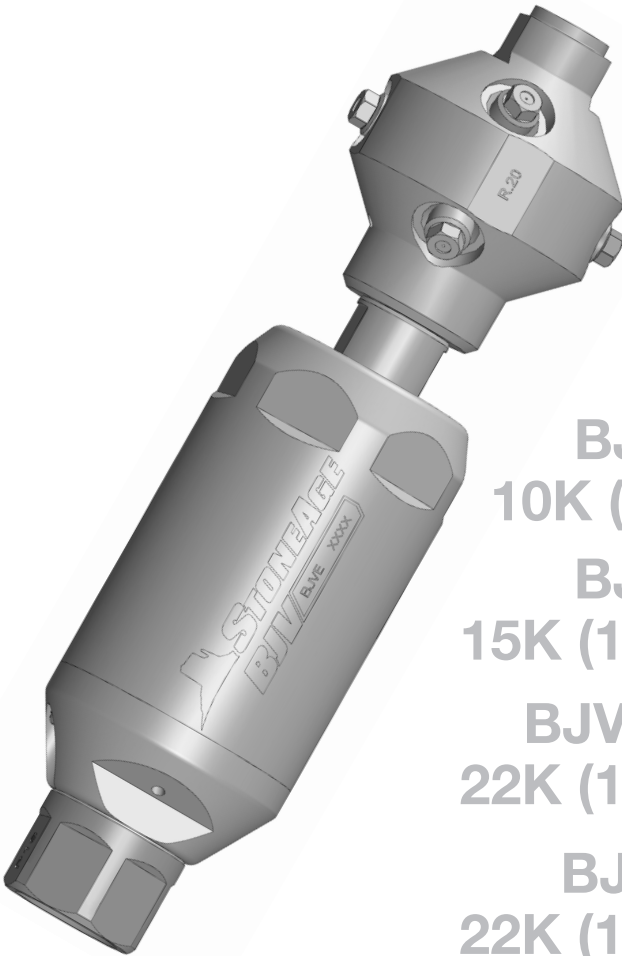


# BJVE

## 自旋转清洗头 产品使用手册



**BJVE-P16**  
**10K (700 bar)**

**BJVE-P12**  
**15K (1000 bar)**

**BJVE-MP12**  
**22K (1500 bar)**

**BJVE-M24**  
**22K (1500 bar)**

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使用者需在遵循所有国家法律法规制度下,使用该产品使用说明书手册。该使用说明书手册是产品的重要部分,需妥善保留,直至产品依据国家法律进行拆解后方可作废。最新产品画册可从公司官网下载:

<https://www.stoneagetools.com/manuals>

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**BJVE 型号与明细**

型号	BJVE-P16		BJVE-P12		BJVE-M24		BJVE-MP12	
	US	Metric	US	Metric	US	Metric	US	Metric
压力范围	2-10k psi	140-700 bar	2k-15k psi	140-1000 bar	2k-22k psi	140-1500 bar	2k-22k psi	140-1500 bar
流量范围	20-200 gpm	76-757 lpm	12-100 gpm	45-380 lpm	12-100 gpm	45-380 lpm	12-100 gpm	45-380 lpm
旋转体直径	3 in.	76 mm	3 in.	76 mm	3 in.	76 mm	3 in.	76 mm
旋转体长度	8.8 in.	224 mm	8.8 in.	224 mm	8.8 in.	224 mm	8.8 in.	224 mm
旋转体重量	8.5 lb	4 kgs	8.5 lbs	4 kgs	8.5 lbs	4 kgs	8.5 lbs	4 kgs
喷头重量	3.3 lbs	1.5 kgs	3.3 lbs	1.5 kgs	3.3 lbs	1.5 kgs	3.3 lbs	1.5 kgs
最高水温	160 °F	70 °C	160 °F	70 °C	160 °F	70 °C	160 °F	70 °C
流量系数	7.5 Cv		4.6 Cv		4.6 Cv		4.6 Cv	
入口连接型式	1 NPT		3/4 NPT		M24		3/4 MP	
喷嘴孔尺寸	1/4 NPT (P4) 1/2 NPT (P8)		1/4 NPT (P4) 1/2 NPT (P8)		1/4 NPT (P4) G12		1/4 NPT (P4) G12	
喷嘴类型	AP4, APF4, OC8-P8, OC8-P12		AP4, APF4, OC8-P8, OC8-P12		AP4, APF4		AP4, APF4	
堵头	GP 025-P4SS GP 025-P8SS		GP 025-P4SS GP 025-P8SS		GP 025-P4SS SA 058-G12		GP 025-P4SS SA 058-G12	

**设备明细与使用**

BJVE 系列清洗头多功能管线清洗头，适用于各种尺寸管线、工作压力、流量、以及清洗应用类型。各类喷头类型可供选择：拉环接头、喷嘴孔径、以及喷嘴组合。根据清洗应用类型不同，选择不同类型阻尼液，调整清洗头转速。清洗头可匹配全系列中心保持架、防倒退安全装置、与自动化清洗系统。BJVE 清洗头也适用于槽罐清洗应用。

**产品特点**

- 简易现场维护 - 高压密封、硬质合金密封座、与轴芯密封，可现场三分钟快速更换。需使用一个内六角扳手。
- 喷嘴组合类型 - 可根据清洗应用类型需要，改变调整喷嘴组合类型。通过改变喷嘴组合类型，调整清洗头推力与前打击力。
- 流线型壳体设计 - 清洗头可在管线内平滑移动
- 专利速控 - 工作转速、扭力、与温度范围广，持续稳定，适用于各类型清洗作业。

## 警告

BJVE系列清洗头，当清洗大直径管线时清洗头会在管线内掉头逆行，以高压冲出管线，造成人员伤亡。所以，在清洗大直径管线时，清洗头与高压胶管连接处必须加装金属导管。安全起见，建议清洗头钢化长度（清洗头至高压胶管接头总长度）需为被清洗管线内径的1.5倍。（请查看下图）

操作系统必须配置可控溢流阀，该溢流阀由最靠近清洗作业的操作员控制。连接 BJVE 之前需冲刷高压胶管。建议在距离高压胶管末端约几英尺处用带颜色胶带做个记号。往回拖拉清洗头时，可提醒操作员停止拉动，防止清洗头带压脱离管线，造成伤亡。将清洗头放在管线开口处。关闭溢流阀，缓慢升压，观测喷嘴射流是否正常，没有被堵塞。此时 BJVE 将开始缓慢旋转。当清洗头压力升至额定压力后，将清洗头推入管线内，开始清洗工作。控制清洗头匀速前进，清洗头开始高效清洗作业。匹配 StoneAge ABX-500 高压胶管控制装置，实现高效持续，匀速清洗作业。工作结束后，断开清洗头与高压胶管，吹干清洗头水分，再进行存储。清洗头内需吹入少量润滑油，延长清洗头使用寿命。

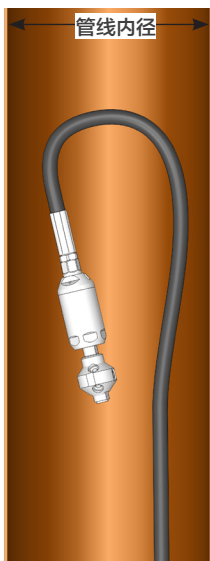
强烈建议使用防倒退安全装置。详细安全装置列表请阅读“产品配件”章节。

## 危险

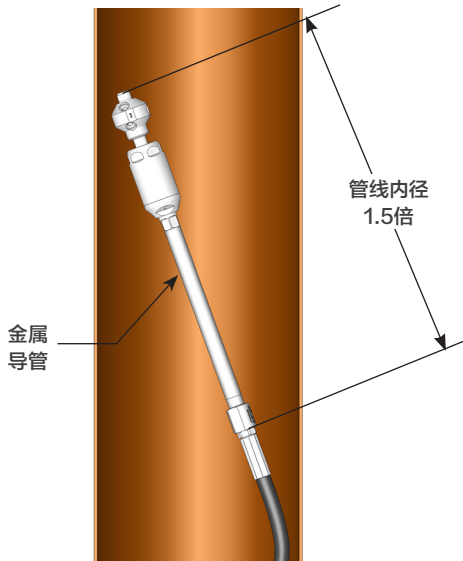
操作与运行该设备具有潜在危险。运行与使用高压水射流设备与清洗头时必须时刻注意安全。请仔细阅读以下安全指引，应配合 WJTA Recommended Practices 安全使用手册一同使用，

详细请浏览 [www.wjta.org](http://www.wjta.org)。

不遵循安全指引与安全使用手册规范的错误操作将导致严重伤害或死亡。



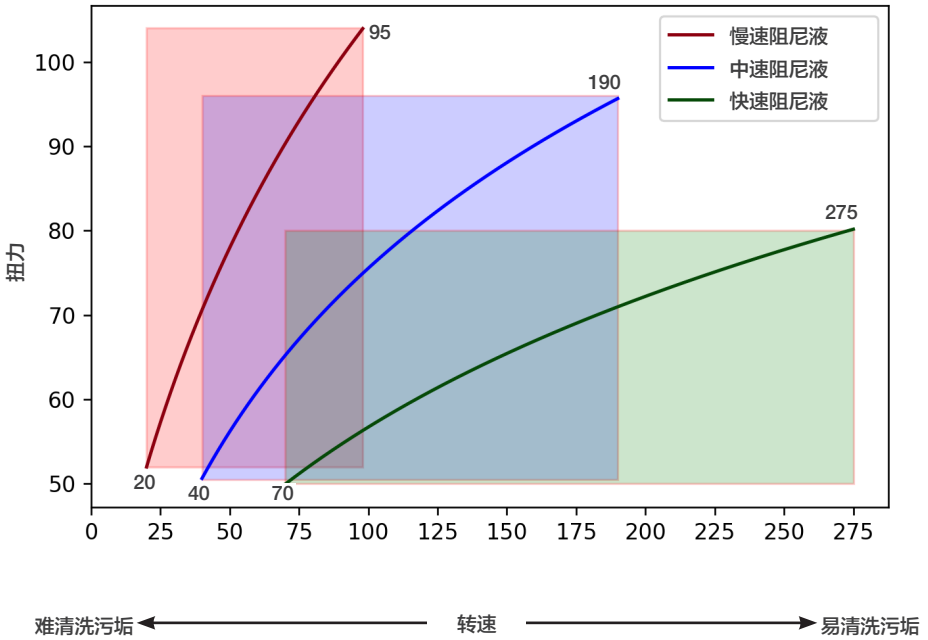
错误操作：  
BJVE 在大直径管线内逆行  
**非常危险!**



正确操作：  
BJVE 安装金属导管，  
防止逆行。

根据清洗应用类型选择适用的阻尼液

BJVE 系列清洗头标配中速阻尼液，适用于大多数扭力与转速范围。为拓展产品功能，使其可适用于更多类型清洗应用，StoneAge 额外设计两种转速阻尼液可供用户选择。慢速阻尼液适用于难以清洗与堵塞管道；快速阻尼液适用于冲刷、抛光、以及较容易清洗的管线。以下为各转速阻尼液的扭力与转速范围图表：



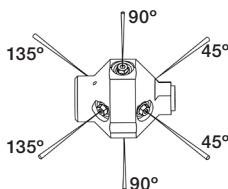
## 污垢类型

管线内污垢的类型多样，坚硬程度、组合形式、薄厚程度、与管线内结构分布位置均不相同。混凝土、焦炭、与矿垢等物质的孔隙率较高。高压水可从污垢薄弱处渗入，撕裂自然裂缝与气孔，进入污垢内层，高效剥离清除污垢。相反，另一种为聚合物，例如橡胶。聚合物污垢因为孔隙率过低，需要直接从结合处切除。清洗头喷嘴组合类型由聚合物污垢厚度所决定。喷嘴数量与尺寸由实际清洗应用类型决定。厚重污垢选择较大孔径喷嘴。涂层类薄厚污垢需选择多喷嘴组合喷头。压力、流量、与转速均会影响清洗头清洗效率。

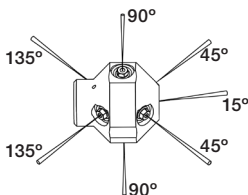
# 喷头类型

喷头类型选择:

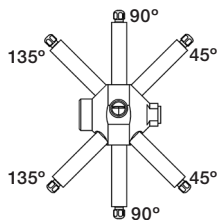
四款标配喷头组合可供选择, 如有需要, 可特殊定制喷头类型。喷头明细由压力、流量、以及喷嘴尺寸决定。带 P8 与 G12 喷嘴孔喷头需要安装延长杆或堵头。



**BJ 144-P4-6-Rxx**  
6-孔  
2 @ 45°  
2 @ 90°  
2 @ 135°



**BJ 144-P4-7-Rxx**  
7-孔  
1 @ 15°  
2 @ 45°  
2 @ 90°  
2 @ 135°



**BJ 145-G12-6-Rxx**  
或  
**BJVE 145-P8-6-Rxx**  
6-孔  
2 @ 45°  
2 @ 90°  
2 @ 135°

## BJVE 喷头选择

喷头		BJVE 旋转体型号				
尺寸	明细	零件编号	M24 (15K, 22K)	MP12 (22K)	P12 (10K,15K)	P16 (10K)
3.0" (76 mm) Ø 喷头	(6) ¼ NPT 喷嘴孔 AP4-XXX 喷嘴	BJ 144-P4-6-R12	√	√	√	√
		BJ 144-P4-6-R20	√	√	√	√
		BJ 144-P4-6-R35	√	√	√	√
		BJ 144-P4-6-R60	√	√	√	√
	(7) ¼ NPT 喷嘴孔 AP4-XXX 喷嘴	BJ 144-P4-7-R12	√	√	√	√
		BJ 144-P4-7-R20	√	√	√	√
		BJ 144-P4-7-R35	√	√	√	√
		BJ 144-P4-7-R60	√	√	√	√
3.5" (89 mm) Ø 喷头	(6) ¾-16 NF 喷嘴孔 AP4-XXX 喷嘴 必须安装 G12-P4 延长杆 或 G12 堵头	BJ 145-G12-R12	√	√	—	—
		BJ 145-G12-R20	√	√	—	—
		BJ 145-G12-R35	√	√	—	—
		BJ 145-G12-R60	√	√	—	—
	(6) ½ NPT 喷嘴孔 AP4-XXX 喷嘴 必须安装 P8-P4 延长杆 或 P8 堵头	BJVE 145-P8-R12	—	—	√	√
		BJVE 145-P8-R20	—	—	√	√
		BJVE 145-P8-R35	—	—	√	√
		BJVE 145-P8-R60	—	—	√	√

## 选择喷嘴

射流反力有助于推动清洗头在管道与管线内前行。垂直清洗应用不需要推力，水平与带坡度清洗需要较强推力。喷嘴尺寸的选择基于清洗应用所需的射流推力与前打击力的流量比例，需计算清洗需要多少射流推力前进，与多少前打击力清除污垢。请使用 StoneAge Jetting App，精确挑选喷头与喷嘴组合类型。

<http://jetting.stoneagetools.com>

常见喷嘴组合明细

BJVE 旋转 体型号	压力		流量		喷头类型			
					BJ 144-XX-X-XXX		BJ 145-XX-XXX	BJVE 145-XX-XXX
	kpsi	bar	gpm	lpm	6 x P4 孔 3" Ø	7 x P4 孔 3" Ø	6 x G12 孔 3.5" Ø	6 x P8 孔 3.5" Ø
P12 或 P16	5	350	15-35	57-133	P4-6-R60	P4-7-R60	—	P8-R60
			30-50	114-189	P4-6-R35	P4-7-R35	—	P8-R35
			50-100	189-379	P4-6-R20	P4-7-R20	—	P8-R20
			80-170	303-644	P4-6-R12	P4-7-R12	—	P8-R12
P12 或 P16	10	700	15-25	76-113	P4-6-R60	P4-7-R60	—	P8-R60
			20-45	113-189	P4-6-R35	P4-7-R35	—	P8-R35
			35-80	189-379	P4-6-R20	P4-7-R20	—	P8-R20
			55-140	303-606	P4-6-R12	P4-7-R12	—	P8-R12
P12	15	1034	10-20	38-113	P4-6-R60	P4-7-R60	—	P8-R60
			20-40	113-151	P4-6-R35	P4-7-R35	—	P8-R35
			30-70	114-265	P4-6-R20	P4-7-R20	—	P8-R20
			50-120	189-454	P4-6-R12	P4-7-R12	—	P8-R12
MP12 或 M24	22	1517	10-20	38-113	P4-6-R60	P4-7-R60	G12-R60	—
			20-35	113-133	P4-6-R35	P4-7-R35	G12-R35	—
			30-65	114-246	P4-6-R20	P4-7-R20	G12-R20	—
			50-110	189-416	P4-6-R12	P4-7-R12	G12-R12	—

## 喷嘴与堵头

根据清洗应用类型，挑选适用的 BJVE 喷头。

以下为通用型喷嘴与堵头组合：

喷头类型	15° 孔	45° 孔	90° 孔	135° 孔
6-Port	N/A	2 x 喷嘴	2 x 喷嘴	2 x 喷嘴
		2 x 堵头	2 x 喷嘴	2 x 喷嘴
		2 x 堵头	2 x 喷嘴	2 x 堵头
		2 x 堵头	2 x 堵头	2 x 喷嘴
7-Port	1x 堵头	2 x 喷嘴	2 x 喷嘴	2 x 喷嘴
	1 x 喷嘴	2 x 堵头	2 x 喷嘴	2 x 喷嘴
	1 x 喷嘴	2 x 堵头	2 x 喷嘴	2 x 堵头
	1 x 喷嘴	2 x 堵头	2 x 堵头	2 x 喷嘴

## 设备运行:

- 清洗系统内需配有一个可控溢流阀。该溢流阀由最靠近清洗区域的操作员控制。
- 连接 BJVE 之前, 需冲刷高压胶管, 排出管内污垢与杂质。
- 建议在距离高压胶管末端几英尺处用带颜色胶带做个记号。往回拖拉清洗头时, 可提醒操作员停止拉动, 防止清洗头带压脱离管线, 造成伤亡。
- 清洗管线, 建议在高压胶管与清洗头之间安装金属导管。金属导管标准长度为60厘米, 为软枪清洗安全防护装置。详细请阅读本使用说明“安全与使用说明”章节。
- 将 BJVE 放入管线。一开始高压密封会出现溢流, 压力逐渐上升后, 溢流停止。
- 关闭溢流阀, 缓慢升压, 观测喷嘴射流是否正常, 没有被堵塞。此时旋转体将开始缓慢旋转。
- 当清洗头压力升至额定压力后, 将清洗头推入管线内, 开始清洗工作。
- 使用自旋转清洗头清洗堵塞管道时, 不要将 BJVE 推入堵塞物中, 导致清洗头无法旋转以及降低清洗头切割能力。当 BJVE 接触堵塞物后, 清洗头以自身速率前进, 切割堵塞物。如清洗头在清洗堵塞物时停止旋转, 可往回拉动高压胶管, 使清洗头稍微离开堵塞物。该步骤也有助于喷嘴从多个角度切割堵塞物。
- 清洗带水垢管线, 清洗头可以自进速率快速清洗管线; 但如果污垢特别难以清洗, 过快的清洗管线则无法完全清除水垢。
- 操作员需经过培训, 学习如何以最佳速率推进清洗头清洁管线。
- 工作结束后, 断开 BJVE 清洗头与高压胶管, 吹干清洗头水分, 在入口连接螺母处吹入一些润滑剂。

如果此处溢流孔出现溢流则  
表示高压胶管没有连接正确

如果此处溢流孔出现溢流则表示:

- 喷头安装不正确
- O型圈与/或紧固圈受损



如果此处溢流孔出现溢流则表示:

- 高压密封安装不正确
- 高压密封受损

疑难解答

<p>高压密封漏水</p>	<ul style="list-style-type: none"> <li>-高压密封在低压状态会溢流，随着压力的升高，溢流会停止。</li> <li>-在工作压力下溢流孔持续漏水则表示需要更换高压密封与密封座</li> <li>-高压密封磨损过快原因：阀芯小孔出现磨损；高压密封与密封座安装相反；或清洗头旋转过快。</li> <li>-清洗头旋转过快原因：阻尼液不足；内部有水（更换轴芯密封）；射流扭力过大。重装清洗头时需更换阻尼液，因为被污染的阻尼液会影响速控效果。</li> <li>-请使用 StoneAge 建议阻尼液。</li> </ul>
<p>密封磨损过快</p>	<ul style="list-style-type: none"> <li>-清洗头需要拆卸并检查。</li> <li>-检查硬质合金密封座是否安装正确。</li> <li>-检查硬质合金密封座是否有破碎或被腐蚀。</li> <li>-检查阀芯末端小孔---硬质合金密封座安装处。当 P16 型号阀芯小孔磨损大于.753"Ø，其他型号阀芯小孔磨损大于.628"Ø时，请更换阀芯。</li> </ul>
<p>喷头不旋转</p>	<ul style="list-style-type: none"> <li>-首先手动转动喷头，感觉是否粗糙不平滑。</li> <li>-不旋转清洗头需要拆卸并检查维护。</li> <li>-清洗头一开始旋转，但随着压力升高，旋转变慢并停止，此时需要更换轴承。</li> <li>-检查喷嘴是否有堵塞。如喷嘴处有堵塞物则会影响喷头选择。请拆卸喷嘴并清洗。</li> <li>-检查喷嘴尺寸与喷头离心率，确认喷嘴型号是否安装正确。详细请浏览官网 <a href="http://jetting.stoneagetools.com">http://jetting.stoneagetools.com</a></li> </ul>
<p>喷头旋转过快</p>	<ul style="list-style-type: none"> <li>-检查喷嘴尺寸与喷头离心率，确认喷嘴型号是否安装正确。详细请浏览官网 <a href="http://jetting.stoneagetools.com">http://jetting.stoneagetools.com</a></li> <li>-喷头旋转过快则表示清洗头速控装置失效。当阻尼液缺失或受污染后均导致清洗头旋转过快。持续带压使用则导致清洗头内部零件或高压密封受损。此时需要更换清洗头内部阻尼液。详细步骤请阅读“阻尼液更换步骤”章节。</li> </ul>

## 产品服务

产品维护要求具备相关维护培训以及使用正确的工具。如果用户担心无法独立维护清洗头，请将清洗头带到我们的授权经销商进行产品维护。StoneAge 在官网上提供了 BJVE 全系列产品维护视频：

<https://www.stoneagetools.com/bjv>

建议使用台钳与轴压机。产品维护过程需小心谨慎，必须保持清洗头内部零件清洁，防止被砂砾、棉绒、或其他物质污染。不正确的产品维护将导致清洗头提前报废。

### 工具列表:

- 台钳 (建议使用)
- 轴压机 (建议使用)
- 自动滑动扳手 (Crescent® C718 或相同类型产品)
- 大尺寸活动扳手
- 中号一字螺丝刀
- T型手柄内六角扳手, 8mm (P16 型号使用10mm)
- 90° 撬杆
- 1 Inch 套筒扳手
- BJVE 612 工具包:  
WGR 186 高压密封拆卸拉环  
BJVE 180 安装工具

### 产品列表:

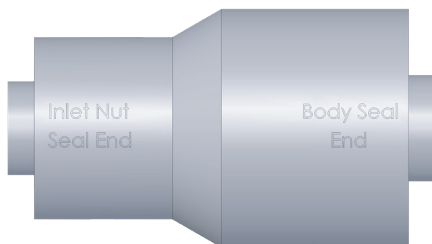
- 干净无绒纸巾
- BJ 048- (F, M, 或 S) 阻尼液
- Anti-Seize - Swagelok® Blue Goop® StoneAge PN (GP 043)
- Grease - Chevron Multifak® EP1 StoneAge PN (GP 049)

Multifak® is a registered trademark of Chevron Corporation.  
Blue Goop® is a registered trademark of Swagelok Company

## BJVE 612 工具 (包含)



WGR 186  
高压密封拆卸拉环



BJVE 180  
安装工具

## 更换高压密封:

1. 使用夹钳固定入口连接螺母阀芯上的扁平面，轴芯末端朝上。
2. 使用一个大活动扳手固定入口连接螺母上的扁平面，逆时针转动并拆下壳体。  
请注意，扳手不可固定下壳体上的扁平面，如此操作将导致壳体与入口连接螺母分离。
3. 使用 WGR 186 密封拆卸拉环工具，将入口连接螺母阀芯的硬质合金密封座与高压密封拆出。
4. 检查硬质合金密封座与密封表面是否有受损，请更换损坏的易损件。
5. 新密封的O型圈需要涂抹润滑剂，然后将它压入入口连接阀芯，O型圈朝下。将密封下压至密封末端与斜面末端持平。
6. 硬质合金密封座扁平面涂抹润滑剂，安装密封座，扁平面接触高压密封上端。
7. 入口连接螺母阀芯螺纹处涂抹金属防粘剂。
8. 将壳体组件与入口连接螺母阀芯重新连接，使用一个大活动扳手，固定入口连接螺母扁平面，将壳体与阀芯拧紧。

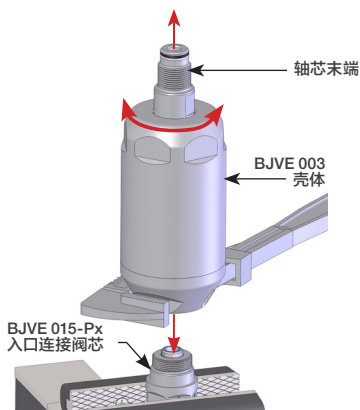


图 1: 步骤 1-2 与 8

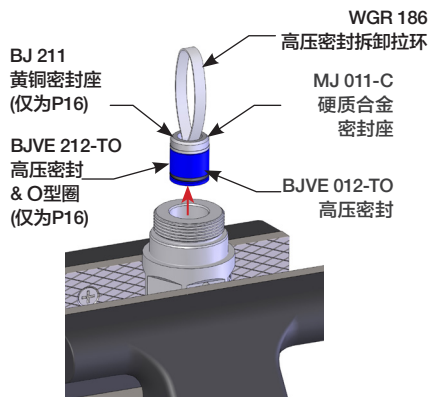


图 2: 步骤 3

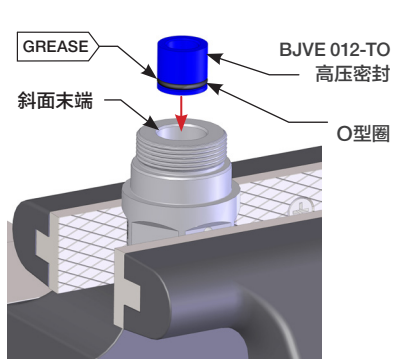


图 3: 步骤 5

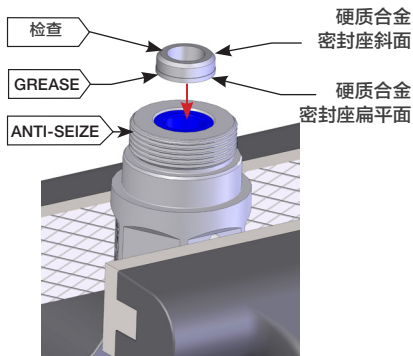


图 4: 步骤 6-7

## 拆卸清洗头

1. 使用台钳固定喷头，入口连接螺母朝上。
2. 使用活动扳手固定轴芯扁平面，将喷头拧松，然后手动将喷头从旋转体上拆出。

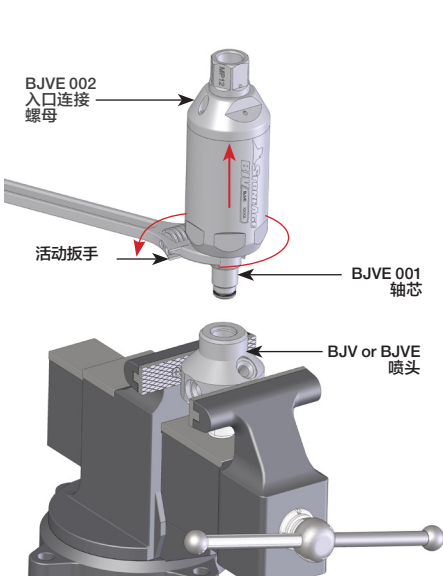


图 6: 步骤 1-2

3. 台钳固定入口连接螺母阀芯扁平面，轴芯末端朝上。
4. 使用自动滑动扳手固定入口连接螺母扁平面，逆时针旋转，拆出壳体。小心不要遗失轴芯内的硬质合金密封座。

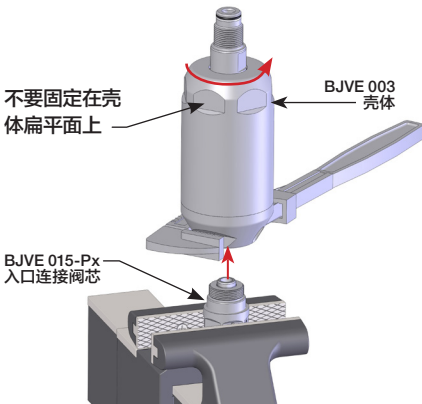


图 7: 步骤 3-4

5. 使用 WGR 186 密封拆卸拉环，拆出入口连接螺母阀芯内的硬质合金密封座与高压密封。

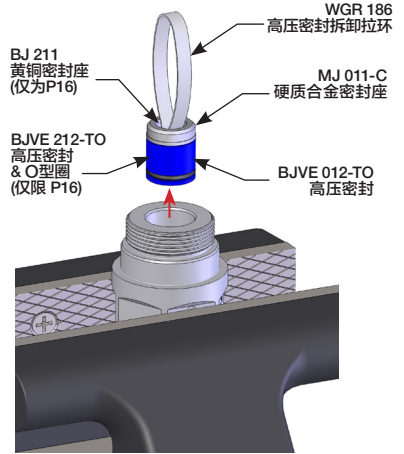


图 7: 步骤 5

6. 拆卸壳体时，如果硬质合金密封座不在高压密封的上方，可直接将其从入口连接螺母处撬出，并检查密封座与密封表面是否有缺口或被腐蚀。如有损坏请更换。

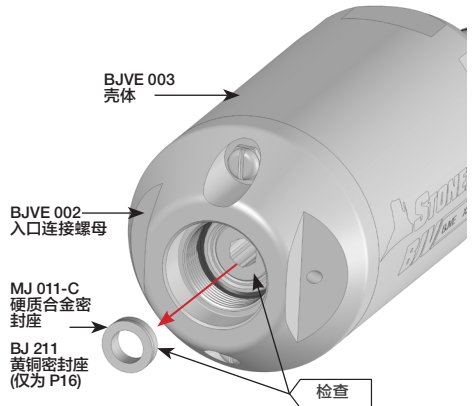


图 8: 步骤 6

7. 以活动扳手固定轴芯，然后使用内六角扳手拆卸密封座平面组件。

所有型号尺寸为 8mm，但 P16 型号为 10mm。

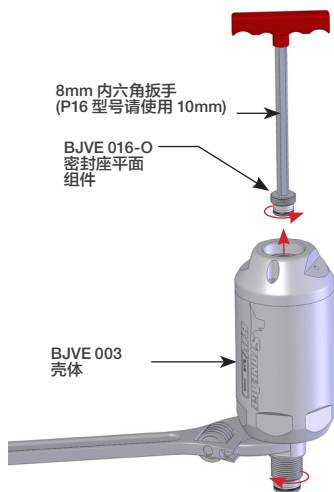


图 9: 步骤 7

## 请注意

台钳固定壳体时不要用力过度。台钳夹力过大会使壳体变形，导致清洗头在工作过程中轴芯与壳体发生摩擦，损坏清洗头内部结构。

8. 使用自动滑动扳手，拆卸入口连接螺母子组件。

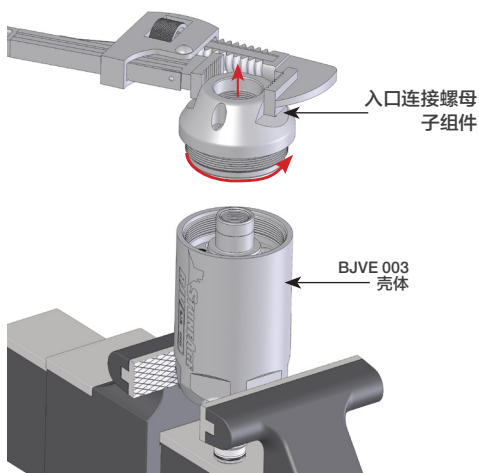


图 10: 步骤 8

9. 从台钳上拆下壳体，倒立放置在另一处，控干壳体内阻尼液。

10. 将轴芯从壳体内取出。



图 11: 步骤 9-10

11. 使用一个小尺寸 90° 撬杆，将壳体的轴芯密封拆出。

12. 此时可手动将轴承滑出。

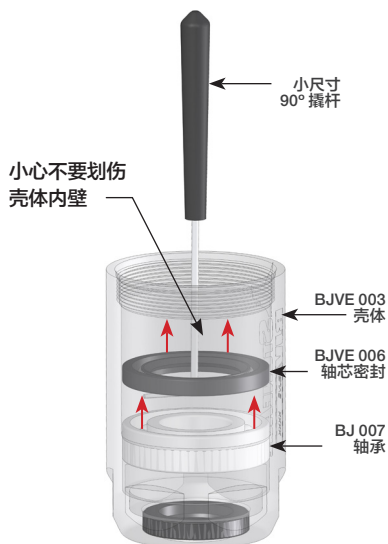


图 12: 步骤 11-12

13. 将壳体摆放在平面上，使用一个中号一字螺丝刀，推出轴芯密封。轴芯密封在拆卸的同时会受损，需要更换。

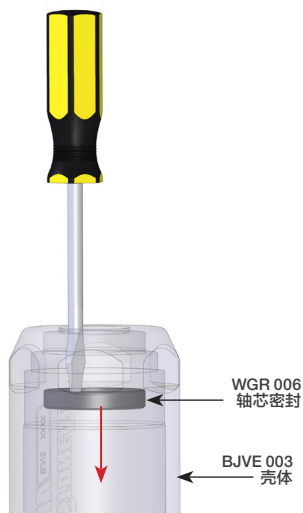


图 13: 步骤 13

14. 使用一个中号一字螺丝刀，撬出入口连接螺母组件上的轴芯密封。

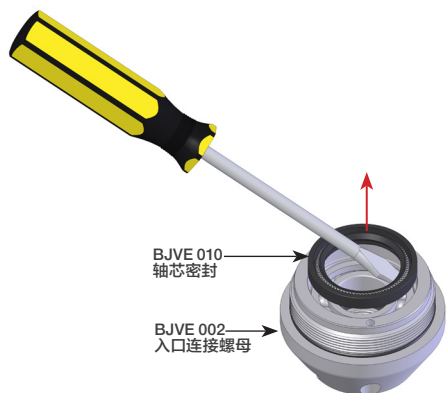


图 14: 步骤 14

15. 手动拆卸轴承和波型弹簧。  
16. 使用小撬杆拆卸入口连接螺母的外O型圈。



图 15: 步骤 15-16

17. 使用一个中号一字螺丝刀，撬出入口连接螺母底部的WHR密封。拆出的密封已受损，请更换新密封。



图 16: 步骤 17

## 请注意

安装 BJVE 之前，需要在清洁溶剂里清洗所有零部件，吹干并使用无绒纸巾擦净。请使用服务包内零部件进行更换。服务包详细信息请阅读“服务包”明细。

## 安装清洗头

GREASE = Chevron Multifak® EP1 Tan

ANTI-SEIZE = Swagelock® Blue Goop 或同类型产品

1. 弹簧一侧朝下，将轴芯密封按入壳体底部。可借助套筒扳手或轴压机将密封均匀平稳的压入壳体底部。

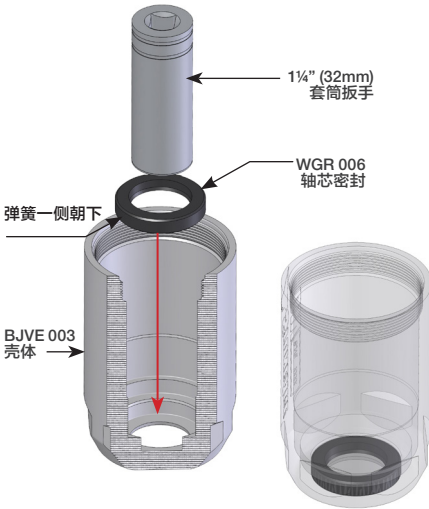


图 17: 步骤 1

2. 轴承涂抹润滑剂，推入壳体内，轴承较宽一侧朝下。轴承可直接滑入，无需按压。此时轴芯密封与轴承之间应有间隙。

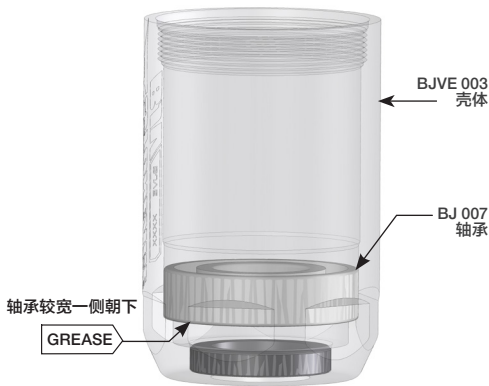


图 18: 步骤 2

3. 轴承上方，使用密封安装工具，安装轴芯，带弹簧一侧朝上。轴承与较小轴芯密封之间的间隙，以及大轴芯密封内径，需注入润滑剂。



图 19: 步骤 3

4. 将轴芯密封按压进入入口连接螺母底部，带弹簧一侧朝下。可借助套筒扳手或轴压机将密封均匀平稳地压入螺母底部。

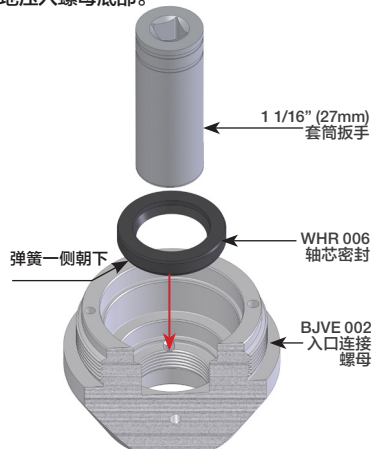


图 20: 步骤 4

- 入口连接螺母螺纹外安装 O 型圈。
- 轴承涂抹润滑剂。
- 入口连接螺母内依次插入波型弹簧、轴承、及轴芯密封。使用密封安装工具的入口连接螺母末

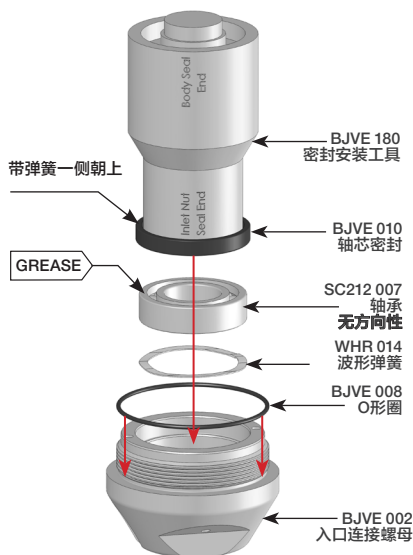


图 21: 步骤 5-7

端，安装轴芯密封。

### 请注意

轴芯组件上紧固圈或活塞不可拆除。

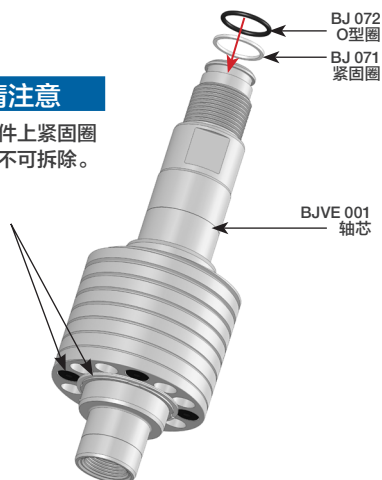
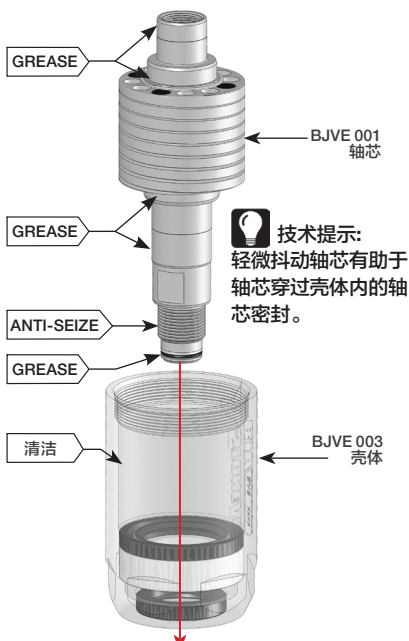


图 22: 步骤 8

- 在轴芯末端安装紧固圈与O型圈。
- 使用无绒纸巾彻底清洁壳体内部。
- 轴芯表面涂一层薄薄的润滑液，将轴芯装进壳体内。
- 轴芯螺纹处涂抹金属防粘剂。



**技术提示:**  
轻微抖动轴芯有助于轴芯穿过壳体内部的轴芯密封。

图 23: 步骤 9-11

- 使用台钳小心固定壳体扁平面。轴芯一端预留空间，便于后续加入阻尼液时扭转轴芯。

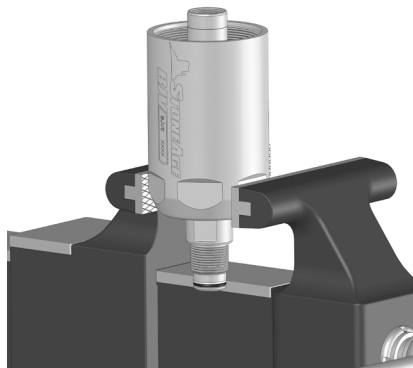


图 24: 步骤 12

- 壳体注入阻尼液，液面至壳体螺纹最下方，锥面最顶端。  
⚠️ 阻尼液液面高度非常重要。
- 逆时针缓慢旋转轴芯，使阻尼液渗入内部结构。



### 技术提示:

阻尼液非常浓稠，需要一定时间才能完全渗入清洗头。轴芯与壳体之间可能会有气泡冒出。

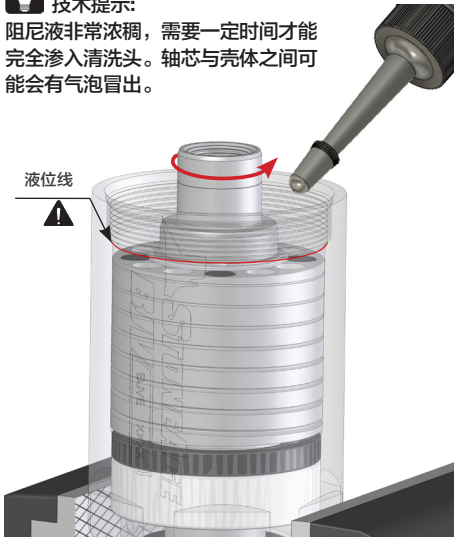


图 25: 步骤 13-14

- 安装壳体前，拆出底部没有衬套螺母的螺栓。不要拆卸堵头螺栓。

### 请注意

不可拆卸带有衬套的堵头螺栓。

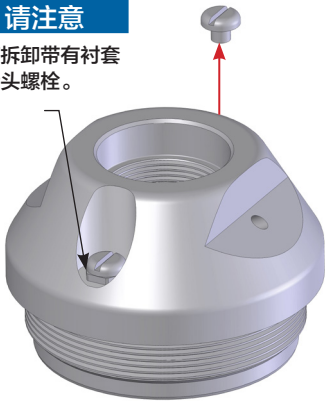


图 26: 步骤 15

- 在入口连接螺母螺纹处涂抹金属防粘剂。擦去密封一侧多余的金属防粘剂。
- 手动连接入口连接螺母组件与壳体。阻尼液会从小孔溢出。如阻尼液没有从小孔溢出，则需向壳体内注入更多阻尼液，返回步骤13。
- 使用自动滑动扳手拧紧组件，重新安装螺栓。将组件置留在台钳上。

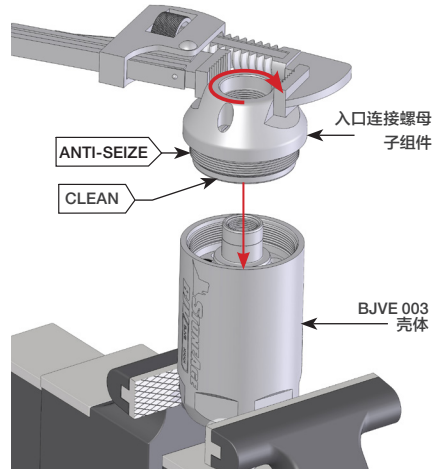


图 27: 步骤 16-18

- 轴芯安装密封座平面组件之前，检查紧固圈、O型圈，及密封座平面表面，替换损坏的零件。
- 密封座平面安装紧固圈，然后安装 O型圈。
- O型圈上润滑剂，装入轴芯前，确保密封表面干净。

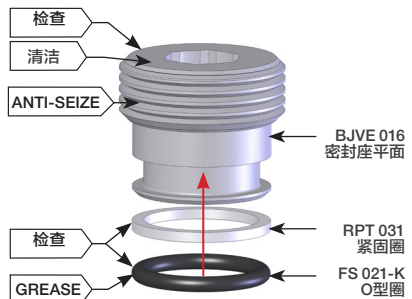


图 28: 步骤 19-21

22. 小心将T型柄内六角扳手完全插入密封座平面组件。所有型号尺寸为 8mm，但P16 型号为 10mm。
23. 密封座平面螺纹处涂抹金属防粘剂。
24. 使用内六角扳手安装密封座平面组件，将组件从台钳上取下。

## 请注意

必须检查密封平面是否有损坏。

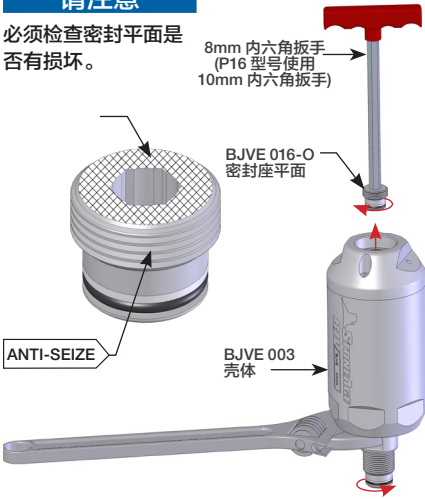


图 29: 步骤 22-24

25. 台钳固定入口连接阀芯扁平面，密封末端小孔朝上。
26. 新高压密封O型圈涂抹润滑剂，按压进入入口连接阀芯，O型圈一侧朝下。往下按压，直至密封顶

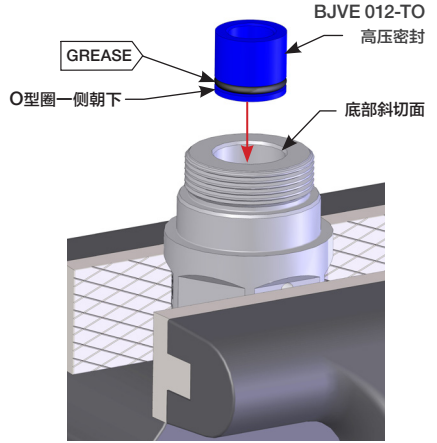


图 31: 步骤 26

端进入底部斜切面。

27. 硬质合金密封座扁平面涂抹润滑剂，安装密封座，扁平面接触高压密封上端。

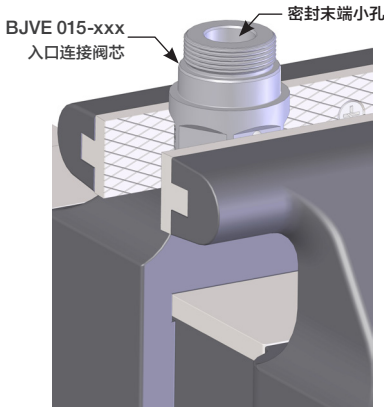


图 30: 步骤 25

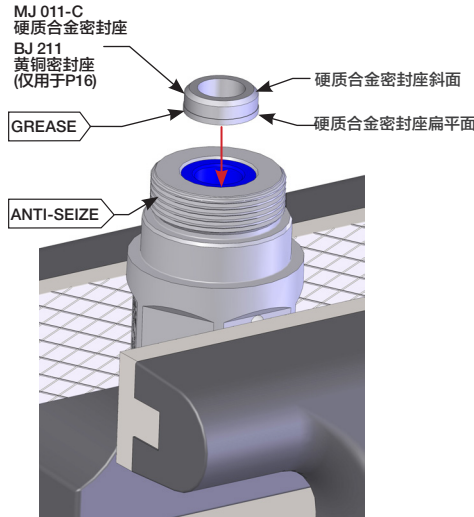


图 32: 步骤 27-28

28. 入口连接螺母阀芯螺纹处涂抹金属防粘剂。

29. 先手动连接壳体组件与入口连接螺母阀芯，然

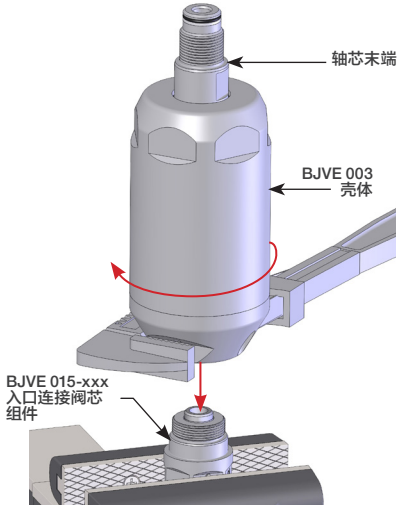


图 33: 步骤 29

后用自动滑动扳手拧紧。

30. 台钳固定喷头扁平面，入口连接螺纹一侧朝上。

31. 手动连接喷头与轴芯，使用活动扳手固定于轴芯扁平面并拧紧。

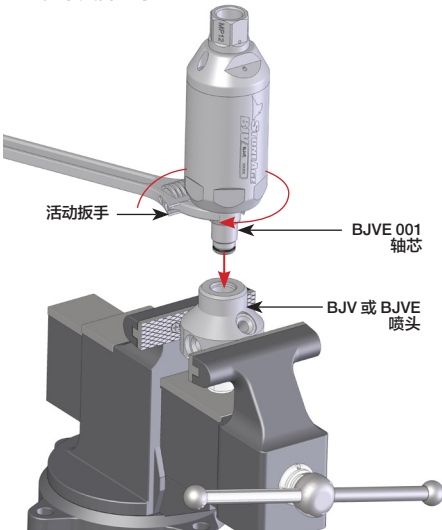


图 34: 步骤 30-31



完成清洗头组装

产品维护包

BJVE 602 密封包  
(P12, MP12, M24)

- 1 BJVE 012-TO 高压密封
- 1 MJ 011-C 硬质合金密封座
- 1 BJ 071 紧固圈
- 1 BJ 072 O型圈

BJVE 603 密封包  
(仅为 P16)

- 1 BJVE 212-TO 高压密封
- 1 BJ 211 黄铜密封座
- 1 BJ 071 紧固圈
- 1 BJ 072 O型圈

BJVE 604-XXX 密封组包  
(P12, MP12, M24)

- 1 BJVE 012-TO 高压密封
- 1 MJ 011-C 硬质合金密封座
- 1 BJ 071 紧固圈
- 1 BJ 072 O型圈
- 1 BJVE 016-O 轴芯密封座
- 1 BJVE 015-XXX 入口连接螺母阀芯

BJVE 605 密封组包  
(仅为 P16)

- 1 BJVE 212-TO 高压密封
- 1 BJ 211 黄铜密封座
- 1 BJ 071 紧固圈
- 1 BJ 072 O型圈
- 1 BJVE 016-HF-O 大流量轴芯密封座
- 1 BJVE 015-P16 入口连接螺母阀芯

BJVE 610 旋转体组包  
(所有型号)

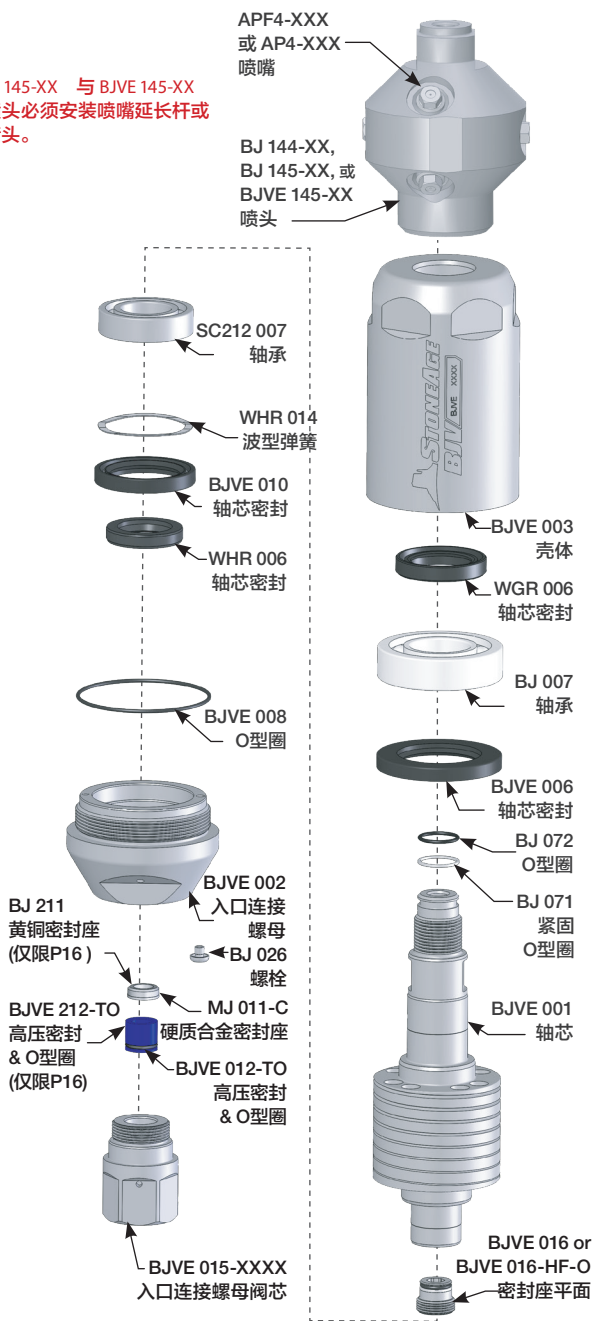
- 1 BJ 007 前轴承
- 1 SC212 007 后轴承
- 1 WGR 006 前-外 轴芯密封
- 1 BJVE 006 前-内 轴芯密封
- 1 BJVE 010 后-内 轴芯密封
- 1 WHR 006 后-外 轴芯密封
- 1 BJ 008 O型圈, 入口连接螺母
- 2 BJVE 026 堵头螺栓
- 1 WHR 014 波型弹簧
- 1 BJ 048-M 中速 Visc - 6 oz
- 1 GP 043 Blue Goop 2 oz
- 1 GP 049.1 GP 049.1 注射器, .68oz
- 1 GP 049.2 Cap, 注射器, 锁定端盖

BJVE 612 工具包  
(所有型号)

- 1 WGR 186 高压密封拉环
- 1 BJVE 180 安装工具

零件编号概观

BJ 145-XX 与 BJVE 145-XX  
喷头必须安装喷嘴延长杆或  
堵头。

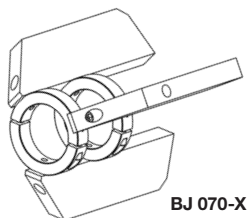


## 中心保持架

中心保持架保护工作中的清洗头，平衡靶距，进行长时间持续清洗作业。当被清洗管道内径大于清洗头直径1.5倍时，中心保持架为重要安全装置，可有效防止清洗头逆行、带压冲出管线。

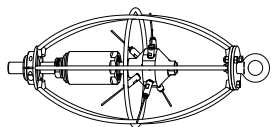
BJVE 清洗头可选安装两款中心保持架。

管线大小		中心保持架 (完整件)	重量		项圈*	滑行板**
inches	mm		lbs	kgs		
6	152	BJ 070-6	3.8	0.9	BJ 070.2	BJ 070.1-6
8	203	BJ 070-8	4.8	1.0	BJ 070.2	BJ 070.1-8
10	254	BJ 070-10	6.2	3.0	BJ 070.2	BJ 070.1-10
12	305	BJ 070-12	4.0	1.8	BJ 070.2	BJ 070.1-12



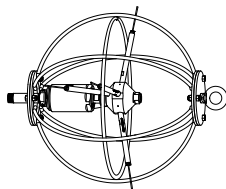
BJ 070-X

\*一套两式项圈 \*\*一套三式滑行板配备六颗螺栓



BJ 408-MP12/H9  
BJ 408-P12/M24

中心防护笼



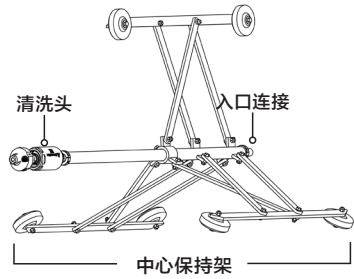
BJ 100-SS 与 BJ 100-SS-MP  
BJVE入口连接螺母处需配置特定  
项圈

中心防护笼										
零件编号	BJVE 清洗头	要求安装入口连接 延长杆*	最大延长距离		直径		长度		重量	
			inch	mm	inch	mm	inch	mm	lbs	kgs
BJ 408-MP12	MP12	N/A	3	76	12	300	20	510	10	4.5
BJ 408-P12/M24*	P12	SA 366-P12P12-6 (3/4 NPT 阳螺纹)	3	76	12	300	20	510	10	4.5
	M24	SA 368-M24M24-6 (M24 阳螺纹)								
BJ 100-SS	P12	N/A	6	152	20	510	24	610	11	5.0
BJ 100-SS-MP	P16 MP12 M24									

\*入口连接处必须安装特定延长杆

6轮中心保持架

6轮BJV中心保持架采用剪刀式铝制框架，直径可调节。大、中、小三种尺寸可供选择。适用于清洗最大直径为5英尺（1.5米）的直型管束。如有需要可特殊定制更大尺寸中心保持架。

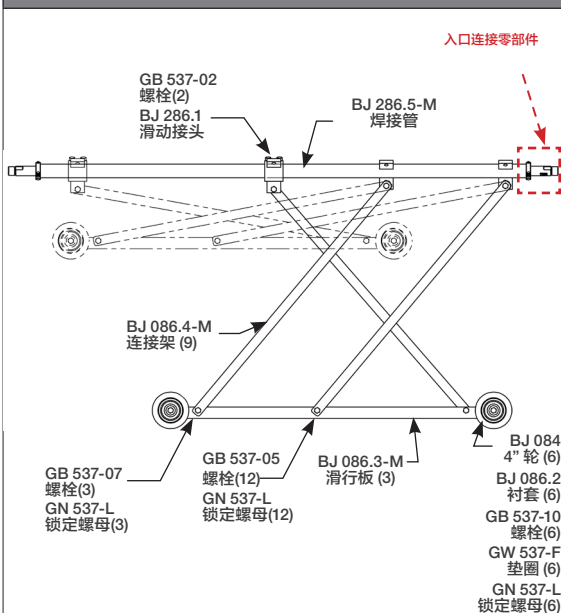


BJVE 清洗头	螺纹尺寸	Ø 直径范围		中心保持架	重量	
		inch	mm		lbs	kgs
P12	3/4 NPT 阳螺纹 x 3/4 NPT 阳螺纹	9-18	230-460	BJ 286-S-P12	22	10
		13-40	330-1000	BJ 286-M-P12	34	15
		16-60	410-1500	BJ 286-L-P12	45	20
M24	M24 阳螺纹 x M24 阴螺纹	9-18	230-460	BJ 286-S-M24	22	10
		13-40	330-1000	BJ 286-M-M24	34	15
		16-60	410-1500	BJ 286-L-M24	45	20
MP12	3/4 MP 阳螺纹 x 3/4 MP 阳螺纹	9-18	230-460	BJ 286-S-MP12	20	9
		13-40	330-1000	BJ 286-M-MP12	32	15
		16-60	410-1500	BJ 286-L-MP12	40	18

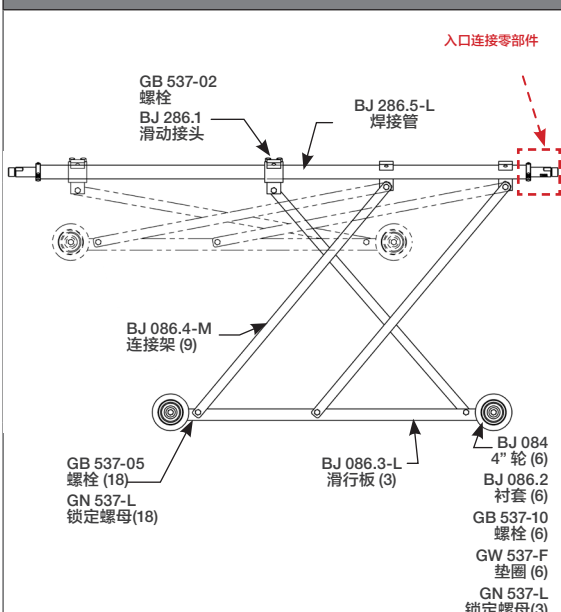
小型 (BJ 286-S) 6 轮中心保持架零件构成

中心保持架零件构成	入口连接尺寸	入口连接零部件
<p>入口连接零部件</p> <p>GB 537-02 螺栓 BJ 286.1 滑动接头</p> <p>BJ 286.5-S 焊接管</p> <p>BJ 086.4-M 连接架 (9)</p> <p>GB 537-07 螺栓 (3) GN 537-L 锁定螺母 (3)</p> <p>GB 537-05 螺栓 (3) GN 537-L 锁定螺母 (12)</p> <p>BJ 086.3-S 滑行板 (3)</p> <p>BJ 084 3" 轮 (6) BJ 086.2 衬套 (6) GB 537-10 螺栓 (6) GW 537-F 垫圈 (6) GN 537-L 锁定螺母 (3)</p>	P12	<p>SA 366-P12P12-30 加长杆 (1) GC-SP-17-F 项圈 (2)</p>
	MP12	<p>SA 577-MP12LMP12L-32 加长杆 (1) GC-SP-12-F 项圈 (2) AF 071-MP12 项圈 (2) GP 086-1218 衬套 (2) AF 072-MP12 防震端盖 (2)</p>
	M24	<p>SA 368-M24M24-30 加长杆 (1) GP252 M24M24 连接接头 (1) M24x1.5 1600 bar GC-SP-17-F 项圈 (2)</p>

中型 (BJ 286-M) 6 轮中心保持架零件构成

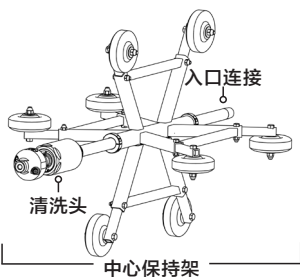
中心保持架零件构成	入口连接尺寸	入口连接零部件
 <p>GB 537-02 螺栓(2) BJ 286.1 滑动接头</p> <p>BJ 286.5-M 焊接管</p> <p>BJ 086.4-M 连接架(9)</p> <p>GB 537-07 螺栓(3) GN 537-L 锁定螺母(3)</p> <p>GB 537-05 螺栓(12) GN 537-L 锁定螺母(12)</p> <p>BJ 086.3-M 滑行板(3)</p> <p>BJ 084 4" 轮(6) BJ 086.2 衬套(6) GB 537-10 螺栓(6) GW 537-F 垫圈(6) GN 537-L 锁定螺母(6)</p> <p>入口连接零部件</p>	P12	<p>SA 366-P12P12-44 加长杆(1)</p> <p>GC-SP-17-F 项圈(2)</p>
	MP12	<p>SA 577-MP12LMP12L-48 加长杆(1)</p> <p>GC-SP-12-F 项圈(2)</p> <p>AF 071-MP12 项圈(2)</p> <p>GP 086-1218 衬套(2)</p> <p>AF 072-MP12 防震端盖(2)</p>
	M24	<p>SA 368-M24M24-48 加长杆(1)</p> <p>GP252 M24M24 连接接头(1)</p> <p>GC-SP-17-F 项圈(2)</p>

大型 (BJ 286-L) 6 轮中心保持架零件构成

中心保持架零件构成	入口连接尺寸	入口连接零部件
 <p>GB 537-02 螺栓</p> <p>BJ 286.1 滑动接头</p> <p>BJ 286.5-L 焊接管</p> <p>BJ 086.4-M 连接架(9)</p> <p>GB 537-05 螺栓(18) GN 537-L 锁定螺母(18)</p> <p>BJ 086.3-L 滑行板(3)</p> <p>BJ 084 4" 轮(6) BJ 086.2 衬套(6) GB 537-10 螺栓(6) GW 537-F 垫圈(6) GN 537-L 锁定螺母(3)</p> <p>入口连接零部件</p>	P12	<p>SA 366-P12P12-60 加长杆(1)</p> <p>GC-SP-17-F 项圈(2)</p>
	MP12	<p>SA 577-MP12LMP12L-60 加长杆(1)</p> <p>GC-SP-12-F 项圈(2)</p> <p>AF 071-MP12 项圈(2)</p> <p>GP 086-1218 衬套(2)</p> <p>AF 072-MP12 防震端盖(2)</p>
	M24	<p>SA 368-M24M24-60 加长杆(1)</p> <p>GP252 M24M24 连接接头(1)</p> <p>GC-SP-17-F 项圈(2)</p>

## 8 轮中心保持架

8 轮 BJV 中心保持架适用于弯型与直型管道。大中小三种尺寸可供选择。可伸缩钢制支架便于通过带弯度管道。

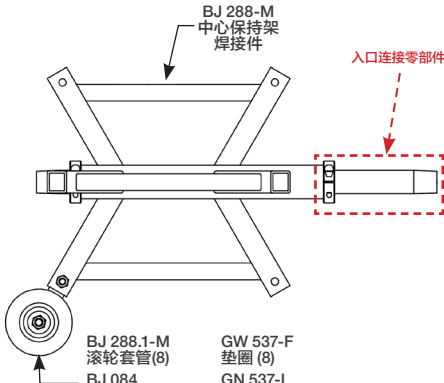
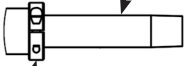

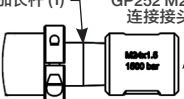


BJVE 清洗头	螺纹尺寸	Ø 直径范围		中心保持架	重量	
		inch	mm		lbs	kgs
P12	3/4 NPT 阳螺纹 x 3/4 NPT 阳螺纹	16-21	410-530	BJ 288-S-P12	19	9
		22-29	560-740	BJ 288-M-P12	27	12
		30-37	770-940	BJ 288-L-P12	36	16
M24	M24 阳螺纹 x M24 阴螺纹	16-21	410-530	BJ 288-S-M24	20	9
		22-29	560-740	BJ 288-M-M24	28	13
		30-37	770-940	BJ 288-L-M24	37	17
MP12	3/4 MP 阳螺纹 x 3/4 MP 阳螺纹	16-21	410-530	BJ 288-S-MP12	18	8
		22-29	560-740	BJ 288-M-MP12	25	11
		30-37	770-940	BJ 288-L-MP12	28	13
P16	1" NPT 阳螺纹 x 1" NPT	22-29	560-740	BJ 288-M-P16	28	13

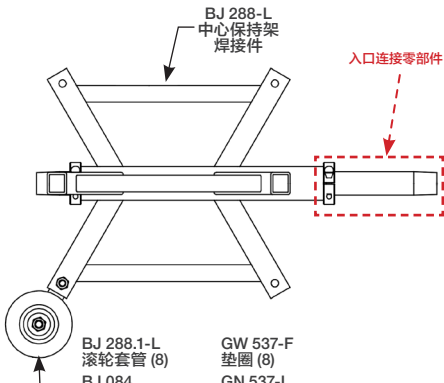
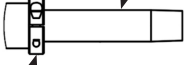

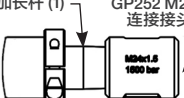
### 小型 (BJ 288-S) 8 轮中心保持架零件构成

中心保持架零件构成	入口连接尺寸	入口连接零部件
<p>BJ 288-S 中心保持架焊接件</p> <p>入口连接零部件</p> <p>BJ 288.1-S 滚轮套管(6)</p> <p>BJ 083 滚轮 (8)</p> <p>BJ 086.2 衬套 (8)</p> <p>GB 537-12 螺栓 (8)</p> <p>GW 537-F 垫圈 (8)</p> <p>GN 537-L 螺母 (8)</p> <p>GB 531-06 螺栓 (8)</p> <p>GN 531-L 螺母 (8)</p>	P12	<p>SA 366-P12P12-18 加长杆 (1)</p> <p>GC-SP-17-F 项圈 (2)</p>
	MP12	<p>SA 577-MP12LMP12L-19 加长杆 (1)</p> <p>GC-SP-12-F 项圈 (2)</p> <p>GP 086-1218 衬套 (2)</p> <p>AF 071-MP12 项圈 (2)</p> <p>AF 072-MP12 防震端盖(2)</p>
	M24	<p>SA 368-M24M24-18 加长杆 (1)</p> <p>GP252 M24M24 连接接头 (1)</p> <p>GC-SP-17-F 项圈 (2)</p>

中型 (BJ 288-M) 8 轮中心保持架零部件

中心保持架零件构成	入口连接尺寸	入口连接零部件
 <p>BJ 288-M 中心保持架 焊接件</p> <p>入口连接零部件</p> <p>BJ 288.1-M 滚轮套管(8)</p> <p>BJ 084 滚轮(8)</p> <p>BJ 086.2 衬套(8)</p> <p>GB 537-12 螺栓(8)</p> <p>GW 537-F 垫圈(8)</p> <p>GN 537-L 螺母(8)</p> <p>GB 531-06 螺栓(8)</p> <p>GN 531-L 螺母(8)</p>	P12	<p>SA 366-P12P12-30 加长杆(1)</p>  <p>GC-SP-17-F 项圈(2)</p>
	MP12	<p>SA 577-MP12LMP12L-32 加长杆(1)</p>  <p>GC-SP-12-F 项圈(2)</p> <p>AF 071-MP12 项圈(2)</p> <p>GP 086-1218 衬套(2)</p> <p>AF 072-MP12 防震端盖(2)</p>
	M24	<p>SA 368-M24M24-30 加长杆(1)</p>  <p>GP252 M24M24 连接接头(1)</p> <p>Mibet.S 1000 bar</p> <p>GC-SP-17-F 项圈(2)</p>

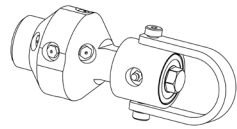
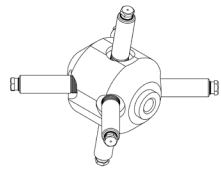
大型 (BJ 288-L) 8 轮中心保持架零件构成

中心保持架零件构成	入口连接尺寸	入口连接零部件
 <p>BJ 288-L 中心保持架 焊接件</p> <p>入口连接零部件</p> <p>BJ 288.1-L 滚轮套管(8)</p> <p>BJ 084 滚轮(8)</p> <p>BJ 086.2 衬套(8)</p> <p>GB 537-12 螺栓(8)</p> <p>GW 537-F 垫圈(8)</p> <p>GN 537-L 螺母(8)</p> <p>GB 531-06 螺栓(8)</p> <p>GN 531-L 螺母(8)</p>	P12	<p>SA 366-P12P12-30 加长杆(1)</p>  <p>GC-SP-17-F 项圈(2)</p>
	MP12	<p>SA 577-MP12LMP12L-32 加长杆(1)</p>  <p>GC-SP-12-F 项圈(2)</p> <p>AF 071-MP12 项圈(2)</p> <p>GP 086-1218 衬套(2)</p> <p>AF 072-MP12 防震端盖(2)</p>
	M24	<p>SA 368-M24M24-30 加长杆(1)</p>  <p>GP252 M24M24 连接接头(1)</p> <p>Mibet.S 1000 bar</p> <p>GC-SP-17-F 项圈(2)</p>

## 配件

### 喷嘴延长杆

BJVE全系列清洗头均可选择安装延长喷嘴。完整喷嘴延长杆信息请阅读“喷嘴与延长杆”。



6孔与8孔BJV喷头可选安装拉环接口。

### 拉环接口

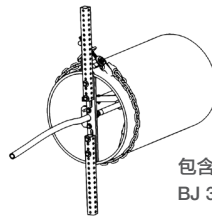
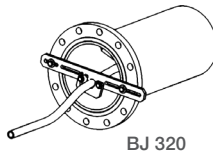
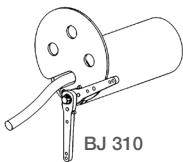
产品描述	零件编号	重量
6孔或8孔 BJV 喷头的拉环接口	HC 090	2.0 lb 0.9 kg

## 选购型安全装置

防倒退安全装置可防止清洗头在管内逆行，带压冲出管道，提高施工安全性。各类型安全装置适用于小直径管线、管道、各尺寸法兰管头、以及无法兰管道转换接头。

管道尺寸		高压胶管外径		防倒退装置	产品描述	重量	
inch	mm	inch	mm			lbs	kgs
4-8	100-200	0.3-1.5	8-38	BJ 310	防倒退安全装置，适用于小型至中型管道	7.6	3.4
5-17	130-430	0.3-1.5	8-38	BJ 320	防倒退安全装置，适用于中型至大型管道	6.3	2.9
15-36	380-910	N/A		BJ 325	BJ 320 防倒退安全装置延展配件	8.5	3.6
8-36	130-910	N/A		BJ 340	BJ 320 防倒退安全装置，无法兰连接配件	17	7.7

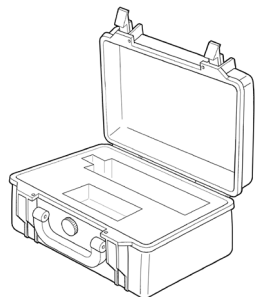
\*不提供固定装置



## 储存

BJVE清洗头配有Pelican™ 防撞箱，定制型内切泡沫，适用于各尺寸BJVE清洗头。

外部尺寸 (L x W x D)	内部尺寸 (L x W x D)	颜色	防撞箱 产品编号
17.5 x 11.7 x 7.1 in. 44.5 x 29.7 x 18.0 cm	16.9 x 10.0 x 6.5 in. 42.9 x 25.4 x 16.5 cm	黑色	BJ 080





## **BJV-P16, BJV-P12, BJV-M24, BJV-MP12**

**1. Acceptance of Terms and Conditions.** Receipt of these Terms and Conditions of Sale ("Terms and Conditions") shall operate as the acceptance by StoneAge, Inc. ("Seller") of the order submitted by the purchaser ("Buyer"). Such acceptance is made expressly conditional on assent by Buyer to these Terms and Conditions. Such assent shall be deemed to have been given unless written notice of objection to any of these Terms and Conditions (including inconsistencies between Buyer's purchase order and this acceptance) is given by Buyer to Seller promptly on receipt hereof.

Seller desires to provide Buyer with prompt and efficient service. However, to individually negotiate the terms of each sales contract would substantially impair Seller's ability to provide such service. Accordingly, the product(s) furnished by Seller are sold only according to the terms and conditions stated herein and with the terms and conditions stated in any effective StoneAge Dealer Agreement or StoneAge Reseller Agreement, if applicable. Notwithstanding any terms and conditions on Buyer's order, Seller's performance of any contract is expressly made conditional on Buyer's agreement to these Terms and Conditions unless otherwise specifically agreed to in writing by Seller. In the absence of such agreement, commencement of performance, shipment and/ or delivery shall be for Buyer's convenience only and shall not be deemed or construed to be an acceptance of Buyer's terms and conditions.

**2. Payment/Prices.** Unless other arrangements have been made in writing between Seller and Buyer, payment for the product(s) shall be made upon receipt of invoice. The prices shown on the face hereof are those currently in effect. Prices invoiced shall be per pricelist in effect at the time of shipment. Prices are subject to increase for inclusion of any and all taxes which are applicable and which arise from the sale, delivery or use of the product(s), and the collection of which Seller is or may be responsible to provide to any governmental authority, unless acceptable exemption certificates are provided by Buyer in accordance with applicable law. Buyer shall pay all charges for transportation and delivery and all excise, order, occupation, use or similar taxes, duties, levies, charges or surcharges applicable to the product(s) being purchased, whether now in effect or hereafter imposed by any governmental authority, foreign or domestic.

**3. Warranty.** SELLER MAKES NO WARRANTIES OR REPRESENTATIONS AS TO THE PERFORMANCE OF ANY PRODUCT EXCEPT AS SET FORTH IN THE STONEAGE LIMITED WARRANTY PROVIDED IN THIS DOCUMENT

**4. Delivery.** Seller is not obligated to make delivery by a specified date but will always use its best efforts to make delivery within the time requested. The proposed shipment date is an estimate. Seller will notify Buyer promptly of any material delay and will specify the revised delivery date as soon as practicable. UNDER NO CIRCUMSTANCES SHALL SELLER HAVE ANY LIABILITY WHATSOEVER FOR LOSS OF USE OR FOR ANY DIRECT OR CONSEQUENTIAL DAMAGES RESULTING FROM DELAY REGARDLESS OF THE REASON(S).

All product(s) will be shipped F.O.B. point of origin, unless specifically agreed otherwise, and Buyer shall pay all shipping costs and insurance costs from that point. Seller, in its sole discretion, will determine and arrange the means and manner of transportation of the product(s). Buyer shall bear all risk of loss commencing with the shipment or distribution of the product(s) from Seller's warehouse. Order shortages or errors must be reported within fifteen (15) business days from receipt of shipment to secure adjustment. No product(s) may be returned without securing written approval from Seller.

**5. Modification.** These Terms and Conditions are intended by Seller and Buyer to constitute a final, complete and exclusive expression of agreement relating to the subject matter hereof and cannot be supplemented or amended without Seller's prior written approval.

**6. Omission.** Seller's waiver of any breach or Seller's failure to enforce any of these Terms and Conditions at any time, shall not in any way affect, limit or waive Seller's right thereafter to enforce and compel strict compliance with every term and condition hereof.

**7. Severability.** If any provision of these Terms and Conditions is held to be invalid or unenforceable, such invalidity or unenforceability shall not affect the validity or enforceability of the other portions hereof.

**8. Disputes.** Seller and Buyer shall attempt in good faith to promptly resolve any dispute arising under these Terms and Conditions by negotiations between representatives who have authority to settle the controversy. If unsuccessful, Seller and Buyer shall further attempt in good faith to settle the dispute by nonbinding third-party mediation, with fees and expenses of such mediation apportioned equally to each side. Any dispute not so resolved by negotiation or mediation may then be submitted to a court of competent jurisdiction in accordance with the terms hereof. These procedures are the exclusive procedures for the resolution of all such disputes between the Seller and Buyer.

**9. Governing Law.** All sales, agreements for sale, offers to sell, proposals, acknowledgments and contracts of sale, including, but not limited to, purchase orders accepted by Seller, shall be considered a contract under the laws of the State of Colorado and the rights and duties of all persons, and the construction and effect of all provisions hereof shall be governed by and construed according to the laws of such state.

**10. Jurisdiction and Venue.** Seller and Buyer agree that the state or federal courts located within the City and County of Denver, Colorado shall have sole and exclusive jurisdiction over any litigation concerning any dispute arising under these Terms and Conditions not otherwise resolved pursuant to Section 9 as well as any alleged defects of any Products or damages sustained as a result of such alleged defects. Seller and Buyer further agree that should any litigation be commenced in connection with such a dispute, it shall only be commenced in such courts. Seller and Buyer agree to the exclusive jurisdiction of such courts and neither will raise any objection to the jurisdiction and venue of such courts, including as a result of inconvenience.

**11. Attorney's Fees.** If any litigation is commenced between Seller and Buyer, or their personal representatives, concerning any provision hereof, the party prevailing in the litigation shall be entitled, in addition to such other relief that is granted, to a reasonable sum as and for their attorneys' fees and costs in such litigation or mediation.

#### STONEAGE TRADEMARK LIST

View the list of StoneAge's trademarks and service marks and learn how the trademarks should be used. Use of StoneAge trademarks may be prohibited, unless expressly authorized.

<http://www.StoneAgetools.com/trademark-list/>

#### STONEAGE PATENT DATA

View the list of StoneAge's current U.S. patent numbers and descriptions.

<http://www.sapatents.com>

#### STONEAGE TERMS AND WARRANTY

View StoneAge's Terms and Warranty Conditions online.

<http://www.stoneagetools.com/terms>

<http://www.stoneagetools.com/warranty>

## WARRANTY:

Warranties set forth herein extend only to End-Users, meaning customers acquiring, or that have previously acquired, a product manufactured by StoneAge ("Product") for their own use and not for resale, either directly from StoneAge Inc. ("StoneAge") or from a StoneAge Authorized Dealer or Reseller ("Dealer"). No warranty of any kind or nature is made by StoneAge beyond those expressly stated herein.

### 1. LIMITED WARRANTY PERIOD.

One (1) year high pressure seal and seat parts as described within the following kits.

BJVE 604-XXX SEAL OVERHAUL Kit (P12, MP12 M24)

BJVE 605 SEAL OVERHAUL KIT (P16 ONLY).

Three (3) years for all other parts in the Product including the speed control mechanism.

Subject to the limitations and conditions hereinafter set forth, StoneAge warrants the Product to be free from defects in workmanship and material from the date of purchase by the End-User within the limited warranty period and is claimed no later than six (6) months from the period's expiration date. All replacement parts which are furnished under this Limited Warranty and properly installed shall be warranted to the same extent as the original Product under this Limited Warranty if, and only if, the original parts were found to be defective within the original Limited Warranty Period covering the original Product. Replacement parts are warranted for the remainder of the original Limited Warranty Period. This Limited Warranty does not cover any component part of any Product not manufactured by StoneAge. Any such component part is subject exclusively to the component manufacturer's warranty terms and conditions.

**2. LIMITED WARRANTY COVERAGE.** StoneAge's sole obligation under this Limited Warranty shall be, at StoneAge's option and upon StoneAge's inspection, to repair, replace or issue a credit for any Product which is determined by StoneAge to be defective in material or workmanship. StoneAge reserves the right to examine the alleged defective Product to determine whether this Limited Warranty is applicable, and final determination of limited warranty coverage lies solely with StoneAge. No statement or recommendation made by a StoneAge representative, Dealer or agent to End-User shall constitute a warranty by StoneAge or a waiver or modification to any of the provisions hereof or create any liability for StoneAge.

**3. WARRANTY SERVICE PROVIDERS.** Service and repair of the Product is to be performed only by StoneAge authorized service representatives, including Dealers who are authorized repair centers, with StoneAge approved parts. Information about StoneAge authorized service representatives can be obtained through the StoneAge website at [www.stoneagetools.com/service](http://www.stoneagetools.com/service). Unauthorized service, repair or modification of the Product or use of parts not approved by StoneAge will void this Limited Warranty. StoneAge reserves the right to change or improve the material and design of the Product at any time without notice to End-User, and StoneAge is not obligated to make the same improvements during warranty service to any Product previously manufactured.

**4. WARRANTY EXCLUSIONS.** This Limited Warranty does not cover, and StoneAge shall not be responsible for the following, or damage caused by the following: (1) any Product that has been altered or modified in any way not approved by StoneAge in advance in writing; (2) any Product that has been operated under more severe conditions or beyond the rated capacity specified for that Product; (3) depreciation or damage caused by normal wear and tear, failure to follow operation or installation instructions, misuse, negligence or lack of proper protection during storage; (4) exposure to fire, moisture, water intrusion, electrical stress, insects, explosions, extraordinary weather and/or environmental conditions including, but not limited to lightning, natural disasters, storms, windstorms, hail, earthquakes, acts of God or any other force majeure event;

(5) damage to any Product caused by any attempt to repair, replace, or service the Product by persons other than StoneAge authorized service representatives; (6) costs of normal maintenance parts and services; (7) damage sustained during unloading, shipment or transit of the Product; or (8) failure to perform the recommended periodic maintenance procedures listed in the Operator's Manual accompanying the Product.

**5. REQUIRED WARRANTY PROCEDURES.** To be eligible for warranty service, the End-User must: (1) report the Product defect to the entity where the Product was purchased (i.e. StoneAge or the Dealer) within the Limited Warranty Period specified in this Limited Warranty; (2) submit the original invoice to establish ownership and date of purchase; and (3) make the Product available to a StoneAge authorized service representative for inspection to determine eligibility for coverage under this Limited Warranty. This Limited Warranty shall not extend to any person or entity who fails to provide proof of original purchase from StoneAge or a Dealer. No Product may be returned for credit or adjustment without prior written permission from StoneAge.

6. **DISCLAIMER OF IMPLIED WARRANTIES AND OTHER REMEDIES.** EXCEPT AS EXPRESSLY STATED HEREIN (AND TO THE FULLEST EXTENT ALLOWED UNDER APPLICABLE LAW), STONEAGE HEREBY DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND ANY AND ALL WARRANTIES, REPRESENTATIONS OR PROMISES AS TO THE QUALITY, PERFORMANCE OR FREEDOM FROM DEFECT OF THE PRODUCT COVERED BY THIS LIMITED WARRANTY. STONEAGE FURTHER DISCLAIMS ALL IMPLIED INDEMNITIES.

7. **LIMITATION OF LIABILITY.** End-User specifically acknowledges that the Product may be operated at high speeds and/or pressures, and that as such it may be inherently dangerous if not used correctly. End-User shall familiarize itself with all operation materials provided by StoneAge and shall at all times use and require its agents, employees and contractors to use all necessary and appropriate safety devices, guards and proper safe operating procedures. In no event shall StoneAge be responsible for any injuries to persons or property caused directly or indirectly by the operation of the Product if End-User or any agent, employee, or contractor of End-User: (1) fails to use all necessary and appropriate safety devices, guards and proper safe operating procedures; (2) fails to maintain in good working order such safety devices and guards; (3) alters or modifies the Product in any way not approved by StoneAge in advance in writing; (4) allows the Product to be operated under more severe conditions or beyond the rated capacity specified for the Product; or (5) otherwise negligently operates the Product. End-User shall indemnify and hold StoneAge harmless from any and all liability or obligation incurred by or against StoneAge, including costs and attorneys' fees, to or by any person so injured.

TO THE FULL EXTENT ALLOWED BY APPLICABLE LAW, STONEAGE SHALL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR PUNITIVE DAMAGES (INCLUDING WITHOUT LIMITATION, LOSS OF PROFITS, LOSS OF GOODWILL, DIMINUTION OF VALUE, WORK STOPPAGE, INTERRUPTION OF BUSINESS, RENTAL OF SUBSTITUTE PRODUCT, OR OTHER COMMERCIAL LOSS EVEN TO THE EXTENT SUCH DAMAGES WOULD CONSTITUTE DIRECT DAMAGES), WITH RESPECT TO THE COVERED STONEAGE PRODUCT, OR OTHERWISE IN CONNECTION WITH THIS LIMITED WARRANTY, REGARDLESS OF WHETHER STONEAGE HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

IT IS UNDERSTOOD THAT STONEAGE'S LIABILITY, WHETHER IN CONTRACT, IN TORT, UNDER ANY WARRANTY, IN NEGLIGENCE, OR OTHERWISE SHALL NOT EXCEED THE AMOUNT OF THE PURCHASE PRICE PAID BY THE END-USER FOR THE PRODUCT. STONEAGE'S MAXIMUM LIABILITY SHALL NOT EXCEED, AND END-USER'S REMEDY IS LIMITED TO EITHER (1) REPAIR OR REPLACEMENT OF THE DEFECTIVE WORKMANSHIP OR MATERIAL OR, AT STONEAGE'S OPTION,(2) REFUND OF THE PURCHASE PRICE, OR (3) ISSUANCE OF A CREDIT FOR THE PURCHASE PRICE, AND SUCH REMEDIES SHALL BE END-USER'S ENTIRE AND EXCLUSIVE REMEDY.

YOU, THE END-USER, UNDERSTAND AND EXPRESSLY AGREE THAT THE FOREGOING LIMITATIONS ON LIABILITY ARE PART OF THE CONSIDERATION IN THE PRICE OF THE STONEAGE PRODUCT YOU PURCHASED.

Some jurisdictions do not allow the limitation or exclusion of liability for certain damages, so the above limitations and exclusions may not apply to you. This Limited Warranty gives you specific legal rights, and you may also have other rights which vary from jurisdiction to jurisdiction. If any provisions of this Limited Warranty is held to be invalid or unenforceable, such invalidity or unenforceability shall not affect the validity or enforceability of the other portions hereof.



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