Instructions-Parts

Wolverine™ DA Chemical Injection Pump

3A5976A

EN

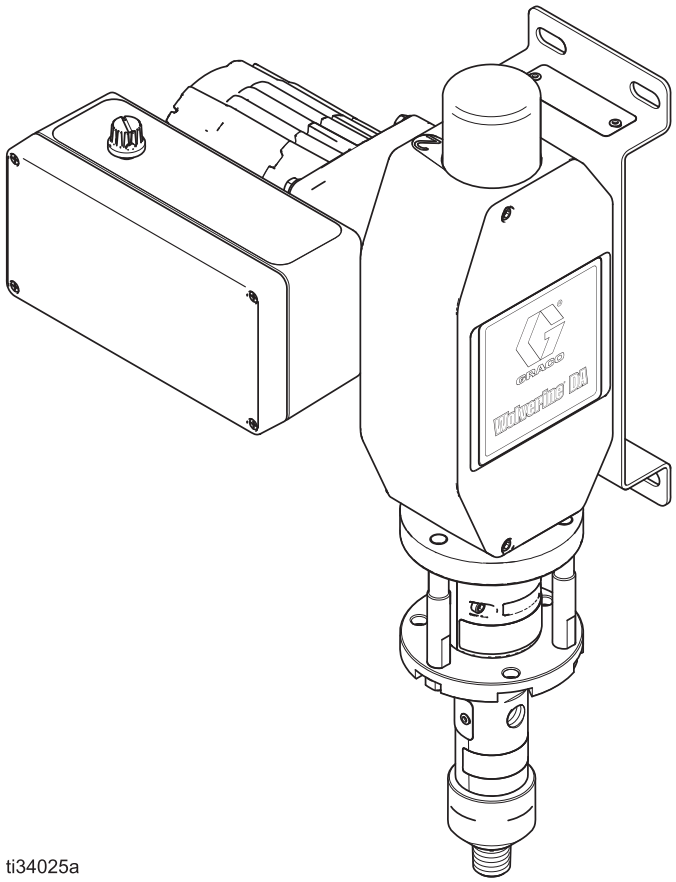
Electric pump for injecting chemicals at well sites. For professional use only.

Not approved for use in explosive atmospheres or hazardous locations unless otherwise stated in the model approvals section.

See page 3 for model information, including maximum working pressures.

Important Safety Instructions

Read all warnings and instructions in this manual.
Save all instructions.



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Contents

Models

Motor Type	Plunger Size	Maximum Working Pressure psi (MPa, bar)	Motor Approvals
12 VDC Variable Speed Brushless	3/8 in.	2,500 (17.2, 172)	 Class I, Division 2 Groups A, B, C, D
	1/2 in.	1,250 (8.6, 86)	
	3/4 in.	600 (4.1, 41)	
	1 in.	380 (2.6, 26)	
24 VDC Variable Speed Brushless	3/8 in.	2,500 (17.2, 172)	
	1/2 in.	1,250 (8.6, 86)	
	3/4 in.	600 (4.1, 41)	
	1 in.	380 (2.6, 26)	
115 VAC Variable Speed Brushless	3/8 in.	2,500 (17.2, 172)	
	1/2 in.	1,250 (8.6, 86)	
	3/4 in.	600 (4.1, 41)	
	1 in.	380 (2.6, 26)	

NOTE: See the **Configuration Number Matrix**, page 7, to find the plunger and pneumatic motor size for your unit.

Part Number	Configuration Code	Motor Type	Plunger Size	Lower Coating	Seal Material
30A000	CI-12B-038-025-XC	12 VDC Variable Speed Brushless	3/8 in.	Chromex	HNBR
30A001	CI-12B-038-025-XD				FFKM
30A002	CI-12B-038-025-XE				TFE/P
30A003	CI-12B-038-025-CC			Ceramic	HNBR
30A004	CI-12B-038-025-CD				FFKM
30A005	CI-12B-038-025-CE				TFE/P
30A006	CI-12B-050-050-XC		1/2 in.	Chromex	HNBR
30A007	CI-12B-050-050-XD				FFKM
30A008	CI-12B-050-050-XE				TFE/P
30A009	CI-12B-050-050-CC			Ceramic	HNBR
30A010	CI-12B-050-050-CD				FFKM
30A011	CI-12B-050-050-CE				TFE/P
30A012	CI-12B-075-063-XC		3/4 in.	Chromex	HNBR
30A013	CI-12B-075-063-XD				FFKM
30A014	CI-12B-075-063-XE				TFE/P
30A015	CI-12B-075-063-CC			Ceramic	HNBR
30A016	CI-12B-075-063-CD				FFKM
30A017	CI-12B-075-063-CE				TFE/P
30A018	CI-12B-100-088-XC		1 in.	Chromex	HNBR
30A019	CI-12B-100-088-XD				FFKM
30A020	CI-12B-100-088-XE				TFE/P
30A021	CI-12B-100-088-CC			Ceramic	HNBR
30A022	CI-12B-100-088-CD				FFKM
30A023	CI-12B-100-088-CE				TFE/P

Part Number	Configuration Code	Motor Type	Plunger Size	Lower Coating	Seal Material
30A024	CI-24B-038-025-XC	24 VDC Variable Speed Brushless	3/8 in.	Chromex	HNBR
30A025	CI-24B-038-025-XD				FFKM
30A026	CI-24B-038-025-XE				TFE/P
30A027	CI-24B-038-025-CC			Ceramic	HNBR
30A028	CI-24B-038-025-CD				FFKM
30A029	CI-24B-038-025-CE				TFE/P
30A030	CI-24B-050-050-XC		1/2 in.	Chromex	HNBR
30A031	CI-24B-050-050-XD				FFKM
30A032	CI-24B-050-050-XE				TFE/P
30A033	CI-24B-050-050-CC			Ceramic	HNBR
30A034	CI-24B-050-050-CD				FFKM
30A035	CI-24B-050-050-CE				TFE/P
30A036	CI-24B-075-063-XC		3/4 in.	Chromex	HNBR
30A037	CI-24B-075-063-XD				FFKM
30A038	CI-24B-075-063-XE				TFE/P
30A039	CI-24B-075-063-CC			Ceramic	HNBR
30A040	CI-24B-075-063-CD				FFKM
30A041	CI-24B-075-063-CE-				TFE/P
30A042	CI-24B-100-088-XC		1 in.	Chromex	HNBR
30A043	CI-24B-100-088-XD				FFKM
30A044	CI-24B-100-088-XE				TFE/P
30A045	CI-24B-100-088-CC			Ceramic	HNBR
30A046	CI-24B-100-088-CD				FFKM
30A047	CI-24B-100-088-CE				TFE/P

Part Number	Configuration Code	Motor Type	Plunger Size	Lower Coating	Seal Material
30A048	CI-1AD-038-025-XC	115 VAC Variable Speed Brushless	3/8 in.	Chromex	HNBR
30A049	CI-1AD-038-025-XD				FFKM
30A050	CI-1AD-038-025-XE				TFE/P
30A051	CI-1AD-038-025-CC			Ceramic	HNBR
30A052	CI-1AD-038-025-CD				FFKM
30A053	CI-1AD-038-025-CE				TFE/P
30A054	CI-1AD-050-050-XC		1/2 in.	Chromex	HNBR
30A055	CI-1AD-050-050-XD				FFKM
30A056	CI-1AD-050-050-XE				TFE/P
30A057	CI-1AD-050-050-CC			Ceramic	HNBR
30A058	CI-1AD-050-050-CD				FFKM
30A059	CI-1AD-050-050-CE				TFE/P
30A060	CI-1AD-075-063-XC		3/4 in.	Chromex	HNBR
30A061	CI-1AD-075-063-XD				FFKM
30A062	CI-1AD-075-063-XE				TFE/P
30A063	CI-1AD-075-063-CC			Ceramic	HNBR
30A064	CI-1AD-075-063-CD				FFKM
30A065	CI-1AD-075-063-CE				TFE/P
30A066	CI-1AD-100-088-XC		1 in.	Chromex	HNBR
30A067	CI-1AD-100-088-XD				FFKM
30A068	CI-1AD-100-088-XE				TFE/P
30A069	CI-1AD-100-088-CC			Ceramic	HNBR
30A070	CI-1AD-100-088-CD				FFKM
30A071	CI-1AD-100-088-CE				TFE/P

Configuration Number Matrix

Check the identification plate (ID) for the 17-digit Configuration Number of your pump. Use the following matrix to define the components of your pump.

NOTE: Not all combinations are possible.

Sample Configuration Number: CI-12B-038-025-XC

CI	12	B	038	025	X	C
Chemical Injection Pump	Voltage	Motor	Pump Lower Primary Seal Size	Pump Lower Secondary Seal Size	Pump Lower Wear Coating	Seal Material

Pump Configuration

Voltage		Motor		Pump Lower Primary Seal Size		Pump Lower Secondary Seal Size		Pump Lower Wear Coating		Seal Material	
12	12 VDC	B	Continuous Injection Variable Speed, Brushess CID2	038	3/8 in. diameter	025	1/4 in. diameter	X	Chromex	C	HNBR
24	24 VDC	D	Continuous Injection Variable Speed, AC	050	1/2 in. diameter	050	1/2 in. diameter	C	Ceramic	D	FFKM
1A	115 VAC			075	3/4 in. diameter	063	5/8 in. diameter			E	TFE/P
				100	1 in. diameter	088	7/8 in. diameter				

Lower Configuration

Pump Lower Primary Seal Size		Pump Lower Secondary Seal Size		Pump Lower Coating		Seal Material		Pump Stroke Length	
038	3/8 in. diameter	025	1/4 in. diameter	X	Chromex	C	HNBR	1	1 inch
050	1/2 in. diameter	050	1/2 in. diameter	C	Ceramic	D	FFKM		
075	3/4 in. diameter	063	5/8 in. diameter			E	TFE/P		
100	1 in. diameter	088	7/8 in. diameter						

Warnings

The following warnings are for the setup, use, grounding, maintenance, and repair of this equipment. The exclamation point symbol alerts you to a general warning and the hazard symbols refer to procedure-specific risks. When these symbols appear in the body of this manual or on warning labels, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

⚠WARNING


FIRE AND EXPLOSION HAZARD

When flammable fluids are present in the work area be aware that flammable fumes can ignite or explode. To help prevent fire and explosion:

- Use equipment only in well ventilated area.
- Eliminate all ignition sources, such as cigarettes and portable electric lamps.
- Ground all equipment in the work area.
- Keep work area free of debris, including rags and spilled or open containers of solvent.
- Do not plug or unplug power cords or turn lights on or off when flammable fumes are present.
- Use only grounded hoses.
- **Stop operation immediately** if static sparking occurs or you feel a shock**.** Do not use equipment until you identify and correct the problem.
- Keep a working fire extinguisher in the work area.


ELECTRIC SHOCK HAZARD

This equipment must be grounded. Improper grounding, setup, or usage of the system can cause electric shock.

- Turn off and disconnect power at main switch before disconnecting any cables and before servicing or installing equipment.
- Connect only to grounded power source.
- All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.





SKIN INJECTION HAZARD

High-pressure fluid from dispensing device, hose leaks, or ruptured components will pierce skin. This may look like just a cut, but it is a serious injury that can result in amputation. **Get immediate surgical treatment.**

- Do not put your hand over the fluid outlet.
- Do not stop or deflect leaks with your hand, body, glove, or rag.
- Follow the **Pressure Relief Procedure** when you stop dispensing and before cleaning, checking, or servicing equipment.
- Tighten all fluid connections before operating the equipment.
- Check hoses and couplings daily. Replace worn or damaged parts immediately.

⚠WARNING

EQUIPMENT MISUSE HAZARD

Misuse can cause death or serious injury.

- Do not operate the unit when fatigued or under the influence of drugs or alcohol.
- Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See **Technical Specifications** in all equipment manuals.
- Use fluids and solvents that are compatible with equipment wetted parts. See **Technical Specifications** in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request Safety Data Sheets (SDSs) from distributor or retailer.
- Turn off all equipment and follow the **Pressure Relief Procedure** when equipment is not in use.
- Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.
- Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards.
- Make sure all equipment is rated and approved for the environment in which you are using it.
- Use equipment only for its intended purpose. Call your distributor for information.
- Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.
- Do not kink or over bend hoses or use hoses to pull equipment.
- Keep children and animals away from work area.
- Comply with all applicable safety regulations.

MOVING PARTS HAZARD

Moving parts can pinch, cut or amputate fingers and other body parts.

- Keep clear of moving parts.
- Do not operate equipment with protective guards or covers removed.
- Equipment can start without warning. Before checking, moving, or servicing equipment, follow the **Pressure Relief Procedure** and disconnect all power sources.

TOXIC FLUID OR FUMES HAZARD

Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled, or swallowed.

- Read Safety Data Sheet (SDS) to know the specific hazards of the fluids you are using.
- Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.

PERSONAL PROTECTIVE EQUIPMENT

Wear appropriate protective equipment when in the work area to help prevent serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. Protective equipment includes but is not limited to:

- Protective eyewear, and hearing protection.
- Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer.

Installation

Choosing an Installation Location

Select a location that will adequately support the weight of the pump, as well as all plumbing and electrical connections.

The pump can either be mounted to a pole using the included 2 in. u-bolts or to a wall.

Refer to the mounting hole layout provided in **Dimensions** on page 28.

Always mount the pump upright.

If you have a mounting configuration that requires installation in a manner different than depicted in FIG. 1 or FIG. 2, please contact your Graco distributor for assistance.

Grounding

The equipment must be grounded to reduce the risk of static sparking and electric shock. Electric or static sparking can cause fumes to ignite or explode. Improper grounding can cause electric shock. Grounding provides an escape wire for the electric current.

Pump: grounded through **Motor Electrical Connections** on page 13.

Fluid lines: use only electrically conductive lines.

Fluid supply container: follow local code.

Accessories

Install the following required accessories in the order shown in FIG. 1 and FIG. 2, using adapters as necessary.

- **Fluid filter (Y-Strainer) (included in K):** with a 60 mesh (250 micron) stainless steel element to filter particles from the fluid before in reaches the pump.
- **Fluid shutoff valve (L):** shuts off fluid flow.
- **Pressure relief valve (D):** overload protection.

Flush Before Using Equipment

The equipment was tested with lightweight oil, which is left in the fluid passages to protect parts. To avoid contaminating your fluid with oil, flush the equipment with a compatible solvent before using the equipment. See **Flush the Equipment**, page 14.

Typical Installation - Ordinary Locations

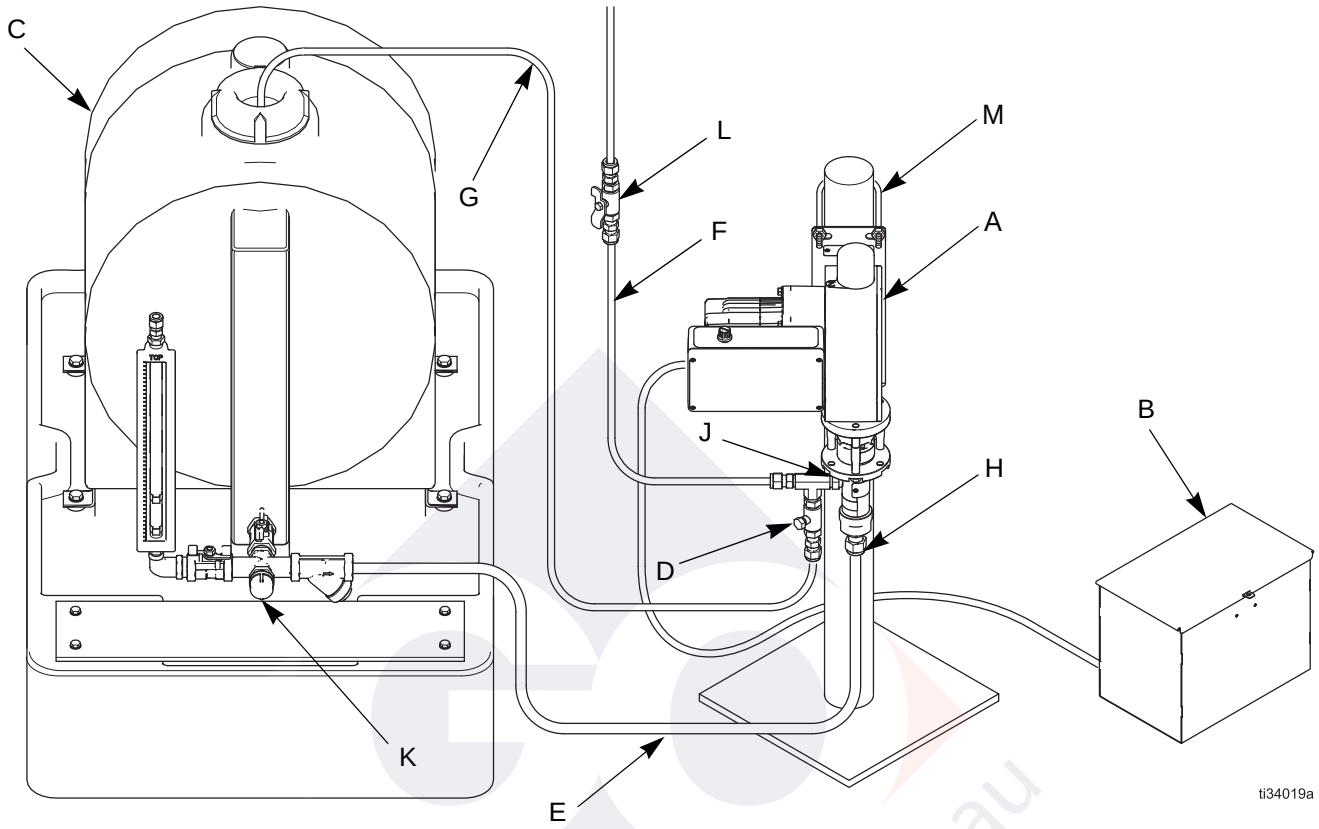


FIG. 1: Typical Installation - Ordinary Location with Generic Power Source

FIG. 1 is an example of an installation with a Wolverine DA chemical injection pump in an ordinary, non-hazardous location. Your installation may differ from what is shown here. (See **Accessories**, page 10.) The Wolverine DA pump (A) and U-bolts (M) are the the only components in FIG. 1 supplied by Graco. All other components are supplied by customer.

Key:

A Pump
B Power Source
C Tank
D Pressure Relief Valve
E Inlet Line
F Outlet Line
G Pressure Relief Line
H Inlet Port
J Outlet Port
K Manifold Assembly (includes y-strainer and fluid shutoff valve (L))
L Fluid Shutoff Valve
M U-bolts

Typical Installation - Hazardous Locations

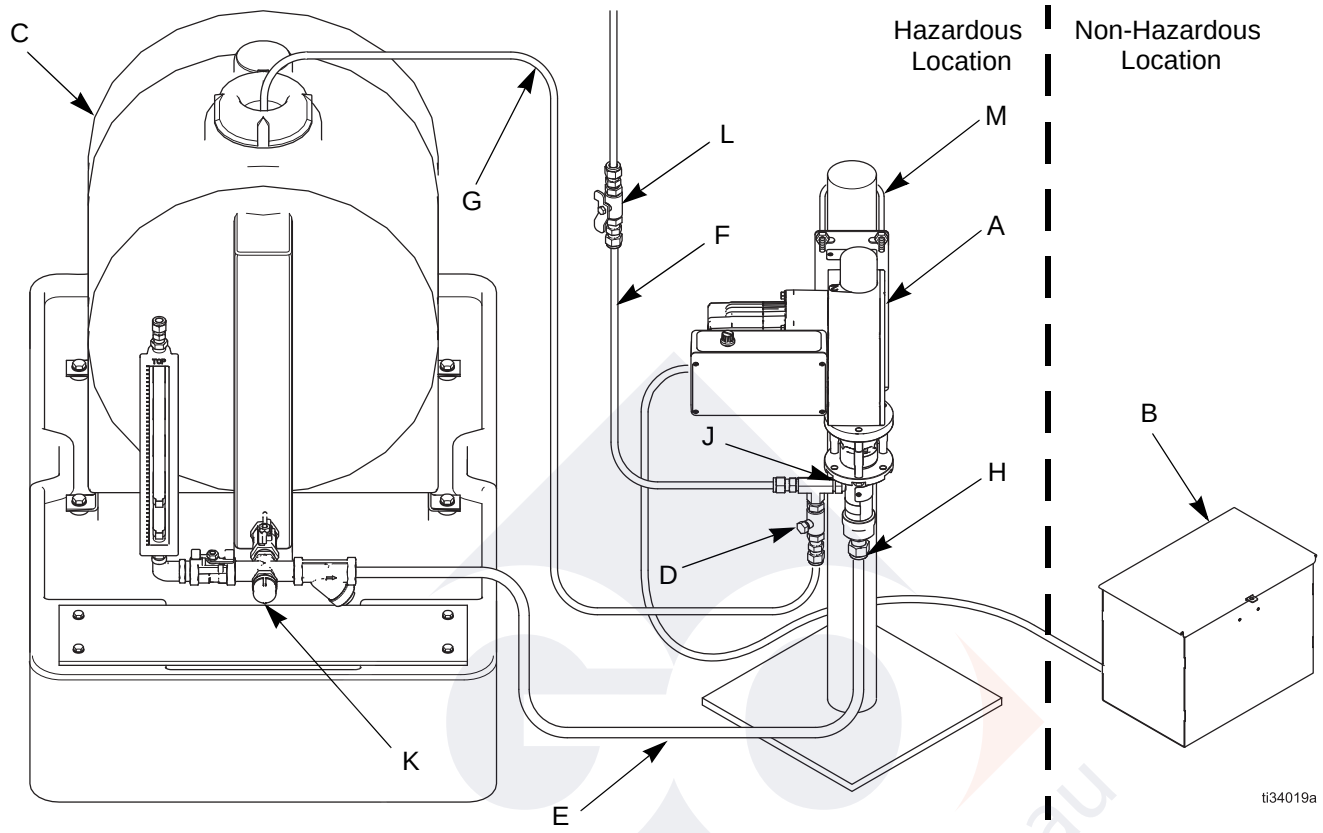


FIG. 2: Typical Installation - Hazardous Location with Generic Power Source

FIG. 2 is an example of an installation with a Wolverine DA chemical injection pump in a hazardous location. Your installation may differ from what is shown here. (See **Accessories**, page 10.) The Wolverine DA pump (A) and U-bolts (M) are the only components in FIG. 2 supplied by Graco. All other components are supplied by customer.

Key:

A Pump
B Power Source
C Tank
D Pressure Relief Valve
E Inlet Line
F Outlet Line
G Pressure Relief Line
H Inlet Port
J Outlet Port
K Manifold Assembly (includes y-strainer and fluid shutoff valve (L))
L Fluid Shutoff Valve
M U-bolts

Fluid Connections

1. Remove and discard plugs on check valves.
2. Connect a 1/4 npt(f) fluid line from the fluid source to the pump inlet port (H). See FIG. 1 or FIG. 2.
3. Install a pressure relief valve (D) on the outlet side of the pump.

NOTE: A pressure relief valve is available from Graco and can be connected back to the tank or directly to the inlet side of the pump. See **Kits and Accessories** on page 27.

In the event of an injection line blockage, to reduce the risk of skin injection and damage to the pump, ensure the pressure relief valve is set at or below the maximum working pressure of the pump.

4. Set the pressure relief valve at or below the maximum working pressure of the pump.
5. Connect a 1/4 npt(f) fluid line from the outlet check valve to the injection point.

Motor Electrical Connections

To reduce the risk of electrical shock:

- All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.
- Install the pump with a dedicated means to disconnect the main power to the pump.

NOTICE

Branch circuit protection (user-supplied) is required on all models. To avoid equipment damage:

- Never operate the pump without branch circuit protection installed.
- Branch circuit protection of the correct voltage and amperage must be installed in line with the power entry to the system.
- Branch circuit protection should be UL248 approved.
- See table below for branch circuit protection rating.

Configuration	Minimum Voltage	Branch Circuit Protection Rating
CI-12B-xxx-xxx-xx	12 VDC	20 A
CI-24B-xxx-xxx-xx	24 VDC	15 A
CI-1AD-xxx-xxx-xx	115 VAC	4 A

For Continuous Injection DC (model CI-xxB-xxx-xxx-xx)

Refer to the motor manual included with continuous injection models for wiring instructions and motor operation.

For Continuous Injection AC (model CI-1AD-xxx-xxx-xx)

The pump assembly has 12 ft. (3.7 m) of motor cable.

1. Connect the green motor wire to a ground location.
2. Connect the white motor wire to the neutral output of the power source.
3. Connect the black motor wire to the line output of the power source.

Operation

Pressure Relief Procedure

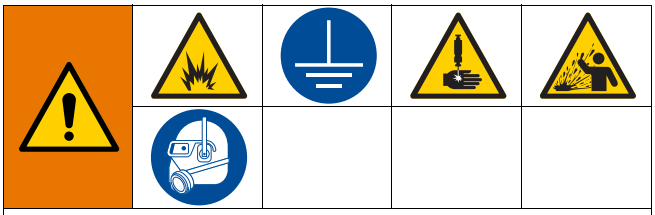
Follow the Pressure Relief Procedure whenever you see this symbol.

This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as skin injection and splashing fluid, follow the **Pressure Relief Procedure** when you stop dispensing and before cleaning, checking, or servicing the equipment.

NOTE: Always discharge fluid into an approved container or location.

1. Disconnect main power from the pump.
2. Shut off the inlet (E) and outlet lines (F) using the shutoff valves (L).
3. Slowly loosen the pressure relief valve (D) to relieve fluid pressure.
4. Disconnect and cap the inlet (E) and outlet fluid lines (F).

Flush the Equipment



To avoid fire and explosion, always ground equipment and waste container. To avoid static sparking and injury from splashing, always flush at the lowest possible pressure.

- Check fittings for leaks and tighten as necessary.
- Flush with a fluid that is compatible with the fluid being dispensed and the equipment wetted parts.

1. Follow the **Pressure Relief Procedure**.
2. Connect the inlet line (E) to the supply source of the flushing fluid.
3. Connect the outlet line (F) to a waste reservoir.
4. Run the pump until the dispensed fluid is predominately flushing fluid.
5. Follow the **Pressure Relief Procedure**.

Calibrate Chemical Dosage

1. Begin the process by setting the cycle rate of the pump to an estimated setting for a desired flow rate. See **Baseline Chemical Dosage Settings**, page 15, for tables of cycles per minute (CPM), and corresponding gallons per day (GPD) and liters per day (LPD).
2. Follow the instructions provided with your calibration gauge in conjunction with the **Baseline Chemical Dosage Settings**, page 15.
3. Adjust the cycle rate accordingly after the test is performed. Increasing the cycle rate of the pump will increase the pump flow rate, while decreasing it will decrease the flow rate.
4. Repeat the instructions provided with you calibration gauge to verify changes.
5. Repeat steps 3 and 4, as necessary, until the desired flow rate is achieved.

Baseline Chemical Dosage Settings

See **Performance Charts**, starting on page 29, for maximum flows at any given pressure.

	3/8 in. Fluid Plunger Pumps		1/2 in. Fluid Plunger Pumps	
CPM	GPD	LPD	GPD	LPD
10	12.2	46.3	27.5	104.1
20	24.5	92.7	55.0	208.2
30	36.7	139.0	82.5	312.3
40	49.0	185.3	110.0	416.4
50	61.2	231.7	137.5	520.6
60	73.4	278.0	165.0	624.7

	3.4 in. Fluid Plunger Pumps		1 in. Fluid Plunger Pumps	
CPM	GPD	LPD	GPD	LPD
10	62.0	234.8	92.6	350.4
20	124.0	469.5	185.1	700.8
30	186.1	704.3	277.7	1051.2
40	248.1	939.1	370.3	1401.6
50	310.1	1173.9	462.8	1752.0
60	372.1	1408.6	555.4	2102.4

NOTE: Maximum cycle rate is 60 CPM (cycles per minute), and the minimum cycle rate is 10 CPM.

Maintenance

Preventive Maintenance Schedule

The operating conditions of your particular pump determines how often maintenance is required. Establish a preventive maintenance schedule by recording when and what kind of maintenance is needed, and then determine a regular schedule for checking your pump.

Tighten Threaded Connections

Check that all threaded connections are tight at routine intervals.

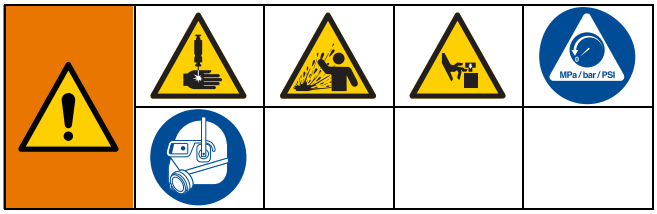
Tighten Packings

The packings included in your pump have the ability to be adjusted to stop leaks that develop when the seals are worn. If a leak develops in the pump's fluid section, tighten the packing nut clockwise by 1/16 of a turn, or lower, until the leak is eliminated. The life of the packing can be affected by over-tightening the packings. If the packing nut needs to be tightened repeatedly after short intervals, replace the packing.

Storage

If the pump is going to be stored for long periods, it is recommended that the pump be flushed with a light-weight oil or rust prohibiter to protect pump components. Store the pump with protective fluid inside whenever possible.

Troubleshooting



1. Follow **Pressure Relief Procedure**, page 14, before checking or repairing pump.
2. Check all possible problems and causes before disassembling pump.

Problem	Cause	Solution
Air bubbles in fluid	Suction line is loose	Tighten suction line.
Fluid leaking	Loose fittings	Tighten fittings.
	Worn or damaged seals or packing	Adjust or tighten seals or packing. If leak persists, replace seals or packing.
Motor running, but no fluid moving	Pump stalled	Check the pump for contamination.
	Worn or damaged check valve seals	Rebuild the inlet and outlet check valves.
Motor will not run	Motor brushes worn or damaged	Replace the motor brushes. (Ordinary location only.)
	Electrical	Check the electrical connectors.
	Blown fuse	Replace the fuse.
	Packings too tight	Loosen or replace packing.

Repair

Before servicing or repairing your pump, verify that pressure is relieved according to the **Pressure Relief Procedure**, page 14, and that all fluid and pneumatic lines are properly shut off, or sealed with compatible valves and disconnected.

Pump

Disconnect Pump

1. Follow the **Pressure Relief Procedure**, page 14.
2. Remove the dust cover (10) by loosening the two screws (11). See FIG. 3.

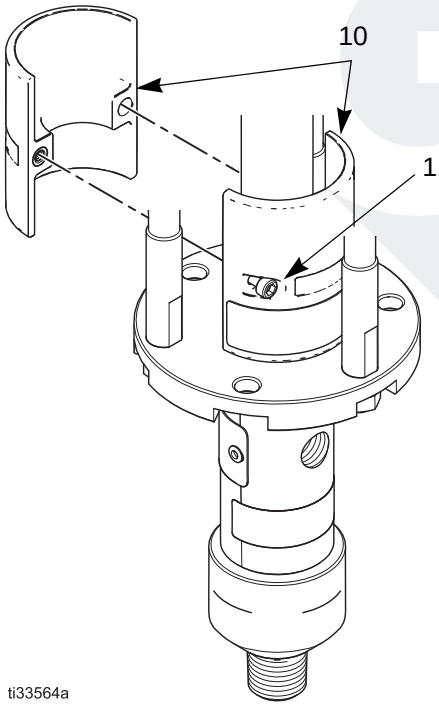


FIG. 3 Remove dust cover

3. Push the retaining spring (9) up and push out the connector pin (8) using a screwdriver or punch. See FIG. 4.

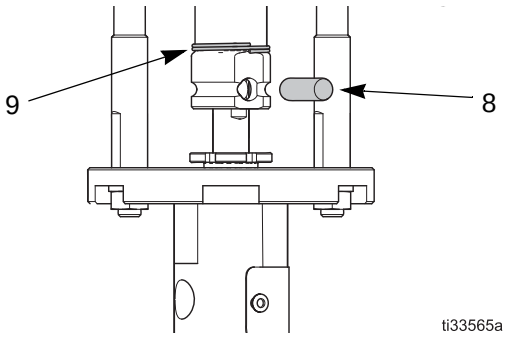


FIG. 4 Retaining spring and connector pin

4. Loosen the fluid cylinder (201) and carefully slide away from the lower pump adapter (5).

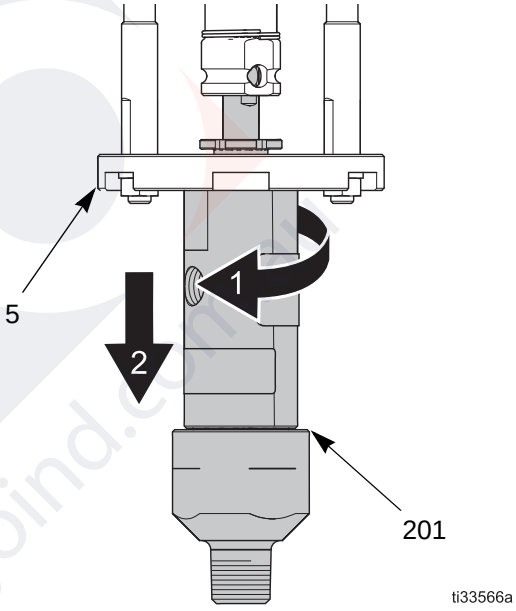


FIG. 5 Remove fluid cylinder

Pump Repair

1. Remove the cylinder cap (219) from the fluid cylinder (201).

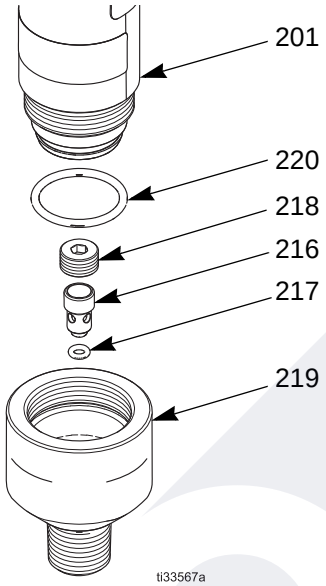


FIG. 6 Fluid cylinder cap assembly

2. Remove the check retainer (218) and lower check poppet (216) from the fluid cylinder cap (219).

3. Inspect the fluid cylinder cap o-ring (220) and lower poppet o-ring (217) for wear or damage, and replace if necessary.

4. Install the lower check poppet (216) into the fluid cylinder cap (219), and then install the check retainer (218).

5. Push the narrow end of the plunger (206) into the top of the fluid cylinder (201), and remove the entire fluid plunger assembly from the bottom of the fluid cylinder (201).

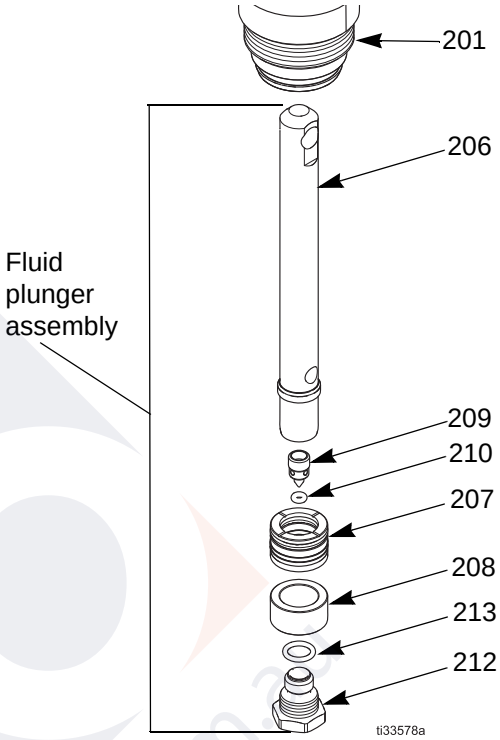


FIG. 7 Fluid plunger assembly

6. Remove the plunger check valve seat (212), and upper check poppet (209) and spring, from the fluid plunger (206).

7. Inspect the check seat o-ring (213) and upper poppet o-ring (210) for wear or damage, and replace if necessary.

8. Reinsert the check valve spring into the fluid plunger (206), and then the upper check poppet (209).

9. Inspect the bottom packing seal set (207) and bottom bearing (208) for wear or damage, and replace if necessary. Lubricate prior to reassembly.

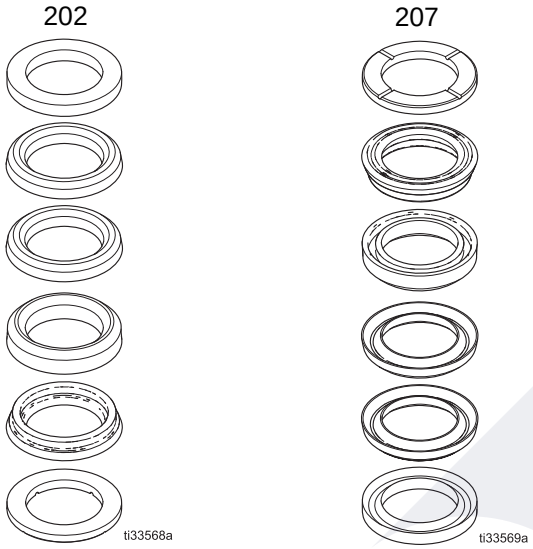


FIG. 8 Packing seal sets

10. Install the check valve seat (212) into the fluid plunger (206) with blue medium thread locker, and torque to 20 in-lb.

11. Remove the packing nut (205) from the top of the fluid cylinder (201).

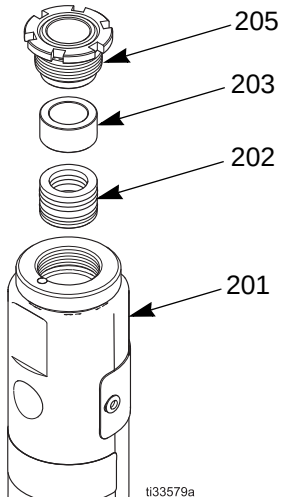


FIG. 9 Top packing seal assembly

12. Push the top packing seal set (202) and top bearing (203) out of the fluid cylinder (201).

13. Inspect the top packing seal set (202) and top bearing (203) for wearing or damage, and replace if necessary. Lubricate prior to reassembly.

14. Install the packing nut (205) into the top of the fluid cylinder (201) with pipe sealant, and set the distance to 5/32 or 0.156 inches. A 5/32 in. hex wrench may be used to set the gap.

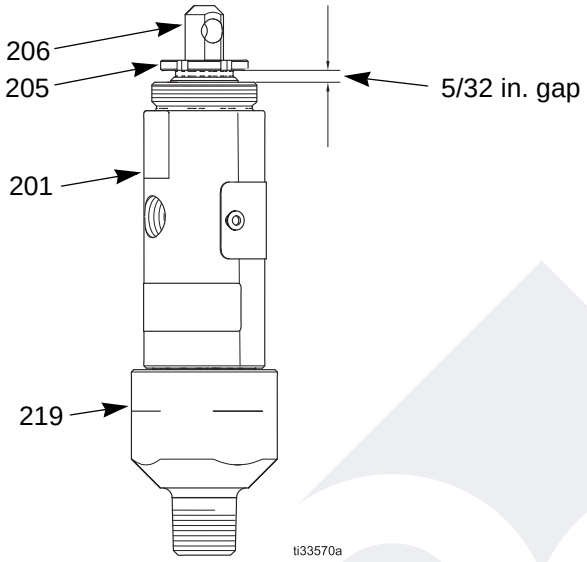


FIG. 10: Tightening the packing nut

15. Install the fluid plunger assembly in the bottom of the fluid cylinder (201) until flush with the end of the fluid cylinder (201). Lubricate the fluid plunger packing and shaft prior to assembly.

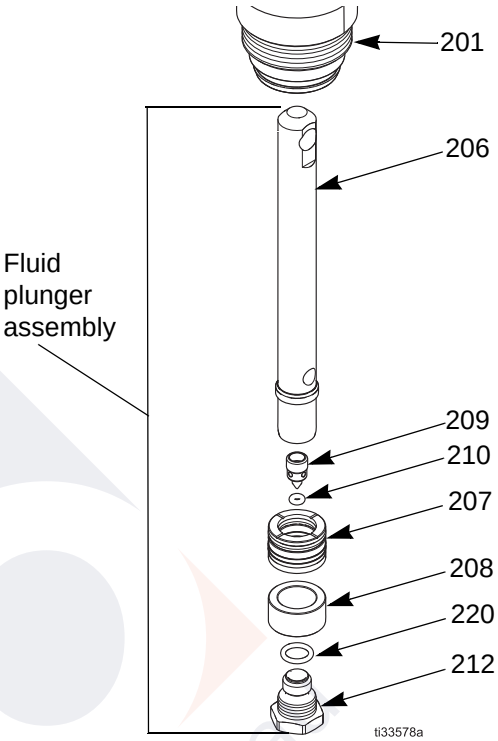


FIG. 11 Fluid plunger assembly

16. Install the fluid cylinder cap (219) and torque to 180 ft-lb. Lubricate the cylinder threads prior to assembly.

NOTE: If the packing nut (205) is over-tightened, the pump may wear the packing prematurely.

Reconnect Pump

NOTICE

The pump can be damaged if the fluid cylinder is not screwed all the way into the adapter plate. Be sure to fully screw the fluid cylinder (201) into the adapter plate (5).

1. Align the hole in the displacement rod with the hole in the pneumatic motor rod. Use a screwdriver to push in the pin (8).

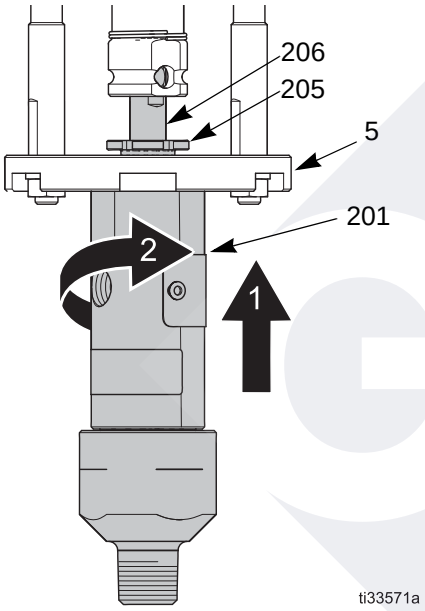


FIG. 12 Reconnect fluid cylinder

2. Screw the fluid cylinder into the adapter plate (nn) until it stops. Tighten fluid cylinder (201) to 30 ft-lbs (40 N•m).

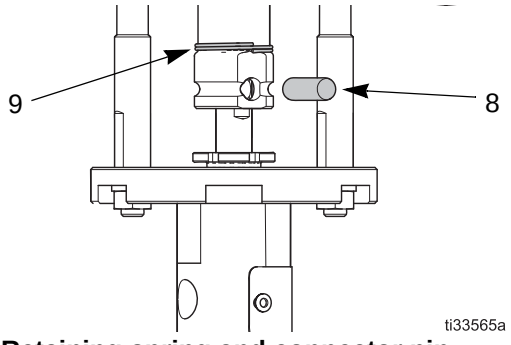


FIG. 13 Retaining spring and connector pin

3. Align the hole in the displacement rod with the hole in the pneumatic motor rod. Use a screwdriver to push in the pin (8).

4. Push the retaining spring (9) into place to cover the pin.

5. Replace the dust cover (10) and secure by tightening the two screws (11).

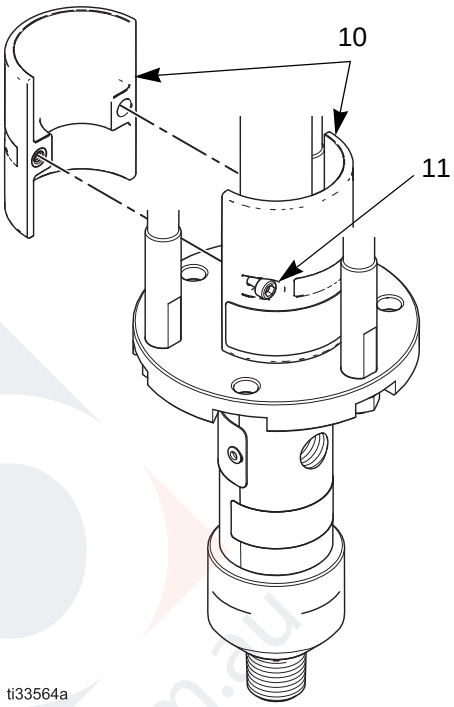
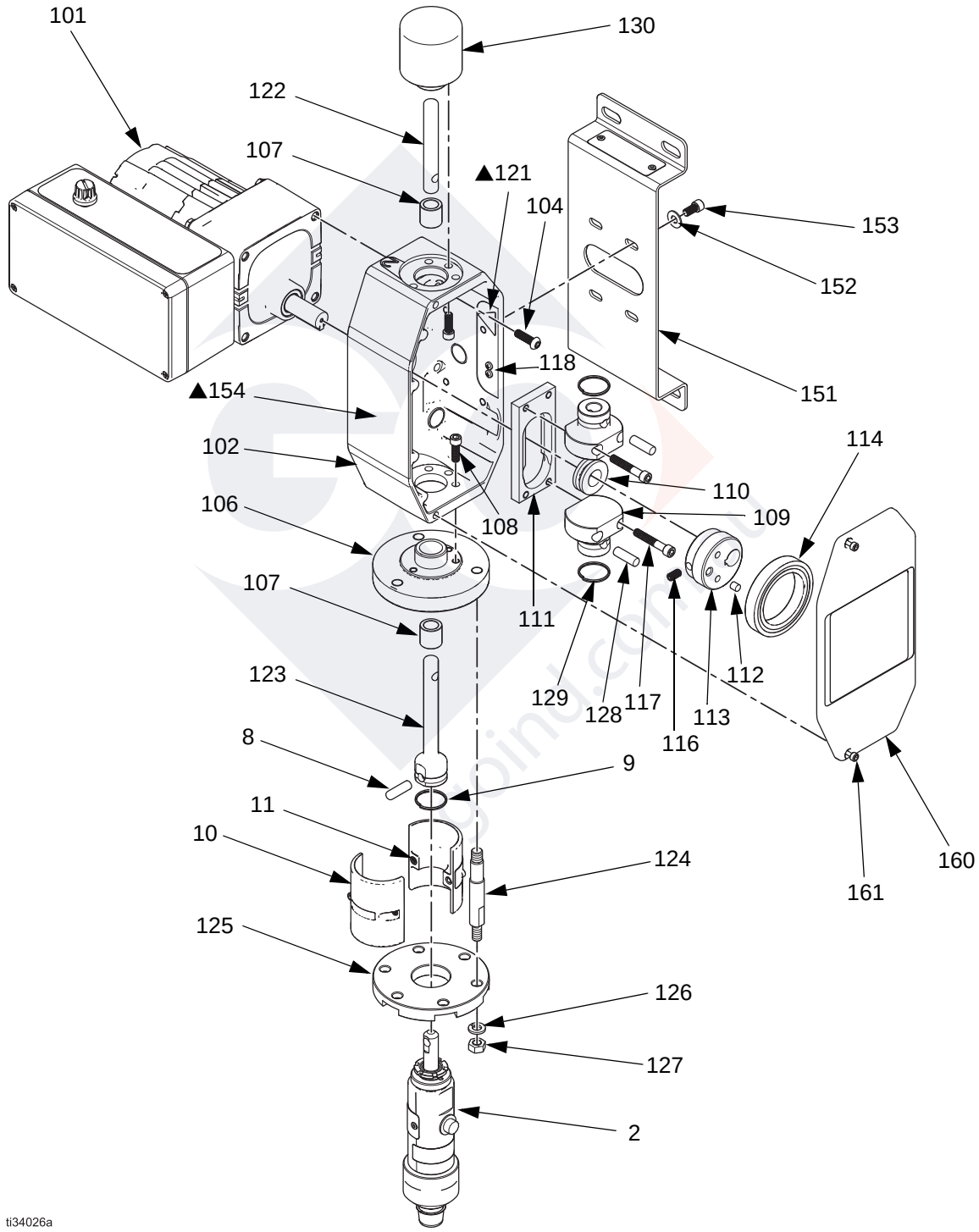


FIG. 14 Replace dust cover

Parts

Wolverine DA Drive Module

CI-1AD-038-025-XC shown (see Table 2, on pg 24, for drive module part numbers)



Wolverine DA Drive Module Parts List

Ref.	Part	Description	Qty
2	See Table 1	Pump lower	1
8	B32654	Pin, dowel, sst	1
9	B32655	Ring, split, sst	1
10	B32277	Guard, dust/hand	1
11	--	Screw	2
101	B32032	Motor, 12V, brushless, w/control	1
	B32236	Motor, 24V, brushless, w/control	
	B32705	Motor, AC, variable speed	
102	--	Housing, drive	1
104	--	Fastener, bhcs, 1/4-20 x .875	4
106	B32948	Adapter	1
107	--	Bearing, sleeve	1
108	--	Fastener, shcs,1/4-20 x .75	5
109†	B32947	Collar, stroke	1
110†	B32709	Bearing, cip carriage, .625 shaft	1
111†	--	Carriage, plunger return (includes ref. 112)	1
112†	--	Key, sst (included with ref. 111)	1
113†	B32411	Cam, for large motor (includes ref. 115 & 116)	1
114†	--	Bearing, deep groove ball	1
115†	--	Magnet, reed sensor (included with ref. 113)	1
116†	--	Screw, set (included with ref. 101 & 113)	1
117†	B32410	Fastener, schs, 1/4-20 x 1.50 (included with ref. 111)	4
118	--	Screw, php, 6-32 unc x .375 sst	2
121▲	15H108	Label, safety, pinch warning	1
122	B32945	Shaft, alignment	1
123	B32946	Shaft, pump	1
124	B32273	Rod, motor tie (includes ref. 126 & 127)	1
125	B32269	Adapter, lower, 25-50	1
	B32270	Adapter, lower, 63-75	
	B32653	Adapter, lower, 100	
126	--	Washer, spring lock (included with ref. 124)	3
127	--	Nut, hex (included with ref. 124)	3
128	B32654	Pin, dowel, sst	1
129	B32655	Ring, split, sst	1
130	B32977	Cap, coupler	1
151	B32949	Panel, mounting	1
152	--	Washer, flat, sst	4
153	--	Fastener, schs, 1/4-28 x .50 w/204	4
154▲	17G318	Label, safety, multiple warning	1
160	B32401	Guard (includes ref. 161)	1
161	--	Fastener, captive (included with ref. 160)	2

▲ *Replacement Danger and Warning labels, tags, and cards are available at no cost.*

† *Included in Drive Train Kit B32909.*

Table 1: Pump Lower (ref. 2)

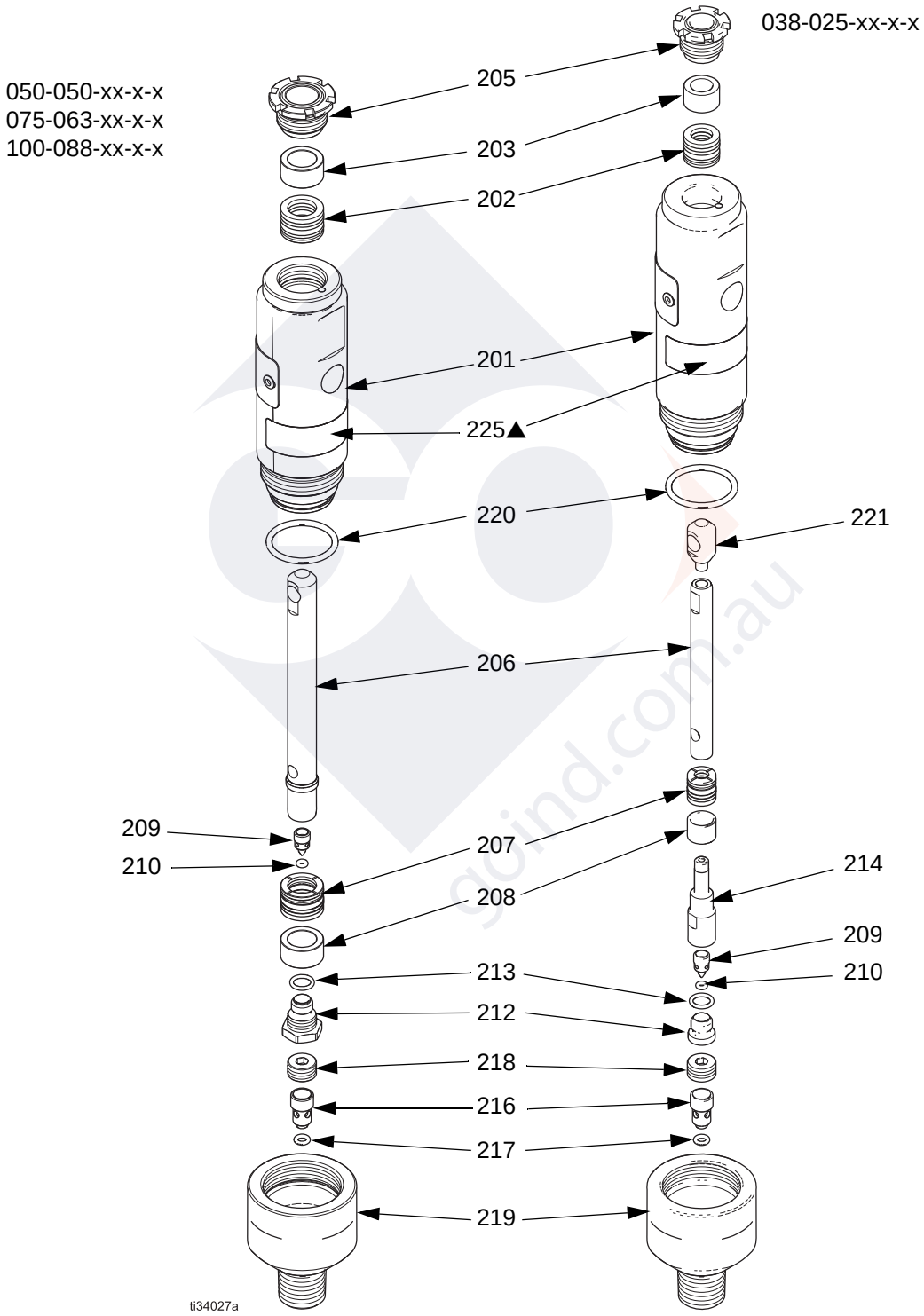
Seal Type	Part Numbers by Fluid Plunger Size			
	3/8 in.	1/2 in.	3/4 in.	1 in.
Chromex-Coated Fluid Plungers				
HNBR	B32953	B32959	B32965	B32971
FFKM	B32954	B32960	B32966	B32972
TFE/P	B32955	B32961	B32967	B32973
Ceramic-Coated Fluid Plungers				
HNBR	B32956	B32962	B32968	B32974
FFKM	B32957	B32963	B32969	B32975
TFE/P	B32958	B32964	B32970	B32976

Table 2: Drive Modules by Motor Type and Pump Lower Size

Motor Type	Part Numbers by Pump Lower Size		
	3/8 in. & 1/2 in.	3/4 in.	1 in.
12 VDC	A30206	A30216	A30267
24 VDC	A30207	A30217	A30268
115 VAC	A30208	A30218	A30269

Wolverine DA Pump Lower

Part No. B32865, 2.5 in. (63.5 mm); B32866, 3.5 in. (88.9 mm), shown



Wolverine DA Pump Lower Parts List

Ref.	Part	Description	Qty
201	See Table 3	Cylinder, fluid	1
202	See Table 6	Packing, z-lip, cip 38 (includes ref. 203 & 208)	1
203	See Table 6	Bearing, plunger (included with ref. 202)	2
204	See Table 4	Pellet, nylon (not shown, included with ref. 205)	1
205	See Table 4	Nut, plunger packing (includes ref. 204)	1
206	See Table 5	Plunger, fluid (includes ref. 214)	1
207	See Table 7	Packing, z-lip, cip 25	1
208	See Table 6	Bearing, fluid plunger (included with ref. 202)	1
209	See Table 9	Piston, check valve, high-pressure (includes ref. 210)	1
210	See Table 9	O-ring, 004, durometer, FFKM (included with ref. 209)	1
212	B32938	Seat, plunger check; 3/8 in.	1
	B32939	Seat, plunger check; 1/2 in.	
	B32940	Seat, plunger check; 3/4 in.	
	B32941	Seat, plunger check; 1 in.	
213	See Table 8	O-ring, FFKM	1
214	See Table 5	Housing, plunger check (included with ref. 206)	1
216	See Table 9	Piston, check (included with ref. 209)	1
217	See Table 9	O-ring, 2-007, FFKM (included with ref. 209)	1
218	B32942	Retainer, check; 3/8 in. & 1/2 in.	1
	B32943	Retainer, check; 3/4 in.	
	B32944	Retainer, check; 1 in.	
219	B32935	Cap, fluid cylinder; 3/8 in. & 1/2 in.	1
	B32936	Cap, fluid cylinder; 3/4 in.	
	B32937	Cap, fluid cylinder; 1 in.	
220	B32932	Packing, o-ring; 3/8 in. & 1/2 in.	1
	B32933	Packing, o-ring; 3/4 in.	
	B32934	Packing, o-ring; 1 in.	
221	See Table 6	Connector, fluid plunger (included with ref. 202)	2
225▲	17G320	Label, safety, multiple warning	1

▲ *Replacement Danger and Warning labels, tags, and cards are available at no cost.*

Table 3: Fluid Cylinder (ref. 201)

Ref	Part Numbers by Fluid Plunger Size			
	3/8 in.	1/2 in.	3/4 in.	1 in.
Chromex-Coated Fluid Cylinders				
105	B32656	B32657	B32658	B32659
Ceramic-Coated Fluid Cylinders				
105	B32660	B32661	B32662	B32663

Table 4: Packing Nut (ref. 205)

Ref	Part Numbers by Fluid Plunger Size			
	3/8 in.	1/2 in.	3/4 in.	1 in.
119	B32265	B32266	B32267	B32264

Table 5: Fluid Plunger (ref. 206)

Ref	Part Numbers by Fluid Plunger Size			
	3/8 in.	1/2 in.	3/4 in.	1 in.
Chromex-Coated Fluid Plungers				
109	B32918	B32919	B32920	B32921
Ceramic-Coated Fluid Plungers				
109	B32922	B32923	B32924	B32925

Table 6: Primary Top Packing Seal (ref. 202)

Seal Type	Part Numbers by Fluid Plunger Size			
	3/8 in.	1/2 in.	3/4 in.	1 in.
HNBR	B32100	B32104	B32129	B32926
FFKM	B32101	B32105	B32130	B32927
TFE/P	B32043	B32044	B32086	B32928

Table 7: Secondary Bottom Packing Seal (ref. 207)

Seal Type	Part Numbers by Fluid Plunger Size			
	3/8 in.	1/2 in.	3/4 in.	1 in.
HNBR	B32096	B32104	B32125	B32929
FFKM	B32097	B32105	B32126	B32930
TFE/P	B32042	B32044	B32085	B32931

Table 8: Check Seat O-Ring (ref. 213)

Seal Type	Part Numbers by Fluid Plunger Size		
	3/8 in. & 1/2 in.	3/4 in.	1 in.
HNBR	B32896	B32899	B32906
FFKM	B32897	B32904	B32907
TFE/P	B32898	B32905	B32908

Table 9: Check Valve Replacement (ref. 209)

Seal Type	Part Numbers by Fluid Plunger Size		
	3/8 in. & 1/2 in.	3/4 in.	1 in.
HNBR	B32991	B32994	B32997
FFKM	B32992	B32995	B32998
TFE/P	B32993	B32996	B32999

Kits and Accessories

Additional Kits & Accessories

Part No.	Description
B32045	225-750 PSI Pressure Relief Valve Kit (Adjustable)
B32046	750-1500 PSI Pressure Relief Valve Kit (Adjustable)
B32047	1500-2250 PSI Pressure Relief Valve Kit (Adjustable)
B32048	2250-3000 PSI Pressure Relief Valve Kit (Adjustable)
B32049	3000-4000 PSI Pressure Relief Valve Kit (Adjustable)
B32050	4000-5000 PSI Pressure Relief Valve Kit (Adjustable)
B32051	5000-6000 PSI Pressure Relief Valve Kit (Adjustable)
B32088	SST Calibration Column Kit
B32089	SST Manifold Assembly Kit
B32157	316 SST Ball Valve Kit, 3/4 in. NPT(F)
B32158	Fluid Filter 6000 PSI
B32159	Fluid Filter 10000 PSI
B32162	1/4 in. NPT(F) X 1/4 in. NPT(F) Check Kit
B32909	Wolverine DA Drive Train Kit

Dimensions

Wolverine DA Pump Dimensions

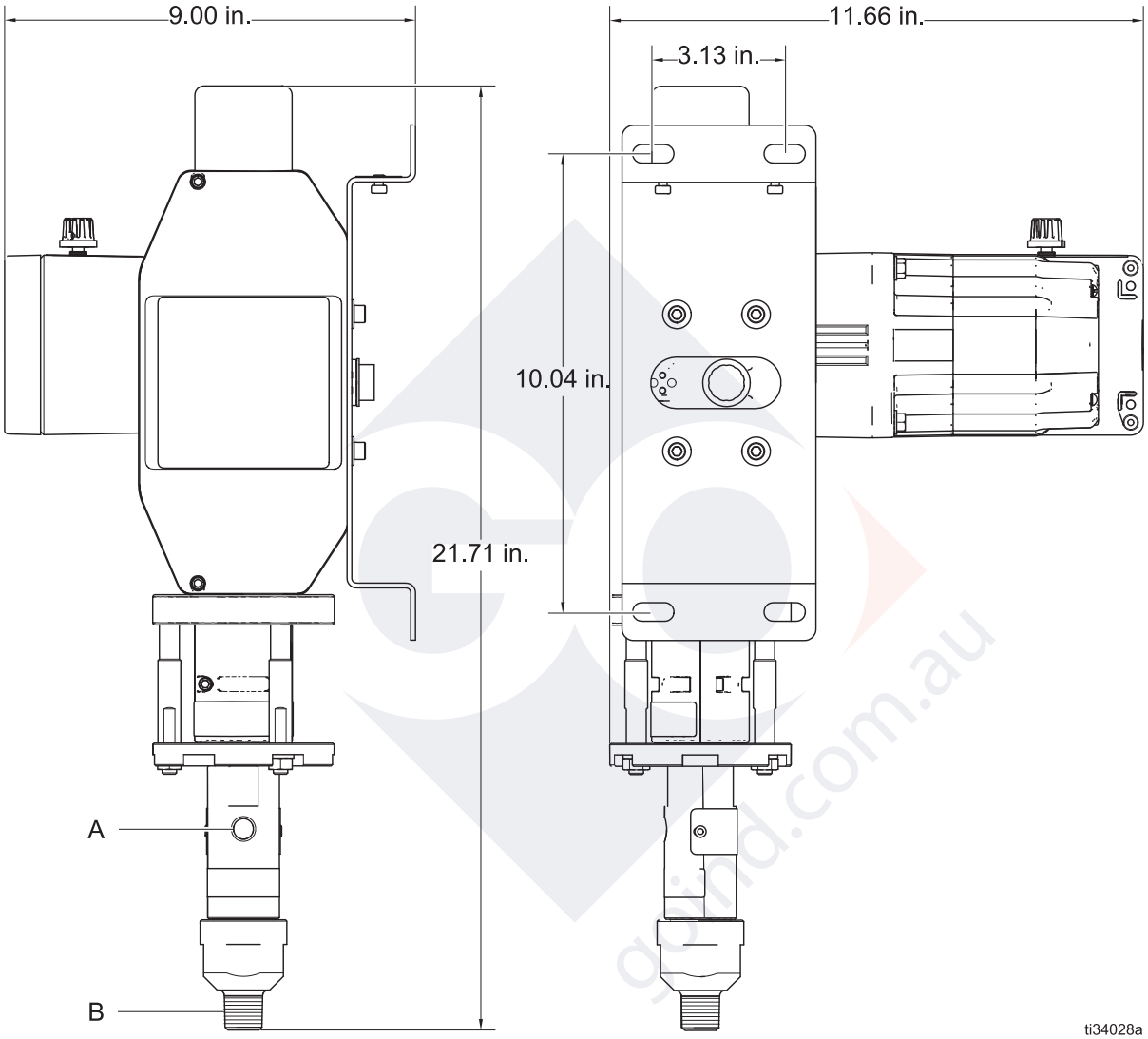
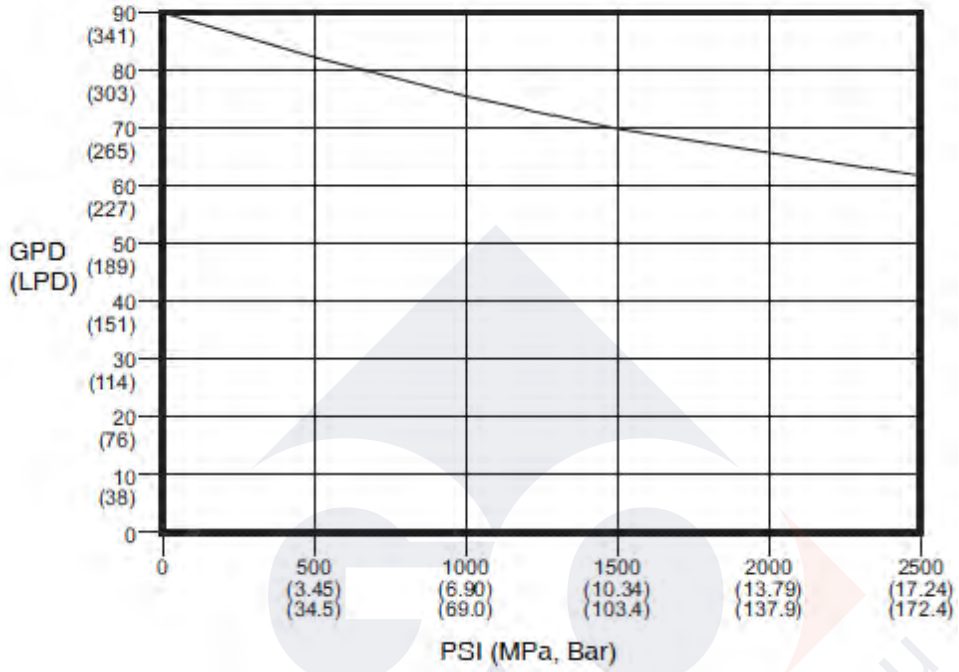


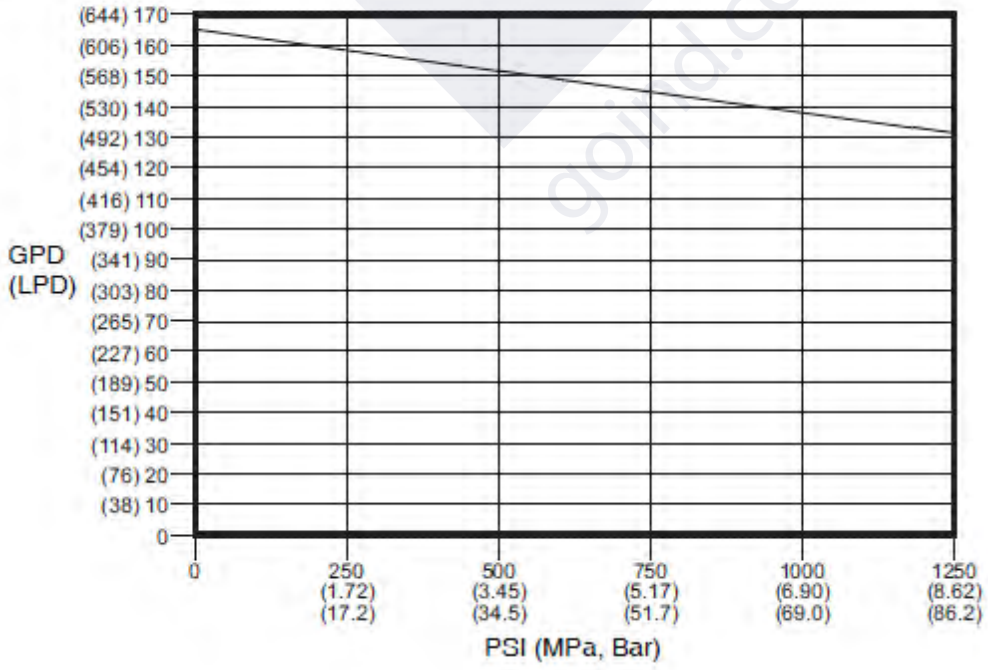
FIG. 15 Wolverine DA Pump Dimensions

Performance Charts

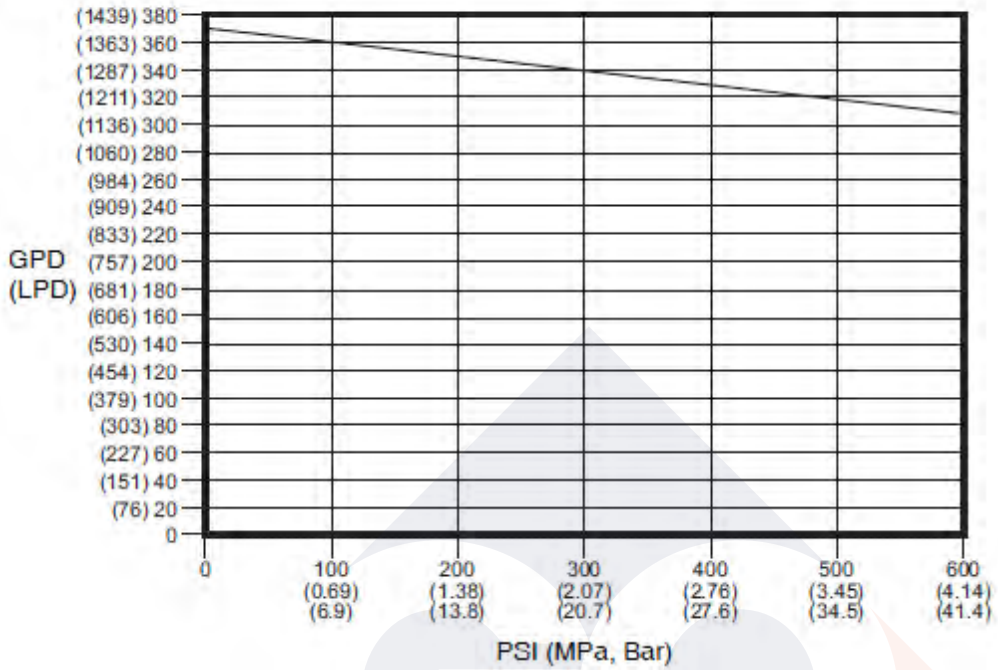
3/8 Inch Plunger



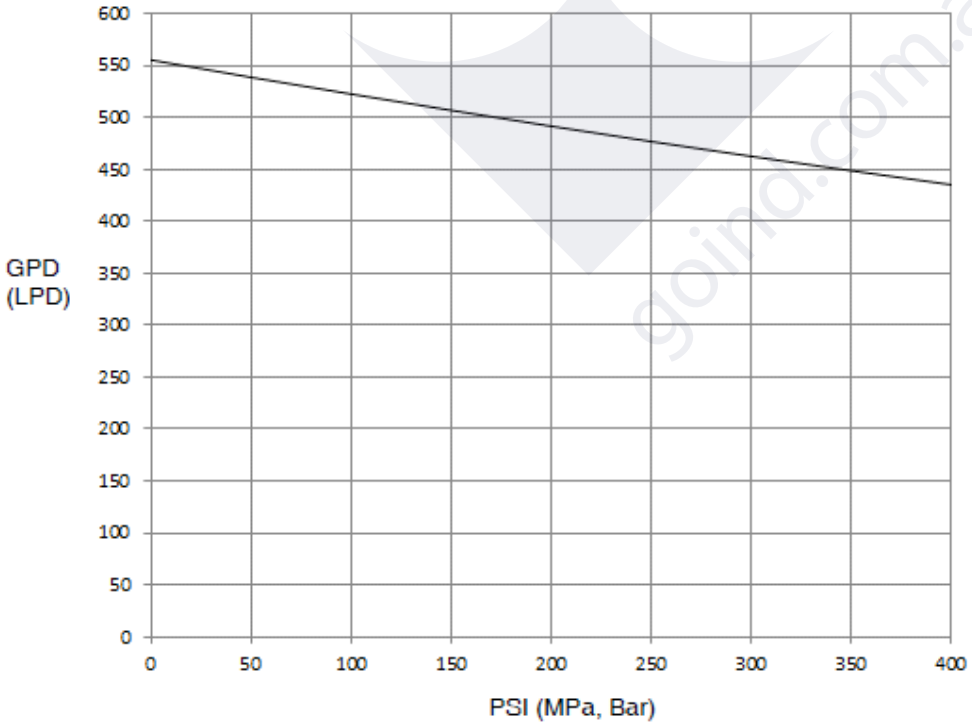
1/2 Inch Plunger



3/4 Inch Plunger



1 Inch Plunger



Technical Data

Wolverine DA Chemical Injection Pump		
	US	**Metric**
Maximum fluid working pressure	Varies by model. See **Models** on page 3.	
Input Voltage		
CI-12B-xx	12 VDC	
CI-24B-xx	24 VDC	
CI-1AD-xx	115 VAC	
Maximum Input Current		
CI-12B-xx-x	16 A @ 12 VDC	
CI-24B-xx-x	11 A @ 24 VDC	
CI-1AD-xx-x	3.0 A @ 110 VAC Single Phase	
Power Connection	See **Motor Electrical Connections** on page 13.	
Environmental temperature range (for CI-1AD-xx)	-40°–176°F	-40°–80°C
Environmental temperature range (for CI-12B-xx and CI-24B-xx)	-4°–104°F	-20°–40°C
Noise (dBa)		
Maximum sound pressure	<70 dBa	
Inlet/Outlet Sizes		
Fluid inlet size (3/8 in. & 1/2 in. plungers	1/2 in. npt(m)	
Fluid inlet size (3/4 in. plunger	3/4 in. npt(m)	
Fluid inlet size (1 in. plunger	1 in. npt(m)	
Fluid outlet size (3/8 in., 1/2 in., & 3/4 in. plungers	1/4 in. npt(f)	
Fluid outlet size (1 in. plunger	1/2 in. npt(f)	
Materials of Construction		
Pump/Check Valve Seal Material	See **Configuration Chart** on page 7 for seal material. All other packing materials are PEEK and PTFE unless otherwise noted.	
Wetted Parts	See **Configuration Chart** on page 7 for plunger material. All other materials are 316 stainless steel unless otherwise noted.	
Weight		
All Models	31 lb.	14 kg

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