

Wolverine® Chemical Injection Pump

334513L

EN

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

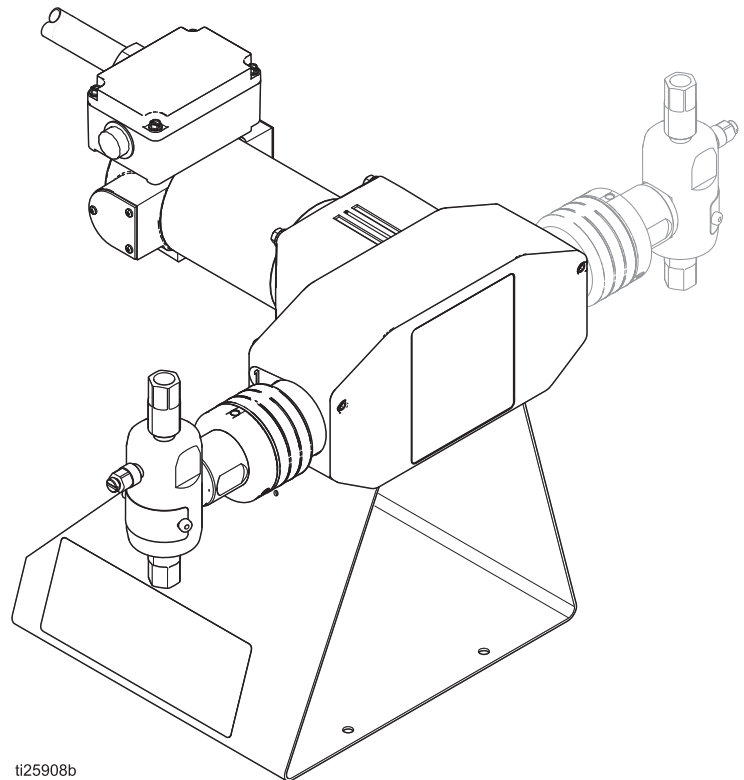
Not approved for use in explosive atmospheres or hazardous locations unless otherwise stated in the model approvals section.

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



Important Safety Instructions

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



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Related Manuals





Manual No.	Description
334993	Harrier Chemical Injection Controller
3A4047	Harrier AC Chemical Injection Controller

Models and Approvals



Wolverine Advanced Pumps

Models	Voltage	Motor	Plunger Size	Maximum Working Pressure psi (MPa, bar)	Approvals
A261xx A291xx	12 VDC	Small	3/16 in.	7000 (48.2, 482)	 Not approved for use in European explosive atmospheres or hazardous locations
			1/4 in.	3500 (24.1, 241)	
			3/8 in.	1500 (10.3, 103)	
			1/2 in.	800 (5.5, 55)	
			5/8 in.	500 (3.4, 34)	
			3/4 in.	350 (2.4, 24)	
A262xx A292xx	12 VDC	Large	3/16 in.	10,000 (69.0, 690)	
			1/4 in.	6000 (41.3, 413)	
			3/8 in.	2500 (17.2, 172)	
			1/2 in.	1250 (8.6, 86)	
			5/8 in.	900 (6.2, 62)	
			3/4 in.	600 (4.1, 41)	
A265xx A295xx	115 VAC	Large	3/16 in.	10,000 (69.0, 690)	
			1/4 in.	6000 (41.3, 413)	
			3/8 in.	2500 (17.2, 172)	
			1/2 in.	1250 (8.6, 86)	
			5/8 in.	900 (6.2, 62)	
			3/4 in.	600 (4.1, 41)	
A266xx A296xx	230 VAC	Large	3/16 in.	10,000 (69.0, 690)	
			1/4 in.	6000 (41.3, 413)	
			3/8 in.	2500 (17.2, 172)	
			1/2 in.	1250 (8.6, 86)	
			5/8 in.	900 (6.2, 62)	
			3/4 in.	600 (4.1, 41)	
A267xx A297xx	230/460 VAC 3 Phase	Large	3/16 in.	10,000 (69.0, 690)	
			1/4 in.	6000 (41.3, 413)	
			3/8 in.	2500 (17.2, 172)	
			1/2 in.	1250 (8.6, 86)	
			5/8 in.	900 (6.2, 62)	
			3/4 in.	600 (4.1, 41)	


Wolverine Hazardous Location Pumps (C1 D1)

Models	Voltage	Motor	Plunger Size	Maximum Working Pressure psi (MPa, bar)	Motor Approvals
A272xx	12 VDC	Hazardous Location	3/16 in.	10,000 (69.0, 690)	 Class I, Group C & D, Class II, Group F & G
			1/4 in.	6000 (41.3, 413)	
			3/8 in.	2500 (17.2, 172)	
			1/2 in.	1250 (8.6, 86)	
			5/8 in.	900 (6.2, 62)	
			3/4 in.	600 (4.1, 41)	
A273xx	24 VDC	Hazardous Location	3/16 in.	10,000 (69.0, 690)	 Class I, Group C & D, Class II, Group F & G, T3C
			1/4 in.	6000 (41.3, 413)	
			3/8 in.	2500 (17.2, 172)	
			1/2 in.	1250 (8.6, 86)	
			5/8 in.	900 (6.2, 62)	
			3/4 in.	600 (4.1, 41)	
A275xx	115/230 VAC	Hazardous Location	3/16 in.	10,000 (69.0, 690)	 Class I, Group C & D, Class II, Group F & G
			1/4 in.	6000 (41.3, 413)	
			3/8 in.	2500 (17.2, 172)	
			1/2 in.	1250 (8.6, 86)	
			5/8 in.	900 (6.2, 62)	
			3/4 in.	600 (4.1, 41)	
A277xx	230/460 VAC 3 Phase	Hazardous Location	3/16 in.	10,000 (69.0, 690)	 Class I, Group C & D, Class II, Group F & G, T3B
			1/4 in.	6000 (41.3, 413)	
			3/8 in.	2500 (17.2, 172)	
			1/2 in.	1250 (8.6, 86)	
			5/8 in.	900 (6.2, 62)	
			3/4 in.	600 (4.1, 41)	


Wolverine ATEX Pumps

Models	Voltage	Motor	Plunger Size	Maximum Working Pressure psi (MPa, bar)	Motor Approvals	Pump Approvals
A278xx	230 VAC	ATEX	3/16 in.	10,000 (69.0, 690)	 II 2 G Ex d IIB T4 Gb -20°C ≤ Ta ≤ +60°C	 II 2 G Ex d h IIB T4 Gb -20°C ≤ Ta ≤ +60°C
			1/4 in.	6000 (41.3, 413)		
			3/8 in.	2500 (17.2, 172)		
			1/2 in.	1250 (8.6, 86)		
			5/8 in.	900 (6.2, 62)		
			3/4 in.	600 (4.1, 41)		

Wolverine Continuous Injection Pumps (C1 D2)

Models	Voltage	Motor	Plunger Size	Maximum Working Pressure psi (MPa, bar)	Motor Approvals
A281xx	12 VDC	Variable Speed Brushless	3/16 in.	10,000 (69.0, 690)	 Class I, Division 2 Groups A, B, C, D
			1/4 in.	6000 (41.3, 413)	
			3/8 in.	2500 (17.2, 172)	
			1/2 in.	1250 (8.6, 86)	
			5/8 in.	900 (6.2, 62)	
			3/4 in.	600 (4.1, 41)	
A283xx	24 VDC	Variable Speed Brushless	3/16 in.	10,000 (69.0, 690)	
			1/4 in.	6000 (41.3, 413)	
			3/8 in.	2500 (17.2, 172)	
			1/2 in.	1250 (8.6, 86)	
			5/8 in.	900 (6.2, 62)	
			3/4 in.	600 (4.1, 41)	
A285xx	115 VAC	Variable Speed AC	3/16 in.	10,000 (69.0, 690)	
			1/4 in.	6000 (41.3, 413)	
			3/8 in.	2500 (17.2, 172)	
			1/2 in.	1250 (8.6, 86)	
			5/8 in.	900 (6.2, 62)	
			3/4 in.	600 (4.1, 41)	

Fluid Modules


Plunger Size	Maximum Working Pressure psi (MPa, bar)	Approvals
3/16 in.	10,000 (69, 690)	
1/4 in.	6000 (41.3, 413)	
3/8 in.	2500 (17.2, 172)	
1/2 in.	1250 (8.6, 86)	
5/8 in.	900 (6.2, 62)	
3/4 in.	600 (4.1, 41)	

Drive Modules


Drive Module Pressure Capability

Plunger Size	Motor Type		
	S - Small (CI-12S-xx-x)	J - Medium (CI-1AJ-xx-x)	L - Large (CI-xx L -xx-x) H - Hazardous Location C1D1 (CI-xx H -xx-x) B - Variable Speed Brushless (CI-xx B -xx-x) D - Variable Speed AC (CI-1A D -xx-x) X - ATEX (CI-xx X -xx-x)
	Maximum Working Pressure psi (MPa, bar)		
3/16 in.	7000 (48.2, 482)	8000 (55.2, 552)	10,000 (69.0, 690)
1/4 in.	3500 (24.1, 241)	4750 (32.8, 328)	6000 (41.3, 413)
3/8 in.	1500 (10.3, 103)	2000 (13.8, 138)	2500 (17.2, 172)
1/2 in.	800 (5.5, 55)	1000 (6.9, 69)	1250 (8.6, 86)
5/8 in.	500 (3.4, 34)	700 (4.8, 48)	900 (6.2, 62)
3/4 in.	350 (2.4, 24)	450 (3.1, 31)	600 (4.1, 41)



Wolverine Advanced Drive Modules

Drive Configuration	Voltage	Motor	Approvals
CI-12S-xx-x	12 VDC	Small	 Not approved for use in European explosive atmospheres or hazardous locations
CI-12L-xx-x	12 VDC	Large	
CI-1AJ-xx-x	115 VAC	Medium	
CI-1AL-xx-x	115 VAC	Large	
CI-2AL-xx-x	230 VAC	Large	
CI-4AL-xx-x	230/460 VAC, 3 Phase	Large	




Wolverine Continuous Injection Drive Modules (C1 D2)

Drive Configuration	Voltage	Motor	Motor Approvals
CI-12B-xx-x	12 VDC	Variable Speed Brushless	 Class I, Division 2 Groups A, B, C, D
CI-24B-xx-x	24 VDC	Variable Speed Brushless	
CI-1AD-xx-x	115 VAC	Variable Speed AC	

Wolverine Hazardous Location Drive Modules (C1 D1)

Drive Configuration	Voltage	Motor	Motor Approvals
CI-12H-xx-x	12 VDC	Hazardous Location	 Class I, Group C & D, Class II, Group F & G  Class I, Group C & D, Class II, Group F & G, T3C
CI-24H-xx-x	24 VDC	Hazardous Location	
CI-3AH-xx-x	115/230 VAC	Hazardous Location	
CI-4AH-xx-x	230/460 VAC 3 Phase	Hazardous Location	

Wolverine ATEX Drive Modules

Drive Configuration	Voltage	Motor	Drive Module Approvals
CI-24X-xx-x	24 VDC	ATEX	 Ex d IIB T4 Gb $-20^{\circ}\text{C} \leq \text{Ta} \leq +60^{\circ}\text{C}$ 
CI-2AX-xx-x	230 VAC	ATEX	
CI-5AX-xx-x	230/400 VAC 3 Phase	ATEX	 Ex d IIB T4 Gb $-20^{\circ}\text{C} \leq \text{Ta} \leq +60^{\circ}\text{C}$

Configuration Number Matrix

Check the identification plate (ID) for the 12-digit Configuration Number of your pump. Use the following matrix to define the components of your pump.

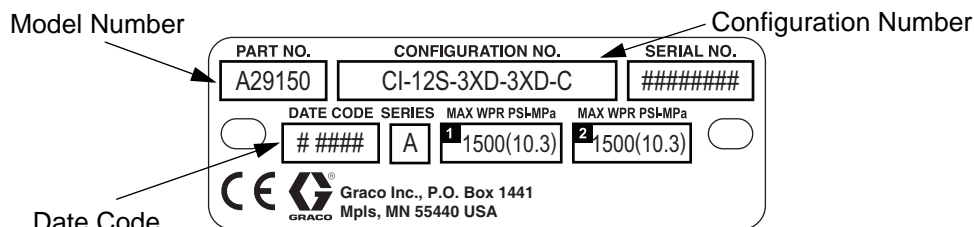


FIG. 1 Example of the Wolverine Assembly Identification Plate

Wolverine Assembly Configuration Code

Sample Configuration Number: CI-12S-3XD-3XD-C

			Side 1			Side 2			
CI	12	S	3	X	D	3	X	D	C
Chemical Injection	Voltage	Motor	Plunger Size	Plunger Coating	Seal Material	Plunger Size	Plunger Coating	Seal Material	Qualifier

				Side 1						Side 2							
Voltage		Motor		Plunger Size		Plunger Coating		Seal Material		Plunger Size		Plunger Coating		Seal Material		Qualifier	
12	12 VDC	S	Small	1	3/16"	C	Ceramic	A	FKM	0	None (Simplex)	0	None (Simplex)	0	None (Simplex)	0	None
24	24 VDC	L	Large	2	1/4"	X	Chromex	B	FKMETP	1	3/16"	C	Ceramic	A	FKM	C	Cycle Count
1A	115 VAC	H	Hazardous Location CID1	3	3/8"			C	HNBR	2	1/4"	X	Chromex	B	FKMETP		
2A	230 VAC	B	Continuous Injection Variable Speed, Brushless C1D2	5	1/2"			D	FFKM	3	3/8"			C	HNBR		
3A	115/230 VAC	D	Continuous Injection Variable Speed, AC	6	5/8"			E	TFE/P	5	1/2"			D	FFKM		
4A	230/460 VAC, 3 Phase	X	ATEX	7	3/4"					7	5/8"			E	TFE/P		
5A	230/400 VAC, 3 Phase									B	None						

NOTE: Effective Date Code "X 2516" (see FIG. 1), if your configuration does not match this format, you have an older pump assembly configuration. See manual 334513, rev C.

NOTE: Not all combinations are possible.

NOTE: Approvals information is found on pages 3 and 4. Models can be identified using the Voltage and Motor configuration codes and columns.

Drive Module Configuration Code

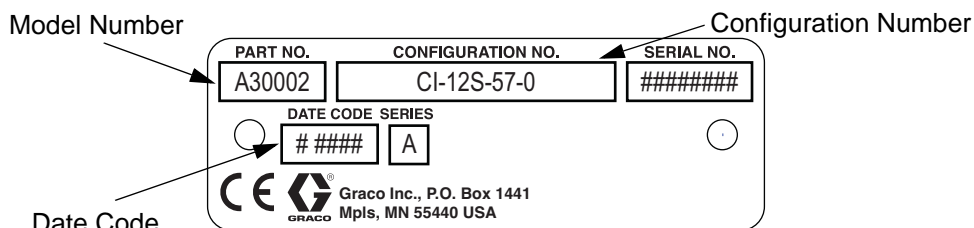


FIG. 2 Example of the Drive Module Identification Plate

Sample Configuration Number: CI-12S-57-0

CI	12	S	5	7	0
Chemical Injection	Voltage	Motor	Drive Side 1	Drive Side 2	Qualifier

Voltage		Motor		Drive Side 1		Drive Side 2		Qualifier	
12	12 VDC	S	Small	5	Fluid Section Sizes 25 : 38 : 50	0	None (Simplex)	0	None
24	24 VDC	L	Large	7	Fluid Section Sizes 19 : 63 : 75	5	Fluid Section Sizes 25 : 38 : 50	C	Cycle Count
1A	115 VAC	H	Hazardous Location CID1			7	Fluid Section Sizes 19 : 63 : 75	B	Harrier AC Controller
2A	230 VAC	B	Continuous Injection Variable Speed, Brushless CID2					D	Harrier AC Control- ler, Cycle Count
3A	115/230 VAC	D	Continuous Injection Variable Speed, AC						
4A	230/460 VAC, 3 Phase	X	ATEX						
5A	230/400 VAC, 3 Phase	J	Medium						

NOTE: Effective Date Code “X 2516” (see FIG. 1), if your configuration does not match this format, you have an older pump assembly configuration. See manual 334513, rev C.

NOTE: Not all combinations are possible.

Fluid Module Configuration Code

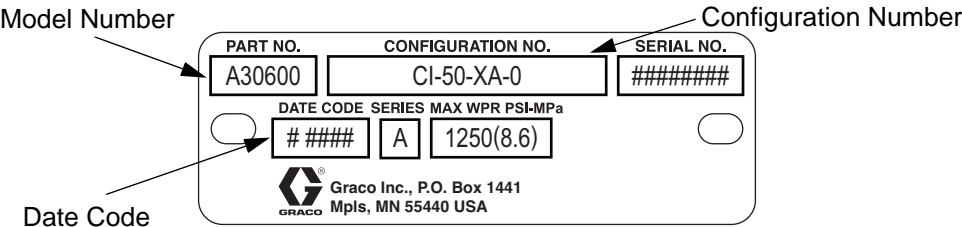


FIG. 3 Example of the Fluid Module Identification Plate

Sample Configuration Number: CI-50-XA-0

CI		50		X		A		0
Chemical Injection		Plunger Size		Plunger Coating		Seal Material		Qualifier

Plunger Size		Plunger Coating		Seal Material		Qualifier	
19	3/16"	X	Chromex	A	FKM	0	None
25	1/4"	C	Ceramic	B	FKMETP		
38	3/8"			C	HNBR		
50	1/2"			D	FFKM		
63	5/8"			E	TFE/P		
75	3/4"						

NOTE: Effective Date Code “X 2516” (see FIG. 1), if your configuration does not match this format, you have an older pump assembly configuration. See manual 334513, rev C.

NOTE: See **Drive Module Configuration Code**, page 9, for drive module side 1 and side 2 compatibility with the fluid module.

NOTE: See **Reconnect Pump**, page 32, for fluid section installation instructions.

NOTE: Fluid module approvals information is found on page 5.

Key Points

Motors

- DC motors are available in a small or large frame size.
- Small DC motors run more efficiently for low to medium pressure applications.
- Large DC and AC motors have a higher torque output for medium to high pressure applications.
- AC motors are available as medium or large.

Wolverine Advanced

- Advanced pumps are higher-quality, modular, and more easily serviceable pumps available in numerous configurations.
- Advanced configurations are available with one or two pumps and all voltages.
- Advanced configurations come standard with Chromex-coated stainless steel plungers for longer plunger and packing life, as well as, better corrosion resistance.
- Advanced configurations are available with a cycle counter factory-installed to allow the pump to operate in cycle mode with the Harrier and Harrier+ Chemical Injection Controllers.

Wolverine Hazardous Location (C1 D1)

- Hazardous Location are large motors, and available as 12 VDC, 24 VDC, 115/230 VAC 1 Phase, and 230/460 VAC 3 Phase.

Wolverine ATEX











- Explosive Atmosphere Zone 1 motors are all large motors, and available as 24 VDC, 230 VAC, and 230/400 VAC 3 Phase









Wolverine Continuous Injection Variable Speed (12 VDC, 24 VDC, and 115 VAC) (C1 D2)

- Continuous injection motors are large motors that do not require a controller for operation. They feature an integral variable speed controller and are adjustable from 0-67 cpm.

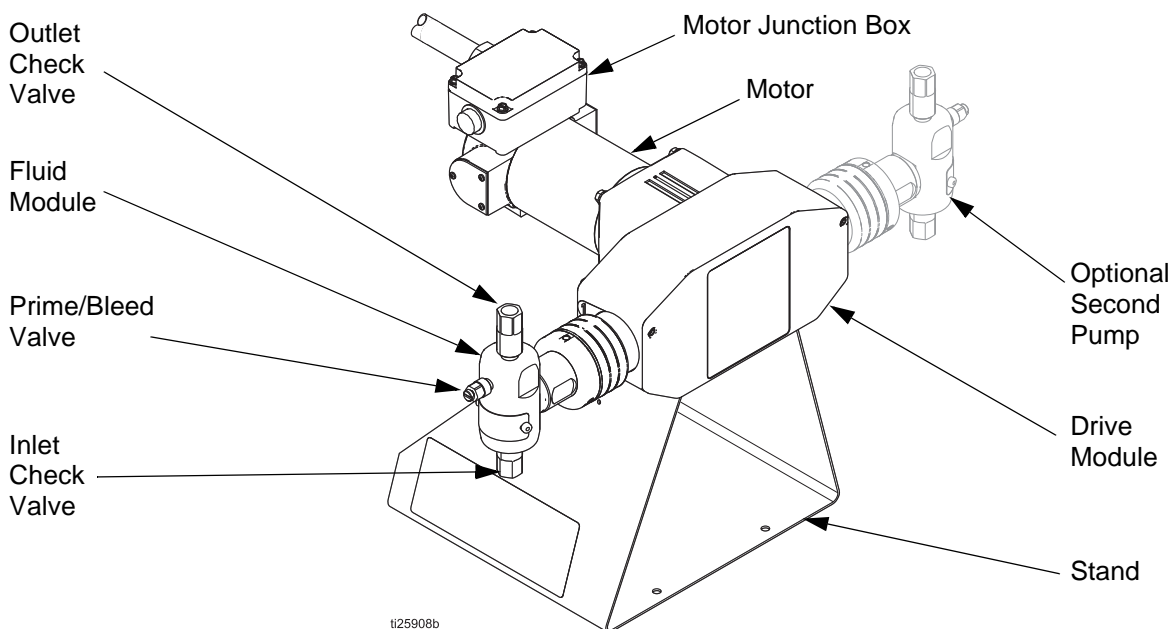
Warnings

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.

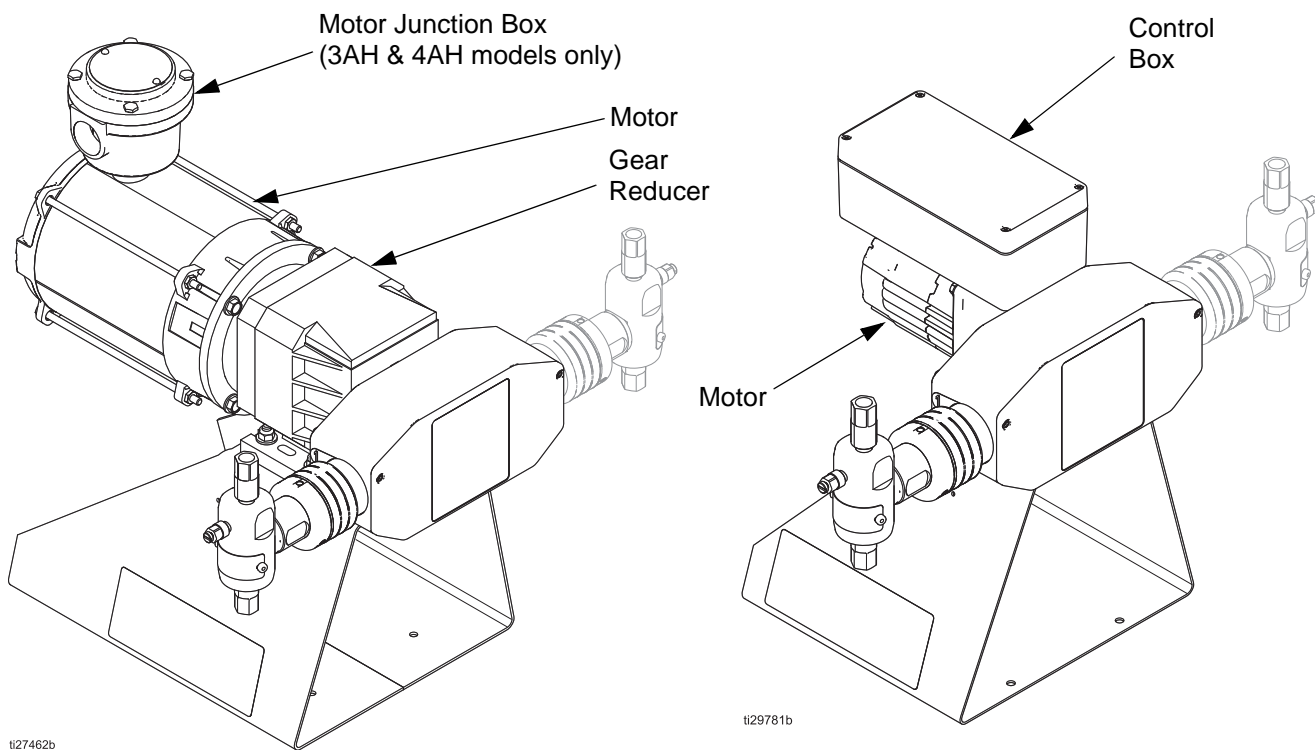
 WARNING	
 	FIRE AND EXPLOSION HAZARD When flammable fluids are present in the work area be aware that flammable fumes can ignite or explode. To help prevent fire and explosion: <ul style="list-style-type: none"> • Use equipment only in well ventilated area. • Eliminate all ignition sources, such as cigarettes 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.
    	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. <ul style="list-style-type: none"> • 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.
 	ELECTRIC SHOCK HAZARD This equipment must be grounded. Improper grounding, setup, or usage of the system can cause electric shock. <ul style="list-style-type: none"> • 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.

 WARNING	
 	MOVING PARTS HAZARD Moving parts can pinch, cut or amputate fingers and other body parts. <ul style="list-style-type: none"> • Keep clear of moving parts. • Do not operate equipment with protective guards or covers removed. • Pressurized 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. <ul style="list-style-type: none"> • 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.
	BURN HAZARD Equipment surfaces and fluid that is heated can become very hot during operation. To avoid severe burns: <ul style="list-style-type: none"> • To reduce the risk of injury, due to burns, allow adequate time for the motor to cool before performing any troubleshooting tasks. • Do not touch hot fluid or equipment.
 	EQUIPMENT MISUSE HAZARD Misuse can cause death or serious injury. <ul style="list-style-type: none"> • 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 Sheet (SDS) from distributor or retailer. • Turn off all equipment and follow the Pressure Relief Procedure when equipment is not in use. • Check equipment regularly. 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.
	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: <ul style="list-style-type: none"> • Protective eyewear, and hearing protection. • Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer.

Model and Component Identification



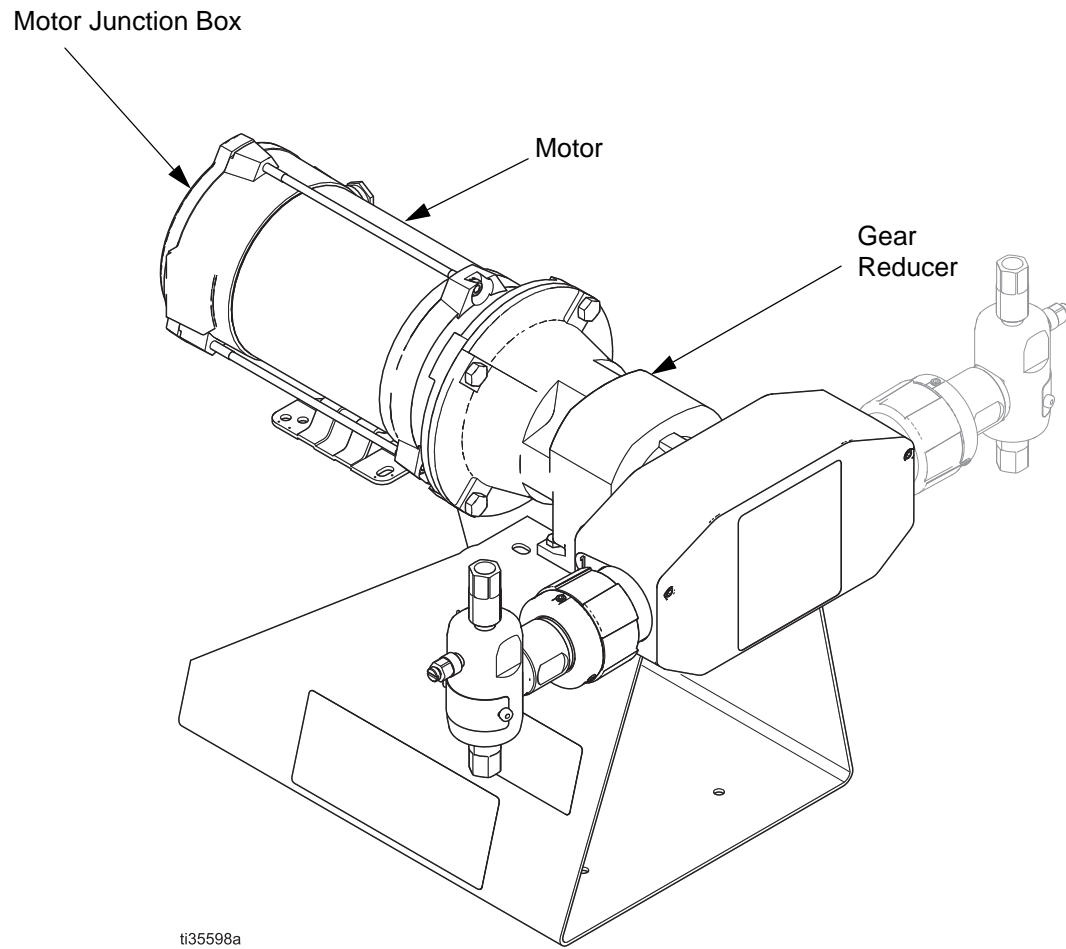
Wolverine Advanced



Wolverine Hazardous Location (C1 D1)

Wolverine Continuous Injection (C1 D2)

FIG. 4 Wolverine Advanced, Haz Loc, and Continuous Injection Pump Components







Wolverine ATEX

FIG. 5 Wolverine ATEX Pump Components

Installation

Grounding

				
<p>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.</p>				

Pump: grounded through motor **Motor Electrical Connections** on page 19.

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. 6 and FIG. 7, using adapters as necessary. See **Kits and Accessories** starting on page 44.

- **Fluid filter (Y-Strainer) (included in M):** with a 60 mesh (250 micron) stainless steel element to filter particles from the fluid before it reaches the pump.
- **Fluid shutoff valves (N):** shuts off fluid flow.
- **Pressure relief valve (F):** 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 23.

Typical Installation - Ordinary Locations

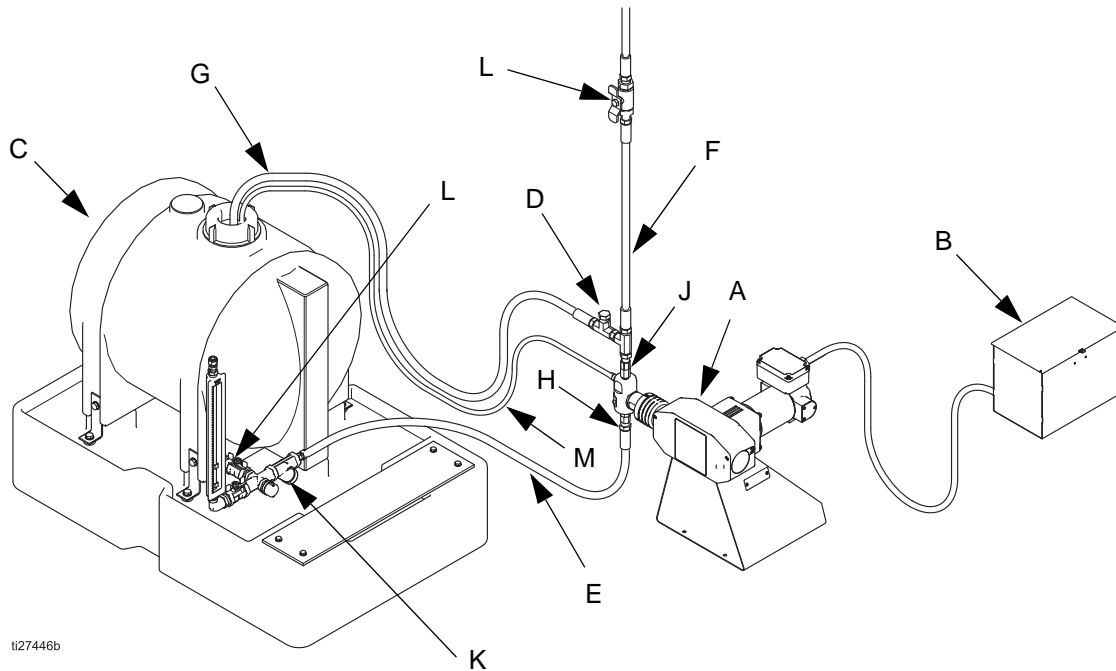


FIG. 6 Typical Installation in Ordinary Location with Generic Power Source

FIG. 6 is an example of an installation with a Wolverine chemical injection pump. Your installation may differ from what is shown here. (See **Accessories** on page 16.) The Wolverine pump (A) is the only component in FIG. 6 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 (N))
- L Fluid Shutoff Valve (inlet & outlet)
- M Bleed/Prime Waste Line

Typical Installation - Hazardous Locations (C1 D1) and ATEX

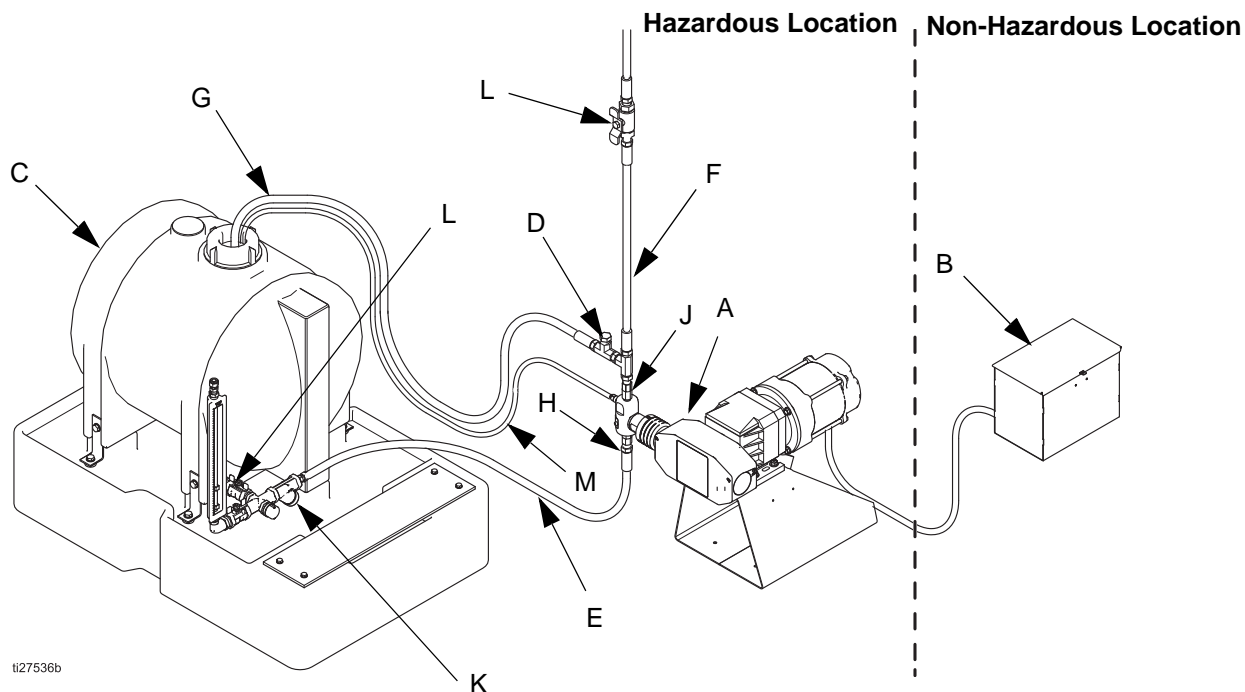


FIG. 7 Typical Installation in Hazardous Location with Generic Power Source

FIG. 7 is an example of an installation with a Wolverine Hazardous Location chemical injection pump. Your installation may differ from what is shown here. (See **Accessories** on page 16.) The Wolverine pump (A) is the only component in FIG. 7 supplied by Graco. All other components are supplied by customer.

NOTICE

This pump is heavy. To prevent damage from dropping, always use two people to lift or move the pump.

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 (N))
- L Fluid Shutoff Valve (inlet & outlet)
- M Bleed/Prime Waste Line





Choosing an Installation Location

- Select a location that will adequately support the weight of the pump, as well as all plumbing and electrical connections.
- Refer to the mounting hole layout provided in **Dimensions** starting on page 49.
- Always mount the pump upright.
- If you have a mounting configuration that requires installation in a manner different than depicted in FIG. 6 or FIG. 7, please contact your Graco distributor for assistance.

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 inlet check valve (K). See FIG. 6 on page 17, or FIG. 7 on page 18.
3. Install a pressure relief valve (F) 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 44.

				
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 (L) to the injection point.
- Connect a 10-32 UNF fluid outlet from the prime/bleed valve (214) to the fluid source or waste reservoir.

Motor Electrical Connections

				
To reduce the risk of electrical shock;				
<ul style="list-style-type: none"> • 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:	
<ul style="list-style-type: none"> • 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-12S-xx-x	12 VDC	15 A
CI-12L-xx-x	12 VDC	20 A
CI-12B-xx-x	12 VDC	20 A
CI-12H-xx-x	12 VDC	25 A
CI-24H-xx-x	24 VDC	15 A
CI-24B-xx-x	24 VDC	15 A
CI-1AJ-xx-x	115 VAC	3 A
CI-1AL-xx-x	115 VAC	3 A
CI-1AD-xx-x	115 VAC	4 A
CI-2AL-xx-x	230 VAC	2 A
CI-3AH-xx-x	115 VAC (Single Phase)	5 A
CI-3AH-xx-x	230 VAC (Single Phase)	3 A
CI-4AL-xx-x	230 VAC (3 Phase)	1 A
CI-4AL-xx-x	460 VAC (3 Phase)	1 A
CI-4AH-xx-x	230 VAC (3 Phase)	1.25 A
CI-4AH-xx-x	460 VAC (3 Phase)	1 A
CI-24X-xx-x	24 VDC	15 A
CI-2AX-xx-x	230 VAC	2 A
CI-5AX-xx-x	230 VAC (3 Phase)	2 A
CI-5AX-xx-x	400 VAC (3 Phase)	1 A

Cycle Counter (models CI-xxS-xxx-xx-C and CI-xxL-xxx-xx-C only)

1. Connect the harness wires (95) to the appropriate terminals. See **Installation** in the Harrier Chemical Injection Controller manual (334993).

NOTE: The Cycle Counter is only available with Wolverine Advanced pumps, and not Hazardous Location.

For DC and AC Ordinary Location Single Phase Units

The pump assembly has 10 feet (3 m) of 1/2-inch, flexible conduit connected to the motor with 12 feet (3.7 m) of motor leads.

1. Connect the conduit to the power source enclosure (B) with the included conduit fitting.
2. Connect the green motor wire to a ground location.
3. Connect the white motor wire to the positive (+) output of the power source.
4. Connect the black motor wire to the negative (-) output of the power source.

For Continuous Injection DC (C1 D2) (model CI-xxB)

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

For Continuous Injection AC (C1 D2) (models CI-1AD-xx-x)

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

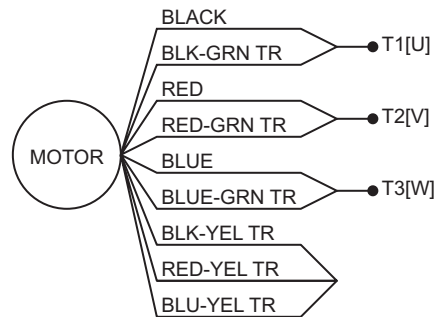
1. Connect the green motor wire to a ground location.
2. Connect the white motor wire to the neutral output of the power source.
3. Connect the black motor wire to the line output of the power source.

For Hazardous Location (C1 D1) 3 Phase Units (model CI-4AL)

The pump assembly has nine motor leads housed inside the motor junction box. See FIG. 4 on page 14.

1. Connect the conduit to the power source enclosure (B) with a conduit fitting.
2. Remove motor junction box cover.
3. Connect wires (user supplied) rated per local electrical code. See FIG. 8 for wiring diagram, and **Technical Specifications**, on page 59, for current ratings.

230 V / 3 Phase (Low Voltage)



460 V / 3 Phase (High Voltage)

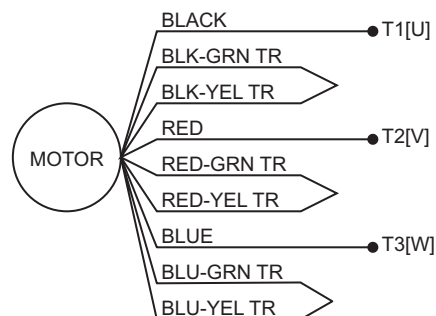


FIG. 8 Electrical Connections for 3 Phase Pump

4. Connect a user-supplied ground wire to the ground stud inside the motor junction-box.
5. Replace motor junction box cover.

For Hazardous Location (C1 D1) (models CI-xxH)

The pump assembly has motor leads housed inside the motor junction box. See FIG. 4 on page 14.

1. Remove the motor junction box cover.
2. Connect wires and related conduit (user-supplied) rated per local electrical code. See FIG. 9 and FIG. 10 for wiring diagrams, and **Technical Specifications**, on 60, for current ratings.

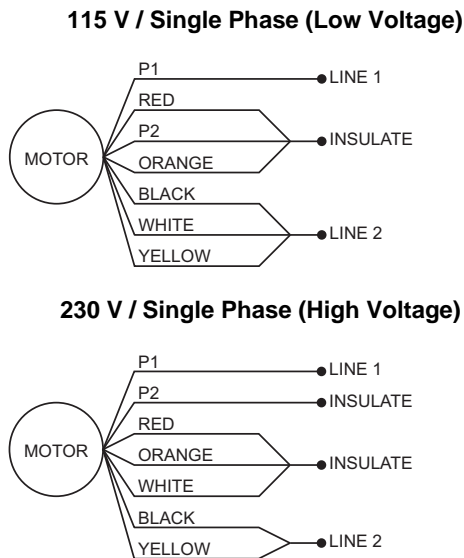


FIG. 9 Electrical Connections for Single Phase Pump

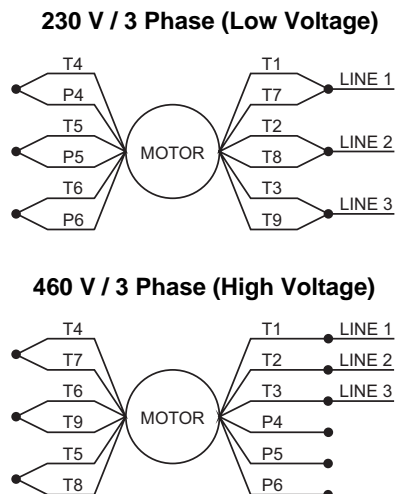


FIG. 10 Electrical Connections for 3 Phase Pump

3. Connect a user-supplied ground wire to the ground stud inside the motor junction-box.
4. Replace motor junction box cover.

For ATEX AC (models CI-2AX and CI-5AX)

The pump assembly has motor leads housed inside the back cover plate of the motor. See FIG. 5 on page 15.

1. Remove the rear cover plate of motor.
2. Connect wires and related conduit (user supplied) rated per local electrical code. See FIG. 10 and FIG. 11 for wiring diagrams, and **Technical Specifications**, on page 58, for current ratings.

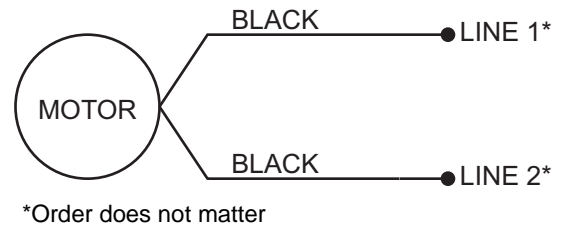


FIG. 11 Electrical connections for Single Phase Pump

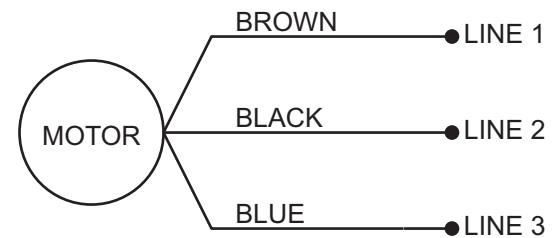


FIG. 12 Electrical connections for 3 Phase AC Pumps

3. Connect a user-supplied ground wire to the ground stud inside the motor cover plate.
4. Replace the motor junction box.

For ATEX DC (models CI-24X)

The pump assembly has terminals housed inside the back cover plate of the motor. See FIG. 5 on page 15.

1. Remove the rear cover plate of the motor.
2. Connect wires and related conduit (user-supplied) rated per local electrical code. See FIG. 12 for wiring diagrams, and **Technical Specifications**, on page 58, for current ratings.

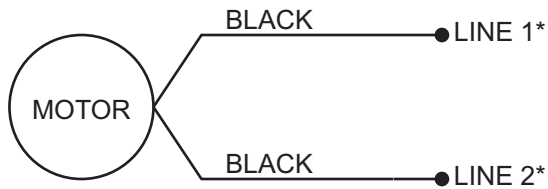


FIG. 13 Electrical connections for Single Phase DC Pumps

3. Replace the motor junction box.
4. Connect a user-supplied ground wire to the ground stud on the opposite side of the motor from the motor wire exit.

Second Pump Add-On

1. Follow **Pressure Relief Procedure**, page 23.

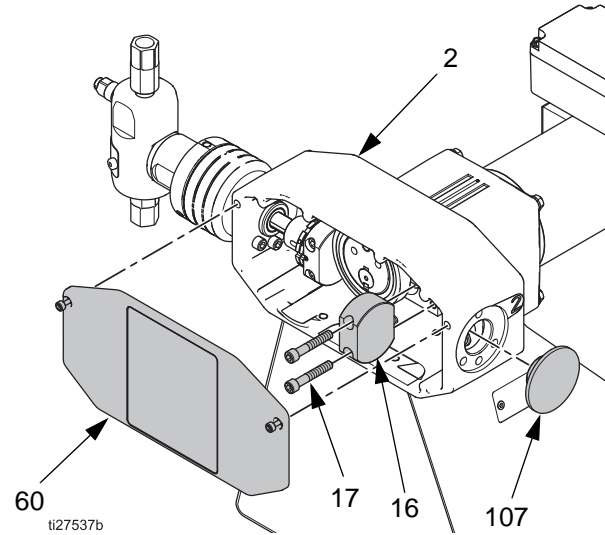


FIG. 14

2. Remove the drive guard (60).
3. Remove the plug (107) on the side of the housing (2) opposite of the existing pump.
4. Remove the two shoulder screws (17), and then remove the plunger return block (16).
5. Follow **Drive Section Repair** (steps 8-11), page 31.
6. Replace drive guard (60).

Operation

Pressure Relief Procedure



Follow the Pressure Relief Procedure whenever you see this symbol.

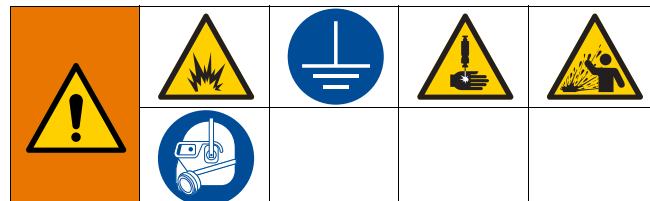


This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as skin injection and splashing fluid, follow the **Pressure Relief Procedure** when you stop dispensing and before cleaning, checking, or servicing the equipment.

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

1. Disconnect main power from pump.
2. Shut off the inlet and outlet lines using shutoff valves (N).
3. Slowly crack the fitting connected to the outlet check valve (216) to relieve downstream fluid pressure.
4. Open the bleed valve (214) by turning needle counter-clockwise with a flathead screwdriver to relieve internal pump fluid pressure.
5. Disconnect and cap inlet and outlet fluid lines.

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's wetted parts.
1. Follow the **Pressure Relief Procedure**.
 2. Connect inlet to the supply source of the flushing fluid.
 3. Connect outlet to a waste reservoir.
 4. Run the pump until the dispensed fluid is predominately flushing fluid.
 5. Follow the **Pressure Relief Procedure**.

Prime the Pump



1. Verify all connections and fluid lines are tight.
2. In order to prime the pump, turn the prime valve (214) counter-clockwise.
3. Turn the pump on and begin cycling.
4. The pump is primed when discharge from the prime valve (214) has transitioned from air, to bubbly liquid chemical, to pure liquid chemical.
5. Close the prime valve (214) tightly and verify that fluid has stopped draining from the port.

Calibrate Chemical Dosage



1. Begin the process by setting the cycle rate and/or stroke adjustment of the pump to an estimated setting for a desired flow rate. See **Baseline Chemical Dosage Settings**, page 25, 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 25.
3. Adjust the cycle rate and/or stroke adjustment accordingly after the test is performed. Increasing the cycle rate and/or stroke adjustment of the pump will increase the pump flow rate, while decreasing it will decrease the flow rate.
4. Repeat the instructions provided with your calibration gauge to verify changes.
5. Repeat steps 3 and 4, as necessary, until the desired flow rate is achieved.

Stroke Adjustment



This pump has infinite stroke adjustment positions between full stroke and half stroke.

1. Disconnect main power from pump.
2. Expose the drive shaft (9c) by loosening the cap screws (61) and removing the drive guard (60). The cap screws will remain with the drive guard.
3. Loosen the stroke adjustment nuts (9d), and move to desired stroke location and re-tighten. Moving the adjustment nuts towards the pump will decrease the stroke, and moving them towards the cam will increase the stroke.

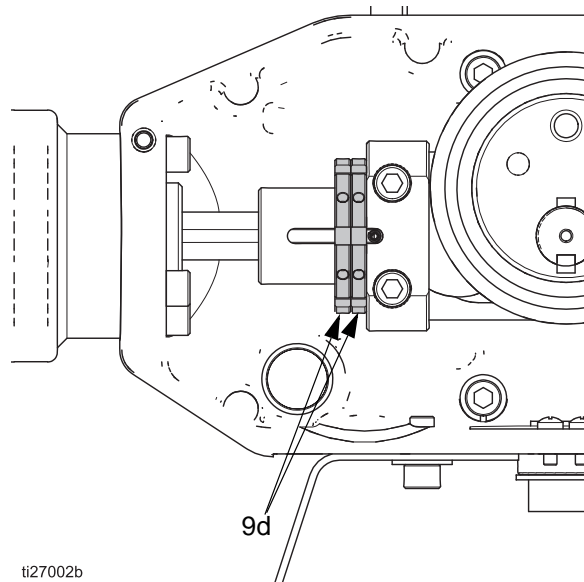


FIG. 15 Wolverine stroke adjustment

4. Reassemble the drive guard (60) to pump.

Baseline Chemical Dosage Settings

See **Stroke Adjustment**, page 24, for stroke adjust settings. CPM (cycles per minute) is determined by controller settings for On/Off Time, or Cycles if using a Harrier-family chemical injection controller. Adjust the controller settings to change the CPM. Motor speed is also affected by voltage and back pressure. To use these charts, find the flow rate above the desired injection rate for the correct-sized plunger. Adjust the stroke and controller settings accordingly for the corresponding CPM.

NOTE: Double values in the charts below for configurations with two pumps.

NOTE: CI-12H pumps have a maximum CPM of 30, which translates to a 50% duty cycle.

NOTE: For continuous injection pumps (CI-xxB), pump CPM is determined by knob setting on the integrated motor controller. Motor speed is set with the knob. Refer to the motor manual included with continuous injection models for motor operation.

CPM	3/16 in. Fluid Plunger Pumps			1/4 in. Fluid Plunger Pumps			3/8 in. Fluid Plunger Pumps		
	GPD (LPD)			GPD (LPD)			GPD (LPD)		
	Full Stroke	3/4 Stroke	1/2 Stroke	Full Stroke	3/4 Stroke	1/2 Stroke	Full Stroke	3/4 Stroke	1/2 Stroke
5	0.9 (3.4)	0.6 (2.3)	0.4 (1.5)	1.5 (5.8)	1.1 (4.3)	0.8 (2.9)	2.8 (10.4)	2.1 (7.8)	1.4 (5.2)
10	1.7 (6.5)	1.3 (4.9)	0.9 (3.4)	3.1 (11.6)	2.3 (8.7)	1.5 (5.8)	5.5 (20.8)	4.1 (15.6)	2.8 (10.4)
15	2.6 (9.8)	1.9 (7.2)	1.3 (4.9)	4.6 (17.4)	3.4 (13.0)	2.3 (8.7)	8.3 (31.3)	6.2 (23.5)	4.1 (15.6)
20	3.4 (13.0)	2.6 (9.8)	1.7 (6.5)	6.1 (23.2)	4.6 (17.4)	3.1 (11.6)	11.0 (41.7)	8.3 (31.3)	5.5 (20.8)
25	4.3 (16.3)	3.2 (12.1)	2.2 (8.3)	7.6 (29.0)	5.7 (21.7)	3.8 (14.5)	13.8 (52.1)	10.3 (39.1)	6.9 (26.1)
30	5.2 (19.5)	3.9 (14.8)	2.6 (9.8)	9.2 (34.7)	6.9 (26.1)	4.6 (17.4)	16.5 (62.5)	12.4 (46.9)	8.3 (31.3)
35	6.0 (22.7)	4.5 (17.0)	3.0 (11.4)	10.7 (40.5)	8.0 (30.4)	5.4 (20.3)	19.3 (73.0)	14.5 (54.7)	9.6 (36.5)
40	6.9 (26.1)	5.2 (19.5)	3.4 (13.0)	12.2 (46.3)	9.2 (34.7)	6.1 (23.2)	22.0 (83.4)	16.5 (62.5)	11.0 (41.7)
45	7.7 (29.3)	5.8 (22.0)	3.9 (14.8)	13.8 (52.1)	10.3 (39.1)	6.9 (26.1)	24.8 (93.8)	18.6 (70.4)	12.4 (46.9)
50	8.6 (32.6)	6.5 (24.6)	4.3 (16.3)	15.3 (57.9)	11.5 (43.4)	7.6 (29.0)	27.5 (104.2)	20.7 (78.2)	13.8 (52.1)
55	9.5 (36.0)	7.1 (26.9)	4.7 (17.8)	16.8 (63.7)	12.6 (47.8)	8.4 (31.9)	30.3 (114.7)	22.7 (86.0)	15.1 (57.3)
60	10.3 (39.1)	7.7 (29.3)	5.2 (19.5)	18.4 (69.5)	13.8 (52.1)	9.2 (34.7)	33.0 (125.1)	24.8 (93.8)	16.5 (62.5)

CPM	1/2 in. Fluid Plunger Pumps			5/8 in. Fluid Plunger Pumps			3/4 in. Fluid Plunger Pumps		
	GPD (LPD)			GPD (LPD)			GPD (LPD)		
	Full Stroke	3/4 Stroke	1/2 Stroke	Full Stroke	3/4 Stroke	1/2 Stroke	Full Stroke	3/4 Stroke	1/2 Stroke
5	5.2 (19.7)	3.9 (14.8)	2.6 (9.8)	8.6 (32.6)	6.5 (24.4)	4.3 (16.3)	12.4 (46.9)	9.3 (35.2)	6.2 (23.5)
10	10.4 (39.4)	7.8 (29.5)	5.2 (19.7)	17.2 (65.2)	12.9 (48.9)	8.6 (32.6)	24.8 (93.8)	18.6 (70.4)	12.4 (46.9)
15	15.6 (59.1)	11.7 (44.3)	7.8 (29.5)	25.8 (97.7)	19.4 (73.3)	12.9 (48.9)	37.2 (140.7)	27.9 (105.6)	18.6 (70.4)
20	20.8 (78.8)	15.6 (59.1)	10.4 (39.4)	34.4 (130.3)	25.8 (97.7)	17.2 (65.2)	49.6 (187.6)	37.2 (140.7)	24.8 (93.8)
25	26.0 (98.5)	19.5 (73.8)	13.0 (49.2)	43.0 (162.9)	32.3 (122.2)	21.5 (81.4)	62.0 (234.6)	46.5 (175.9)	31.0 (117.3)
30	31.2 (118.1)	23.4 (88.6)	15.6 (59.1)	51.6 (195.5)	38.7 (146.6)	25.8 (97.7)	74.4 (281.5)	55.8 (211.1)	37.2 (140.7)
35	36.4 (137.8)	27.3 (103.4)	18.2 (68.9)	60.2 (228.0)	45.2 (171.0)	30.1 (114.0)	86.8 (328.4)	65.1 (246.3)	43.4 (164.2)
40	41.6 (157.5)	31.2 (118.1)	20.8 (78.8)	68.8 (260.6)	51.6 (195.5)	34.4 (130.3)	99.1 (375.3)	74.4 (281.5)	49.6 (187.6)
45	46.8 (177.2)	35.1 (132.9)	23.4 (88.6)	77.5 (293.2)	58.1 (219.9)	38.7 (146.6)	111.5 (422.2)	83.7 (316.7)	55.8 (211.1)
50	52.0 (196.9)	39.0 (147.7)	26.0 (98.5)	86.1 (325.8)	64.5 (244.3)	43.0 (162.9)	123.9 (469.1)	92.9 (351.8)	62.0 (234.6)
55	57.2 (216.6)	42.9 (162.5)	28.6 (108.3)	94.7 (358.4)	71.0 (268.8)	47.3 (179.2)	136.3 (516.0)	102.2 (387.0)	68.2 (258.0)
60	62.4 (236.3)	46.8 (177.2)	31.2 (118.1)	103.3 (390.9)	77.5 (293.2)	51.6 (195.5)	148.7 (562.9)	111.5 (422.2)	74.4 (281.5)

Maintenance

Preventive Maintenance Schedule

The operating conditions of your particular pump determine 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 1/16th 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

To reduce the risk of injury due to burns, allow adequate time for the motor to cool before performing any troubleshooting tasks.

1. Follow **Pressure Relief Procedure**, page 23, before checking or repairing the pump.
2. Check all possible problems and causes before disassembling the pump.

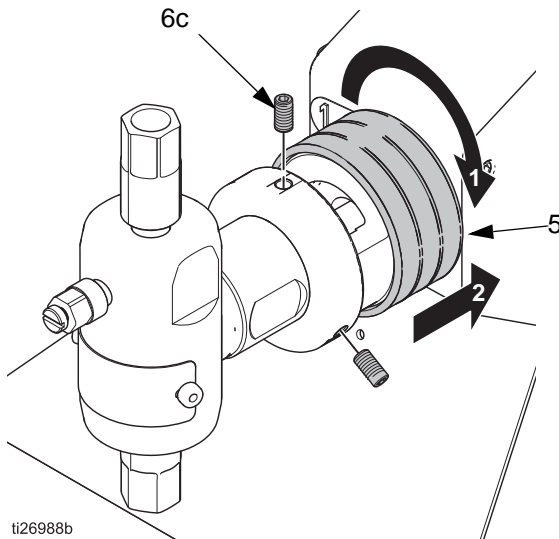
Problem	Cause	Solution
Air bubbles in fluid	Suction line is loose	Tighten
Fluid leaking	Loose fittings	Tighten fittings
	Worn or damaged seals and/or packing	Adjust or tighten seals and/or packing. If leak persists, replace seals and/or packing.
Motor running but no fluid moving	Pump stalled	Check pump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

Repair



Disconnect Pump

1. Follow **Pressure Relief Procedure**, page 23.
2. Expose the packing nut (201) by loosening the dust cover (5) and sliding it towards the drive housing (2).



ti26988b
FIG. 16 Remove dust cover

3. Loosen, but do not remove, packing nut (201).

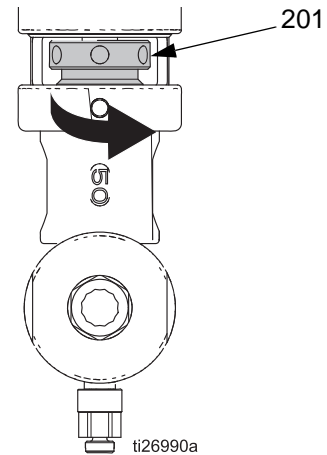


FIG. 17 Loosen packing nut

4. Loosen the three set screws (6c) from the drive cylinder (6a) to release and remove the fluid cylinder (208)
5. Place two 7/32" (or smaller) Allen wrenches (or similar tools) in the holes on the cam (13) and use them to rotate the cam until the key is towards the pump being repaired.

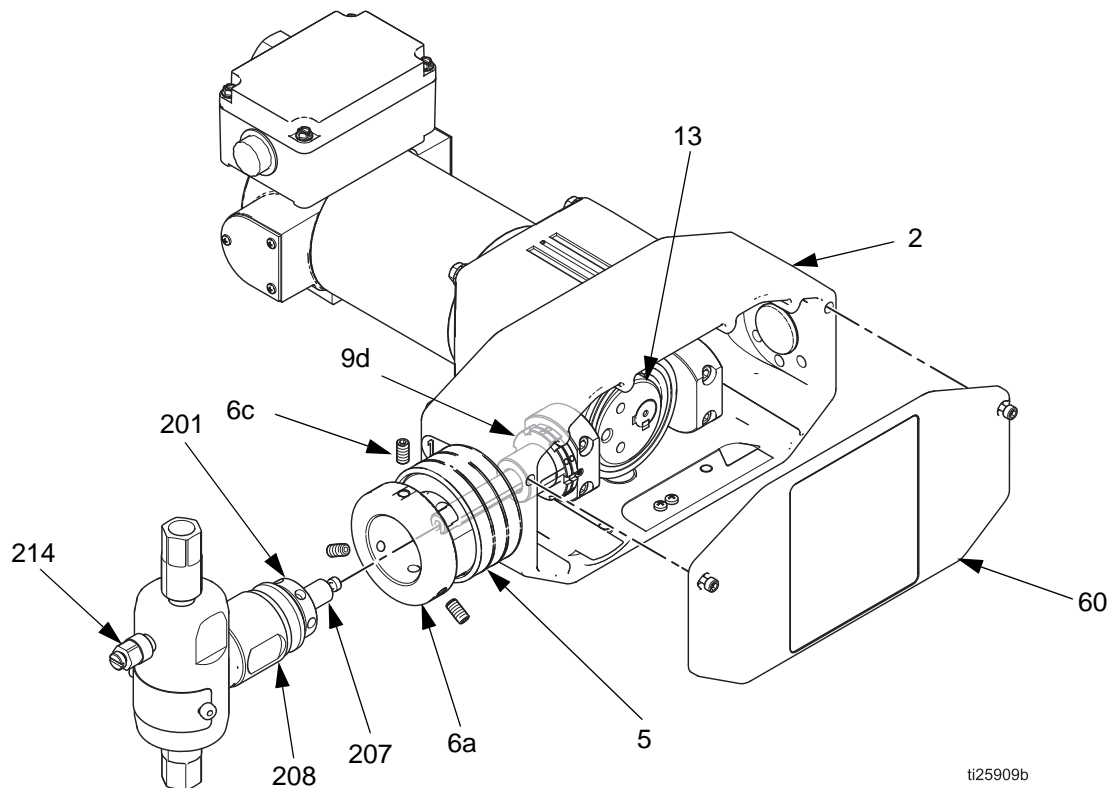


FIG. 18 Disconnect Wolverine Advanced and Hazardous Location Pump

6. Carefully remove the plunger (207) from the drive shaft (9c).

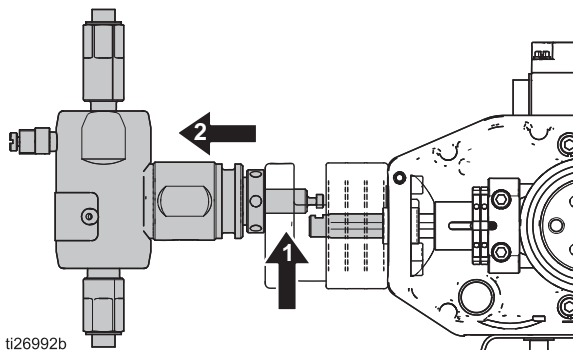


FIG. 19 Disconnect plunger from drive shaft

Pump Repair

1. Remove packing nut assembly from fluid cylinder (208).

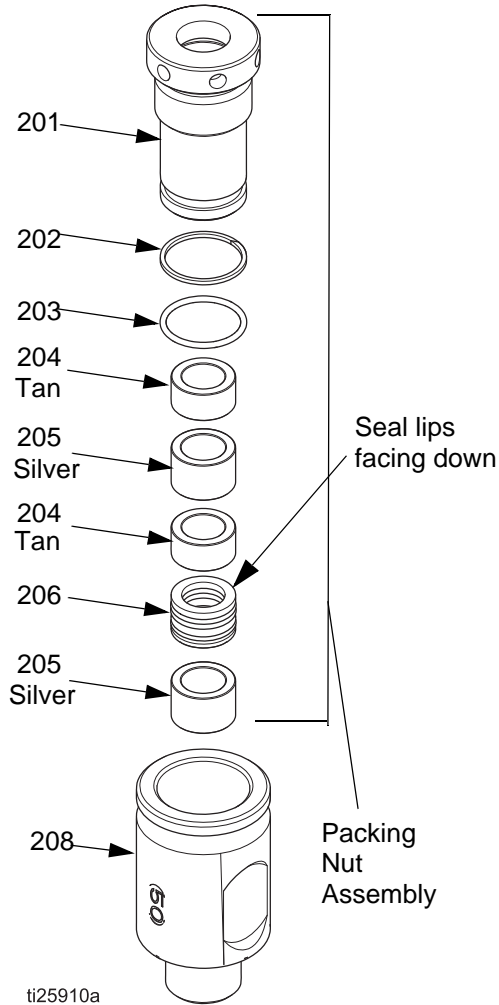


FIG. 20 Wolverine Pump Repair

2. Use a socket or flat punch to press out the packing assembly.

3. Replace packing (206) and bearings (204). Inspect spacers and replace, if necessary. Lubricate prior to reassembly.

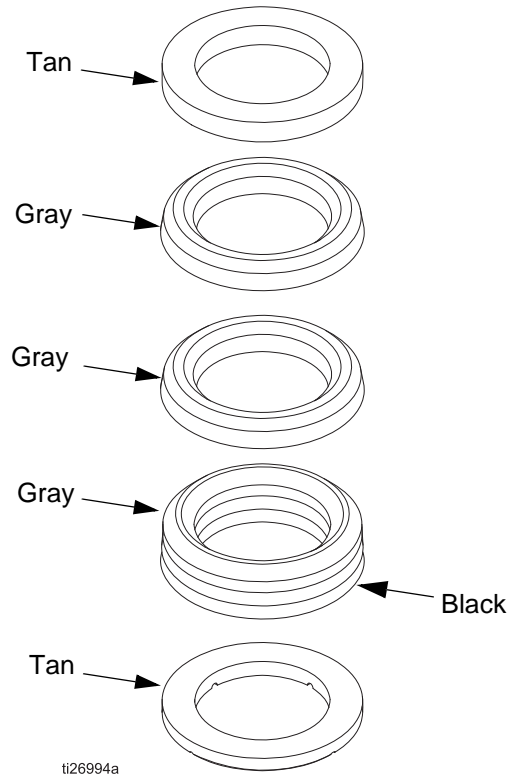


FIG. 21 Packing (206) detailed view

4. Replace the o-ring (202) and back-up ring (203) on the outside of the packing nut (201). Lubricate prior to reassembly.
5. Replace packing nut assembly into fluid cylinder. Tighten hand tight and back off 1/2 of a turn to prevent damage to packing during reassembly.

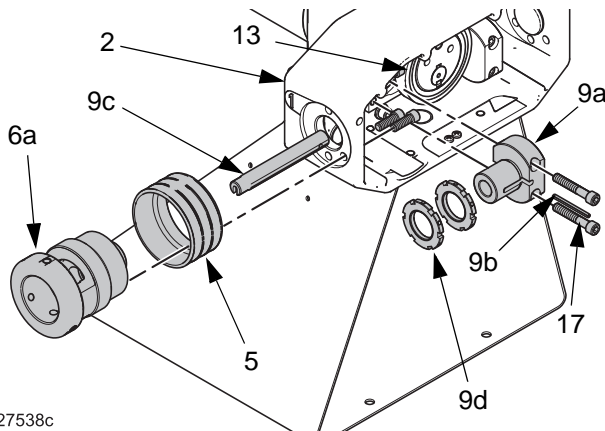
Drive Section Repair

1. **Disconnect Pump**, page 28.
2. Place two 7/32 in. (or smaller) Allen wrenches (or similar tools) in the holes on the cam assembly (13), and use them to rotate the cam assembly until the key (12) is in the downward position.
3. Use a 3/16 in. Allen wrench to remove the two screws (17) attaching the stroke adjuster (9a) to the return carriage (11).
4. Remove the red plug from the bottom of the housing (2) and use a 1/8 in. Allen wrench to remove the set screw on the bottom rear of the cam assembly.

NOTE: Earlier series models may require different-sized Allen wrenches.

5. Remove the cam assembly (13) from the motor shaft.
6. Slide the stroke adjuster assembly (9a) towards the motor shaft and out of the housing.

7. Bring the stroke adjuster assembly (9a) into the housing (2), and slide the shaft through the drive cylinder (6a).
8. Place the cam assembly (13) onto the shaft, with the bearing in the front and the step-down in the rear, and slide on until the motor shaft is flush with the front face of the cam assembly (13).
9. Apply lubricant to the cam assembly (13) outside diameter bearing surface.
10. Insert the cam set screw (16), with pre-applied threadlocker, and torque to 70-75 in-lbs.
11. Orient the stroke adjuster assembly (9a) so that the end of the shaft (where the fluid head connects) has the opening of the U-shape at the top; otherwise, the fluid head will not be able to be attached during reassembly.
12. Use the two screws (17) to attach the stroke adjuster (9a) to the plunger return carriage (11) behind the cam assembly (13). Torque the screws to 70-75 in-lbs.
13. Install the red plug into the bottom of the housing (2).



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Fig. 22 Drive section repair

Reconnect Pump

1. Reconnect the pump plunger (207) to the drive shaft (9c).

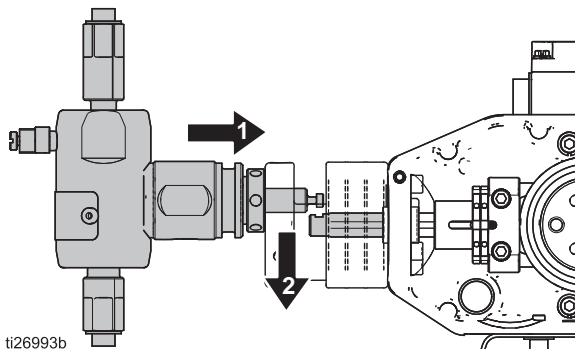


FIG. 23 Reconnect plunger to drive shaft

2. While guiding the plunger (207) back into the fluid cylinder (208), guide the fluid cylinder into the drive cylinder (6a).
3. Apply threadlocker to the three set screws (6c) and tighten them to restrain the fluid cylinder (208) to the drive cylinder (6a). Torque the set screws to 15-20 in-lbs.
4. Verify the set screws (6c) are in the groove of the drive cylinder (6a).
5. Tighten packing nut assembly hand tight plus a 1/16th turn.

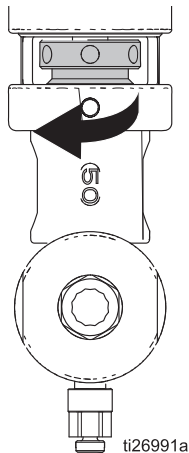


FIG. 24 Tighten packing nut

6. Cover the packing nut (201) by threading the dust cover (5) onto the drive cylinder (6a).

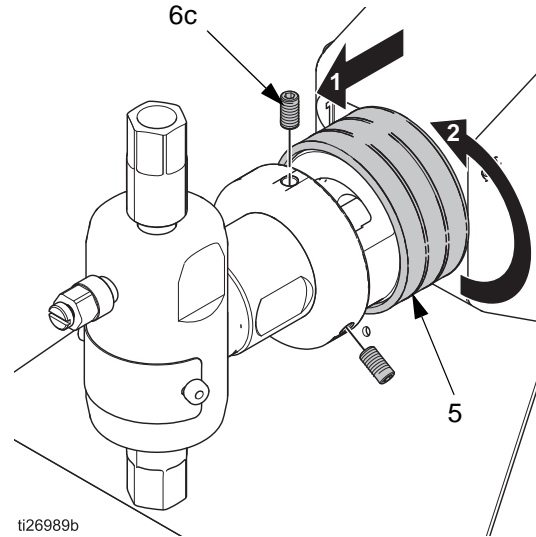


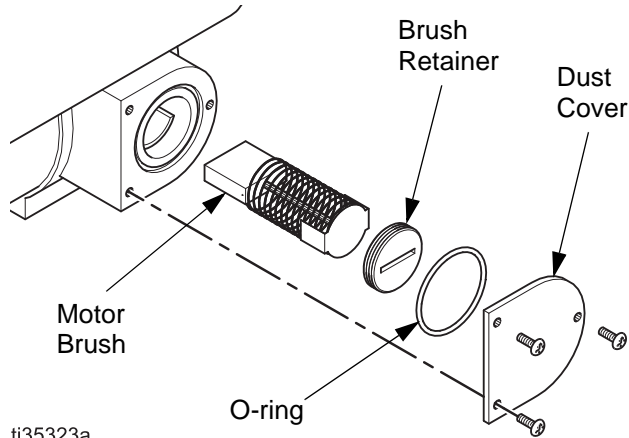
FIG. 25 Replace dust cover

7. Reconnect inlet and outlet fluid lines to the pump.
8. Reconnect power to the motor.
9. **Prime the Pump**, page 23.
10. If necessary, **Calibrate Chemical Dosage**, page 24.
11. Tighten packing nut as necessary to seal pump plunger.

DC Motor Brush Repair (not Hazardous Location (C1 D1) or ATEX)



1. Disconnect pump from power source.
2. Remove dust cover screws, dust cover, and o-ring.
3. Remove brush retainer using a flathead screwdriver.
4. Remove and replace motor brush.
5. Reinstall brush retainer.
6. Ensure o-ring is in place, and reinstall dust cover and dust cover screws.
7. Repeat steps 2-6 for the other side of the motor.



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FIG. 26 Motor Brush Repair

Check Valve Repair



The following procedures apply to the check valves on Wolverine Advanced and Wolverine Hazardous Location pumps. FIG. 27 shows the placement of the check valves on a Wolverine Advanced pump.

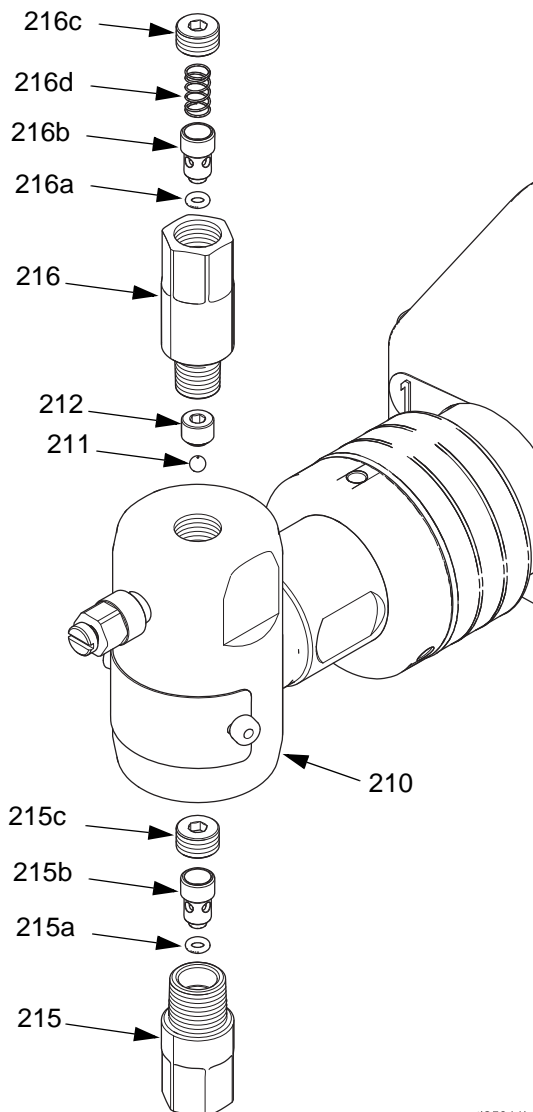


FIG. 27 Check Valve Repair

Inlet Check Valve

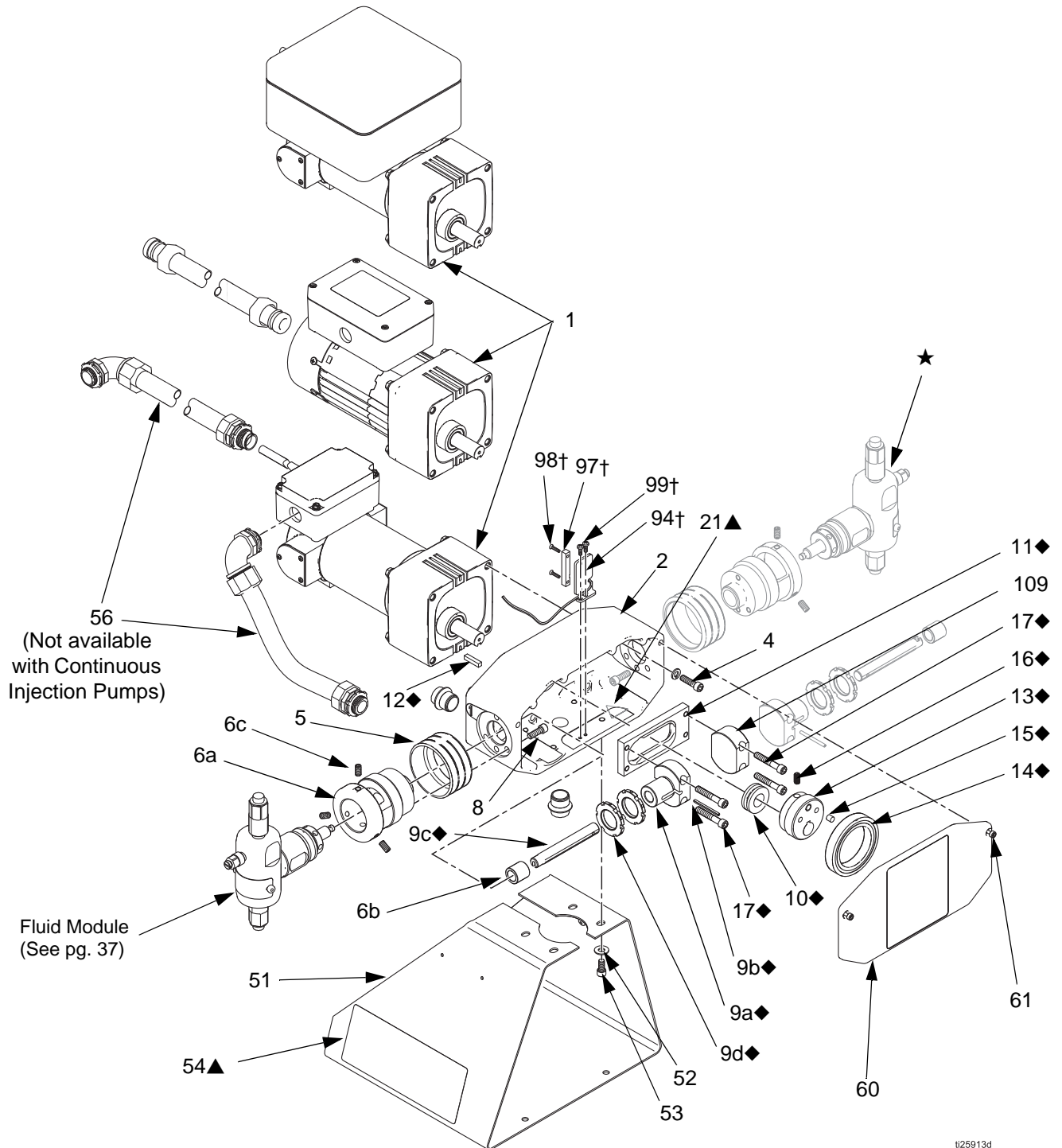
1. Follow the **Pressure Relief Procedure** on page 23.
2. Remove the inlet check valve assembly (215).
3. Remove the retaining nut (215c) and piston (215b).
4. Remove the piston o-ring (215a) from the piston (215b).
5. Inspect parts for wear, and replace as needed.
6. Install the piston o-ring (215a).
7. Reassemble the piston (215b) and retaining nut (215c). Torque the retaining nut to 30-35 in-lbs.
8. Reconnect the inlet check valve assembly (215). Apply sealant to the exterior threads of the valve assembly.
9. Reconnect and tighten fluid lines.
10. **Prime the Pump**, page 23.
11. If necessary, **Calibrate Chemical Dosage**, page 24.

Outlet Check Valve

1. Follow the **Pressure Relief Procedure** on page 23.
2. Remove the outlet check valve assembly (216).
3. Remove the retaining nut (216c), spring (216d), and piston (216b).
4. Remove the piston o-ring (216a) from the piston (216b).
5. Inspect parts for wear, and replace as needed.
6. Install the piston o-ring (216a).
7. Reassemble the piston (216b), spring (216d), and retaining nut (216c). Torque the retaining nut to 30-35 in-lbs.
8. Reconnect the outlet check valve assembly (216). Apply sealant to the exterior threads of the valve assembly.
9. Reconnect and tighten fluid lines.
10. **Prime the Pump**, page 23.
11. If necessary, **Calibrate Chemical Dosage**, page 24.

Parts

Wolverine Drive Module for AC, DC, and Continuous Injection Pumps (C1 D2)



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Wolverine Drive Module Parts List for AC, DC, and Continuous Injection Pumps (C1 D2)

Ref.	Part	Description	Qty
1	B32023	Motor: small, 12 VDC	1
	B32109	Motor: large, 12 VDC	1
	B32761	Motor: medium, 115VAC	1
	B32146	Motor: large, 115 VAC	1
	B32147	Motor: large, 230 VAC	1
	B32151	Motor: large, 230/460 VAC 3 Phase	1
	B32032	Motor: continuous injection variable speed, brushless, 12 VDC, C1 D2	1
	B32236	Motor: continuous injection variable speed, brushless, 24 VDC, C1 D2	1
	B32705	Motor: continuous injection variable speed, AC, 115 VAC, C1 D2	1
2	24Z033	Drive housing, small	1
	24Z034	Drive housing, large	1
4	--	Button head cap screw, included with motor (ref. 2)	4
5	B32427	Dust cover	1
6a	B32880	Drive cylinder for plunger sizes 1/4", 3/8", 1/2"	1
	B32879	Drive cylinder for plunger sizes 3/16", 5/8", 3/4"	1
6b	--	Sleeve bearing; included with drive cylinder (ref. 6a)	1
6c	B33048	Cup head set screw; included with drive cylinder (ref. 6a)	3
8	--	Socket head cap screw, included with drive cylinder (ref. 6a)	3
9a◆	B32712	Stroke adjuster	1
9b◆		Coiled pin (17F380)	1
9c◆		Drive shaft	1
9d◆		Stroke adjuster nut	2
10◆	B32708	Carriage bearing, small	1
	B32709	Carriage bearing, large	1
11◆	--	Plunger return carriage, small	1
	--	Plunger return carriage, large	1
12◆	--	Square key, included with motor (ref. 2) & cam (ref. 13) & plunger return carriage (ref. 11) & carriage bearing (ref. 10)	1
13◆	B32084	Cam, small motors	1
	B32411	Cam, large motors	1
14◆	--	Deep groove ball bearing; included with cam (ref. 13)	1
15◆	--	Magnet; included with cam (ref. 13)	1

Ref.	Part	Description	Qty
16◆	--	Set screw, included with motor (ref. 2) & cam (ref. 13) & plunger return carriage (ref. 11) & carriage bearing (ref. 10)	1
17◆	--	Socket head cap screw, included with plunger return carriage (ref. 11) & plunger return block (ref. 109)	4
21▲	15H108	Pinch hazard warning label	1
40	--	Tapered cap plug (not shown)	1
51	--	Pump base	1
52	--	Flat washer	4
53	--	Socket head cap screw	4
54▲	17G318	Multiple warning safety label	1
56	--	Liquid-tight flex metal conduit assembly	2
60	B32401	Drive guard	1
61	--	Captive fastener, included with drive guard (ref. 60)	2
94†	--	Reed switch bracket	1
97†	--	Reed switch, with connector	1
98†	--	Flat Head Phillips Screw, 4-40 x .500	1
99†	--	Pan Head Phillips Screw, 6-32UNC x .375	3
109	B32711	Plunger return block (not used with duplex models)	1

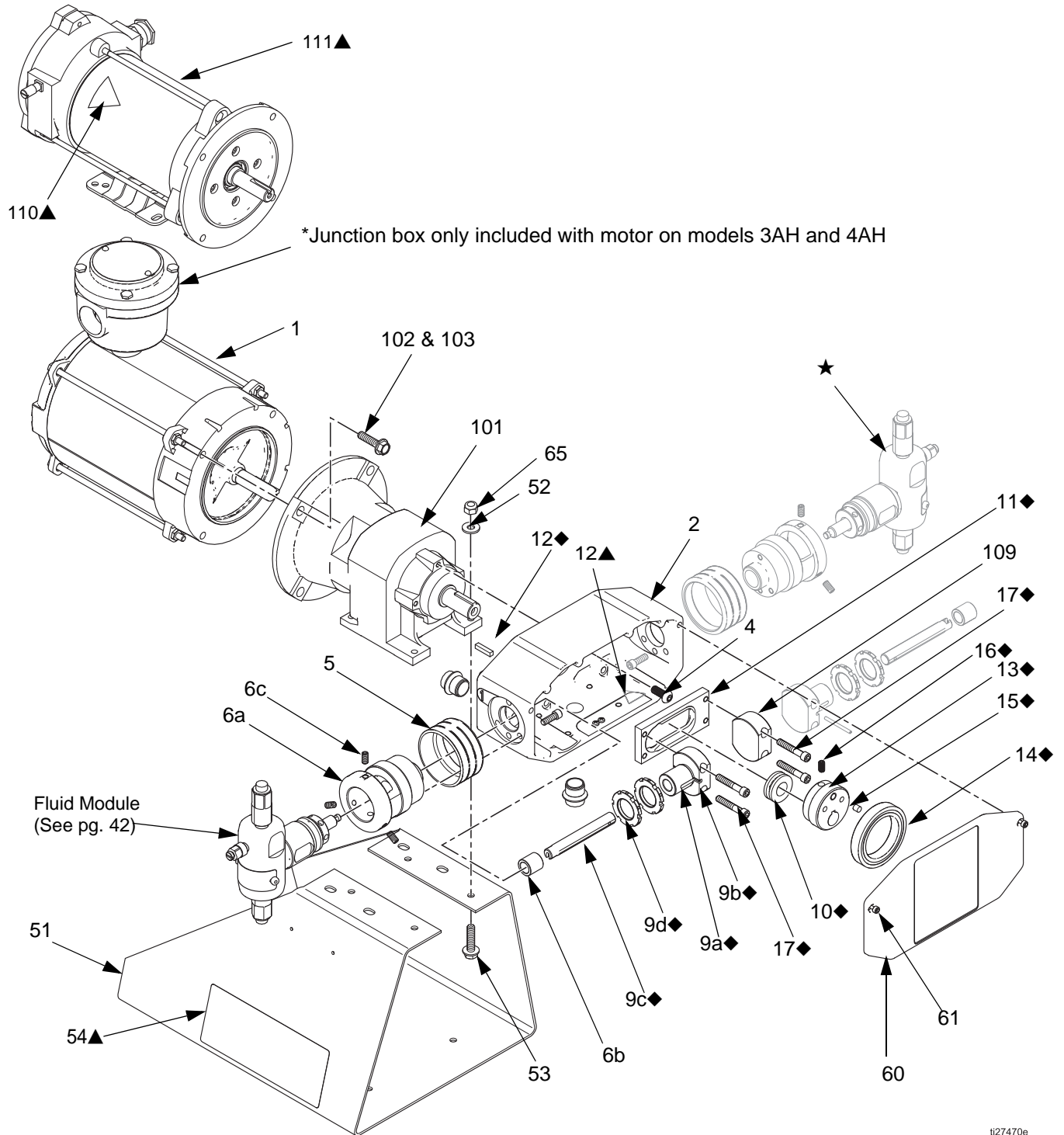
▲ Replacement Danger and Warning labels, tags, and cards are available at no cost.

† Included in Cycle Count kit, see **Kits and Accessories**, page 44.

★ See Duplex Add-On Kits in **Kits and Accessories**, page 44.

◆ Included in Drive Train Repair kit, see **Kits and Accessories**, page 44.

Wolverine Drive Module for Hazardous Location (C1 D1) and ATEX Pumps



Wolverine Drive Module Parts List for Hazardous Location (C1 D1) and ATEX Pump

Ref.	Part	Description	Qty
1	B32149	Motor: Hazardous Location, 12 VDC, 1/5 HP, C1 D1	1
	B32209	Motor: Hazardous Location, 115/230 VAC, 1/4 HP, C1 D1	1
	B32210	Motor: Hazardous Location, 230/460 VAC, 1/4 HP, C1 D1	1
	B32211	Motor: Hazardous Location, 24 VDC, 1/5 HP, C1 D1	1
	B33001	Motor: ATEX, 24 VDC, Zone 1	1
	B33002	Motor: ATEX, 230 VAC, Zone 1	1
	B33003	Motor: ATEX, 230/400 VAC, Zone1	1
2	24Z147	Drive housing	1
4	--	Socket head cap screw, included with gear reducer (ref. 101)	4
5	B32427	Dust cover	1
6a	B32880	Drive cylinder for plunger sizes 1/4", 3/8", 1/2"	1
	B32879	Drive cylinder for plunger sizes 3/16", 5/8", 3/4"	1
6b	--	Sleeve bearing; included with drive cylinder (ref. 6a)	1
6c	B33048	Cup head set screw; included with drive cylinder (ref. 6a)	3
8	--	Socket head cap screw, included with drive cylinder (ref. 6a)	3
9a◆	B32712	Stroke adjuster	1
9b◆		Coiled pin (17F380)	1
9c◆		Drive shaft	1
9d◆		Stroke adjuster nut	2
10◆	B32710	Carriage bearing, included with plunger return carriage (ref. 11)	1
11◆	--	Plunger return carriage	1
12◆	--	Square key, included with motor (ref. 2) & cam (ref. 13) & plunger return carriage (ref. 11) & carriage bearing (ref. 10)	1
13◆	B32212	Cam	1
14◆	--	Deep groove ball bearing; included with cam (ref. 13)	1
15◆	--	Magnet; included with cam (ref. 13)	1
16◆	--	Set screw, included with motor (ref. 2) & cam (ref. 13) & plunger return carriage (ref. 11) & carriage bearing (ref. 10)	1

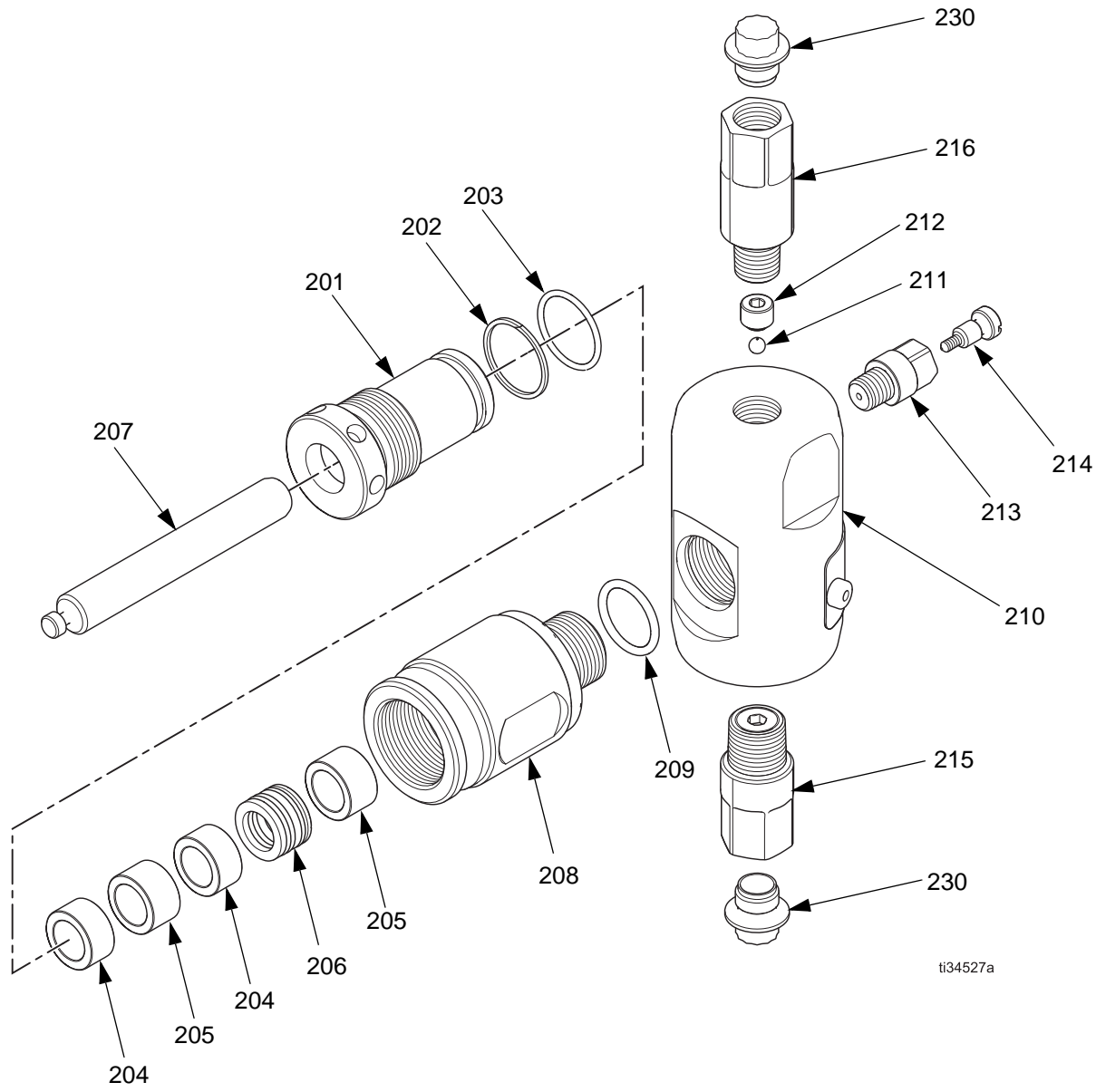
Ref.	Part	Description	Qty
17◆	--	Socket head cap screw, included with plunger return carriage (ref. 11) & plunger return block (ref. 109)	4
21▲	15H108	Pinch hazard warning label	1
40	--	Tapered cap plug (not shown)	1
51	--	Pump base	1
52	--	Flat washer, included with gear reducer (ref. 101)	4
53	--	Socket head cap screw, included with gear reducer (ref 101)	4
54▲	17G318	Multiple warning safety label	1
56	--	Liquid-tight flex metal conduit	1
60	B32401	Drive guard	1
61	--	Captive fastener, included with drive guard (ref. 60)	2
65	--	Hex nut, included with gear reducer (ref 101)	4
101	B32876	Gear Reducer: Hazardous Location	1
	B32877	Gear Reducer: ATEX	
102	--	Hex head screw	4
103	--	Lock washer	4
109	B32711	Plunger return block (not used with duplex models)	1
110▲	15G303	Electric Shock Warning Label	1
111▲	125363	Burn Hazard Warning Label	1

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

★ See Duplex Add-On Kits in **Kits and Accessories**, page 44.

◆ Included in Drive Train Repair kit, see **Kits and Accessories**, page 44.

Wolverine Fluid Module



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Wolverine Fluid Module Parts List

Ref.	Part	Description	Qty
201	See Table 6	Packing nut	1
202	See Table 6 & 7	O-Ring, included with packing nut (ref 201) & packing stack (ref 206)	1
203	See Table 6 & 7	Backup o-ring, included with packing nut (ref. 201) & packing stack (ref. 206)	1
204	--	Plunger bearing, included with packing (ref. 206)	2
205	See Table 12	Spacer	2
206	See Table 7	Packing	1
207	See Table 9	Plunger	1
208	See Table 8	Fluid cylinder	1
209	See Table 5 & 8	O-Ring, included with check/bleed housing (ref. 210) & fluid cylinder (ref. 208)	1
210	See pg. 39	Check/bleed housing	1
211	--	Ball, included with check/bleed housing (ref 210)	1
212	--	Ball retainer, included with check/bleed housing (ref 210)	1
213	B32191	Bleed housing	1
214	17F572	Bleed valve, included with bleed housing (ref. 213)	1
215	See Table 10	Inlet check valve	1
216	See Table 11	Outlet check valve	1
230	--	Plug cap	2

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

Table 5: Check / Bleed Housing

Ref	Part Numbers by Fluid Plunger Size Diameter						Qty.
	3/16 in.	1/4 in.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	
FKM							
210	B32539	B32477	B32477	B32477	B32478	B32478	1
FKMETP							
210	B32540	B32509	B32509	B32509	B32512	B32512	1
HNBR							
210	B32541	B32510	B32510	B32510	B32513	B32513	1
FFKM							
210	B32542	B32511	B32511	B32511	B32514	B32514	1

Table 6: Packing Nut

Ref	Part Numbers by Fluid Plunger Size Diameter						Qty.
	3/16 in.	1/4 in.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	
FKM							
201	B32420	B32421	B32422	B32423	B32424	B32425	1
FKMETP							
201	B32489	B32490	B32491	B32492	B32493	B32494	1
HNBR							
201	B32496	B32497	B32498	B32499	B32500	B32501	1
FFKM							
201	B32503	B32504	B32505	B32506	B32507	B32508	1

Table 7: Packing, including Plunger Bearing, qty 2 (ref. 204)

Ref	Part Numbers by Fluid Plunger Size Diameter						Qty.
	3/16 in.	1/4 in.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	
FKM							
206	B32429	B32430	B32431	B32432	B32433	B32434	1
FKMETP							
206	B32436	B32437	B32438	B32439	B32440	B32441	1
HNBR							
206	B32443	B32444	B32445	B32446	B32447	B32448	1
FFKM							
206	B32450	B32451	B32452	B32453	B32454	B32455	1
TFE/P							
206	B32882	B32883	B32884	B32885	B32886	B32887	1

Table 8: Fluid Cylinder

Ref	Part Numbers by Fluid Plunger Size Diameter						Qty.
	3/16 in.	1/4 in.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	
FKM							
208	B32482	B32483	B32484	B32485	B32486	B32487	1
FKMETP							
208	B32516	B32517	B32518	B32519	B32520	B32521	1
HNBR							
208	B32523	B32524	B32525	B32526	B32527	B32528	1
FFKM							
208	B32530	B32531	B32532	B32533	B32534	B32535	1

Table 9: Fluid Plunger

Ref	Part Numbers by Fluid Plunger Size Diameter						Qty.
	3/16 in.	1/4 in.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	
Ceramic							
207	B32543	B32544	B32545	B32546	B32547	B32548	1
Chromex-Coated 17-4 Stainless Steel							
207	B32060	B32061	B32062	B32063	B32064	B32065	1

Table 10: Inlet Check Valve

Ref	Part Numbers by Fluid Plunger Size Diameter						Qty.
	3/16 in.	1/4 in.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	
FKM							
215	B32216	B32024	B32024	B32024	B32024	B32024	1
FKMETP							
215	B32218	B32026	B32026	B32026	B32026	B32026	1
HNBR							
215	B32220	B32113	B32113	B32113	B32113	B32113	1
FFKM							
215	B32222	B32028	B32028	B32028	B32028	B32028	1
TFE/P							
215	B32092	B32610	B32610	B32610	B32610	B32610	1

Table 11: Outlet Check Valve

Ref	Part Numbers by Fluid Plunger Size Diameter						Qty.
	3/16 in.	1/4 in.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	
FKM							
216	B32217	B32025	B32025	B32025	B32025	B32025	1
FKMETP							
216	B32219	B32027	B32027	B32027	B32027	B32027	1
HNBR							
216	B32221	B32114	B32114	B32114	B32114	B32114	1
FFKM							
216	B32223	B32029	B32029	B32029	B32029	B32029	1
TFE/P							
216	B32087	B32608	B32608	B32608	B32608	B32608	1

Table 12: Stainless Steel Packing Spacer Kits

Ref	Part Numbers by Fluid Plunger Size Diameter						Qty.
	3/16 in.	1/4 in.	3/8 in.	1/2 in.	5/8 in.	3/4 in.	
205	B32859	B32860	B32861	B32862	B32863	B32864	1

Kits and Accessories

Wolverine (All)

Part No.	Description
B32038	FKM Inlet and Outlet Check Valve Repair Kit for 1/4", 3/8" 1/2", 5/8", and 3/4" (includes ref. 215a, 216a, 216d)
B32224	FKM Inlet and Outlet Check Valve Repair Kit for 3/16" (includes ref. 215a, 216a, 216d)
B32039	FKM ETP Inlet and Outlet Check Valve Repair Kit for 1/4", 3/8" 1/2", 5/8", and 3/4" (includes ref. 215a, 216a, 216d)
B32225	FKM ETP Inlet and Outlet Check Valve Repair Kit for 3/16" (includes ref. 215a, 216a, 216d)
B32040	FFKM Inlet and Outlet Check Valve Repair Kit for 1/4", 3/8" 1/2", 5/8", and 3/4" (includes ref. 215a, 216a, 216d)
B32235	FFKM Inlet and Outlet Check Valve Repair Kit for 3/16" (includes ref. 215a, 216a, 216d)
B32111	HNBR Inlet and Outlet Check Valve Repair Kit for 1/4", 3/8" 1/2", 5/8", and 3/4" (includes ref. 215a, 216a, 216d)
B32234	HNBR Inlet and Outlet Check Valve Repair Kit for 3/16" (includes ref. 215a, 216a, 216d)
B32870	TFE/P Inlet and Outlet Check Valve Repair Kit for 1/4", 3/8", 1/2", 5/8", and 3/4" (includes ref. 215a, 216a, 216d)
B32871	TFE/P Inlet and Outlet Check Valve Repair Kit for 3/16" (includes ref. 215a, 216a, 216d)
B32157	316 SST Ball Valve Kit, 3/4 NPT (F)
B32075	Motor Brush Repair, 12 VDC (CI-12L-xxx-xxx-x)
B33047	Motor Brush Repair, 115 VAC (CI-1AD-xxx-xxx-x)
B33046	Motor Brush Repair, 12 VDC (CI-12S-xxx-xxx-x)
B32045	225-750 PSI Pressure Relief Valve Kit
B32046	750-1500 PSI Pressure Relief Valve Kit
B32047	1500-2250 PSI Pressure Relief Valve Kit
B32048	2250-3000 PSI Pressure Relief Valve Kit
B32049	3000-4000 PSI Pressure Relief Valve Kit
B32050	4000-5000 PSI Pressure Relief Valve Kit
B32051	5000-6000 PSI Pressure Relief Valve Kit
B32737	Small Motor Duplex Conversion Kit (CI-12S-x0-x)
B32738	Large Motor Duplex Conversion Kit (all simplex models except CI-12S-x0-x)
B33039	Variable Speed Control Board, 115 VAC (CI-1AD-xxx-xxx-x)

B33040	Variable Speed Control Board, 24 VCC (CI-24B-xxx-xxx-x)
B33041	Variable Speed Control Board, 12 VDC (CI-12B-xxx-xxx-x)
B32881	AC Potentiometer Repair Kit
B32990	DC Potentiometer Repair Kit
B32479	Cycle Count Accessory Kit for 12 VDC 150 in-lb Motor* (ordinary location only)
B32004	Simplex Small Motor Drivetrain Repair Kit (for configuration CI-12S-x0-x)**
B32005	Duplex Small Motor Drivetrain Repair Kit (for configuration CI-12S-xx-x)**
B32006	Simplex Large Motor Drivetrain Repair Kit (for configurations CI-12L-x0-x, CI-12B-x0-x, CI-24B-x0-x, CI-1AL-x0-x, CI-1AD-x0-x, CI-2Ax-x0-x, and CI-4AL-x0-x)**
B32008	Duplex Large Motor Drivetrain Repair Kit (for configurations CI-12L-xx-x, CI-12B-xx-x, CI-24B-xx-x, CI-1AL-xx-x, CI-1AD-xx-x, CI-2Ax-xx-x, and CI-4AL-xx-x)**
B32030	Simplex Hazardous Location (C1 D1) and ATEX (Zone 1) Drivetrain Repair Kit (for configurations CI-12H-x0-x, CI-24H-x0-x, CI-3AH-x0-x, CI-4AH-x0-x, CI-24X-x0-x, CI-2AX-x0-x, and CI-5AX-x0-x)**
B32031	Duplex Hazardous Location (C1 D1) and ATEX (Zone 1) Drivetrain Repair Kit (for configurations CI-12H-xx-x, CI-24H-xx-x, CI-3AH-xx-x, CI-4AH-xx-x, CI-24X-xx-x, CI-2AX-xx-x, and CI-5AX-xx-x)**
B32869	Simplex Plug Kit
B33009	ATEX Motor Dust Shield

* Includes ref. 91, 92, 93, 94, 95, 96, 97, and 98.

** Includes ref. 7, 9a, 9b, 9c, 9d, 10, 11, 13, 14, 15, 16, 17, and 109.

Wolverine Advanced, Hazardous Location (C1 D1), ATEX, and Continuous Injection (C1 D2) Fluid Module Kits

Part No.	Description
A30300	3/16" FKM: Chromex Fluid Module *
A30301	3/16" FKM ETP: Chromex Fluid Module *
A30302	3/16" HNBR: Chromex Fluid Module *
A30303	3/16" FFKM: Chromex Fluid Module *
A30304	3/16" TFE/P: Chromex Fluid Module *
A30310	3/16" FKM: Ceramic Fluid Module *
A30311	3/16" FKM ETP: Ceramic Fluid Module *
A30312	3/16" HNBR: Ceramic Fluid Module *
A30313	3/16" FFKM: Ceramic Fluid Module *
A30314	3/16" TFE/P: Ceramic Fluid Module *
A30400	1/4" FKM: Chromex Fluid Module *
A30401	1/4" FKM ETP: Chromex Fluid Module *
A30402	1/4" HNBR: Chromex Fluid Module *
A30403	1/4" FFKM: Chromex Fluid Module *
A30404	1/4" TFE/P: Chromex Fluid Module *
A30410	1/4" FKM: Ceramic Fluid Module *
A30411	1/4" FKM ETP: Ceramic Fluid Module *
A30412	1/4" HNBR: Ceramic Fluid Module *
A30413	1/4" FFKM: Ceramic Fluid Module *
A30414	1/4" TFE/P: Ceramic Fluid Module *
A30500	3/8" FKM: Chromex Fluid Module *
A30501	3/8" FKM ETP: Chromex Fluid Module *
A30502	3/8" HNBR: Chromex Fluid Module *
A30503	3/8" FFKM: Chromex Fluid Module *
A30504	3/8" TFE/P: Chromex Fluid Module *
A30510	3/8" FKM: Ceramic Fluid Module *
A30511	3/8" FKM ETP: Ceramic Fluid Module *
A30512	3/8" HNBR: Ceramic Fluid Module *
A30513	3/8" FFKM: Ceramic Fluid Module *
A30514	3/8" TFE/P: Ceramic Fluid Module *
A30600	1/2" FKM: Chromex Fluid Module *
A30601	1/2" FKM ETP: Chromex Fluid Module *
A30602	1/2" HNBR: Chromex Fluid Module *
A30603	1/2" FFKM: Chromex Fluid Module *

A30604	1/2" TFE/P: Chromex Fluid Module *
A30610	1/2" FKM: Ceramic Fluid Module *
A30611	1/2" FKM ETP: Ceramic Fluid Module *
A30612	1/2" HNBR: Ceramic Fluid Module *
A30613	1/2" FFKM: Ceramic Fluid Module *
A30614	1/2" TFE/P: Ceramic Fluid Module *
A30700	5/8" FKM: Chromex Fluid Module *
A30701	5/8" FKM ETP: Chromex Fluid Module *
A30702	5/8" HNBR: Chromex Fluid Module *
A30703	5/8" FFKM: Chromex Fluid Module *
A30704	5/8" TFE/P: Chromex Fluid Module *
A30710	5/8" FKM: Ceramic Fluid Module *
A30711	5/8" FKM ETP: Ceramic Fluid Module *
A30712	5/8" HNBR: Ceramic Fluid Module *
A30713	5/8" FFKM: Ceramic Fluid Module *
A30714	5/8" TFE/P: Ceramic Fluid Module *
A30800	3/4" FKM: Chromex Fluid Module *
A30801	3/4" FKM ETP: Chromex Fluid Module *
A30802	3/4" HNBR: Chromex Fluid Module *
A30803	3/4" FFKM: Chromex Fluid Module *
A30804	3/4" TFE/P: Chromex Fluid Module *
A30810	3/4" FKM: Ceramic Fluid Module *
A30811	3/4" FKM ETP: Ceramic Fluid Module *
A30812	3/4" HNBR: Ceramic Fluid Module *
A30813	3/4" FFKM: Ceramic Fluid Module *
A30814	3/4" TFE/P: Ceramic Fluid Module *
A30513T12	3/8" Severe Duty Fluid Module (FFKM seals, Ceramic Coating)
A30613T12	1/2" Severe Duty Fluid Module (FFKM seals, Ceramic Coating)
A30713T12	5/8" Severe Duty Fluid Module (FFKM seals, Ceramic Coating)
A30813T12	3/4" Severe Duty Fluid Module (FFKM seals, Ceramic Coating)

* Includes ref. 201, 202, 203, 204, 205, 206, 207, 208, and 209.

Fluid Module Seal Conversion Kits by Plunger Size**					
3/16 in.	1/4 in.	3/8 in.	1/2 in.	5/8 in.	3/4 in.
FKM					
B32549	B32550	B32551	B32552	B32553	B32554
FKMETP					
B32555	B32556	B32557	B32558	B32559	B32560
HNBR					
B32561	B32562	B32563	B32564	B32565	B32566
FFKM					
B32567	B32568	B32569	B32570	B32571	B32572

** Includes ref. 202, 203, 204, 206, and 209.

NOTE: A 1 cc grease packet and a new O-ring for the outlet check valve are also included in conversion kits.

Wolverine Advanced, Hazardous Location (C1 D1), ATEX, and Continuous Injection (C1 D2) Drive Module Kits

Small Motor (Advanced)

Simplex (25:38:50)	Simplex (19:63:75)	Duplex Side 1 - 25:38:50 Side 2 - 25:38:50	Duplex Side 1 - 19:63:75 Side 2 - 19:63:75	Duplex Side 1 - 19:63:75 Side 2 - 25:38:50	Duplex Side 1 - 25:38:50 Side 2 - 19:63:75
12 VDC					
A30000	A30003	A30001	A30005	A30004	A30002
12 VDC Cycle Count					
A30004	A30009	A30007	A30011	A30010	A30008

Medium Motor (Advanced)

Simplex (25:38:50)	Simplex (19:63:75)	Duplex Side 1 - 25:38:50 Side 2 - 25:38:50	Duplex Side 1 - 19:63:75 Side 2 - 19:63:75	Duplex Side 1 - 19:63:75 Side 2 - 25:38:50	Duplex Side 1 - 25:38:50 Side 2 - 19:63:75
115 VAC					
A30095	A30097	A30096	A30098	---	---

Large Motor (Advanced)

Simplex (25:38:50)	Simplex (19:63:75)	Duplex Side 1 - 25:38:50 Side 2- 25:38:50	Duplex Side 1 - 19:63:75 Side 2 - 19:63:75	Duplex Side 1 - 19:63:75 Side 2 - 25:38:50	Duplex Side 1 - 25:38:50 Side 2 - 19:63:75
12 VDC					
A30020	A30023	A30021	A30025	A30024	A30022
12 VDC Cycle Count					
A30026	A30029	A30027	A30031	A30030	A30028
115 VAC					
A30040	A30043	A30041	A30045	A30044	A30042
115 VAC Cycle Count					
A30046	A30049	A30047	A30051	A30050	A30048
115 VAC Harrier AC					
A30170	A30173	A30171	A30175	A30174	A30172
115 VAC Harrier AC Cycle Count					
A30176	A30179	A30177	A30187	A30186	A30178
230 VAC					
A30060	A30063	A30061	A30065	A30064	A30062
230 VAC Cycle Count					
A30066	A30069	A30067	A30071	A30070	A30068
230 VAC Harrier AC					
A30188	A30191	A30189	A30193	A30192	A30190
230 VAC Harrier AC Cycle Count					
A30194	A30197	A30195	A30199	A30198	A30196
230/480 VAC 3 Phase					
A30080	A30083	A30081	A30085	A30084	A30082
230/480 VAC 3 Phase Cycle Count					
A30086	A30089	A30087	A30091	A30090	A30088

Hazardous Location (C1 D1)

Simplex (25:38:50)	Simplex (19:63:75)	Duplex Side 1 - 25:38:50 Side 2 - 25:38:50	Duplex Side 1 - 19:63:75 Side 2 - 19:63:75	Duplex Side 1 - 19:63:75 Side 2 - 25:38:50	Duplex Side 1 - 25:38:50 Side 2 - 19:63:75
12 VDC					
A30100	A30103	A30101	A30105	A30104	A30102
24 VDC					
A30120	A30123	A30121	A30125	A30124	A30122
115/230 VAC Hazardous Location					
A30140	A30143	A30141	A30145	A30144	A30142
230/480 VAC 3 Phase					
A30160	A30163	A30161	A30165	A30164	A30162

Continuous Injection (C1 D2)

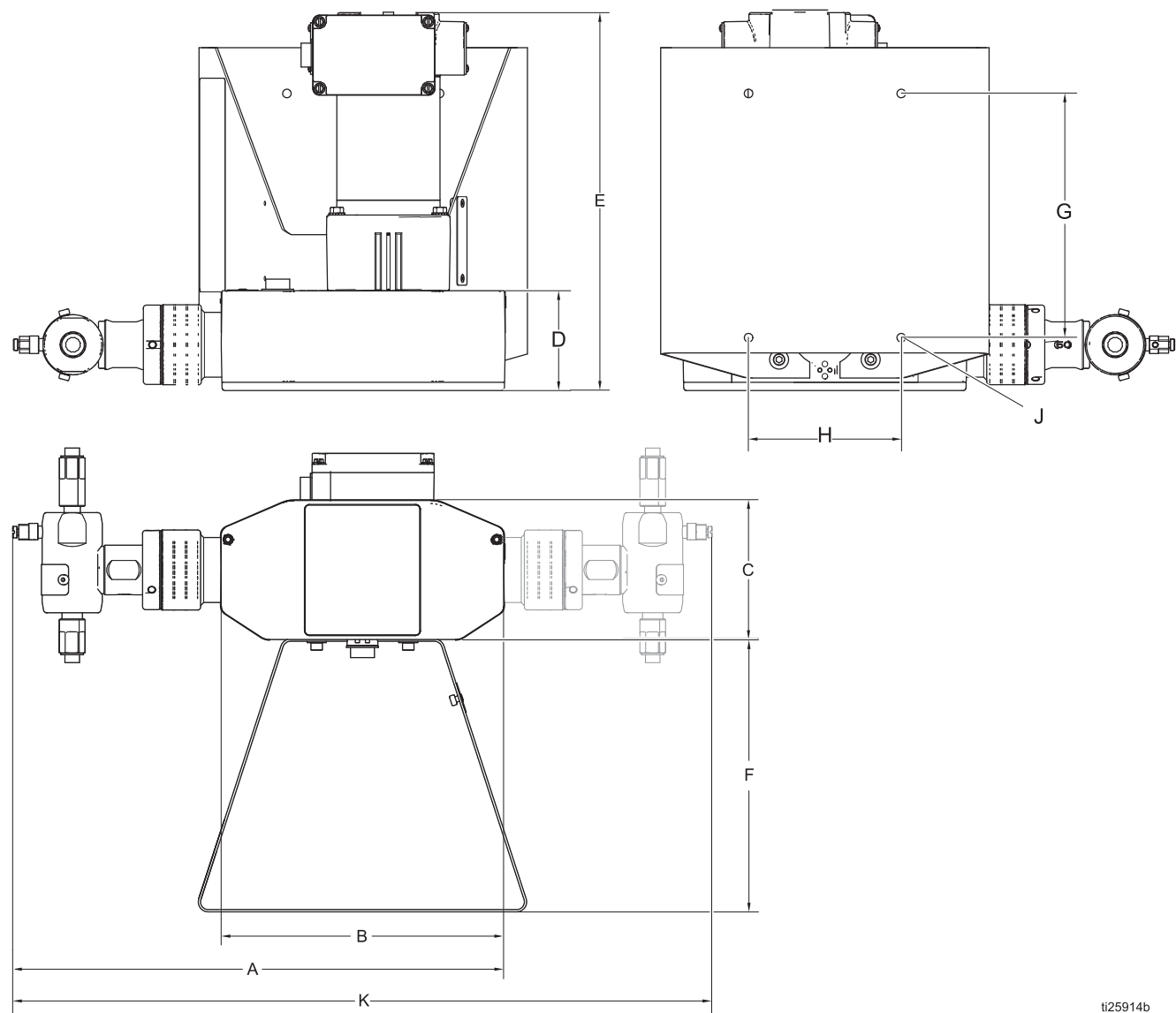
Simplex (25:38:50)	Simplex (19:63:75)	Duplex Side 1 - 25:38:50 Side 2 - 25:38:50	Duplex Side 1 - 19:63:75 Side 2 - 19:63:75	Duplex Side 1 - 19:63:75 Side 2 - 25:38:50	Duplex Side 1 - 25:38:50 Side 2 - 19:63:75
12 VDC					
A30200	A30203	A30201	A30205	A30204	A30202
24 VDC					
A30210	A30213	A30211	A30215	A30214	A30212
115 VAC					
A30260	A30263	A30261	A30265	A30264	A30262

ATEX

Simplex (25:38:50)	Simplex (19:63:75)	Duplex Side 1 - 25:38:50 Side 2 - 25:38:50	Duplex Side 1 - 19:63:75 Side 2 - 19:63:75	Duplex Side 1 - 19:63:75 Side 2 - 25:38:50	Duplex Side 1 - 25:38:50 Side 2 - 19:63:75
24 VDC					
A30126	A30128	A30127	A30129	---	---
230 VAC ATEX					
A30072	A30074	A30073	A30075	---	---
230/400 VAC ATEX 3 PHASE					
A30166	A30168	A30167	A30169	---	---

Dimensions

Wolverine Advanced Pump Dimensions



ti25914b

FIG. 28 Wolverine Advanced Pump Dimensions

A	B	C	D	E	F	G	H	J	K
16.3 in. (41.4 cm)	8.9 in. (22.6 cm)	4.5 in. (11.4 cm)	2.85 in. (7.2 cm)	11.9 in. (30.2 cm)	8.9 in. (22.7 cm)	8.0 in. (20.3 cm)	5.0 in. (12.7 cm)	0.281 in. dia (0.714 cm)	23.7 in. (60.2 cm)

Wolverine Hazardous Location (C1 D1) Pump Dimensions

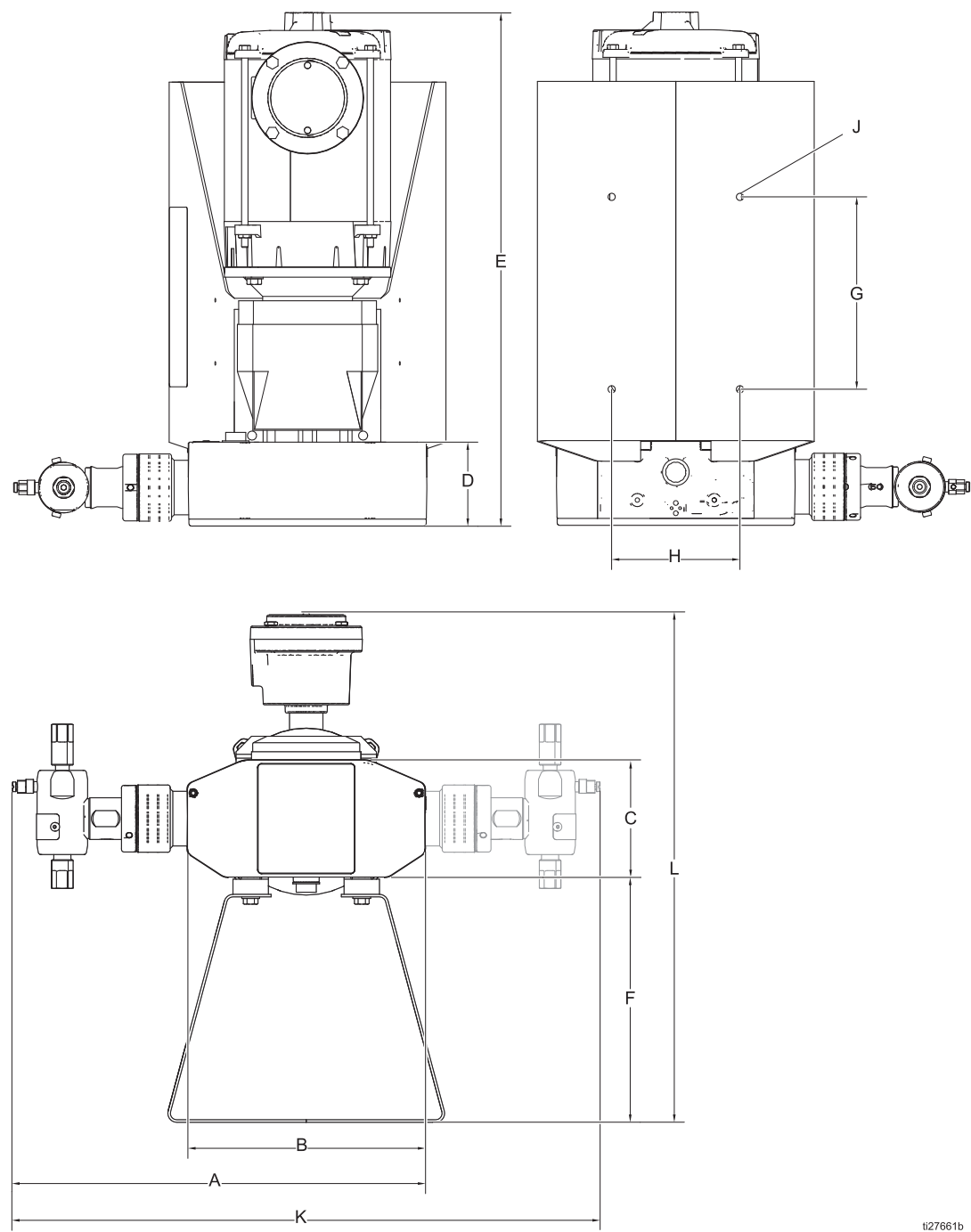
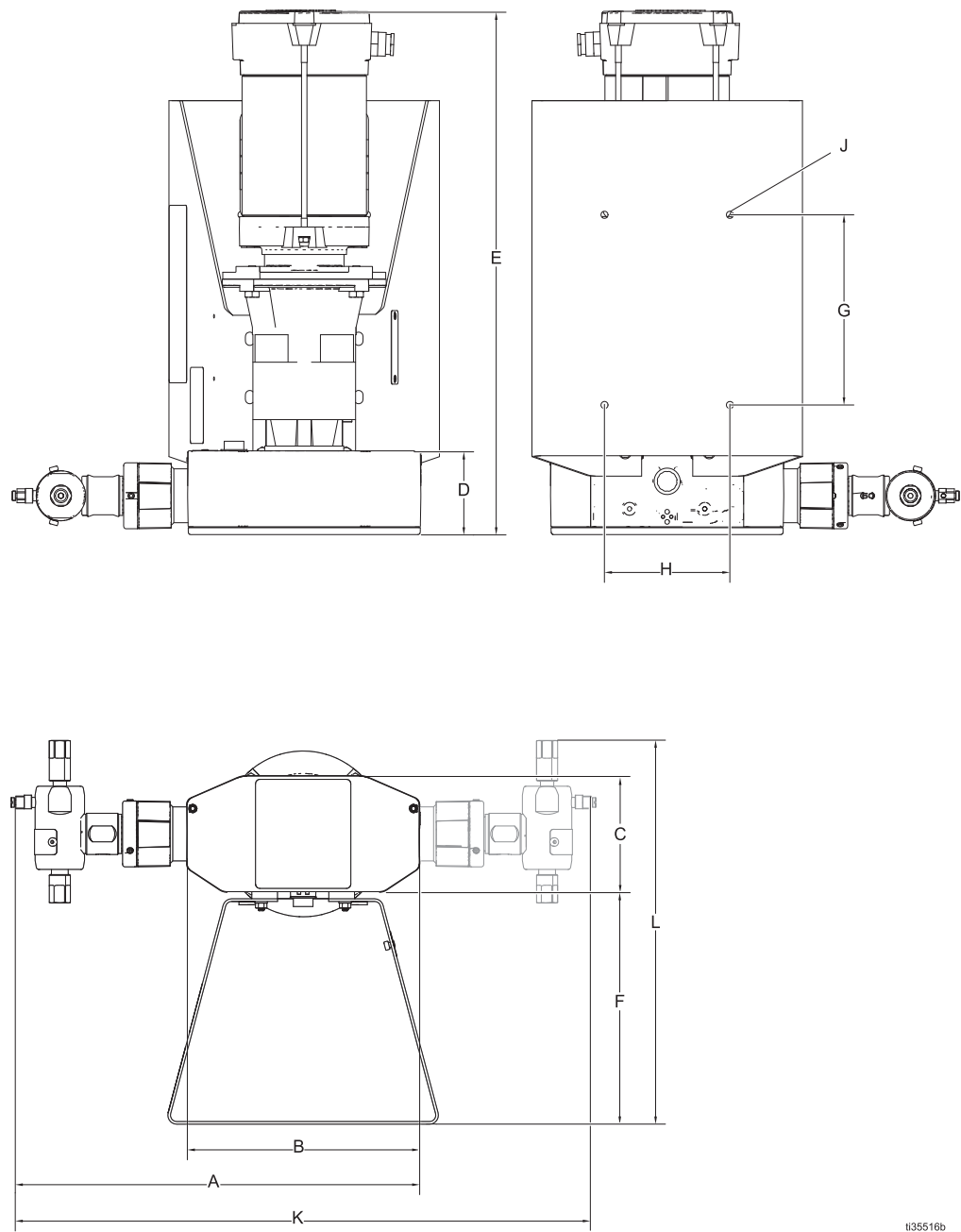


Fig. 29 Wolverine Hazardous Location Pump Dimensions

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	A	B	C	D	E	F	G	H	J	K	L
AC Pump	16.3 in. (41.4 cm)	8.9 in. (22.6 cm)	4.5 in. (11.4 cm)	2.85 in. (7.2 cm)	19.6 in. (49.8 cm)	9.6 in. (25.1 cm)	7.5 in. (19.8 cm)	5.0 in. (12.7 cm)	0.281 in. dia (0.714 cm)	23.7 in. (60.2 cm)	19.6 in. (49.8 cm)
DC Pump	16.3 in. (41.4 cm)	8.9 in. (22.6 cm)	4.5 in. (11.4 cm)	2.85 in. (7.2 cm)	17.6 in. (44.7 cm)	9.6 in. (25.1 cm)	7.5 in. (19.8 cm)	5.0 in. (12.7 cm)	0.281 in. dia (0.714 cm)	23.7 in. (60.2 cm)	--

Wolverine ATEX Pump Dimensions

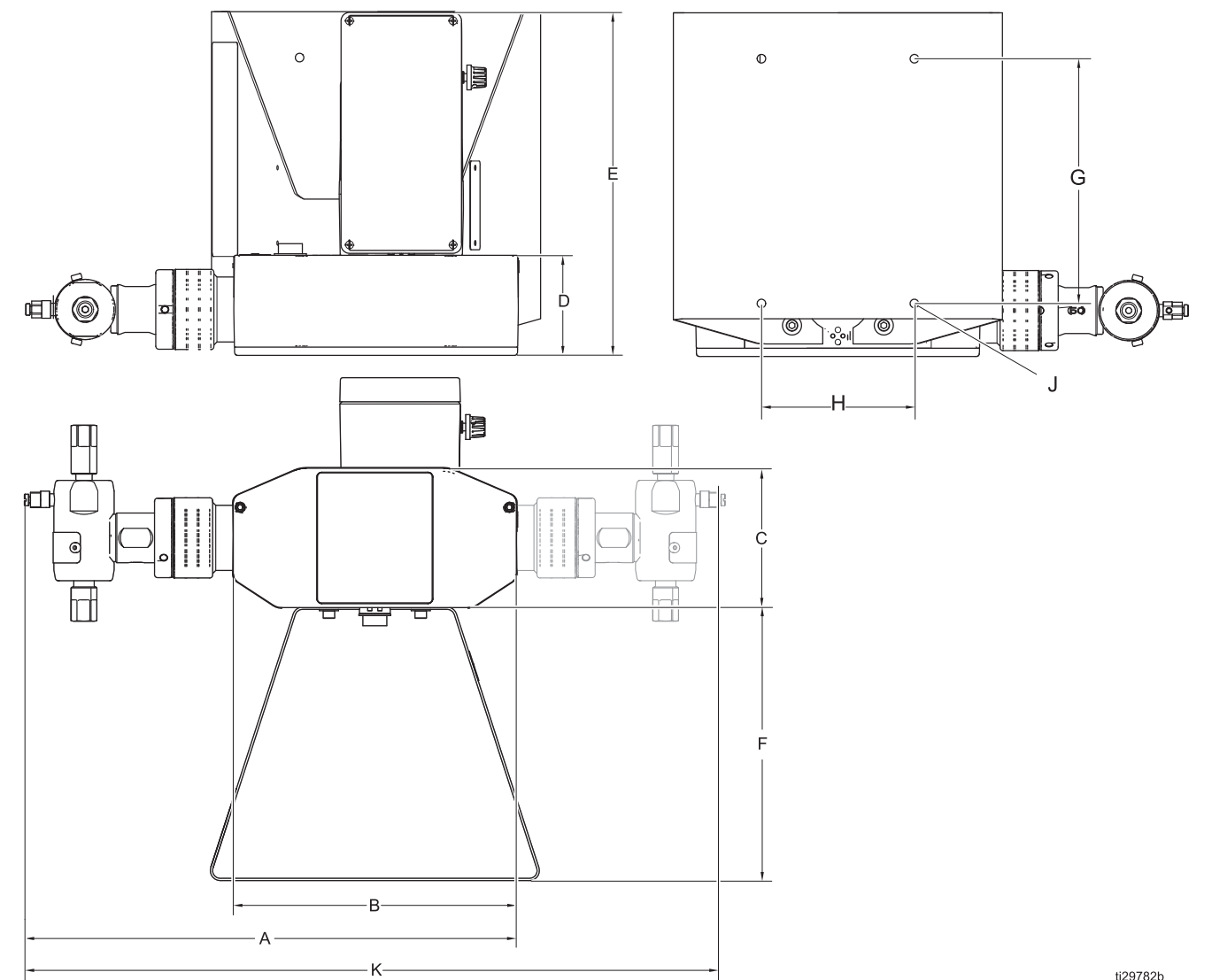


135516b

FIG. 30 Wolverine Hazardous Location Pump Dimensions

	A	B	C	D	E	F	G	H	J	K	L
AC Pump	16.3 in. (41.4 cm)	8.9 in. (22.6 cm)	4.5 in. (11.4 cm)	2.85 in. (7.2 cm)	20.63 in. (52.4 cm)	9.6 in. (25.1 cm)	7.5 in. (19.8 cm)	5.0 in. (12.7 cm)	0.281 in. dia (0.714 cm)	23.7 in. (60.2 cm)	14.19 in. (36.0 cm)
DC Pump	16.3 in. (41.4 cm)	8.9 in. (22.6 cm)	4.5 in. (11.4 cm)	2.85 in. (7.2 cm)	20.52 in. (52.1 cm)	9.6 in. (25.1 cm)	7.5 in. (19.8 cm)	5.0 in. (12.7 cm)	0.281 in. dia (0.714 cm)	23.7 in. (60.2 cm)	14.85 in. (37.7 cm)

Wolverine Continuous Injection (C1 D2) Pump Dimensions



ti29782b

FIG. 31 Wolverine Continuous Injection Pump Dimensions

A	B	C	D	E	F	G	H	J	K
16.3 in. (41.4 cm)	8.9 in. (22.6 cm)	4.5 in. (11.4 cm)	2.85 in. (7.2 cm)	10.8 in. (27.3 cm)	8.9 in. (22.7 cm)	8.0 in. (20.3 cm)	5.0 in. (12.7 cm)	0.281 in. dia (0.714 cm)	23.7 in. (60.2 cm)

Performance Charts

Wolverine Advanced Pumps

3/16 Inch Plunger

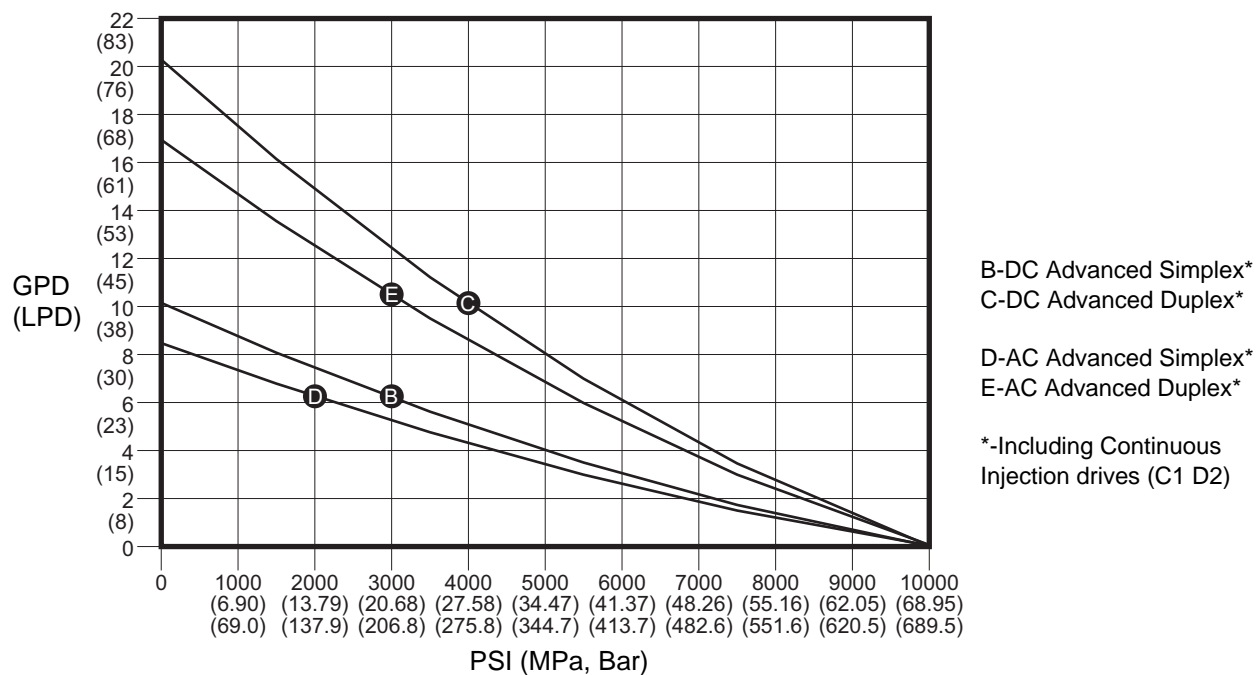


FIG. 32

1/4 Inch Plunger

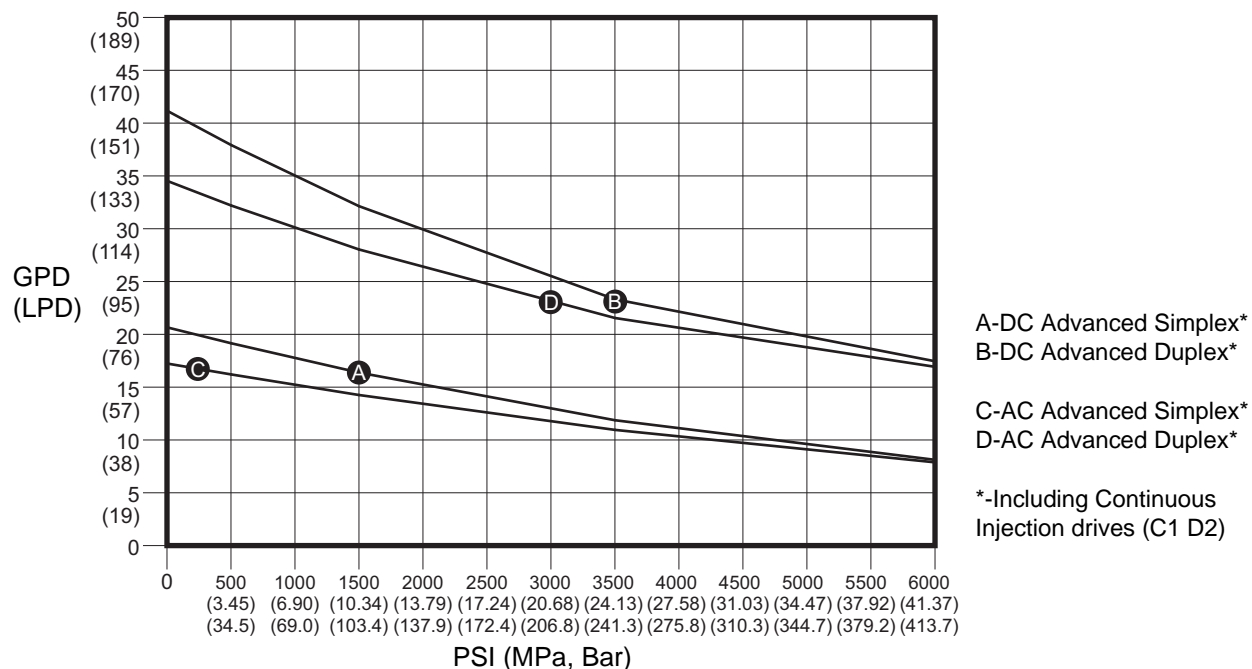


FIG. 33

3/8 Inch Plunger

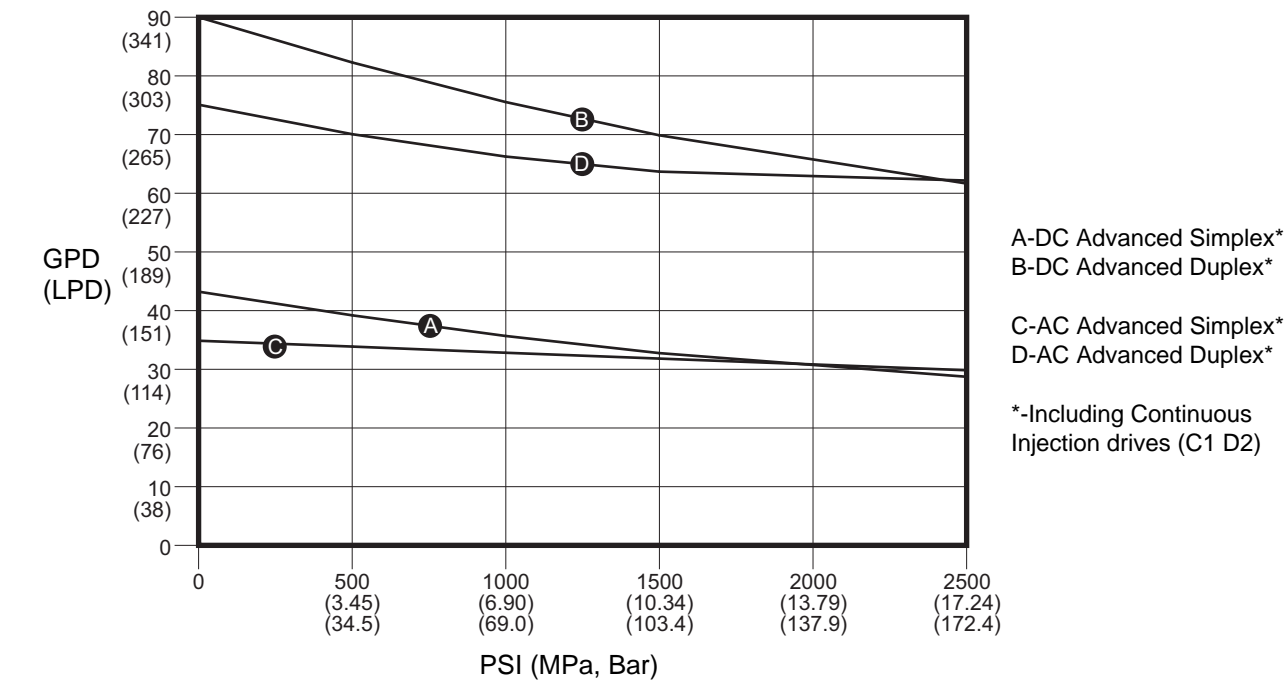


FIG. 34

1/2 Inch Plunger

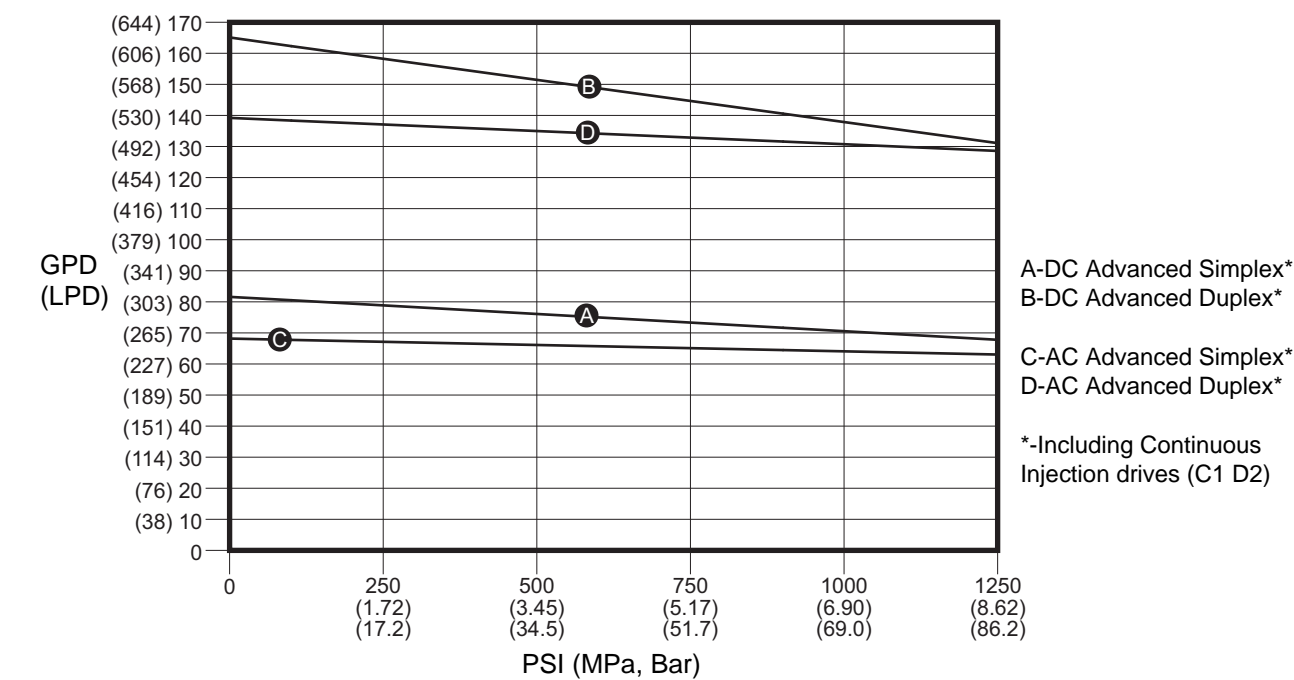
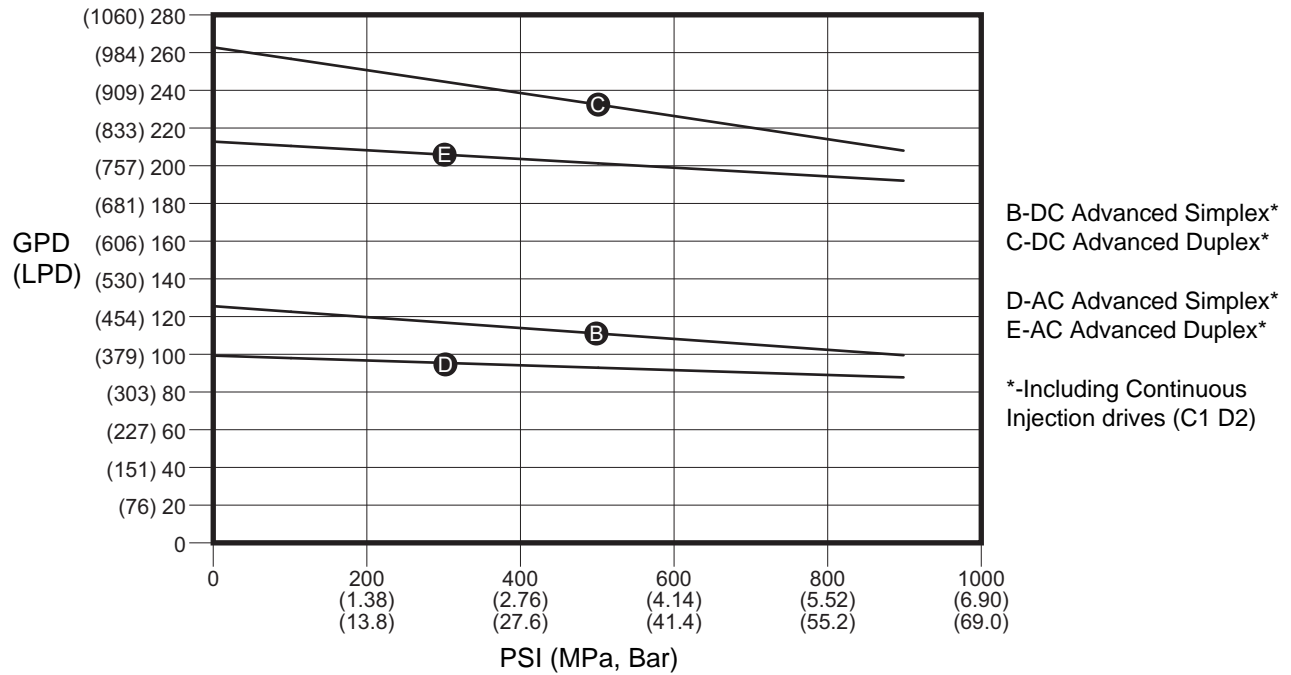
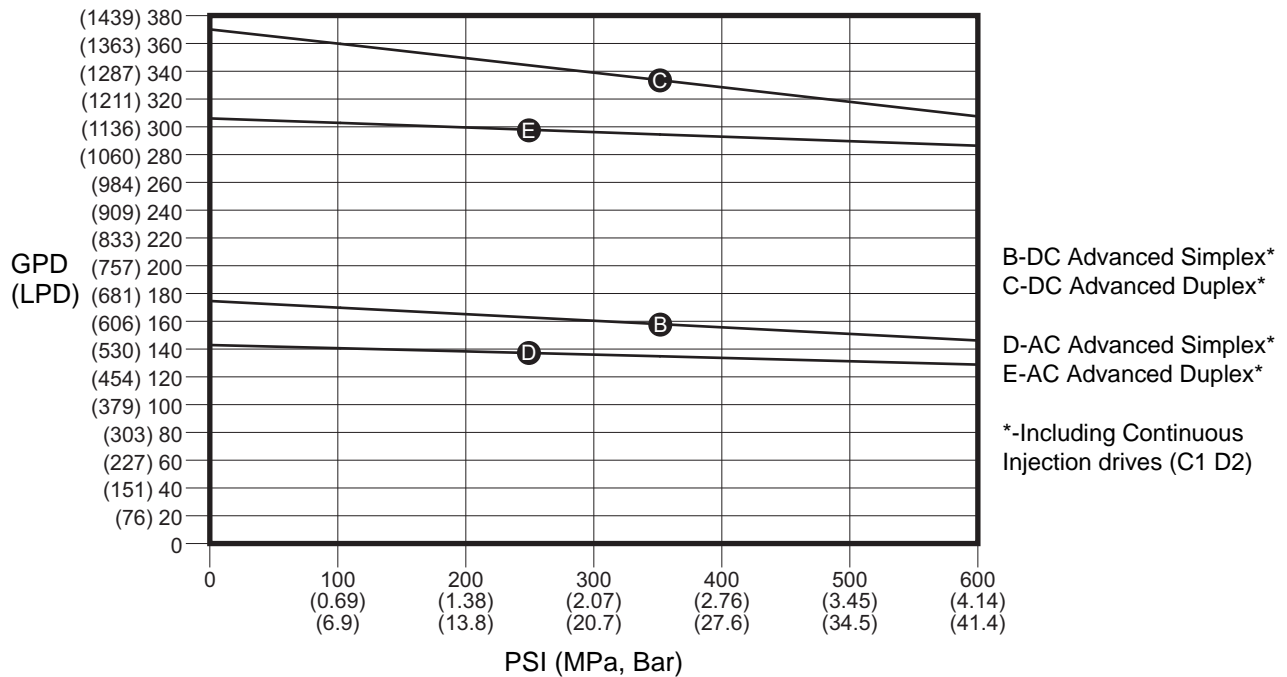


FIG. 35

5/8 Inch Plunger**FIG. 36****3/4 Inch Plunger****FIG. 37**

Wolverine Hazardous Location Pumps (C1 D1) and ATEX

3/16 Inch Plunger

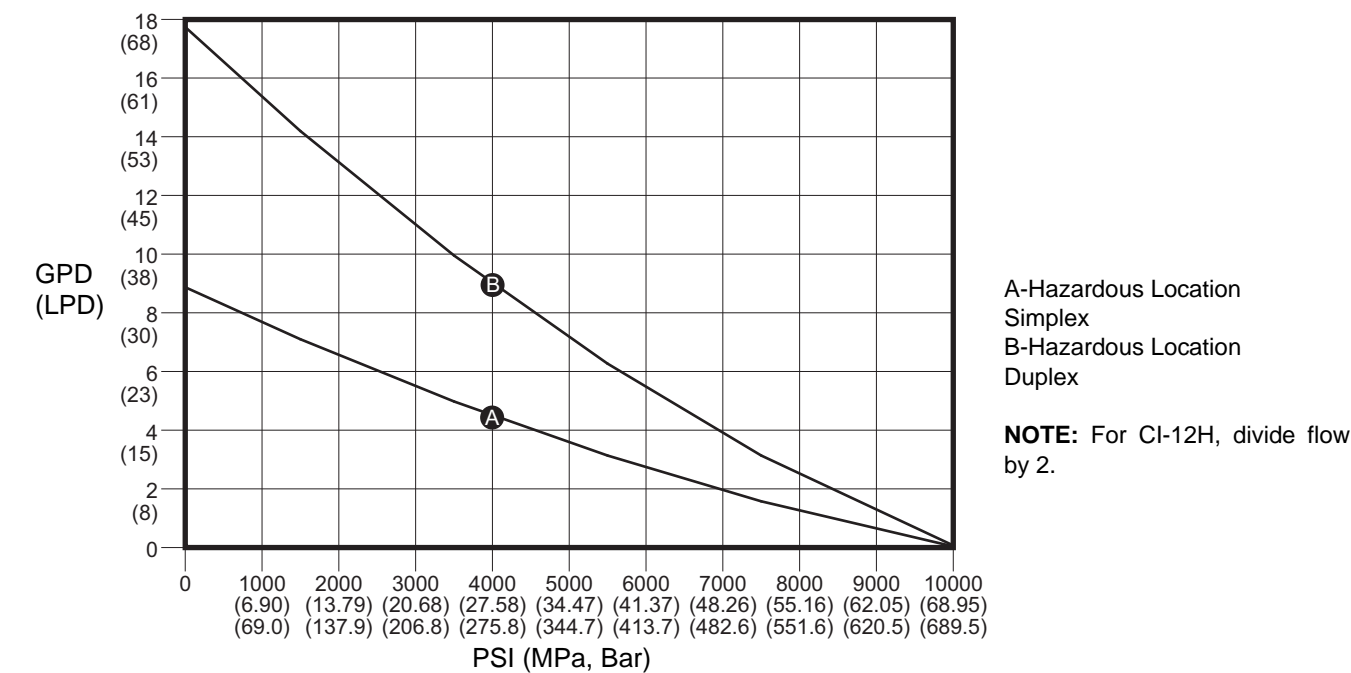


FIG. 38

1/4 Inch Plunger

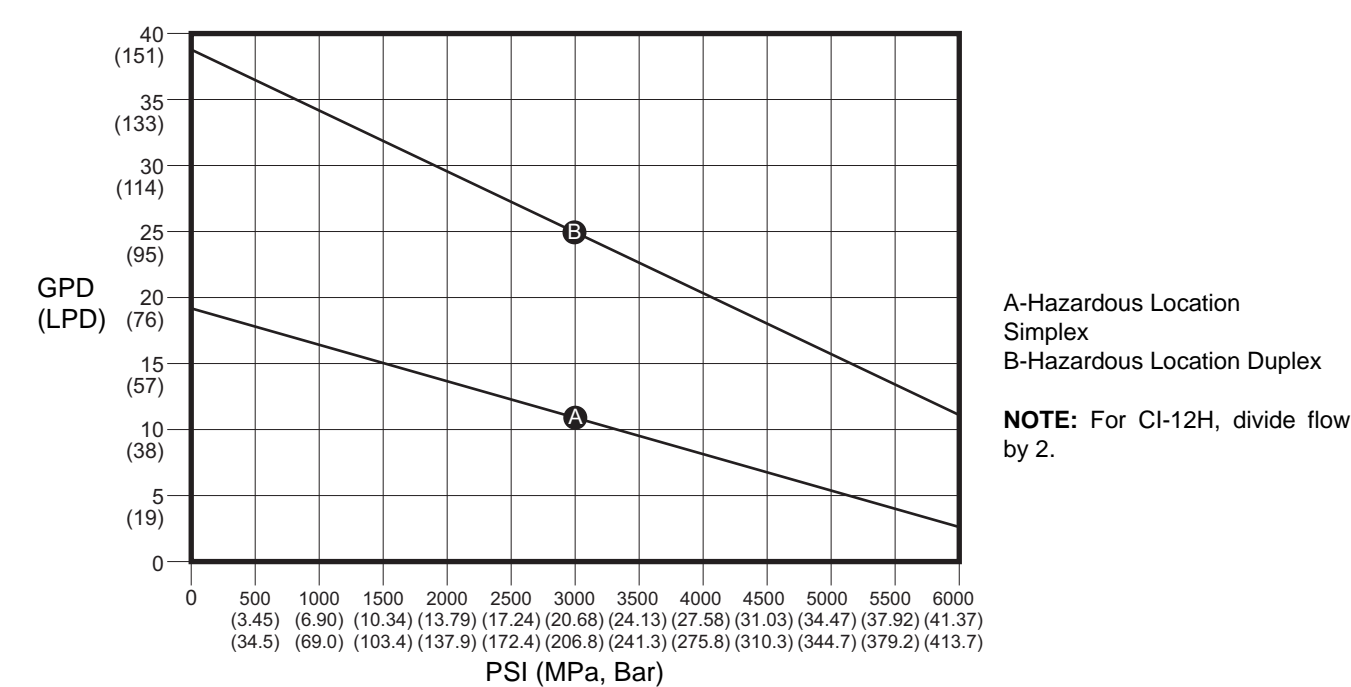
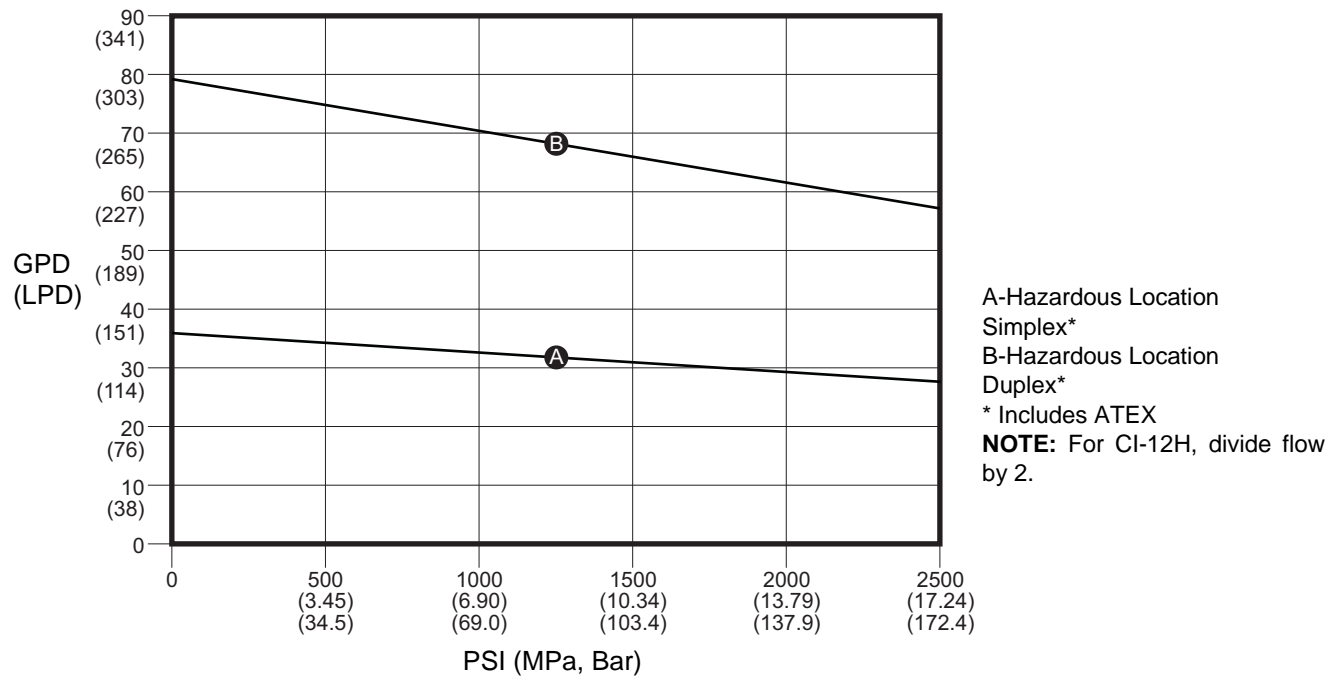
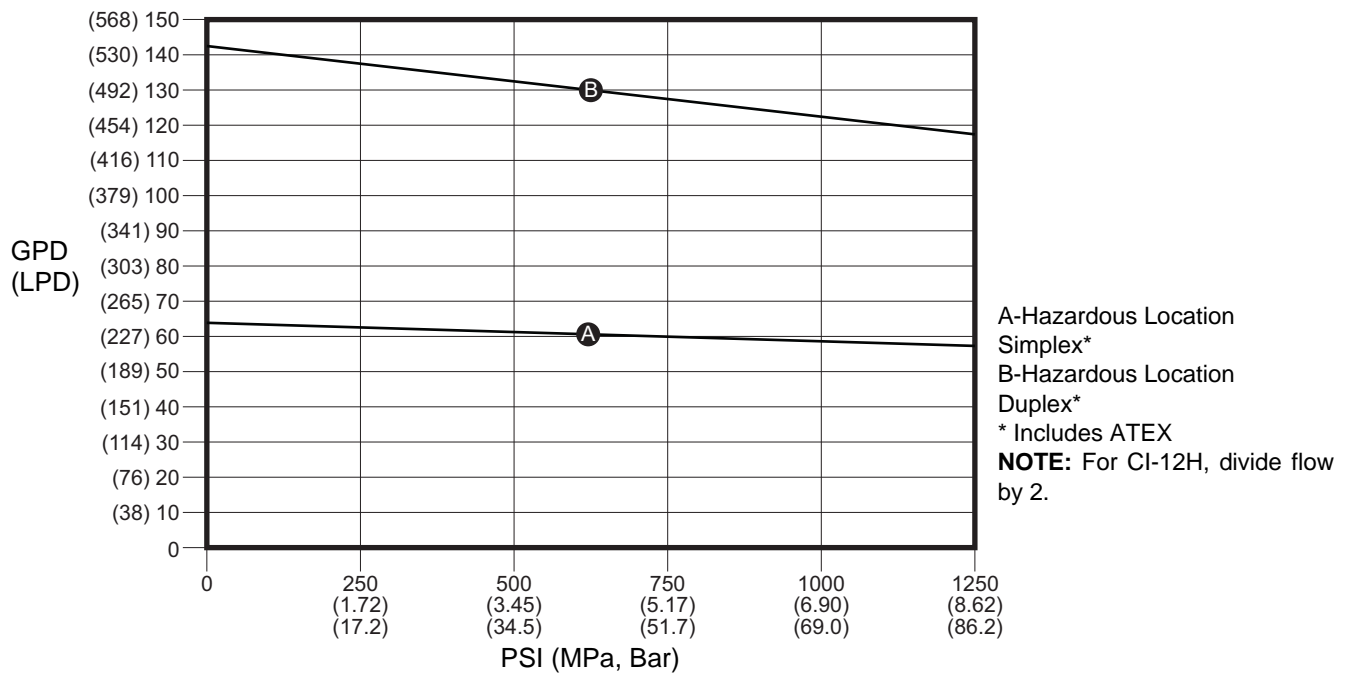


FIG. 39

3/8 Inch Plunger**FIG. 40****1/2 Inch Plunger****FIG. 41**

5/8 Inch Plunger

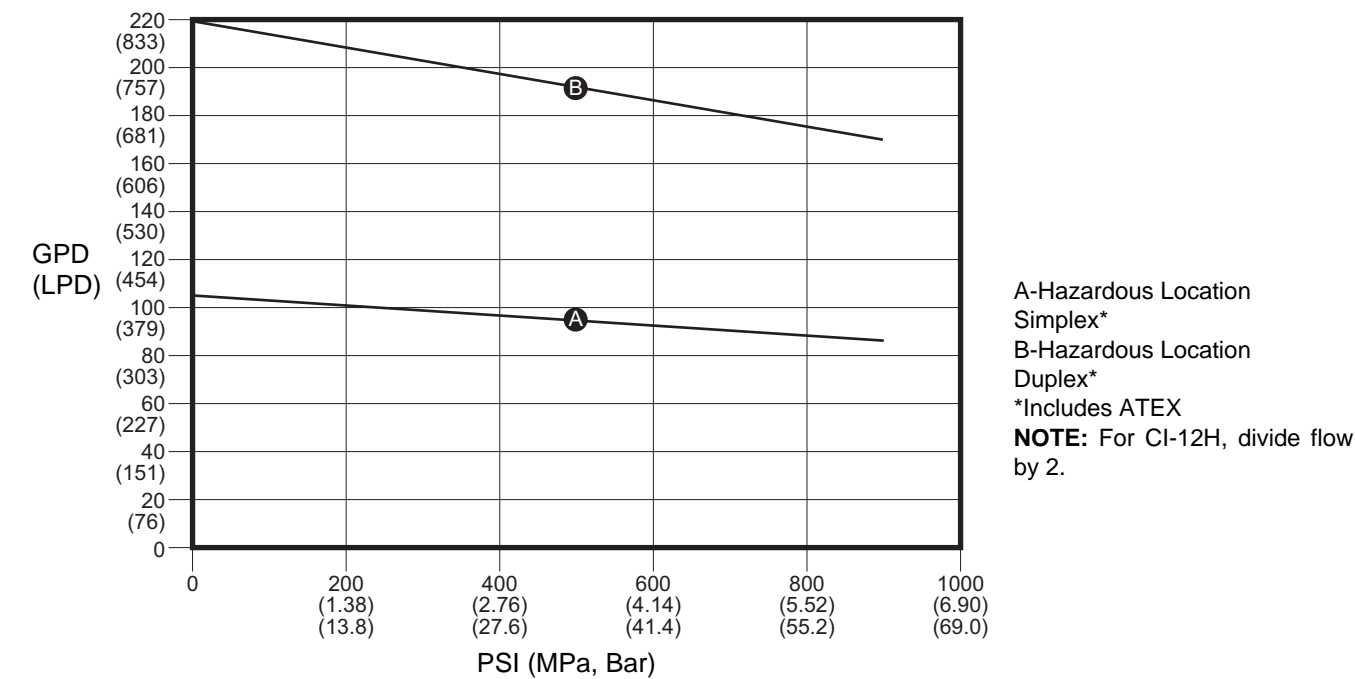


FIG. 42

3/4 Inch Plunger

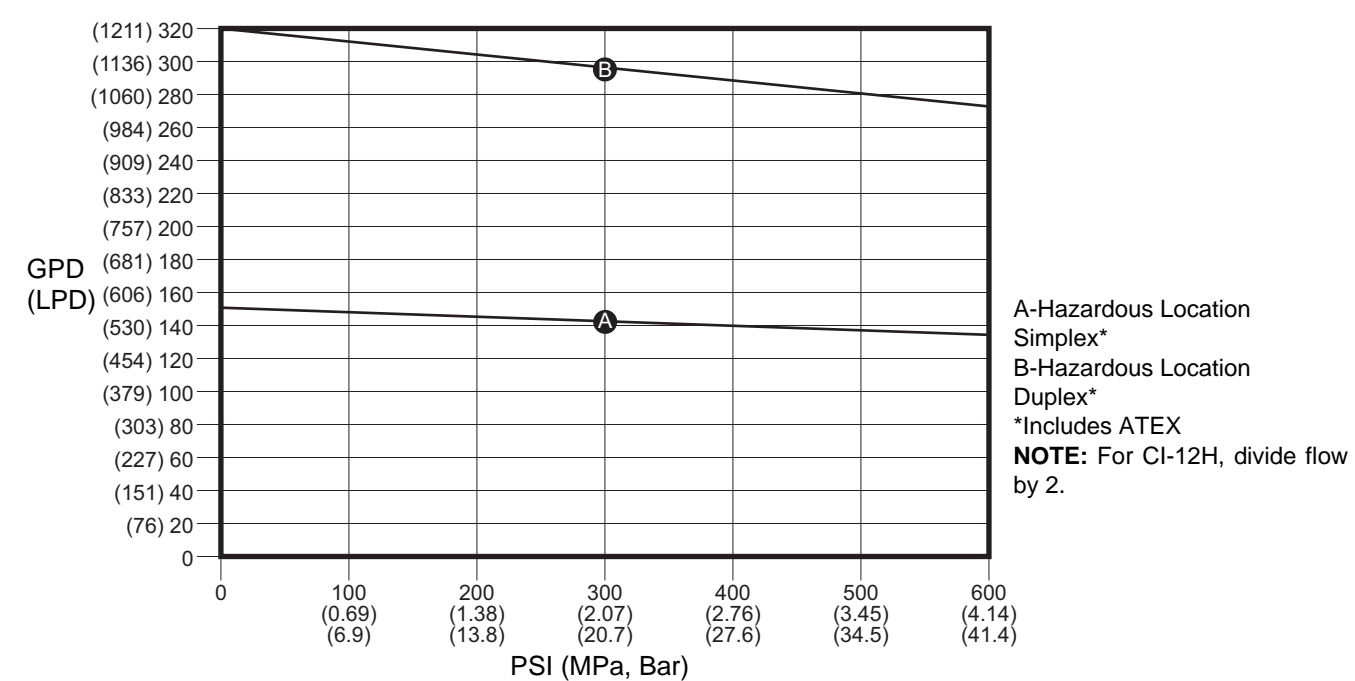


FIG. 43

Technical Specifications

Wolverine Chemical Injection Pump		
	US	Metric
Maximum fluid working pressure	Varies by model. See Models and Approvals on page 3.	
Input Voltage (by Drive Module, see pg 9)		
..... CI-12x-xx-x	12 VDC	
..... CI-24x-xx-x	24 VDC	
..... CI-1Ax-xx-x	115 VAC	
..... CI-2Ax-xx-x	230 VAC	
..... CI-3Ax-xx-x	115 VAC or 230 VAC 3 Single Phase	
..... CI-4Ax-xx-x	230 VAC or 460 VAC 3 Phase	
Maximum Input Current (by Drive Module, see pg 9)		
..... CI-12S-xx-x	11 A @ 12 VDC	
..... CI-12L-xx-x	16 A @ 12 VDC	
..... CI-12B-xx-x	16 A @ 12 VDC	
..... CI-12H-xx-x	23 A @ 12 VDC (Intermittent duty cycle, see page 25)	
..... CI-24H-xx-x	12 A @ 24 VDC	
..... CI-24B-xx-x	11 A @ 24 VDC	
..... CI-1AL-xx-x	2.0 A @ 110 VAC Single Phase	
..... CI-1AD-xx-x	3.0 A @ 110 VAC Single Phase	
..... CI-1AJ-xx-x	2.0 A @ 110 VAC Single Phase	
..... CI-2Ax-xx-x	1.2 A @ 230 VAC Single Phase	
..... CI-3AH-xx-x	4.8 A @ 110 VAC Single Phase	
..... CI-3AH-xx-x	2.4 A @ 230 VAC Single Phase	
..... CI-4AL-xx-x	0.59 A @ 230 VAC 3 Phase	
..... CI-4AL-xx-x	0.30 A @ 460 VAC 3 Phase	
..... CI-4AH-xx-x	1.1 A @ 230 VAC 3 Phase	
..... CI-4AH-xx-x	0.55 A @ 460 VAC 3 Phase	
..... CI-24X-xx-x	11.5 A @ 24 VDC	
..... CI-2AX-xx-x	1.5 A @ 230 VAC Single Phase	
..... CI-5AX-xx-x	2.0 A @ 230 VAC 3 Phase	
..... CI-5AX-xx-x	1.0 A @ 400 VAC 3 Phase	
Power Connection	See Motor Electrical Connections on page 19.	
Environmental temperature range (for CI-xxS-xx-x, CI-xxL-xx-x)	-40°–176°F	-40°–80°C
Environmental temperature range (for CI-1AJ-xx-x)	-40°–131°F	-40°–55°C
Environmental temperature range (for CI-xxH-xx-x, CI-xxD-xx-x)	-13°–104°F	-25°–40°C
Environmental temperature range (for CI-xxB-xx-x)	-4°–104°F	-20°–40°C
Environmental temperature range (for CI-xxX-xx-x)	-4°–140°F	-20°–60°C
Noise (dBa)		
Maximum sound pressure	<70 dBa	
Inlet/Outlet Sizes		
Fluid inlet size	1/4 in. npt(f)	
Fluid outlet size	1/4 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		
Wolverine Advanced/Continuous Injection, 1 pump (Simplex)	35 lb.	16 kg
Wolverine Advanced/Continuous Injection, 2 pumps (Duplex)	39 lb.	18 kg
Wolverine Hazardous Location, 1 pump (Simplex)	72 lb.	33 kg
Wolverine Hazardous Location, 2 pumps (Duplex)	76 lb.	34 kg

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Graco warrants all equipment referenced in this document which is manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility of Graco equipment with structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

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Original instructions. This manual contains English. MM 334513

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Revision L, 11/2019