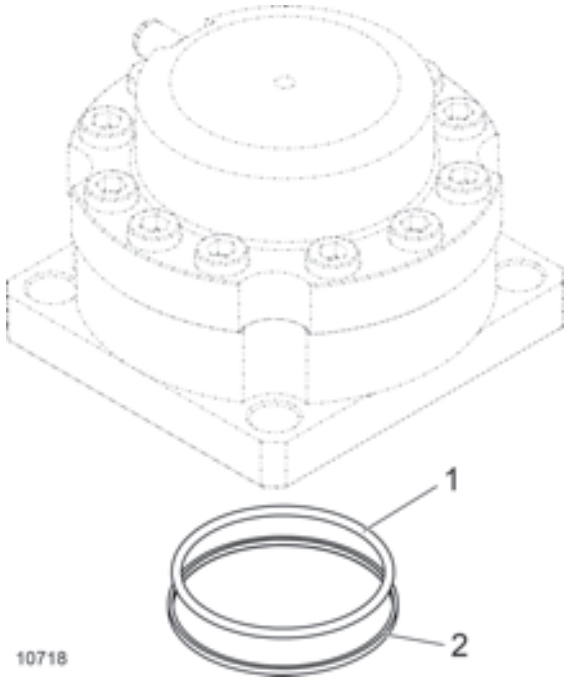
BXR160 — INTERNAL SEAL KIT



Item	Part No.	Description	Qty.
	6400099	**INTERNAL SEAL KIT** Includes the following items:	
1	6360046	O-RING	1
2	6550308	O-RING	1
3	6550307	O-RING	2
4	6550082	QUAD RING	1
5	6550085	STEP SEAL	2
6	6550083OMS	BUFFER SEAL	1
7	6550084OMS	BUFFER SEAL	1
8	6550084	U-PACKING	1
9	6550086	DUST SEAL	1
10	6551134	O-RING	6
11	6500088	O-RING	5
12	6500007	O-RING	2
13	6700007	O-RING	4
14	6131539	O-RING	1
15	6550200	DUST SEAL	1
16	6551083	BUFFER SEAL	1

NOTE: Items not available separately

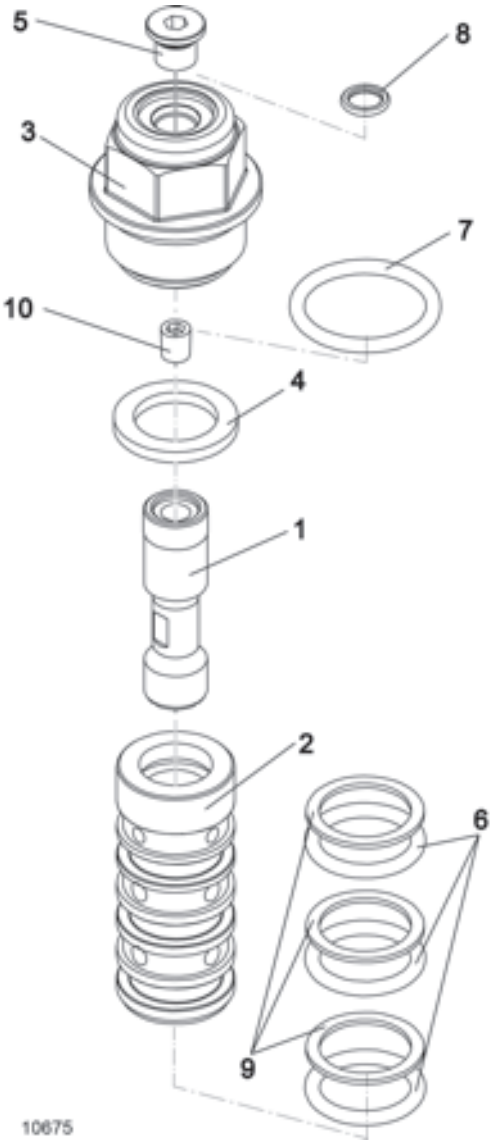
BXR160	ACCUMULATOR SEAL KIT



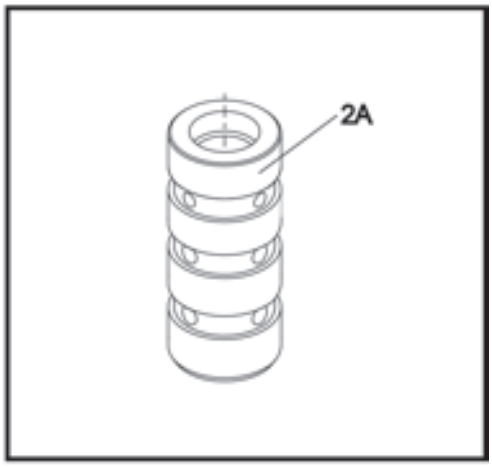
Item	Part No.	Description	Qty.
	6550065	**ACCUMULATOR SEAL KIT** Includes the following items:	
1	6550300	O-RING	1
2	6550400	BACKUP RING	1

NOTE: Items not available separately

STROKE ADJUSTER ASSEMBLY



ALL MODELS

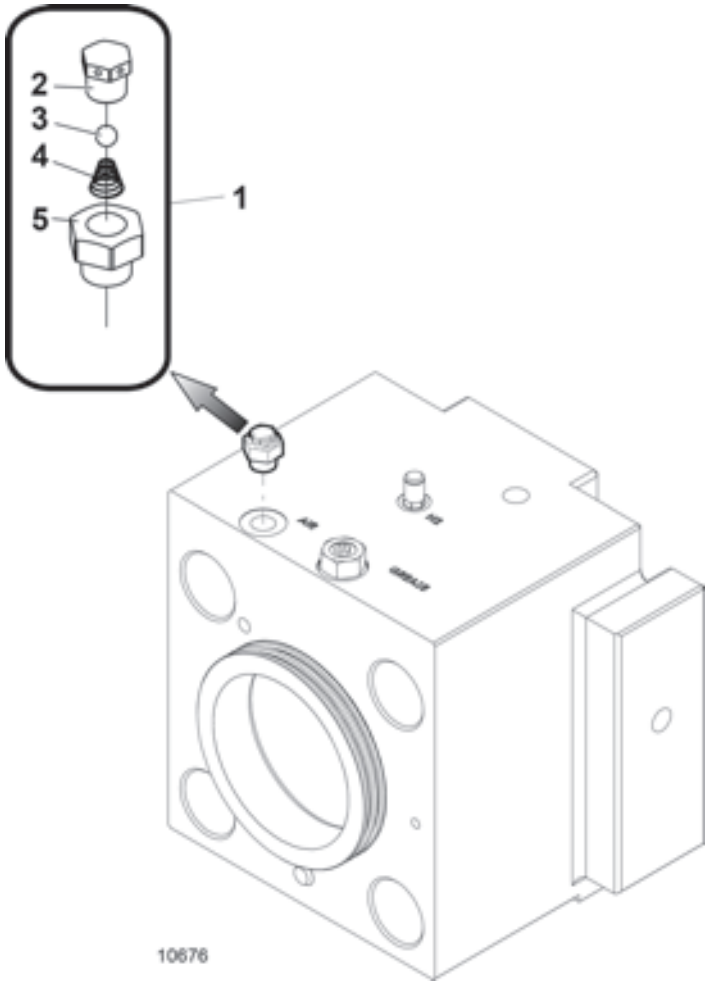


Item	Part No.	Description	Qty.
	6550120	**STROKE ADJUSTER ASSEMBLY** Includes the following items:	
1	6550020	STROKE ADJUSTER VALVE	1
2	6550021	STROKE ADJUSTER BUSHING	1
2A	6550021A	STROKE ADJUSTER BUSHING (OPTIONAL)	1
3	6550022	STROKE ADJUSTER CAP	1
4	6550023	BRASS WASHER	1
5	6550700	PLUG	1
6	6550309	O-RING	3
7	6131539	O-RING	1
8	6550302	O-RING	1
9	6550407	BACKUP RING	3
10	6550028	NPT PLUG	1

NOTE: Item 6 and Item 9 (o-rings and back-up rings) are not required if Stroke Adjuster Bushing (2A) is used.

AIR VALVE ASSEMBLY

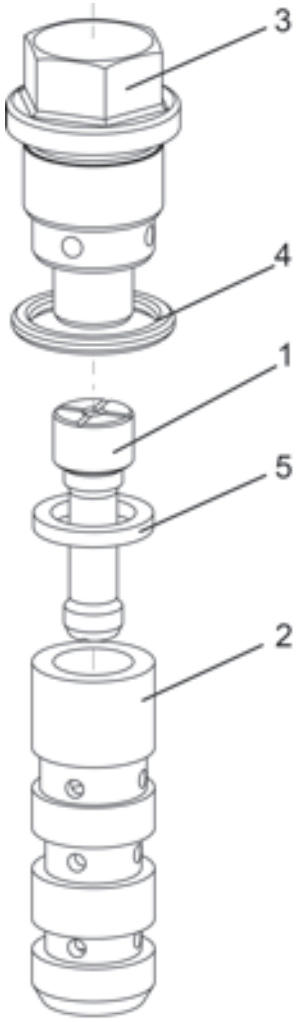
ALL MODELS

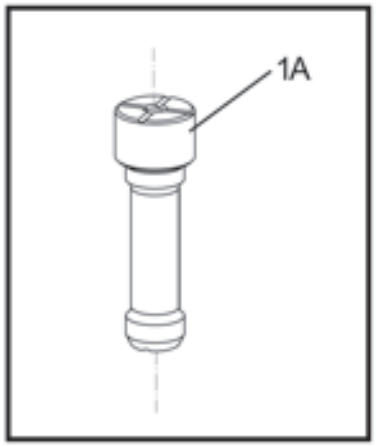


Item	Part No.	Description	Qty.
1	**6557527**	**AIR VALVE ASSEMBLY** Includes the following items:	1
2	6557528	AIR VALVE CAP	1
3	6557529	AIR BALL	1
4	6557530	AIR SPRING	1
5	6557531	AIR BASE	1

REGENERATION VALVE

ALL MODELS





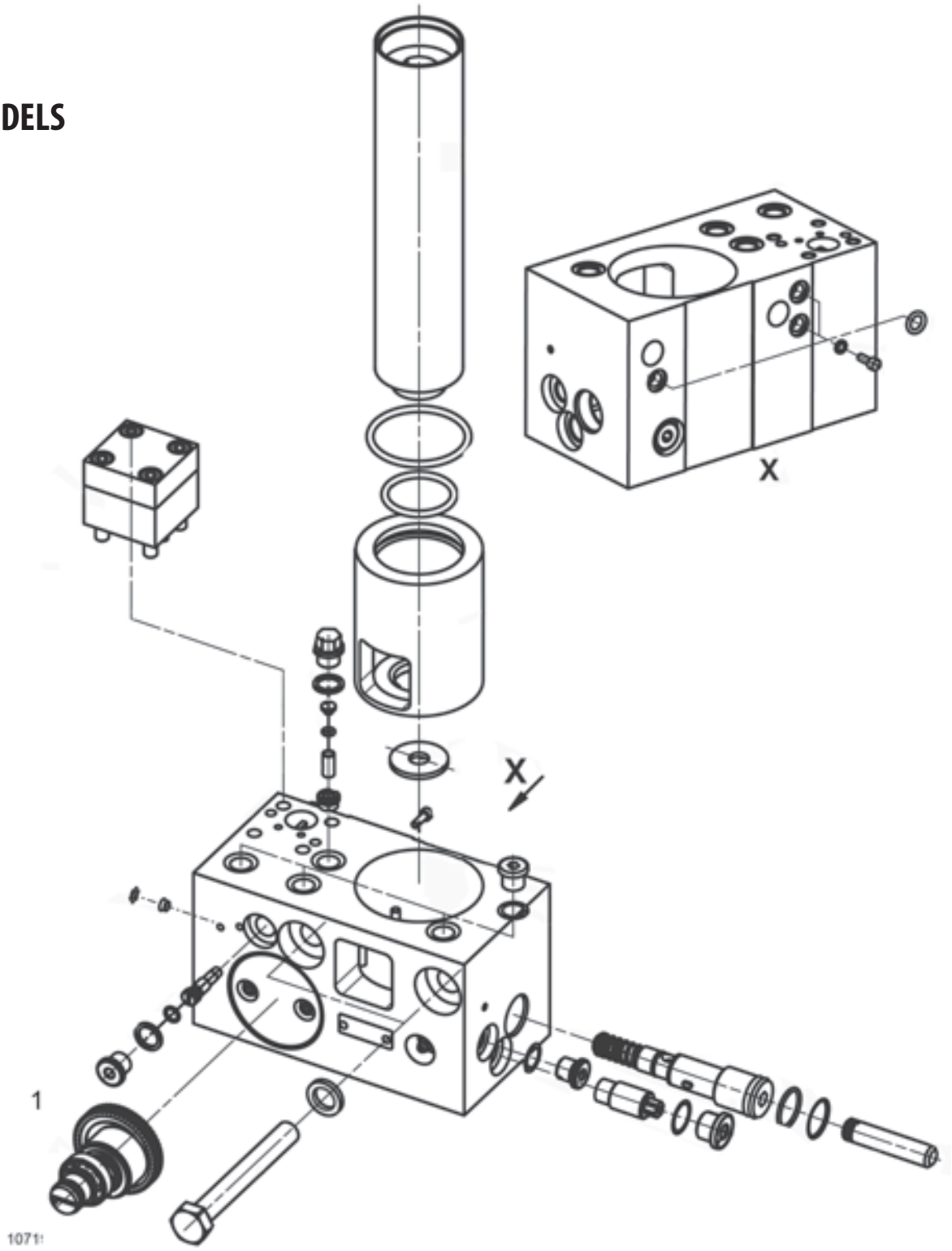
10677

Item	Part No.	Description	Qty.
	6550018	**REGENERATION VALVE** Includes the following items:	
1	6550015	PILOT VALVE	1
1A	6550015L	PILOT VALVE OPTION (For Cold Weather Application)	REF
2	6550016	PILOT VALVE BUSHING	1
3	6550017	REGENERATION VALVE CAP	1
4	6501563	O-RING	1
5	6550027	CRUSHED BRASS WASHER	1

NOTES

BXR AUTO-LUBE SYSTEM

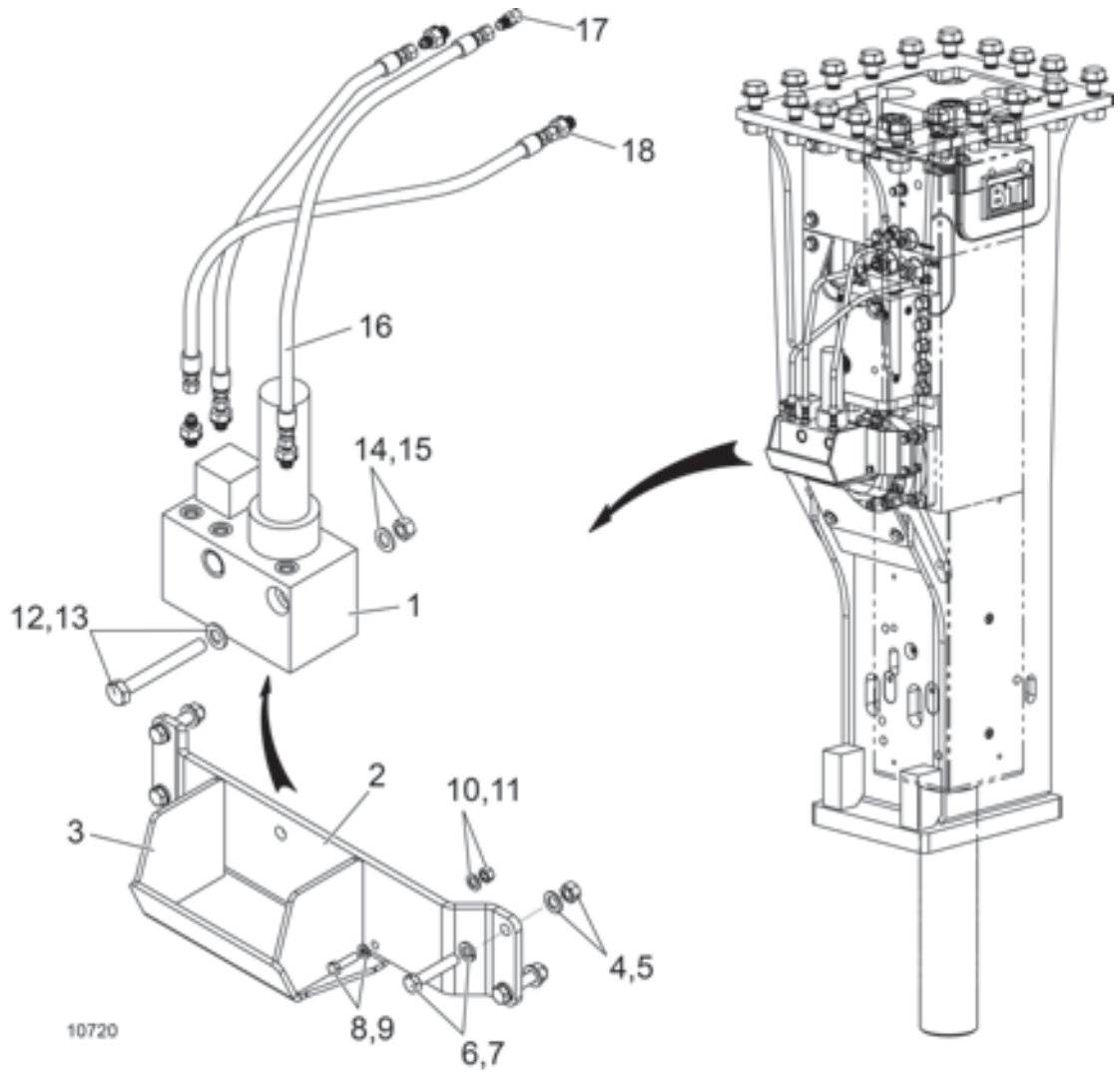
ALL MODELS



BXR AUTO-LUBE SYSTEM

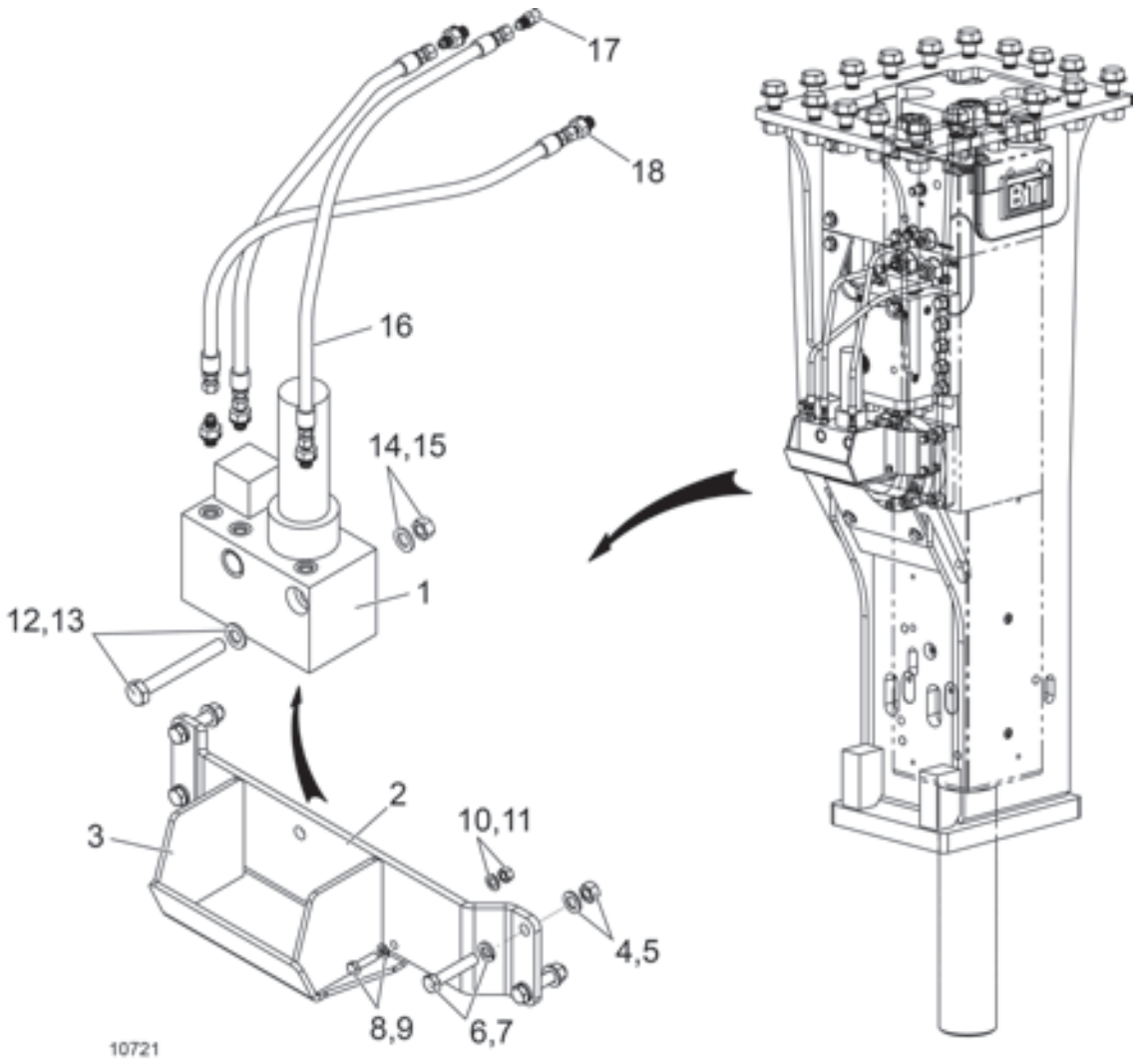
Item	Part No.	Description	Qty.
	1012511	**BXR AUTO-LUBE SYSTEM** Includes the following items:	
1	1012511-1	HYDRAULIC MOTOR	1
2	1012511-2	FILTER PLUG SCREW	1
3	1012511-3	CU-SEALING RING	8
4	1012511-4	THRUST PIECE	1
5	1012511-5	O-RING	1
6	1012511-6	STRAINER	1
7	1012511-7	DIAPHRAGM	1
8	1012511-8	THROTTLE	1
9	1012511-9	O-RING	1
10	1012511-10	SCREW PLUG	7
11	1012511-11	ECCENTRIC UNIT	1
12	1012533	CARTRIDGE	1
13	1012511-13	O-RING	1
14	1012511-14	O-RING	1
15	1012511-15	CARTRIDGE ADAPTER	1
16	1012511-16	FLAT SEAL	1
18	1012511-18	LOCKWASHER	2
19	1012511-19	HEX BOLT	2
25	1012511-25	PRESSURE RELIEF VALVE	1
26	1012511-26	CU-SEALING RING	1
27	1012511-27	SCREW PLUG	1
29	1012511-29	PUMPING ELEMENT	1
30	1012511-30	O-RING	1
31	1012511-31	BACKUP RING	1
32	1012511-32	PULLING DEVICE	1
33	1012511-33	O-RING	3
34	1012511-34	CU-SEALING RING	3
35	1012511-35	HEX SOCKET SCREW	3
36	1012511-36	SCALLOPED RING	1
37	1012511-37	VALVE SLEEVE	1

BXR50 AUTO GREASE SYSTEM



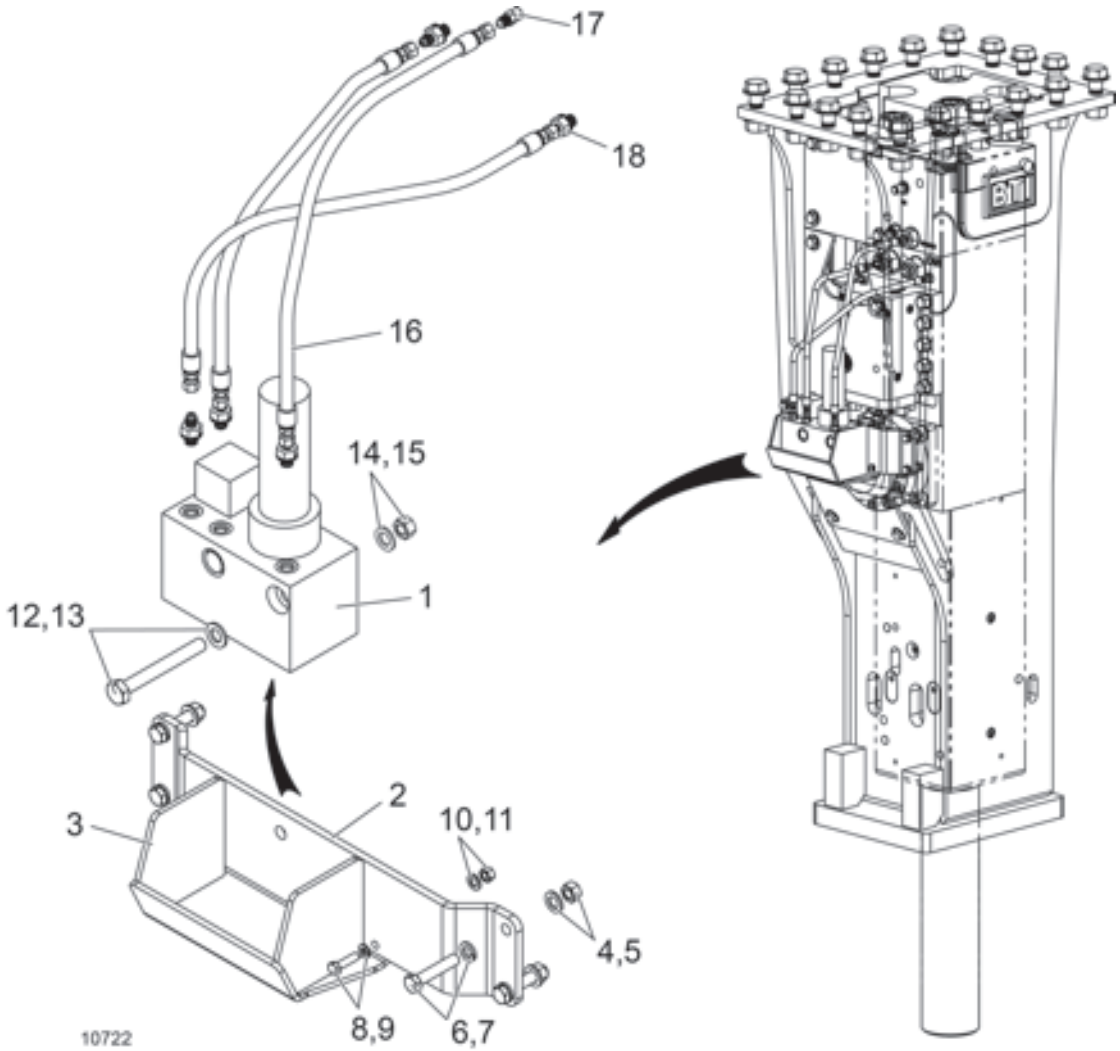
Item	Part No.	Description	Qty.
	444-0200	**BXR50 AUTO GREASE SYSTEM** Includes the following items:	
1	1012511	GREASE PUMP	1
2	444-0201	GUARD MOUNT PLATE	1
3	444-0204	GUARD WELDMENT	1
4	1941035	FLAT WASHER	4
5	1931002	HEX NUT	4
6	1912555	HEX CAPSCREW	4
7	1942014	LOCK WASHER	4
8	1912603	HEX CAPSCREW	2
9	1942011	LOCK WASHER	2
10	1931000	HEX NUT	2
11	1941029	FLAT WASHER	2
12	1912602	HEX CAPSCREW	2
13	1942024	LOCK WASHER	2
14	1931058	HEX NUT	2
15	1941045	FLAT WASHER	2
16	HK-0063	BXR50 GREASE HOSE KIT	1
17	1800096	FITTING	1
18	1801478	FITTING	5

BXR65 AUTO GREASE SYSTEM



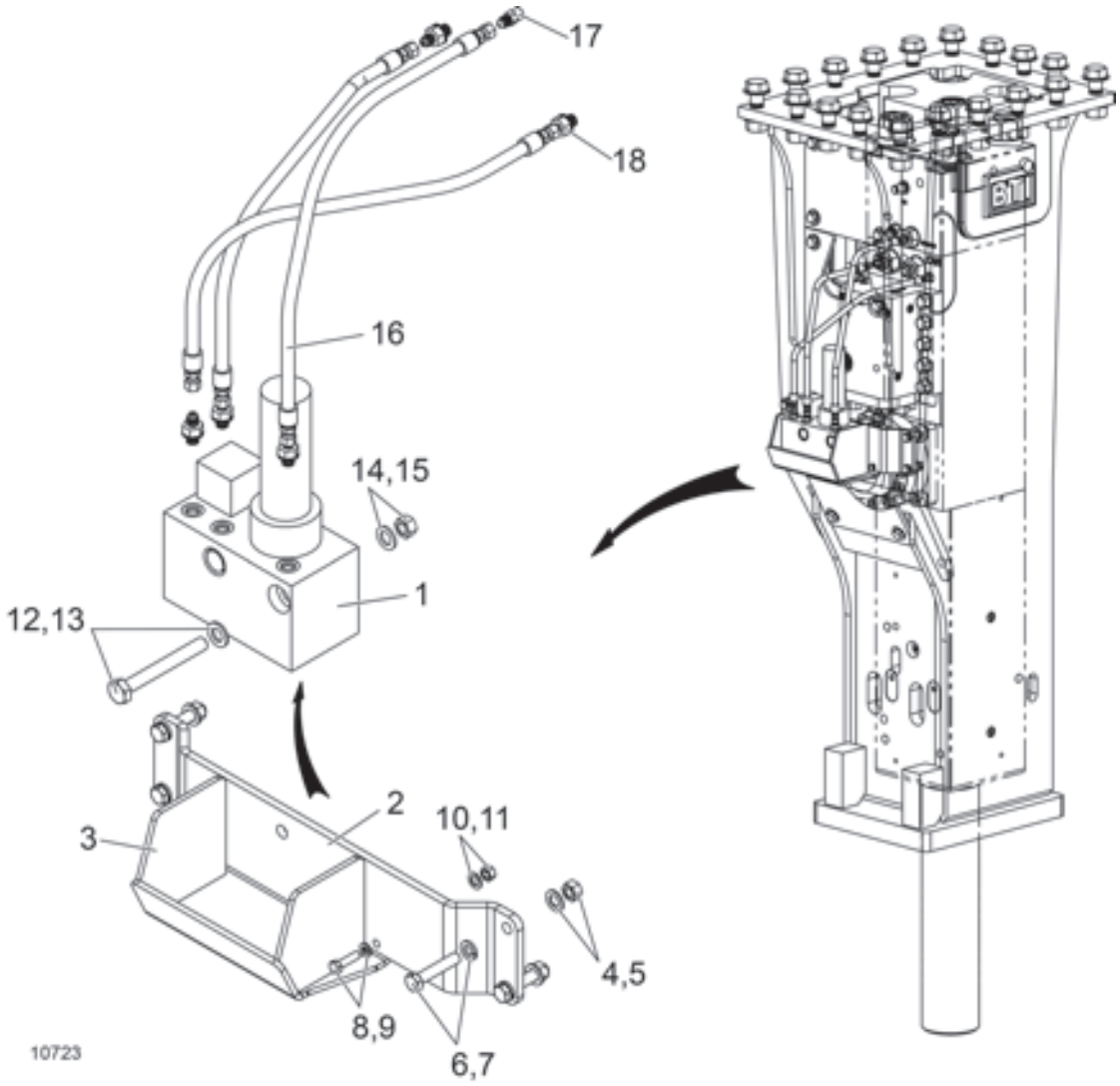
Item	Part No.	Description	Qty.
	454-0200	**BXR65 AUTO GREASE SYSTEM** Includes the following items:	
1	1012511	GREASE PUMP	1
2	444-0201	GUARD MOUNT PLATE	1
3	444-0204	GUARD WELDMENT	1
4	1941035	FLAT WASHER	4
5	1931002	HEX NUT	4
6	1912555	HEX CAPSCREW	4
7	1942014	LOCK WASHER	4
8	1912603	HEX CAPSCREW	2
9	1942011	LOCK WASHER	2
10	1931000	HEX NUT	2
11	1941029	FLAT WASHER	2
12	1912602	HEX CAPSCREW	2
13	1942024	LOCK WASHER	2
14	1931058	HEX NUT	2
15	1941045	FLAT WASHER	2
16	HK-00631	BXR65 GREASE HOSE KIT	1
17	1800096	FITTING	1
18	1801478	FITTING	5

BXR85 AUTO GREASE SYSTEM



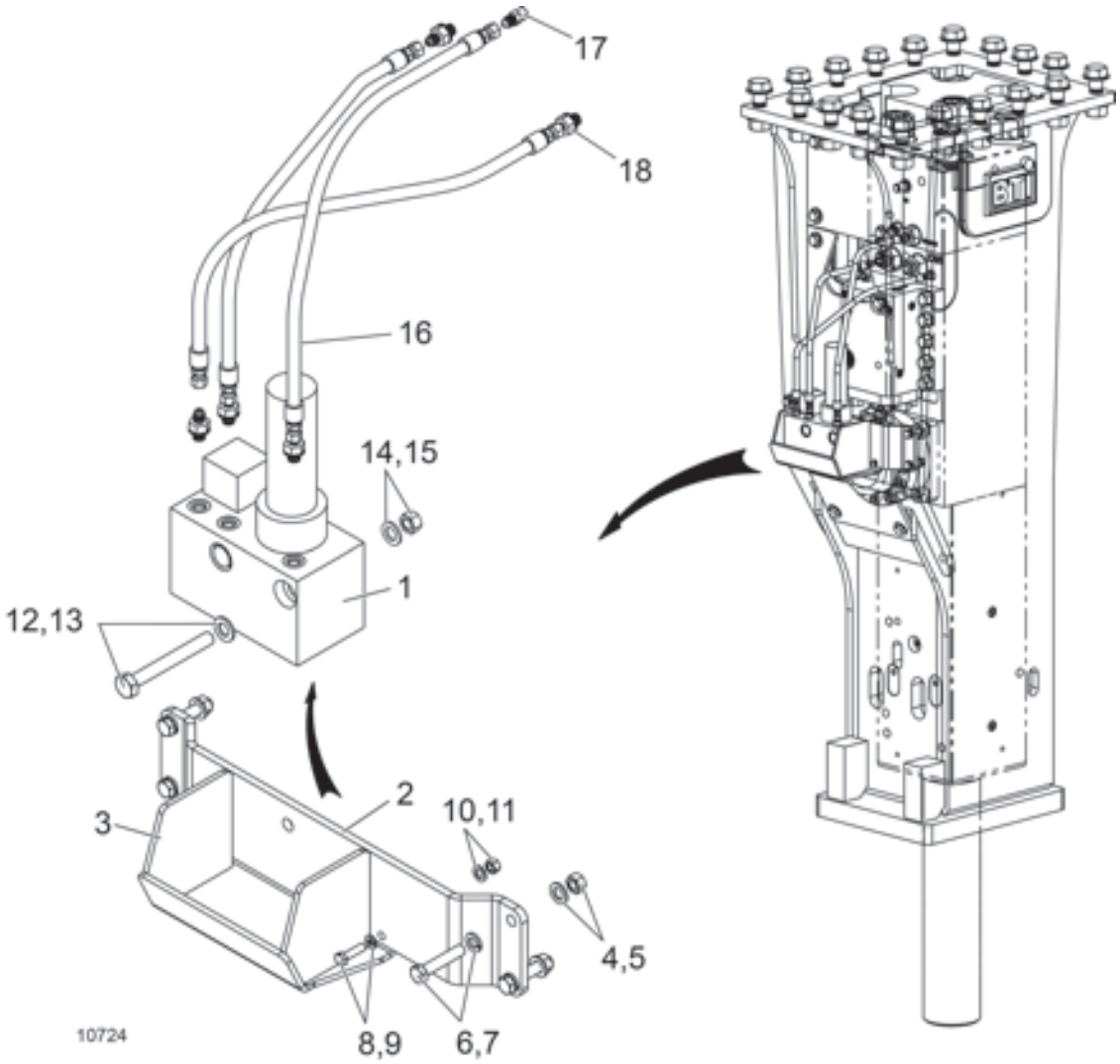
Item	Part No.	Description	Qty.
	464-0200	**BXR85 AUTO GREASE SYSTEM** Includes the following items:	
1	1012511	GREASE PUMP	1
2	464-0201	GUARD MOUNT PLATE	1
3	444-0204	GUARD WELDMENT	1
4	1941035	FLAT WASHER	4
5	1931002	HEX NUT	4
6	1912555	HEX CAPSCREW	4
7	1942014	LOCK WASHER	4
8	1912603	HEX CAPSCREW	2
9	1942011	LOCK WASHER	2
10	1931000	HEX NUT	2
11	1941029	FLAT WASHER	2
12	1912602	HEX CAPSCREW	2
13	1942024	LOCK WASHER	2
14	1931058	HEX NUT	2
15	1941045	FLAT WASHER	2
16	HK-00632	BXR85 GREASE HOSE KI	1
17	1800096	FITTING	1
18	1801478	FITTING	5

BXR100 AUTO GREASE SYSTEM



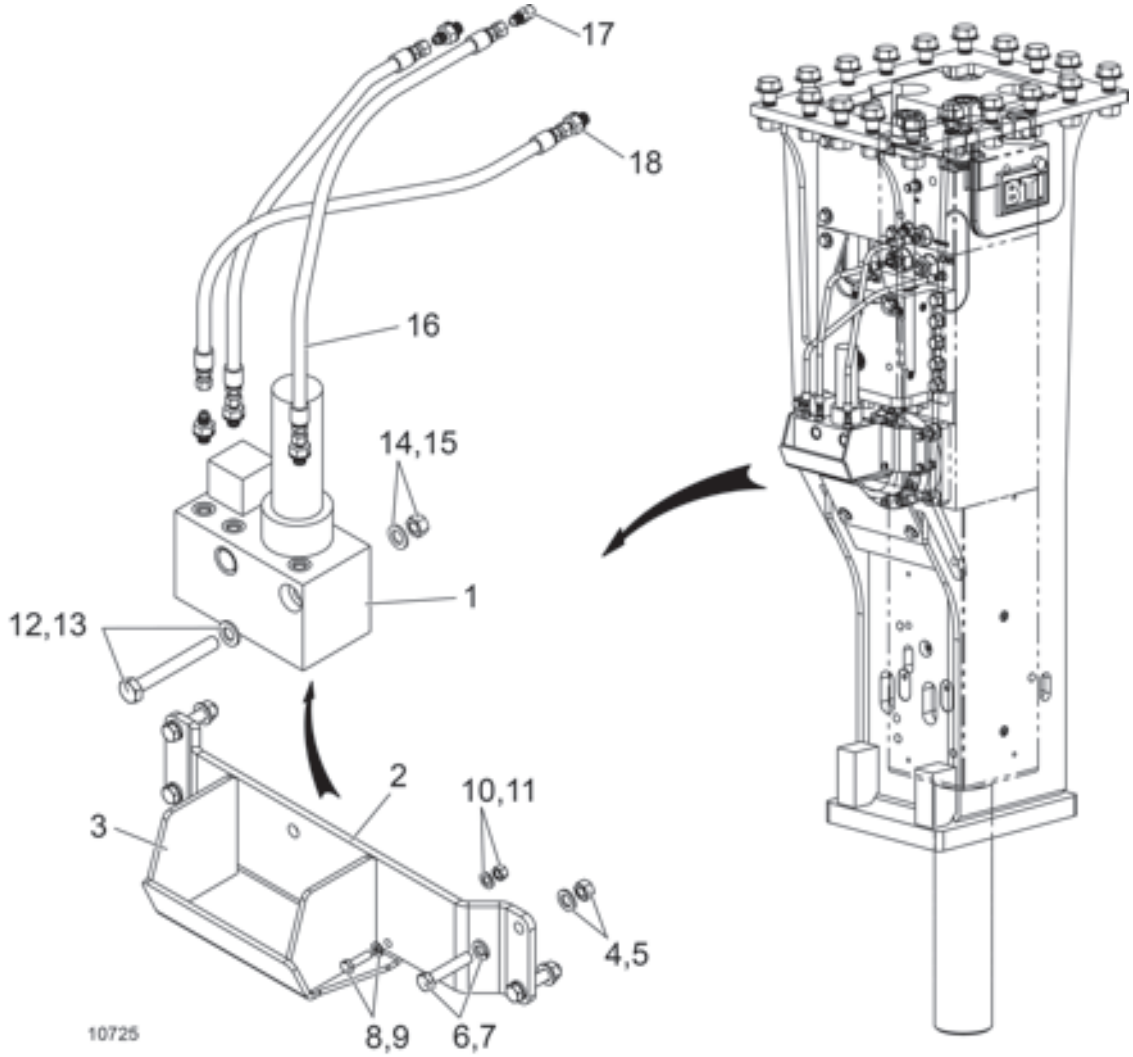
Item	Part No.	Description	Qty.
	475-0200	**BXR100 AUTO GREASE SYSTEM** Includes the following items:	
1	1012511	GREASE PUMP	1
2	475-0201	GUARD MOUNT PLATE	1
3	444-0204	GUARD WELDMENT	1
4	1941035	FLAT WASHER	4
5	1931002	HEX NUT	4
6	1912555	HEX CAPSCREW	4
7	1942014	LOCK WASHER	4
8	1912603	HEX CAPSCREW	2
9	1942011	LOCK WASHER	2
10	1931000	HEX NUT	2
11	1941029	FLAT WASHER	2
12	1912602	HEX CAPSCREW	2
13	1942024	LOCK WASHER	2
14	1931058	HEX NUT	2
15	1941045	FLAT WASHER	2
16	HK-00633	BXR100 GREASE HOSE KIT	1
17	1800096	FITTING	1
18	1801478	FITTING	5

BXR120 AUTO GREASE SYSTEM



Item	Part No.	Description	Qty.
	474-0200	**BXR120 AUTO GREASE SYSTEM** Includes the following items:	
1	1012511	GREASE PUMP	1
2	474-0201	GUARD MOUNT PLATE	1
3	444-0204	GUARD WELDMENT	1
4	1941035	FLAT WASHER	4
5	1931002	HEX NUT	4
6	1912555	HEX CAPSCREW	4
7	1942014	LOCK WASHER	4
8	1912603	HEX CAPSCREW	2
9	1942011	LOCK WASHER	2
10	1931000	HEX NUT	2
11	1941029	FLAT WASHER	2
12	1912602	HEX CAPSCREW	2
13	1942024	LOCK WASHER	2
14	1931058	HEX NUT	2
15	1941045	FLAT WASHER	2
16	HK-00634	BXR120 GREASE HOSE KIT	1
17	1800096	FITTING	1
18	1801478	FITTING	5

BXR160 AUTO GREASE SYSTEM



Item	Part No.	Description	Qty.
	481-0200	**BXR160 AUTO GREASE SYSTEM** Includes the following items:	
1	1012511	GREASE PUMP	1
2	481-0201	GUARD MOUNT PLATE	1
3	444-0204	GUARD WELDMENT	1
4	1941035	FLAT WASHER	4
5	1931002	HEX NUT	4
6	1912555	HEX CAPSCREW	4
7	1942014	LOCK WASHER	4
8	1912603	HEX CAPSCREW	2
9	1942011	LOCK WASHER	2
10	1931000	HEX NUT	2
11	1941029	FLAT WASHER	2
12	1912602	HEX CAPSCREW	2
13	1942024	LOCK WASHER	2
14	1931058	HEX NUT	2
15	1941045	FLAT WASHER	2
16	HK-00635	BXR160 GREASE HOSE KIT	1
17	1800096	FITTING	1
18	1801478	FITTING	5

NOTES

Hydraulic Breaker Warranty Policy

REV 09/04

WARRANTY POLICY

1. BREAKER TECHNOLOGY INC. Company (hereinafter referred to as "BTI") warrants this product against defects in materials and workmanship for a period of twelve (12) months or 2000 hours from the date of installation, or 18 months from the date of shipment, whichever comes first. This warranty will become void if, (a) replacement parts not manufactured by BTI are used, and (b) non-standard length tools are used. This warranty does not cover o-rings, seals, fittings, hoses, breaker tools or other items considered normal wear items. These are covered by the Limited Warranty period of thirty (30) days. Warranty for propriety items such as valves, filters, installation kits, and componentry that are not manufactured by BTI, will be governed by the warranty terms of their manufacturer. This warranty is void if BTI's standard installation specifications and procedures are not adhered to.

2. BTI will authorize return of any defective components or sufficient evidence of such defect to a BTI warehouse. Such components or such evidence must clearly show that the defect was caused by faulty material or poor workmanship. Warranty claim will be accepted only if it is submitted on a proper claims form with proof of purchase and received within sixty (60) days from the date of discovery of the defect. Warranty claims will be considered only if the "Installation Notice" has been duly filled in and returned to BTI's within thirty (30) days from the date of installation.

3. BTI will at it's option, repair or refurbish the defective part(s) without charge to the initial user or may elect to issue full or partial credit toward the purchase of a new part(s). The extent of credit issued, which will be in the form of a "Credit Memo", will be determined by pro-rating against the normal life of the part(s) in question.

4. BTI is not responsible for mileage, travel time, travel expenses, overtime labor, and any freight expenses required to facilitate the repair.

5. This warranty does not apply if the product has been damaged by accident, abuse, misuse, misapplication or neglect, or as a result of service, disassembly or modification, without BTI's express authorization.

6. BTI assumes no liability beyond the replacement of defective parts or materials and/or the correction of such defective parts or materials.

7. BTI neither assumes nor authorizes any other person to assume for it any liability in connection with the sale of its products other than that specifically stated herein.

8. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY AND ALL OTHER WARRANTIES. EXCEPT AS EXPRESSLY SET FORTH HEREIN, BTI MAKES NO REPRESENTATION OR WARRANTY, STATUTORY, EXPRESS OR IMPLIED, WITH RESPECT TO THE PRODUCTS MANUFACTURED AND/OR SUPPLIED BY BTI, WHETHER AS TO MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER MATTER. IN NO EVENT, INCLUDING IN THE CASE OF A CLAIM OF NEGLIGENCE, SHALL BTI BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

10249-ENG-0904

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Breaker Technology Ltd.
35 Elgin St.
Thornbury Ontario,
N0H 2P0 Canada
PH. 519-599-2015
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Reference Information

Hardness of Rock

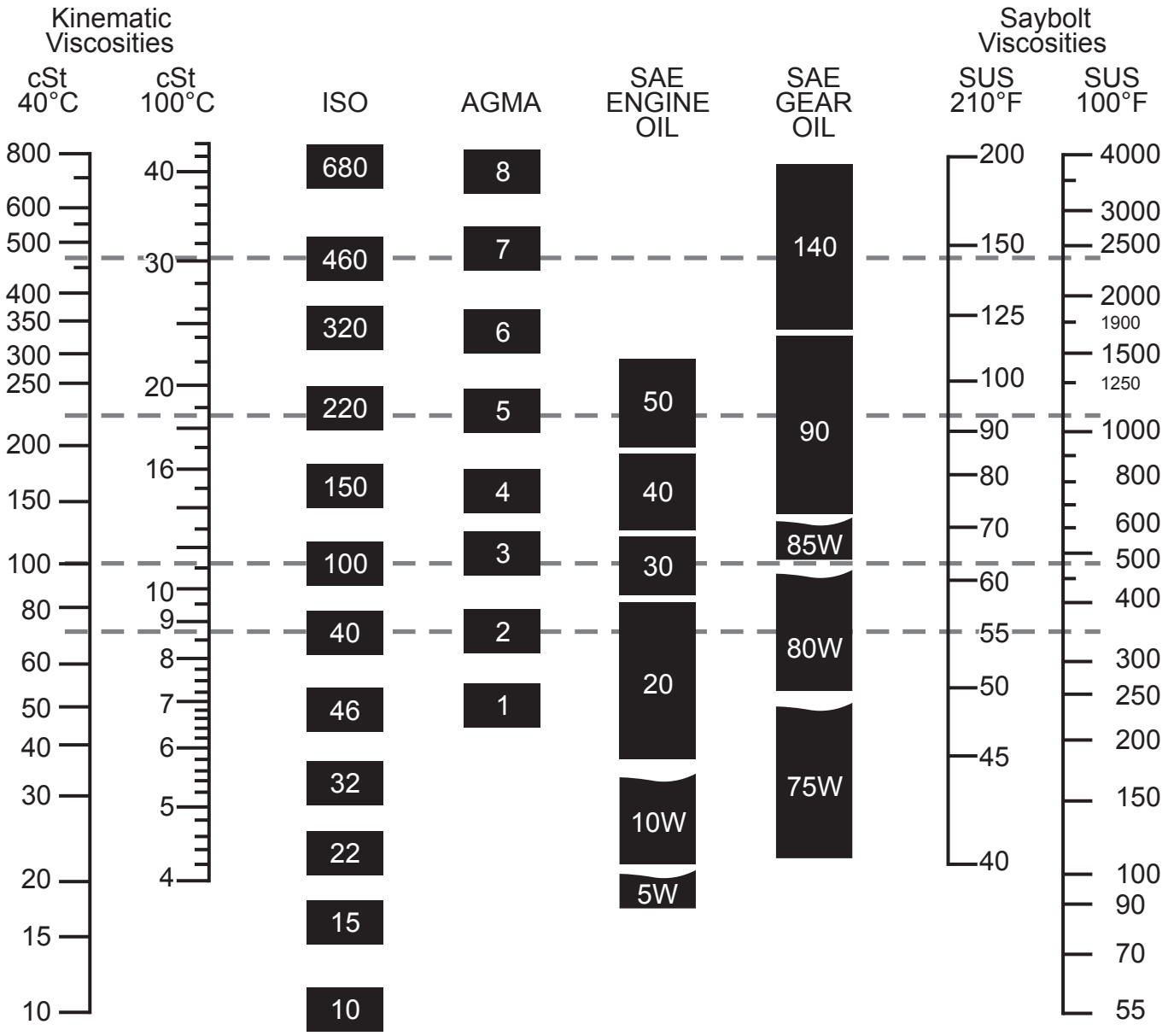
Soft	Medium	Hard	Very Hard
Talc	Limestone	Granite	Iron ore (Taconite)
Slate	Dolomite	Quartzite	Granite
Gypsum rock	Sandstone	Iron ore	Grantic gravel
Asbestos rock	Copper Ore	Trap rock	Trap rock
Soft limestone		Gravel	
		Gabro	

MOHS Scale of Hardness		Testing (you can do in the field)	
1 - Talc	6 - Orthoclase	Scratched with:	Hardness:
2 - Gypsum	7 - Quartz	Fingernail	little over 2
3 - Clacite	8 - Topaz	Copper coin.	about 3
4 - Flourite	9 - Corundum	Pocket knife	little over 5
5 - Apatite	10 - Diamond	Window glass	5.5
		Steel file	6.5

Viscosity Conversion Table

POISE	CENTIPOISE	DUPONT PARLIN 7	DUPONT PARLIN 10	FISHER 1	FISHER 2	FORD CUP 3	FORD CUP 4	GARDNER HOLDT BUBBLE	KREBS UNITS KU	SAYBOLT UNIVERSAL SSU	ZAHN 1	ZAHN 2	ZAHN 3	ZAHN 4	ZAHN 5	SEARS CRAFTSMAN CUP	REDWOOD No. 1 SEC	SAYBOLT FUROL SEC	REDWOOD No. 2 SEC
0.10	10	27	11	20			5	A-4		60	30	16					54		
0.15	15	30	12	25			8	A-3		80	34	17					70		
0.20	20	32	13	30	15	12	10			100	37	18					98		
0.25	25	37	14	35	17	15	12	A-2		130	41	19					106		
0.30	30	43	15	39	18	19	14	A-1		160	44	20					125		
0.40	40	50	16	50	21	25	18	A		210	52	22				19	165		
0.50	50	57	17		24	29	22		30	260	60	24				20	203		
0.60	60	64	18		29	33	25	B	33	320	68	27				21	245	30.8	
0.70	70		20		33	36	28		35	370		30				23	286	35.0	30.05
0.80	80		22		39	41	31	C	37	430		34				24	327	40.0	34.00
0.90	90		23		44	45	32		38	480		37	10			26	368	44.7	37.85
1.00	100		25		50	50	34	D	40	530		41	12	10		27	409	47.8	41.90
1.20	120		30		62	58	41	E	43	580		49	14	11		31	485	58.2	49.80
1.40	140		32			66	45	F	46	690		58	16	13		34	570	66.8	57.90
1.60	160		37				50	G	48	790		66	18	14		38	645	76.4	66.00
1.80	180		41				54		50	900		74	20	16		40	735	86.3	74.15
2.00	200		45				58	H	52	1000		82	23	17	10	44	815	95.8	82.35
2.20	220						62	I	54	1100			25	18	11		900	104.6	90.00
2.40	240						65	J	56	1200			28	19	12		985	113.5	97.75
2.60	260						68		58	1280			30	21	13		1060	124.5	105.60
2.80	280						70	K	59	1380			32	22	14		1140	137.5	114.90
3.00	300						74	L	60	1475			34	24	15		1235	143.2	123.75
3.20	320							M		1530			36	25	16		1300	151.8	131.65
3.40	340							N		1630			39	26	17		1390	161.3	139.50
3.60	360							O	62	1730			41	28	18		1465	171.5	149.00
3.80	380									1850			43	29	19		1550	180.0	157.55
4.00	400							P	64	1950			46	30	20		1635	189.5	166.35
4.20	420									2050			48	32	21		1695	199.5	171.65
4.40	440							Q		2160			50	33	22		1790	209.5	183.50
4.60	460							R	66	2270			52	34	23		1837	218.4	188.65
4.80	480								67	2380			54	36	24		1950	228.9	198.75
5.00	500							S	68	2480			57	37	25		2045	239.4	208.85
5.50	550							T	69	2660			63	40	27		2240	259.7	229.95
6.00	600							U	71	2900			68	44	30		2433	287.6	248.50
7.00	700								74	3375				51	35		2850	332.4	289.60
8.00	800								77	3880				58	40		3270	380.1	329.75
9.00	900							V	81	4300				64	45		3690	427.8	368.85
10.00	1000							W	85	4600					49		4000	479.6	408.70
11.00	1100								88	5200					55				

Fluid Grade Systems



Viscosities can be related horizontally only. For example, the following oils have similar viscosities: ISO 460, AGMA 7 and SAE GEAR OIL 140.

The viscosity/temperature relationships are based on 95 VI oils and are usable only for mono grade engine oils, gear oils and other 95 VI oils.

Crankcase oils and gear oils are based on 100°C viscosity. The "W" grades are classified on low temperature properties. ISO oils and AGMA grades are based on 40 °C viscosity.

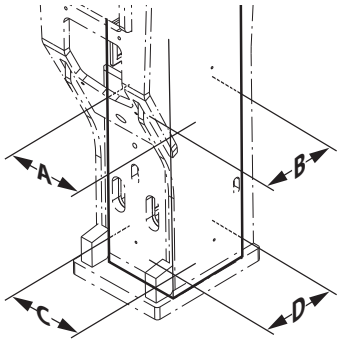
Box Housing Measurement Data Sheet

Breaker Model: _____ Date of Service: _____

Serial No: _____ Reference No: _____

STEP 1

Measure minimum dimension inside housing at positions A, B, C, & D.

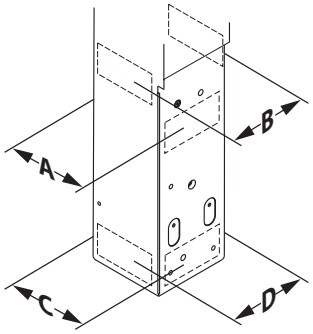


Minimum Housing Inside Dimension

Position A		Position C	
Position B		Position D	

STEP 2

Measure maximum dimension outside breaker body at positions A, B, C, & D.



Maximum Breaker Dimension

Position A		Position C	
Position B		Position D	

STEP 3

Measure support pad thickness (qty 2) for each position A, B, C, & D.

Support Pad Thickness Total (qty 2)

Position A		Position C	
Position B		Position D	

STEP 4

Add Step 2 and 3 together, then add .006 in (0,15 mm). Do this for each position A, B, C, & D.

Add Step 2, Step 3, + .006 in (0,15 mm)

Position A		Position C	
Position B		Position D	

STEP 5

Subtract Step 4 from Step 1 for each position A, B, C, & D.
This is the required shim thickness. Position equal number of shims on both sides if possible.

Total Shim Thickness Required

Position A		Position C	
Position B		Position D	

BREAKER TECHNOLOGY, INC.
an Astec company

Service Report

Date of Service:_____
Reference No: _____

Base Carrier:	Manufacturer:	Model:	
	Operating Hours:	Remarks:	
Breaker:	Model:	Serial No:	
	Gas Pressure:	Bracket Type:	
	Operating Hours:	Delivered Date:	
Condition of Breaker:	Oil Flow:	GPM	LPM
	Relief Set Pressure:	psi	bar
	Operating Pressure:	psi	bar
	Blows per Minute:		BPM

No: Part No:	Qty: - Evidence - Detail Report ( ) - Photos ( ) - Parts Returned ( )
Inspector's Comment:	Customer's Comment:
Customer: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ Location of Equipment: _ _ _ _ _ _ _ _ _ _ Signature of Inspector: _ _ _ _ _ _ _ _ _ _	Distributor: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ Signature of Customer: _ _ _ _ _ _ _ _ _ _

BREAKER TECHNOLOGY, INC.
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Receiving Inspection Report

Receiving Date: _____
Inspection Date: _____

Check Inspection Items:
Good: **G**
Bad: **B**
Correction made: **C**

Model		Serial No.	
Paint	Main body ( ) Bracket ( )	Spare Parts	
Tool Box		Gas Recharge Kit	

Inspector's Comments:

Distributor: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Signature of Customer: _ _ _ _ _ _ _ _ _ _

BTI use only:

BREAKER TECHNOLOGY, INC.
an Astec company

Delivery Report

Date Received:_____
Reference No: _____

Distributor:
Customer:
Breaker:
Model: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ Serial No: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ Operating Weight: _ _ _ _ _ _ _ _ _ _ _ _ _ _ Operating Hours: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ Operating Pressure: _ _ _ _ _ _ _ _ _ _ _ _ Relief Set Pressure: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ Gas Pressure: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ Others: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
Installation Date: _ _ _ _ _ _ _ _ _ _ _ _ Expiry Date See Warranty
I hereby acknowledge that the breaker has been delivered in satisfactory condition and operates properly; and that I received the owner's manual complete with operation, maintenance, and parts listing; and that all aspects of the standard warranty have been fully explained to me.
Signature of Customer: _ _ _ _ _ _ _ _ _ _ _ Title/Position: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Quantity	SI Unit of Measure	US Unit of Measure	Conversion
Length	Millimeter	Inch (in)	1 in. = 25.4 mm
Pressure	Bar (assumed to be “gauge”	Pounds per sq. inch	1 Bar = 14.5 psi
Pressure	Bar (a value less than 1.0 is shown as a decimal, i.e. 0.95 bar)	Inches of mercury (in Hg)	1 in. Hg (@ 60°F) = 0.034 bar
Flow	Liters per minute (l/min)	Gallons per minute	1 gpm = 3.79 l/m
Flow	Liters per second (l/sec)	Gallons per minute (gpm)-U.S.	1 gpm = 0.063 l/sec
Flow	Cubic decimeters per second	Cubic feet per minute (cfm)	1 dm3/s = 2.12 scfm
Force	Newton (N)	Pound (f) lb(f)	1 lb(f) = 4.44 N
Mass	Kilogram (kg)	Pound (m) lb(m)	1 kg = 2.20 lb(m)
Time	Second (s)	Second (s)	
Volume	Liter (l)	Gallon (gal) U.S.	1 U.S. gal = 3.79 l
Temperature	Degrees Celsius (°C)	Degrees Fahrenheit (°F)	°C = 5/9 (°F -32)
Torque	Kilogram - meters (kg•m)	Foot-pounds (ft•lb)	1 kg•m = 7.23 ft-lb
Power	Kilowatt (kW)	Horsepower (hp)	1 kW = 1.34 hp
Shaft speed	Revolutions per minute (rpm)	Revolutions per minute (rpm)	
Frequency	Hertz (Hz)	Cycles per second (cps)	1 Hz = 1 cps
Displacement	Milliliters per revolution (ml/rev)	Cubic inches per revolution	1 ml/rev = 0.061 cipr
Kinetic Viscosity	Centistokes (cSt)	Saybolt (SUS)	cSt = 4.635 SUS
Velocity	Meter per second (m/s)	Feet per second (fps)	1 m/s = 3.28 fps
Material Stress	Deka newtons per sq.millimeter (da N/mm^2)	Pounds per sq.inch (psi)	1 da N/mm2 = 1450 psi

NOTES