

USUN[®]

GAS BOOSTER MANUAL



OPERATIONS & MAINTENANCE MANUAL (160MM driven)

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1.0 Introduction

His installation and operation manual offers detailed informational service.

Installation and maintenance of some assemblies are similar to maintenance of pumps from other series.

Most of the information contained in this manual is applicable to all USUN Gas Booster Pumps.

2.0 Operation Principles

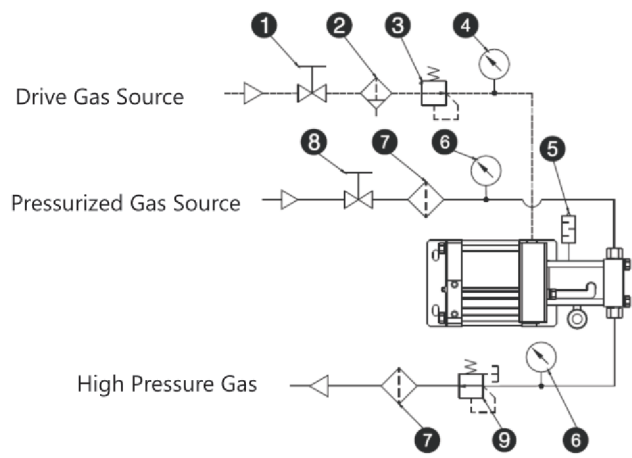
CAUTION!

Misuse of pressurized air or gas might cause serious injuries or even death.

Adopt the following precautionary measures to minimize the risk.

- Before operation carefully read the manual
 - You must wear safety goggles
 - When you are adding pressure do not randomly disconnect high-pressure duct
 - When you are decreasing pressure do not touch outlet of high-pressure gas duct
 - Ensure that input and output pump pressure is compliant with pump's pressure rating
- USUN GB Gas Booster Pump series use a single pneumatic control non-equilibrium gas distributing valve, so the pump can realize automatic reciprocating movement. It is produced entirely from aluminum alloys and stainless steel. The maximum drive pressure is 8.3 Bar. However, to ensure longer pump life, pressure ≤ 7 Bar is recommended. Drive piston diameter of GB series' gas booster pumps is 160 mm. All pump head components have venting and cooling functions.

Figure 1. Classic installation circuit diagram



- 1.Drive air source switch
- 2.Air filter
- 3.Air pressure regulator
- 4.Air pressure gauge
- 5.Silencer
- 6.Pressure gauge
- 7.precision filter
- 8.Needle valve
- 9.Relief valve

3.0 Installation

Drive pressure connection range of USUN GB Gas Booster Pump series is (3- 8.3Bar max).

CAUTION!

Modification or changes of the system (machinery, liquid gas, pneumatic, etc.) may cause harm or damage to the system and injury to operators.

4.0 Operation

- 4.1 Working environment must be free of dust and pests.
- 4.2 Each pressure pump is equipped with two L-shaped biponds , which means that dimensions need to be considered during installation.

4.3 Air source requirements

Solid particles		Pressure dew point		Maximum oil content	
Category	μm	Category	°C	Category	mg/m3
6	≤ 5	4	≤ +3	2	≤ 0.1

Category standard: ISO 8573-1

4.4 Gas insert

On standard drive connection (end thread dimension must be taken into account), connect drive pre-pressured medium. Oil atomizer deployed in drive inlet air lubricates pump's body (we recommend that you add VG32 turbine oil to oil atomizer. Other oils might cause accelerated wear and tear of sealing components).

4.5 Pipe requirements

According to output pressure, you must select pipes that can withstand maximum output pressure of the pump.

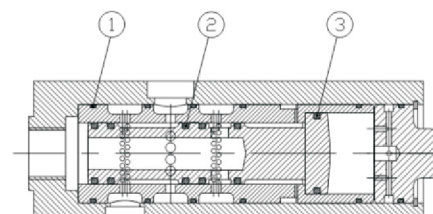
4.6 Activation

- a. Ensure that all joints are tightly screwed and that all components are in their designated positions.
- b. Using relief valve, adjust the pressure to 0 psi.
- c. Open inlet air switch and slowly increase the value on relief valve until you activate the pump (under usual circumstances, activation pressure of the pump is 15~43 psi), continue to adjust and observe the pressure on pressure gauge, until you reach desired pressure.

5.0 Trouble shooting

No.	Symptoms	Malfunction reason analysis	Solution
1	No reciprocating movement in pump, silencer does not vent the air or in small amount	1. Stuck directional valve 2. Clogged silencer	1. Disassemble stuck directional valve spring, and extract directional valve core, clean dirt, apply appropriate amount of lubricant. 2. Disassemble silencer, clean.
2	No reciprocating movement in pump, silencer vents excessive amount of air	O-ring of directional valve core is seriously worn	Extract stuck directional valve ring, use new sealing component to replace damaged sealing component, apply appropriate amount of lubricant and install
3	Pump movement, process is irregular, pump often abnormally accelerates or abnormally decelerates	1. Stuck impactor 2. O-ring impactor detached	1. Unscrew impactor, use cutting pliers to take out impactor and wipe it clean. 2. Unscrew impactor, return O-ring to starting position
4	Pump movement normal, no increased pressure or might increase pressure, but increased pressure does not reach rated pressure.	1. Stuck check valve or check valve has foreign matter in it. 2. Sealing components of pressurizing piston are seriously worn.	1. Inspect single directional valve, clean dirt 2. Remove stuck check valve and replace pressurizing piston sealing component.

6.0 Directional Valve Assembly



NO.	Name	Dimension(mm) internal diameter*wire diameter	Qty
1	O-ring	ID38.5x1.8	6
2	O-ring	ID19.8X2.65	5
3	O-ring	ID28x2.65	1



Actual appearance

6.1 Directional valve assembly

Maintenance , disassembly and explanation of pneumatic directional valve as follows

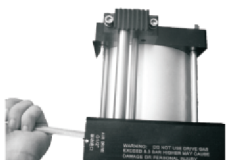
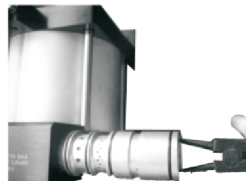

CAUTION!

1. During disassembly and installation process , you must first ensure that drive air source is disconnected , and only then perform the operations described below. otherwise there is a risk of injury or damage.
2. During disassembly and installation , you must be careful to keep note of the sealing rings position . All parts must be kept clean and without damage . Where metal and sealing rings are in contact there must be appropriate silicone used.

Figure 6-1

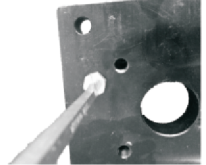
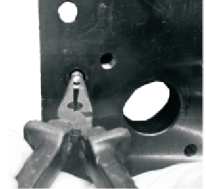
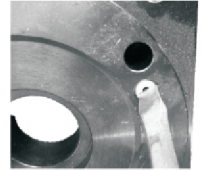
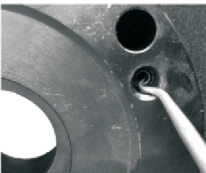



Use circlip pliers to remove 40 ring

Figure 6-2		Use screwdriver to go through gas inlet . Gently push valve lid and extract valve core and plane in a clean place.																								
Figure 6-3		Use external pliers to stop the internal part of valve sleeve . Gently extract it and place in a clean place . sleeve , unless you are replacing the valve core's seal.																								
Figure 6-4		Manually extract the sealing ring of the valve core's sleeve																								
Figure 6-5	<p>Direction Valve components</p> <table border="1" data-bbox="310 1076 929 1390"> <thead> <tr> <th>No.</th><th>Name</th><th>Dimensions</th></tr> </thead> <tbody> <tr> <td>1</td><td>Valve sleeve</td><td></td></tr> <tr> <td>2</td><td>Valve core</td><td></td></tr> <tr> <td>3</td><td>Valve lid</td><td></td></tr> <tr> <td>4</td><td>Shield Ring</td><td></td></tr> <tr> <td>5</td><td>O-ring</td><td>O-ring-19.8x2.65</td></tr> <tr> <td>6</td><td>O-ring</td><td>O-ring-28x2.65</td></tr> <tr> <td>7</td><td>O-ring</td><td>O-ring-36.5x1.8</td></tr> </tbody> </table>		No.	Name	Dimensions	1	Valve sleeve		2	Valve core		3	Valve lid		4	Shield Ring		5	O-ring	O-ring-19.8x2.65	6	O-ring	O-ring-28x2.65	7	O-ring	O-ring-36.5x1.8
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7.0 Impactor Assembly

Maintenance ,Disassembly and explanation of impactor is as follows


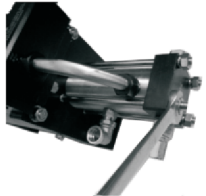

Figure 7-1		Use a Spanner or slotted screwdriver to remove the Nut as shown . Inspect O-ring on Nut for damage
Figure 7-2		As shown in figure , First Extract Pressurized Spring and then from the back push out impactor or use sharp pliers and pull impactor Out .
Figure 7-3		Use slotted Screwdriver to disassemble guide sleeve And remove guide sleeve .
Figure 7-4		Extract the seal on the bottom of guide sleeve as shown. Clean sealed groove , inspect and replace sealing ring if it is damaged .
Figure 7-5		After removing all the components , clean sealing groove and all components and inspect seals for damage.

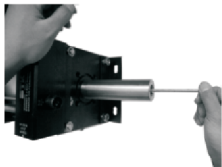
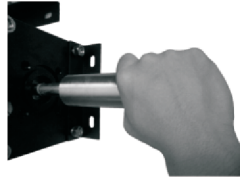
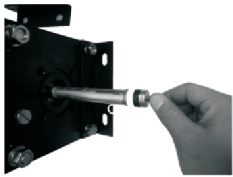



Direction Valve components

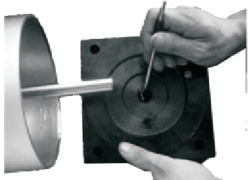
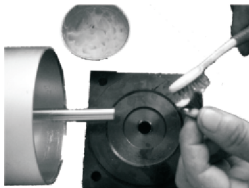
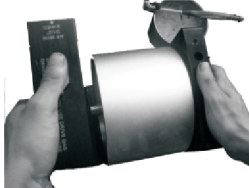
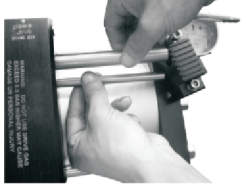

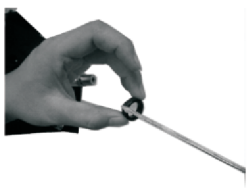
No.	Name	Dimensions	Qty
1	Guide Sleeve		1
2	O ring	D4X1.8	1
3	Impactor		1
4	O ring	D5.6X1.8-90°	1
5	Pressurizing Spring	D7XCS1x25-8.5	1
6	O ring	D11.8x1.8	1
7	Impactor Nut		1

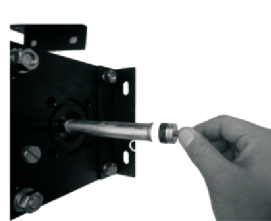
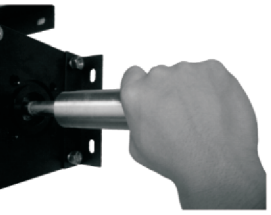
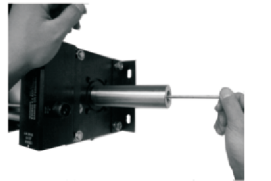

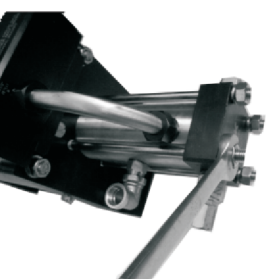
8.0 Drive and Pressurized Components

8.1 Disassembly procedure

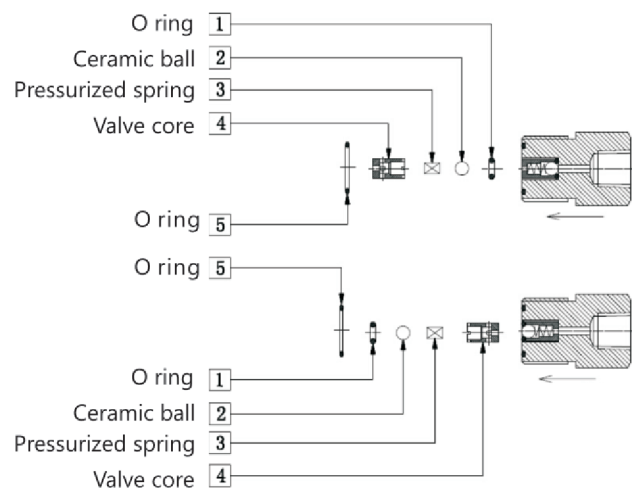
	Use adjustable spanner to remove connecting nut from distribution pipe of directional valve. Inner part of Nut has 2 PCS D15X2.65 Sealing rings .
	Use spanner to remove M12 Nut from High pressure cylinder head bar . Extract high pressure cylinder head and four pieces Bars . High pressure cylinder head has 1 sealing ring.
	Extract high pressure cooling sleeve ,Both heads of cooling sleeve have Sealing ring With size of D38.7X1.8 .

	Use M6 inner Hex to loosen tightened M6 screw on high pressure piston.
	Manually Maintain Parallel direction ,Steadily pull out High pressure cylinder to ensure that no sharp objects touch inner walls of high pressure cylinder.
	Manually remove M6 Screw ,Extract high pressure guide sleeve , High pressure seals and support pad.
	High pressure assembly has: Support pad 1, High pressure seal 1 , High pressure guide sleeve 1, Inner hex screw 1.
	Use spanner 19 to manually remove two screws fastening drive Terminal sleeve And extract stand and bar.
	Remove gas distribution block and gas pipe and use rubber hammer to hit cover Edges to remove left and right side cover. (Both ends of gas pipe and gas distribution block have O rings)

	Use a tool to extract bearing seals in cover .You can first remove slip ring from Bearing Seal and then extract O ring and clean sealing Groove .
	Clean bearing seal and apply Lubricant, Fit in left and right covers . First , Install O-ring seal into sealing groove and then install slip Ring Groove 2,072 bearing seals does not have to be installed without direction separation.
	Install left and right cover : First Put cylinder pole into right cover and after installing drive piston and install drive cylinder tube. (Drive cylinder tube can be assembled with driven piston under 45 angle)
	Install gas distribution pipe : before installation , gas pipes sealing rings are divided into D11.2X2.65 1 And D6.9x1.8 1
	Use M8 inner hex spanner to manually tighten distribution block . As much as possible press distribution block into directional valve end and tighten Screws .
	First ,clean all components and partially apply lubricant on seals .

	Install High pressure seals in the following order : Support pad , high pressure seal , High pressure sleeve, Inner-hex screw . This procedure does not require screw to be tightened.(High pressure seal can be first installed with base and then O-ring) .
	Apply Lubricant on the inner parts of High pressure cylinder and in the same direction of plane install High pressure cylinder .(Be carefully of the direction of High pressure cylinder ,parts that match the front part of cylinder body are the correct installation direction)
	Use M6 Hex spanner to tighten fastening screw on the outside part of High pressure piston.
	Install cooling jacket and bar (Groove in bottom of cooling sleeve end has sealing Ring D38.7x1.8)
	Install High pressure cylinder head (Put high pressure cylinder head into matching high pressure cylinder and cooling sleeve and use spanner to tighten fastened high pressure cylinder head screw and connect nut onto gas pipe of directional valve)

8.2 Check valve



8.3 Description of check valve components

No	Name	Quantity
1	O-ring	2
2	Ceramic ball	2
3	Pressurized spring	2
4	Valve core	2
5	O-ring	2

9.0 Technical data for GB ,GBD,GBT serial gas booster

Model	Pressure ratio	Mini inlet gas pressure PI(Bar)	Maximum outlet gas pressure PO(Bar)	Outlet pressure formula PO	Inlet port size	Outlet port size	Maximum flow rate L/Min=6 Bar
GB02	2.5:1	0	16.6	2PA	NPT1/2"	NPT1/2"	522@PI=7
GB04	4:1	1.2	33.2	4PA	NPT1/2"	NPT1/2"	354@PI=7
GB05T	5:1	1.7	41.5	4PA+PI	NPT1/2"	NPT1/2"	572@PI=7
GB07	7:1	3.4	56	7PA	NPT3/8"	NPT3/8"	252@PI=7
GB08T	8:1	3.4	64	7PA+PI	NPT3/8"	NPT3/8"	362@PI=7
GB10	10:1	3.4	80	10PA	NPT3/8"	NPT3/8"	196@PI=7
GB15	15:1	3.4	120	15PA	NPT3/8"	NPT3/8"	164@PI=7
GB25	25:1	7.5	200	25PA	NPT1/4"	NPT1/4"	91@PI=10
GB40	40:1	12	320	40PA	NPT1/4"	NPT1/4"	56@PI=40
GB60	60:1	21	480	60PA	NPT1/4"	NPT1/4"	72@PI=40
GB100	100:1	30	800	100PA	NPT1/4"	NPT1/4"	45@PI=40
GB130	130:1	45	1000	130PA	NPT1/4"	NPT1/4"	28@PI=40

GBD serial double action gas booster pump

Model	Pressure Ratio	Mini Inlet pressure PI (Bar)	Max Inlet pressure PO (Bar)	Max outlet pressure PO (Bar)	Outlet pressure formula PO	Inlet size	Outlet size	Max flow L/Min =6Bar
GBD07	7:1	3.4	56	56	7PA+PI	NPT3/8	NPT3/8	513@PI=7
GBD10	10:1	3.4	80	80	10PA+PI	NPT3/8	NPT3/8	393@PI=7
GBD15	15:1	7	120	120	15PA+PI	NPT3/8	NPT3/8	380@PI=20
GBD25	25:1	12	200	200	25PA+PI	NPT1/4	NPT1/4	186@PI=20
GBD40	40:1	21	300	320	40PA+PI	NPT1/4	NPT1/4	272@PI=40
GBD60	60:1	30	480	480	60PA+PI	NPT1/4	NPT1/4	175@PI=40
GBD100	100:1	45	800	800	100PA+PI	NPT1/4	NPT1/4	136@PI=60
GBD130	130:1	60	1000	1000	130PA+PI	NPT1/4	NPT1/4	75@PI=60

GBT serial double stage gas booster

Model	High pressure piston diameter	Ratio	Mini inlet gas pressure	Maximum outlet pressure PO	Outlet gas pressure formula	Gas IN	Gas out	Max gas flow L/min)
GBT7/15	63/40	15:1	3.4	124	15PA+2PI	NPT3/8	NPT3/8	215@PI=7
GBT7/30	63/28	32:1	3.4	204	32PA+3PI	NPT3/8	NPT1/4	118@PI=7
GBT15/30	40/28	32:1	7	204	32PA+2PI	NPT3/8	NPT1/4	150@PI=10
GBT15/40	40/25	40:1	7	330	40PA+2PI	NPT3/8	NPT1/4	125@PI=10
GBT15/60	40/20	60:1	7	498	60PA+4PI	NPT3/8	NPT1/4	92@pi=10
GBT30/60	28/20	60:1	30	498	60PA+2PI	NPT3/8	NPT1/4	245@PI=40
GBT30/100	28/16	100:1	30	830	100PA+3PI	NPT1/4	NPT1/4	192@pi=40

Air consumption is 0.8M³/min base on 7 bar air driven pressure, @ at certain conditions ,for example 100@PI=7 Bar , When air driven pressure is 7 bar , the flow rate is 100NL/min.

Remarks: PA= Air driven PI= Inlet gas supply PO = Outlet pressure

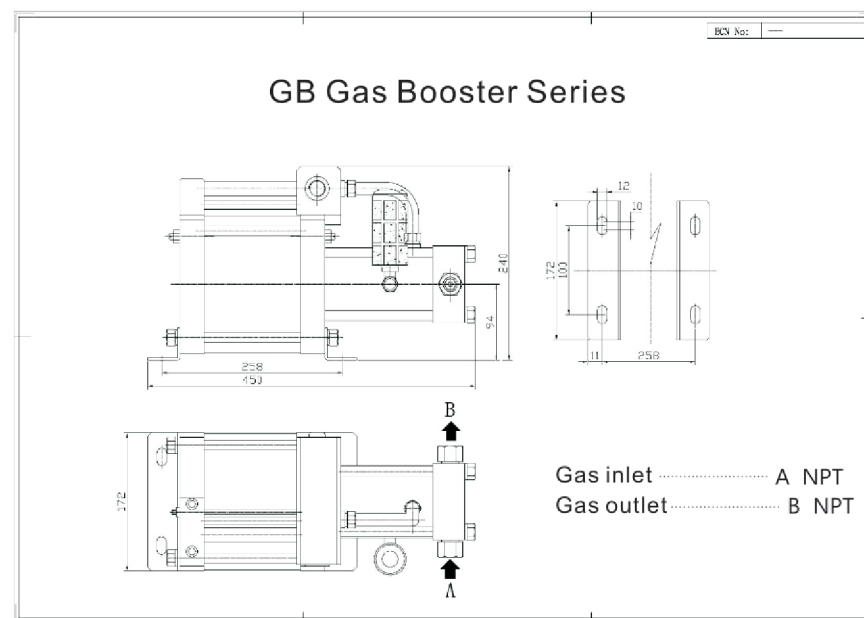
9.1 Transport and storage

USUN products are precision machinery equipment and during transport they must be appropriately fastened ,Tilting is strictly prohibited , please gently lift and put down ,do not turn upside down.

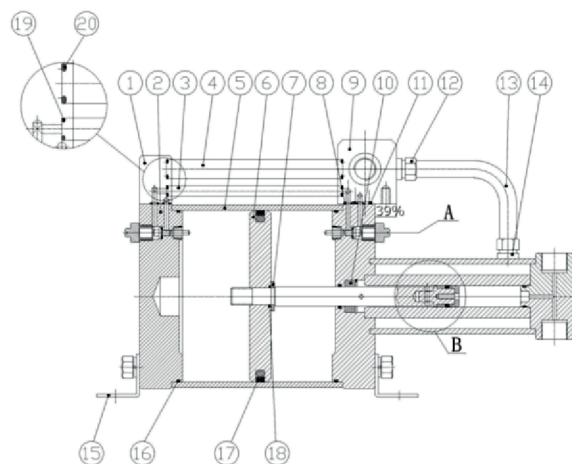
- When storing please protection against moisture ,rust and dust.
- When stored ,do not tilt or stack on other products .

10.0 Partial break down and supplementary data

10.1 Outside view



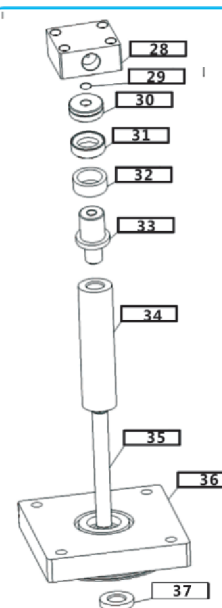
10.2 GB model general component drawing



ITEM NUMBER	Description	QTY
1	Gas distribution block	1
2	Blind lid	1
3	Gas pipe	1
4	Gas pipe	1
5	Driven cylinder tube	1
6	Driven piston	1
7	Pad piece	1
8	O ring	4
9	Directional valve assembly	1
10	Support pad	1
11	O ring	1
12	Adaptor nut	2
13	Gas pipe	1
14	Adaptor	2
15	Stand	2

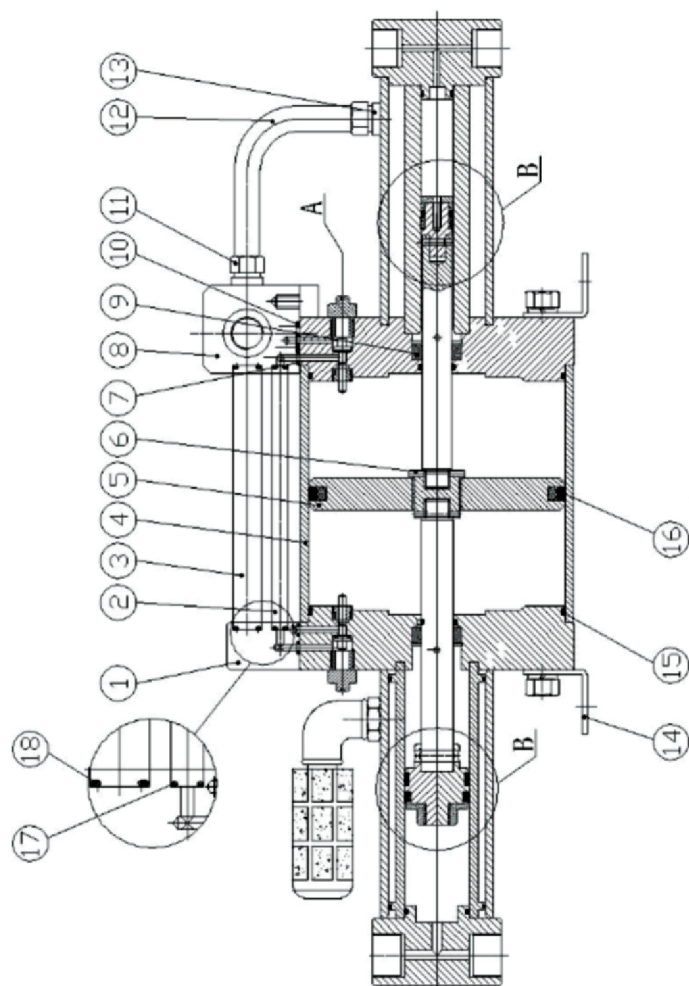
ITEM NUMBER	Description	QTY
16	O ring	1
17	Glyd ring	2
18	O ring	2
19	O ring	2
20	O ring	2
21	Guiding sleeve	2
22	O ring	2
23	Impactor	2
24	O ring	2
25	Pressurized spring	2
26	O ring	2
27	Impactor nut	2

10.3 GB serial Component drawings of high pressure components



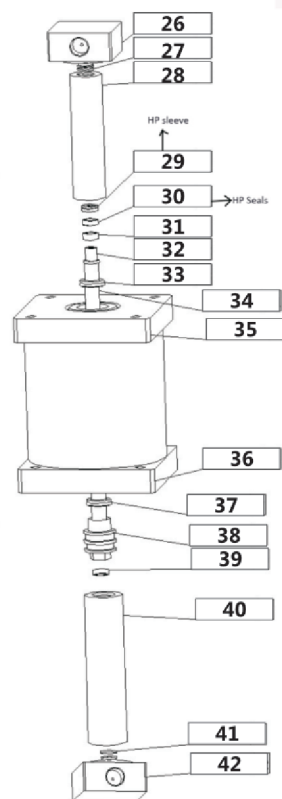
- 28 High pressure cylinder head
- 29 O-ring
- 30 High pressure guide sleeve
- 31 High pressure seal
- 32 Support sleeve
- 33 High pressure piston
- 34 High pressure cylinder sleeve
- 35 Piston rod
- 36 Front cover
- 37 Bearing seal

10.4 GBT Pneumatic driven booster pump



ITEM NUMBER	Description	QTY	size
1	Air manifold	1	
2	Flow tube		
3	Flow tube		
4	Air barrel	1	
5	Driven piston	1	
6	Washer		
7	O ring seal	4	D 4.5X1.8
8	½ air cycling parts	1	
9	Supporting washer	1	
10	O Ring	2	D15x2.65
11	Adaptor Gland	2	
12	Air tube		
13	Adaptor		
14	Mounting bracket		
15	O ring	2	D 152.5x2.65
16	Gly seal	1	
17	O ring	2	D 6.9x1.8
18	O ring	2	D 11.2x2.65
19	Sleeve guiding	2	
20	O ring	2	D 4x1.8
21	Firing pins	2	
22	O rings	2	D5.6x91.8-90
23	Springs		
24	O rings	2	d 11.8x 1.81
25	Pins Gland	2	

10.5 GBT Connect drawings of High pressure components



- 26 High pressure cylinder head
- 27 O ring
- 28 High pressure cylinder
- 29 High pressure guide sleeve
- 30 HP Pressurized seals
- 31 Guide sleeve
- 32 High pressure piston
- 33 Shaft seal
- 34 Piston Rod
- 35 Right cylinder cover
- 36 Left cylinder cover
- 37 Shaft seal
- 38 High pressure piston
- 39 High pressure seal
- 40 High pressure cylinder
- 41 O ring seal
- 42 High pressure cylinder cover

10.6 GBT serial layout drawing

