Welker Engineering Company

Installation and Operating Manual

BIP-1Dual Seal
Bellows Injection Pump

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Section 1 – General Information

1.1 Introduction

The Welker BIP-1 is a positive displacement pump used to inject a liquid chemical into a pressurized pipeline. The BIP-1 incorporates a Teflon® bellows that separates the chemical, being injected, from the working side of the pump from the outside environment with the use of the dual seals. Opposite from the chemical side of the bellows, the I.D. of the bellows is packed with hydraulic oil that is contained by a hydraulic seal. When actuation air is applied to the actuator piston, the hydraulic oil is compressed which in turn flexes (extends) the bellows and displaces the chemical through the outlet check valve. The chemical output volume may be field adjusted to up to 3.0 cc per stroke.

1.2 Pump Specifications

Actuator:
Operating Pressure: …….. 100 psi Maximum Supply Pressure
Material: …….. Anodized Aluminum
Supply Connection:…….. Female, ¼” NPT

Wetted Parts:
Maximum Working Pressure: ...2160 PSI
Injection Body: ……. 316 S.S.
Check Valve Body: …….. 316 S.S.
Check Valve Cartridges: …….. 316 S.S. , Teflon® Seals
Check Valve Connections: …... Female, ¼” NPT
Bellows: …… Teflon®
Hydraulic Seal:…….. Polyurethane
Hydraulic Piston: ……..316 S.S. / Nickel Plated

Pump:
Total Pump Weight:…….. 5 lbs.

Torque Specifications:
Bellows……..25 ft.-lbs.

Section - 2 Installation

2.1 Mounting

The BIP-1 Pump has two 3/8"-16 threaded mounting holes on the bottom side of the pump body for ease of mounting. When mounting the pump, be sure it is in an upright, vertical position. This will maximize the amount of air that can be purged from the chemical chamber purge port as the chemical supply is applied to the inlet check valve.

2.2 Connections

All connections are ¼", female NPT. Connect the inlet line from the chemical supply tank to the pump inlet connection. Connect the pump connection outlet to the line leading to the pipeline. Connect the actuation air supply to the actuator port. Connect a sensing device (Vent Check Valve) to the dual seal port. The actuator may be repositioned by turning the actuator housing counter-clockwise from the actuator collar. The collar is knurled for ease of disassembly. When a desired position has been found, the collar may be **hand tightened** back to the actuator housing. Once all connections are made, proceed to start up procedures.
NOTE: When sealing fittings with PTFE tape, refer to the proper sealing instructions for the tape used.

2.3 Startup

Open the outlet valve from the pipeline connection to allow line pressure to the pump outlet check valve.

Apply a blanket of pressure to the chemical tank to start the flow of liquid chemical to the pump inlet check valve. The chemical will flow through the inlet check valve and into the body (chemical chamber). The pump body is equipped with a purge fitting (as previously noted) to release the air that will be displaced as the chamber is filled with chemical. The purge fitting cap has a purge hole that faces the pump body so that the person who is purging the chemical chamber does not get sprayed with chemical during the purging process. Once all air is purged from the chamber, tighten the purge fitting. NOTE: a small hose may be connected to collect any chemical that may be present during purging.

Set the volume adjustment screw on top of the actuator housing to insure the proper, required chemical output volume.

The pump is ready to be put into service.

Section 3: Maintenance

3.1 STOPPING OPERATION

If a reason to stop the pump arises such as for maintenance issues, all electrical power, actuation air supply and pressure must be off and bled down.

Set the volume adjustment screw such that maximum chemical output is possible. This will decrease the hydraulic pressure on the bellows.

Since the pump is equipped with inlet and outlet check valves, the pressure must be bled down between them. Slowly loosen the chemical chamber purge fitting to allow the release of trapped pressure.

3.2 Removal of Pump

It is recommended before disconnecting pump that you purge the pump system with a neutralizing solvent.

Disconnect and drain the inlet and outlet lines to and from the pump.

Remove the pump from its mounted position by removing the mounting bolts from the previously noted threaded, mounting holes.

3.3 Disassembly of Pump – Reference Drawing AD788BG

Loosen the actuator housing (15) from the actuator retainer (12), outside diameter is knurled for ease of removal. Turn the housing (15) in a counter clock-wise motion until it becomes loose. Spin off the retainer and remove

the actuator from the pump mid-section. **CAUTION: The actuator piston is spring loaded.**

Remove the actuator (15) and hydraulic piston (14) assembly from the pump mid-section (11). Inspect surface of hydraulic piston (14) and inside of actuator (15) for a smooth polished finish. **Note: If deep scratches are present, please consult Welker Engineering for replacement parts.**

Remove pump mid-section (11) from hydraulic cap (8) by twisting mid-section (11) in a counter clockwise direction. Inspection seal (29) and wipers (30), replace if needed. **When removing pump mid-section, keep pump in a vertical position to keep the hydraulic oil contained in the bellows.**

Drain the hydraulic oil from the bellows (7). Remove Hydraulic cap (8), examine poly-pak (22) and o-ring (31), replace if needed. Check to make sure the Hydraulic bearing (23) is smooth and clean. Once the bellows (7) has been drained, remove the bellows and inspect it for possible required replacement, replace o-ring (9).

Remove the inlet and outlet check valve caps, cartridges and o-rings from the bellows housing. **Note the direction of the cartridges as you remove them. The check valves check in the direction of the arrow on the check valve casing.**

Clean all parts with a solvent and wipe clean.

3.4 Assembly of Pump – AD788BG

Lightly lubricate all new seals with silicone based grease.

Place bellows into bellows housing and center the bellows in the bellows return spring. **Be certain the spring is centered on the end of the bellows so that the bellows is correctly compressed as it is inserted into the housing.**

Place 019 o-ring in bellows groove and reattach hydraulic cap. Torque hydraulic cap bolts to 25-ft.-lbs.

Replace hydraulic seal (poly-pak) (22) in hydraulic cap (8). Fill bellows (7) with hydraulic oil to just bellow the seal, approximately 1/64”. Replace Hydraulic bearing. Place hydraulic piston (10) into poly-pak seal (22),

gently press on air actuator, remove piston actuator and denote oil level. Should be within 1/64" of poly-pak, if so continue assembly. If not, repeat the above step.

Place pump mid-section (11) through the center of the actuator retainer (12) and reattach mid-section (11) to the hydraulic cap (9) by twisting mid-section (11) in a clock-wise motion.

Lightly lubricate hydraulic piston with the silicone grease. After replacing the actuator spring into the body mid-section, guide the piston down and through the mid section seal (29 & 30) and the hydraulic seal (poly-pak) (22).

Lightly lubricate the inside of the actuator housing with a thin film of grease and place the actuator housing down over the actuator piston. Connect and tighten the actuator housing to the actuator retainer. **Note the position of the actuator housing so that the pump may be placed back into service in the same position as before maintenance.**

3.5 Installation of Check Valves

When replacing the check valves, notice the directional arrow on the casing of the check valve cartridges. The cartridges should be installed with the noted arrow pointing in the direction of the flow of the liquid chemical to and from the pump.

Inlet Check Valve: Replace 013 o-ring (3) on the cap thread relief and insert 009 o-ring (2) into inlet check valve cap so that it is pressed to the bottom of said cap.

Insert cartridge into cap conical end first. The flow arrow on the cartridge will be facing the pump. Attach and tighten cap to the bellows housing.

Outlet Check Valve: Replace the 013 o-ring (3) around the cap thread relief and install cartridge large end first. The flow arrow on the cartridge should be facing away from the pump when installed.

Place 009 o-ring (2) on the end of the cartridge. Attach and tighten cap to the bellows housing.

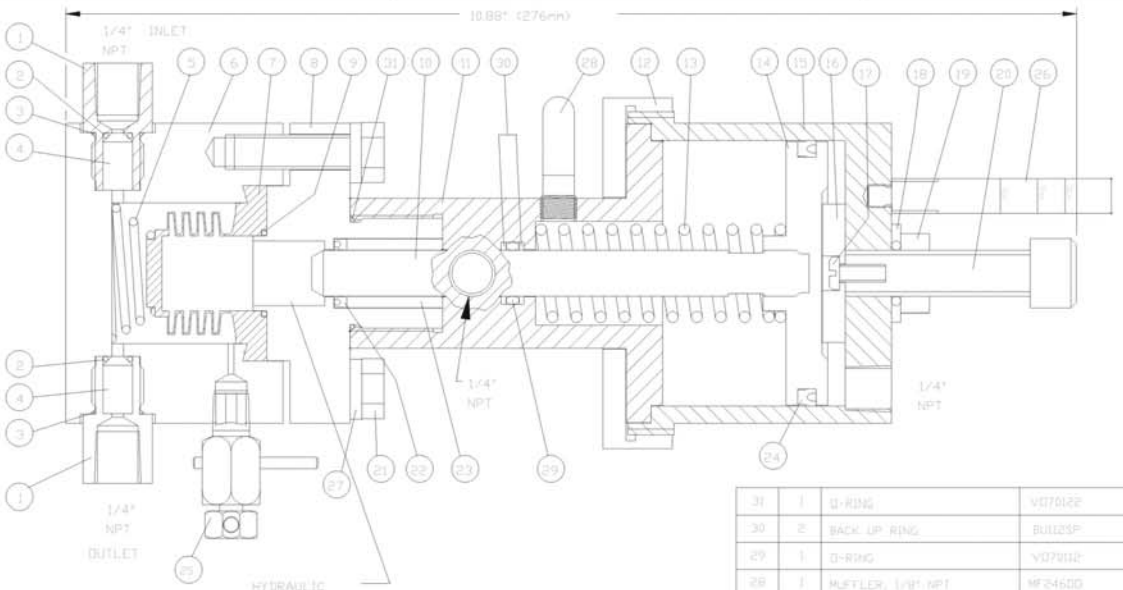
The pump is now ready to put back into service.

NOTE: If the check valve alignment needs to be changed, you may reverse by simply exchanging check valves.

Please see attached drawing AD788BG…

316 S.S./ ALUM

AD7888G



NO.	QTY.	TITLE	PART NUMBER
31	1	O-RING	VD78122
30	2	BACK UP RING	BU1125P
29	1	O-RING	VD78112
28	1	MUFFLER, 1/8" NPT	MF24600
27	6	LOCK WASHER 3/8"	MA8790X
26	1	INDICATOR TOWER	BP1036
25	1	PURGE VALVE	VL48800
24	1	O-CUP	MS04400
23	1	HYDRAULIC BEARING	BP1004
22	1	POLY-PAK	MS04700
21	6	BOLT 3/8"-16	MA004EX
20	1	ADJUSTMENT SCREW	BP1010

NO.	QTY.	TITLE	PART NUMBER
19	1	JAM NUT	MA0710X
18	1	STAT SEAL	MS09000
17	1	SCREW	MA1010X
16	1	ADJUSTMENT SPACER	BP1011
15	1	ACTUATOR HOUSING	BP1019
14	1	ACTUATOR PISTON	BP1003
13	1	ACTUATOR SPRING	SPR11800
12	1	RETAINING NUT	BP1002
11	1	SPRING HOUSING	BP1054
10	1	HYDRAULIC PISTON	BP1055
9	1	O-RING	VD78019
8	1	HYDRAULIC CAP	BP1006
7	1	BELLOWS	MD08600
6	1	INJECTION BODY	BP1007
5	1	BELLOWS RETURN SPR.	SPR1060X
4	2	CHECK VALVE CART.	MR57800
3	2	O RING	VD70013
2	2	O RING	VD78089
1	2	CHECK VALVE CAP	BP1008

WELKER

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1/2" BELLOWS INJECTION PUMP
STYLE: BIP-10 (DUAL SEAL)

MAX. WORKING PRESS: 2160 PSIG

RDC

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