

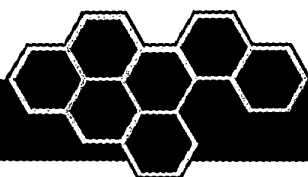
**Operation & Maintenance Manual
CIP Series Chemical Injection Pumps**

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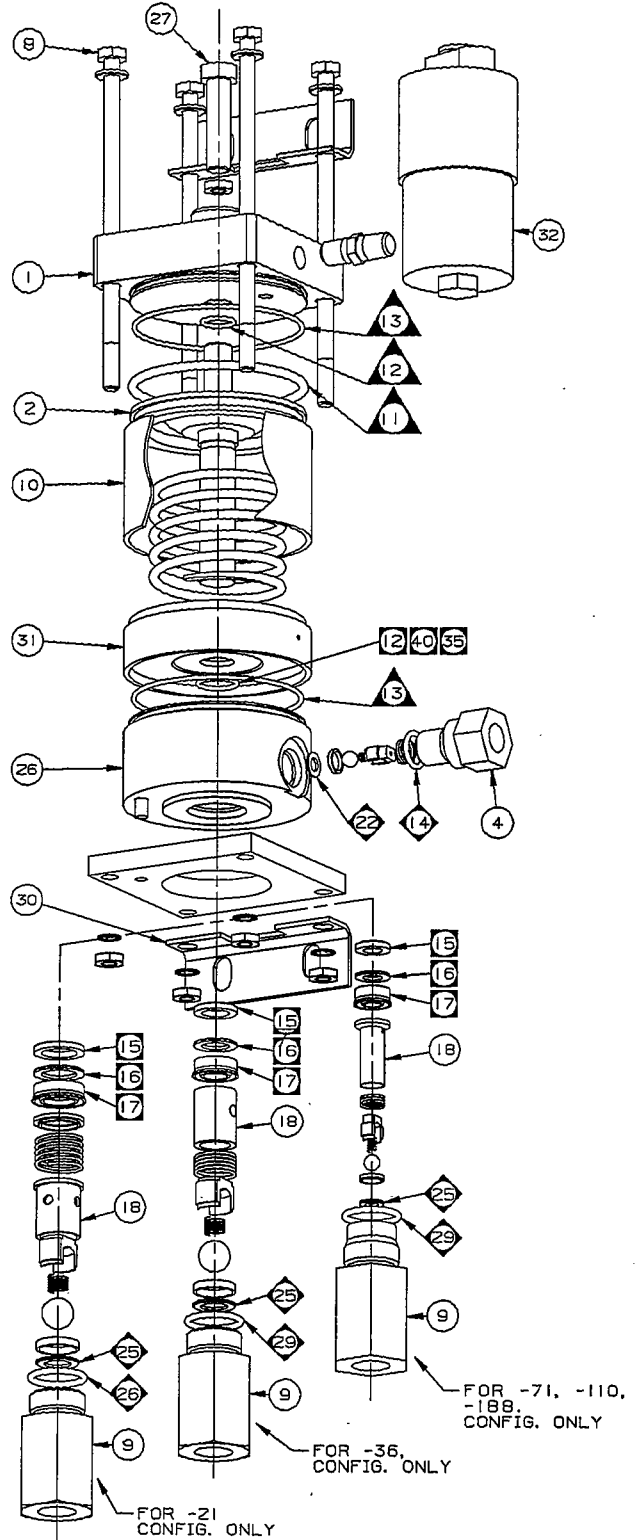
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Our products are backed by outstanding technical support, an excellent reputation for reliability, and world-wide distribution.

SEAL KIT	
DESCRIPTION	PART NO.
○ PLUNGER SEAL	50258
○ POLYURETHANE(STANDARD)	~(BASIC)
○ ULTRA-HIGH MOLECULAR WEIGHT POLYETHYLENE (UHMWPE)	~01
○ TEFLON	~02
◇ WETTED O-RINGS	50259
◇ VITON (STANDARD)	~(BASIC)
◇ BUNA N	~03
◇ EPR	~04
△ TEFLON	~05
△ DRIVE SECTION O-RINGS	50260
△ VITON(STANDARD)	~(BASIC)
△ BUNA N	~06



2. APPLY LIGHT COATING OF LUBRICANT (P/N 28442) TO DYNAMIC SEALS IN AIR DRIVE SECTION.

△ MUST INDICATE PUMP RATIO WHEN ORDERING SEAL KIT (EXAMPLE: 50258-188-02 IS A TEFLON PLUNGER SEAL FOR A -188 RATIO PUMP).

NOTES

-PARTS LIST DIAGRAM-

AIR/GAS DRIVEN CIP SERIES
(PART LIST ON ADJACENT PAGE)

CIP-21-XX PUMP			PLUNGER SEAL			WETTED O-RINGS				DRIVE SECTION O-RINGS	
IT NO.	DESCRIPTION	QTY	PU BASIC	UHMWPE -01	TEFLON -02	VITON BASIC	BUNA N -03	EPR -04	TEFLON -05	VITON BASIC	BUNA N -06
11	O-RING	1	-	-	-	-	-	-	-	568231-7	27270
12	O-RING	1	-	-	-	-	-	-	-	568013-7	568013-2
13	O-RING	2	-	-	-	-	-	-	-	568038-7	568038-2
14	O-RING	1	-	-	-	568906-7	568906-2	568906-13	568906-11	-	-
15	BEARING	1	17167-21	29703-21	29703-21	-	-	-	-	-	-
16	BACK UP	1	26378-21	-	-	-	-	-	-	-	-
17	SEAL	1	17186-13	29744-21	50262	-	-	-	-	-	-
22	SEAT	1	-	-	-	28081-1	28081-1	28081-1	28081-1	-	-
25	SEAT	1	-	-	-	28119	28119	28119	28119	-	-
29	O-RING	1	-	-	-	568910-7	568910-2	568910-13	568910-11	-	-
40	O-RING	1	568015-7	568015-7	568015-7	-	-	-	-	-	-
CIP-36-XX PUMP			PLUNGER SEAL			WETTED O-RINGS				DRIVE SECTION O-RINGS	
11	O-RING	1	-	-	-	-	-	-	-	568231-7	27270
12	O-RING	1	568013-7	568013-7	568013-7	-	-	-	-	568013-7	568013-2
13	O-RING	2	-	-	-	-	-	-	-	568038-7	568038-2
14	O-RING	1	-	-	-	568906-7	568906-2	568906-13	568906-11	-	-
15	BEARING	1	17167-36	29703-36	29703-36	-	-	-	-	-	-
16	BACK UP	1	26378-36	-	-	-	-	-	-	-	-
17	SEAL	1	17186-11	29744-36	50263	-	-	-	-	-	-
22	SEAT	1	-	-	-	28081-1	28081-1	28081-1	28081-1	-	-
25	SEAT	1	-	-	-	28119	28119	28119	28119	-	-
29	O-RING	1	-	-	-	568910-7	568910-2	568910-13	568910-11	-	-
CIP-71-XX PUMP			PLUNGER SEAL			WETTED O-RINGS				DRIVE SECTION O-RINGS	
11	O-RING	1	-	-	-	-	-	-	-	568231-7	27270
12	O-RING	1	-	-	-	-	-	-	-	568013-7	568013-2
13	O-RING	2	-	-	-	-	-	-	-	568038-7	568038-2
14	O-RING	1	-	-	-	568906-7	568906-2	568906-13	568906-11	-	-
15	BEARING	1	17167-71	29703-71	29703-71	-	-	-	-	-	-
16	BACK UP	1	26378-71	-	50264-2	-	-	-	-	-	-
17	SEAL	1	17186-9	29744-71	50264-1	-	-	-	-	-	-
22	SEAT	1	-	-	-	28081-1	28081-1	28081-1	28081-1	-	-
25	SEAT	1	-	-	-	28081-3	28081-3	28081-3	28081-3	-	-
29	O-RING	1	-	-	-	568910-7	568910-2	568910-13	568910-11	-	-
35	O-RING	1	568011-7	568011-7	568011-7	-	-	-	-	-	-
CIP-110-XX PUMP			PLUNGER SEAL			WETTED O-RINGS				DRIVE SECTION O-RINGS	
11	O-RING	1	-	-	-	-	-	-	-	568231-7	27270
12	O-RING	1	-	-	-	-	-	-	-	568013-7	568013-2
13	O-RING	2	-	-	-	-	-	-	-	568038-7	568038-2
14	O-RING	1	-	-	-	568906-7	568906-2	568906-13	568906-11	-	-
15	BEARING	1	17167-110	29703-110	29703-110	-	-	-	-	-	-
16	BACK UP	1	26378-110	-	50265-2	-	-	-	-	-	-
17	SEAL	1	17186-8	29744-110	50265-1	-	-	-	-	-	-
22	SEAT	1	-	-	-	28081-1	28081-1	28081-1	28081-1	-	-
25	SEAT	1	-	-	-	28081-3	28081-3	28081-3	28081-3	-	-
29	O-RING	1	-	-	-	568910-7	568910-2	568910-13	568910-11	-	-
35	O-RING	1	568010-7	568010-7	568010-7	-	-	-	-	-	-
CIP-188-XX PUMP			PLUNGER SEAL			WETTED O-RINGS				DRIVE SECTION O-RINGS	
11	O-RING	1	-	-	-	-	-	-	-	568231-7	27270
12	O-RING	1	-	-	-	-	-	-	-	568013-7	568013-2
13	O-RING	2	-	-	-	-	-	-	-	568038-7	568038-2
14	O-RING	1	-	-	-	568906-7	568906-2	568906-13	568906-11	-	-
15	BEARING	1	17167-188	29703-188	29703-188	-	-	-	-	-	-
16	BACK UP	1	26378-188	-	50266-2	-	-	-	-	-	-
17	SEAL	1	17186-7	29744-188	50266-1	-	-	-	-	-	-
22	SEAT	1	-	-	-	28081-1	28081-1	28081-1	28081-1	-	-
25	SEAT	1	-	-	-	28081-3	28081-3	28081-3	28081-3	-	-
29	O-RING	1	-	-	-	568910-7	568910-2	568910-13	568910-11	-	-
35	O-RING	1	568008-7	568008-7	568008-7	-	-	-	-	-	-



MODEL NUMBER _____ SERIAL NUMBER _____ DATE _____

PLEASE PROVIDE MODEL NO. AND SERIAL NO. WHEN ORDERING REPLACEMENT PARTS

AIR/GAS DRIVEN CHEMICAL INJECTION PUMPS CIP SERIES

Operating And Maintenance Manual Instructions

1.0 INTRODUCTION

The Haskel CIP Series Air/Gas Driven Pumps are positive displacement reciprocating pump/linear motor assemblies with controlled volume designed to be driven by conventional 50 to 110 psi compressed air, dry nitrogen, clean natural gas or CO2 gas. The drive gas and surrounding temperatures should be within a range of approximately 25 degree F to 150 degree F for reliable operation.

WARNING: TO PREVENT INJURY, MAKE SURE THAT ANY FLAMMABLE GAS SUCH AS NATURAL GAS IS PROPERLY VENTED FOR SAFETY.

2.0 INSTALLATION

2.1 Installation

- A. The Haskel CIP Series can be mounted in any position and be secured by the mounting brackets, however, it is best mounted vertically so that any fluid leakage from the chamber vent port will not migrate into the air drive section. Alternatively, the hydraulic inlet can be directly mounted to a tank top. Do not pipe vent port back to fluid source.
- B. For maximum performance, use minimum 1/4 inch air drive supply line with between 50 psi and 110 psi supply. Be sure the supply pressure is sufficient enough to stroke the pump against process line pressure. Install a supply line filter and pressure regulator between the supply and timer relay with a minimum of 1/4 inch npt size.

NOTE:

1. Supply pressure should be at least 5-15 psi above the minimum required to achieve injection. Insufficient pressure or volume at the timer will result in an erratic flow rate and/or stalling of timer relay.
2. If a filter or silencer is used in the timer relay exhaust port, care should be taken not to restrict exhaust flow as it may cause erratic operation.

WARNING: DO NOT USE SUPPLY LINE LUBRICATORS. OIL WILL CLOG SMALL PASSAGES AND CAUSE STALLING OF TIMER RELAY. THE AIR DRIVE SECTION IS PRE-LUBRICATED AT THE FACTORY & REQUIRES NO OTHER LUBRICATION.

CAUTION: TO PREVENT DAMAGE TO THE TIMER RELAY, ALWAYS USE A REGULATOR BETWEEN THE SUPPLY AND THE TIMER WHEN THE AIR/GAS SUPPLY PRESSURE EXCEEDS 110 PSI THE MAXIMUM RATING OF YOUR TIMER.

- C. Use hydraulic inlet line size equal to or larger than the pump npt size of the hydraulic inlet port.

NOTE: Maximum hydraulic supply pressure not to exceed 25 psi or pump will free-flow.

- D. Use hydraulic outlet piping of any size if it is rated for the maximum pressure potential of the pump. Install a suitable relief valve should the piping not be of the required pressure rating.

2.2 Startup

- A. To prime pump, loosen hydraulic outlet fitting (4) so it will leak. Adjust timer relay (32) to slowly cycle pump. When liquid appears, tighten outlet fitting (4). The pump is ready for operation.

2.3 Operation

- A. To vary the cycle rate, adjust the timer relay (32) from 0-100% (0-50 cycles per minute).
- B. To vary the injection volume per cycle, adjust the stroke limiter (27) to desired setting.

3.0 ROUTINE MAINTENANCE

Normal maintenance requirements are limited to periodic relubrication of the timer relay (32) and air drive section seals Δ as follows. The maintenance schedule should be 4 to 16 weeks depending on stroke rate, amount of moisture in air/gas supply and possible presence of hydrocarbons in gas supply.

Prior to maintenance, disconnect pump from system and perform the maintenance on a clean, well lit work bench.

3.1 Timer Relay

- A. Remove timer (32) from pump. Unscrew upper body and plug in lower body.
- B. Remove piston assembly and poppet valve.
- C. Wipe residue from piston assembly, poppet valve and bores in lower body.
- D. Lubricate lower body and piston assembly liberally with a good quality silicone grease.
- E. Reinstall piston assembly and poppet valve into lower body taking care not to damage seals. Replace plug in lower body and reassemble upper body.
- F. Reinstall timer (32) to pump.

3.2 Air Drive Section

- A. Remove timer (32) from pump.
- B. Remove four (4) tie bolts (8) and the mounting brackets (30).

CAUTION: THE AIR PISTON HAS A RETURN SPRING. CARE SHOULD BE TAKEN WHEN DISMANTLING TO PREVENT SPRING FROM EJECTING THE TOP AIR CAP.

- C. Separate air barrel (10) from air cap (1) and distance piece (31) to expose air drive seals Δ .
- D. Remove air drive o-ring seals. There are three (3) o-rings in the air drive section and one (1) o-ring in the distance piece (31). Inspect o-rings for wear or damage. If you suspect o-rings may have degraded, replace with new o-rings according to Drive Section O-Rings Seal Kit call-out on Parts List diagram.
- E. Apply Haskel 28442 Lubricant to o-rings and inside both ends of air barrel (10).
- F. Reassemble the air drive. Tighten four (4) tie bolts (8) to 50 in.-lbs torque.

3.3 Inlet Check Valve

- A. Unscrew inlet check valve fitting (9). Be careful not to loose check valve parts. These parts are relatively small and consist of a spacer, springs, shank, ring, ball and seat.
- B. Examine the plastic seat (25) for contamination or damage. Replace, if necessary, with new seat according to Wetted O-Rings Seal Kit call-out on Parts List diagram.
- C. Reassemble check valve parts and fitting according to Parts List diagram. Tighten inlet fitting to torque specification as follows.

50 ft.-lbs (-21 & -36 ratio pumps)
125 ft.-lbs (-71, -110 & -188 ratio pumps)

3.4 Plunger Seal

- A. Disassemble air drive section according to steps 3.2 A through E, Air Drive Section. Remove air piston/plunger assembly (2) from the hydraulic cap (26).
- B. Disassemble inlet check valve according to steps 3.3 A through C, Inlet Check Valve.
- C. Remove metal spacer (18).
- D. Remove seal package \square . Use a pin or dowel with close fit to inside end of hydraulic cap hole and push the seal package out through the inlet port.
- E. Examine seal package parts \square for contamination or damage. Replace, if necessary, with new seal package according to Plunger Seal Kit call-out on Parts List diagram.
- F. Reassemble seal package parts according to Parts List diagram.

3.5 Outlet Check Valve

- A. Unscrew outlet check valve fitting (4). Be careful not to loose check valve parts. These parts are relatively small and consist of a shank, ring, springs, ball and seat.
- B. Examine the plastic seat (22) for contamination or damage. Replace, if necessary, with new seat according to Wetted O-Rings Seal Kit call-out on Parts List diagram.
- C. Reassemble check valve parts and fitting according to Parts List diagram. Tighten outlet fitting to 50 ft.-lbs torque.

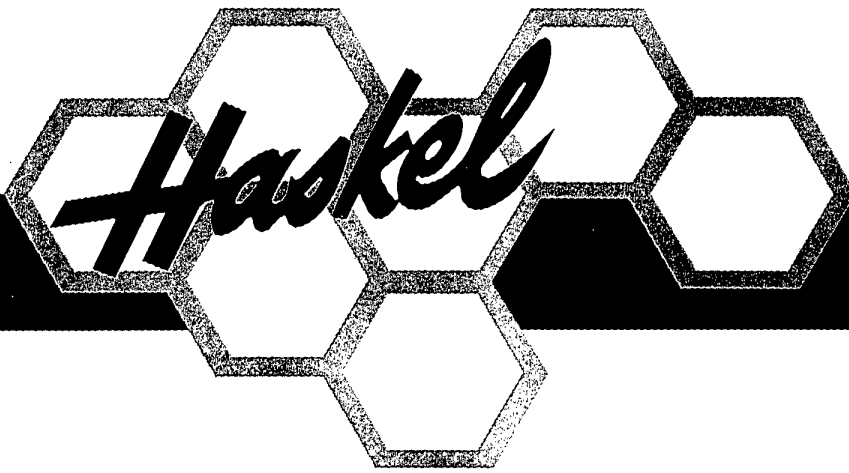
4.0 TROUBLE SHOOTING GUIDE

4.1 Air Drive Side

PROBLEM	POSSIBLE CAUSE(S)	ACTION
A. Will not cycle. No air flow through Timer Relay exhaust.	<ol style="list-style-type: none"> 1. Timer relay is set at 0%. 2. Low supply pressure through timer relay. 3. Low supply volume through timer relay. 	<ol style="list-style-type: none"> 1. Adjust timer relay above 0%. 2. Provide 50 psi minimum. 3. Increase supply line size.
B. Will not cycle. Constant air flow through Timer Relay exhaust.	<ol style="list-style-type: none"> 1. Improper inlet/outlet port connections (timer relay). 2. Poppet valve contamination or damaged (timer relay). 3. Lower seal contamination or damaged (timer relay). 	<ol style="list-style-type: none"> 1. Switch port connections. 2. Inspect poppet valve. Replace seals per 59870 drawing. 3. Inspect seal. Replace seal per 59870 drawing.
C. Timer Relay cycles but will not adjust properly.	<ol style="list-style-type: none"> 1. Teflon seal contamination or damaged. 	<ol style="list-style-type: none"> 1. Inspect teflon seal. Replace seal per 59870 drawing.
D. Timer Relay cycles intermittently or sluggish operation.	<ol style="list-style-type: none"> 1. Piston obstruction. 2. Inadequate lubrication of piston seals. 	<ol style="list-style-type: none"> 1. Inspect piston. Remove any contamination. 2. Inspect and lubricate piston seals (3 seals).
E. Constant air flow through Timer Relay drain hole.	<ol style="list-style-type: none"> 1. Middle seal contamination or damaged. 	<ol style="list-style-type: none"> 1. Inspect middle seal. Replace seal per 59870 drawing.

4.2 Hydraulic Side

PROBLEM	POSSIBLE CAUSE(S)	ACTION
A. Fluid leakage from drain port.	<ol style="list-style-type: none"> 1. Plunger seal worn or damaged. 	<ol style="list-style-type: none"> 1. Replace plunger seal per section 3.4, Plunger Seal.
B. Will not prime.	<ol style="list-style-type: none"> 1. Inlet check valve contamination or damaged. 	<ol style="list-style-type: none"> 1. Inspect inlet check valve. Remove contamination or replace damaged parts.
C. Output flow diminishing with constant conditions.	<ol style="list-style-type: none"> 1. Inlet check valve contamination or damaged. 	<ol style="list-style-type: none"> 1. Inspect inlet check valve. Remove contamination or replace damaged parts.
D. Excessive pulsation of output pressure.	<ol style="list-style-type: none"> 1. Outlet check valve contamination or damaged. 	<ol style="list-style-type: none"> 1. Inspect outlet check valve. Remove contamination or replace damaged parts.
E. Free flow	<ol style="list-style-type: none"> 1. High supply pressure. 	<ol style="list-style-type: none"> 1. Decrease supply pressure to 25 psi maximum.



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