

396-5480Y1



SPARTAN

DIRECT INJECTION

FORCE EVO
APPLICATION SYSTEM
INSTALLATION
GUIDE

FOR
FINAL INSTALLATION
CALL
866-801-4356



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Safety

TAKE NOTE! THIS SAFETY ALERT SYMBOL FOUND THROUGHOUT THIS MANUAL IS USED TO CALL YOUR ATTENTION TO INSTRUCTIONS INVOLVING YOUR PERSONAL SAFETY AND THE SAFETY OF OTHERS. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN INJURY OR DEATH.



THIS SYMBOL MEANS
ATTENTION!
BECOME ALERT!
YOUR SAFETY IS INVOLVED!

Note the use of the signal words DANGER, WARNING and CAUTION with the safety messages. The appropriate signal word for each has been selected using the following guidelines:



DANGER: Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations typically for machine components which, for functional purposes, cannot be guarded.



WARNING: Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.



CAUTION: Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

NOTICE is used to address safety practices not related to personal safety.



 Current EPA - Approved Label



 Safety Data Sheet



Safety

A

Introduction/
Safety

NOTICE

- Before installing the SurePoint Spartan injection system, read the entire manual and familiarize yourself with all system components.
- Follow all safety information in this manual, and other manuals related to the entire system operation including the implement and/or other control systems
- Replace as necessary, damaged safety labels on equipment that protect the operator.
- Contact your local SurePoint dealer for assistance with installation, maintenance or service of the injection system.

CAUTION

- Ensure the system is operating properly with water or RV antifreeze and is free from leaks or plugs prior to charging the system with chemical. Relieve all system pressure before servicing.
- Any and all operators of the system should be familiar with the contents of this manual and equipment.
- All repairs or modifications to the system should be completed by a SurePoint dealer or authorized personnel to ensure the longevity and functionality of the system is not compromised.
- The SurePoint injection system includes moving parts. Take extra care by wearing appropriate clothing for the task at hand and keep jewelry, long hair, or loose fitting items secured.

WARNING

- Review the product label with your chemical supplier prior to the operation of your SurePoint injection system.
- **Always follow the safety precautions by the chemical manufacturer**
 - Obtain special instructions before use, and read the product label and MSDS.
 - Do not handle until all safety precautions have been read and understood.
 - Do not breathe mist, vapors, spray.
 - In case of inadequate ventilation wear respiratory protection.
 - If exposed or concerned: Get medical advice/attention.
 - Specific treatment is urgent (see Section 4 First Aid Measures).
 - Keep away from heat, sparks, open flames, hot surfaces. No smoking.
 - Wash hands and face thoroughly after handling.
 - Do not eat, drink or smoke when using this product.
 - Use only outdoors or in a well-ventilated area.
 - Wear protective gloves, protective clothing, eye protection.
 - If swallowed: Immediately call a poison center, doctor or Syngenta. Rinse mouth.
 - If on skin: Wash with plenty of soap and water.
 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
 - If inhaled: Remove person to fresh air and keep comfortable for breathing.
 - Immediately call a poison center, doctor or Syngenta. Do NOT induce vomiting.
 - Take off immediately all contaminated clothing and wash it before reuse.
 - In case of fire: Use dry chemical, foam or CO2 for extinction.
 - Store in a well-ventilated place and store locked up. Keep cool.
 - Dispose of contents and container in accordance with local regulations.

System Operation and Maintenance

A

Introduction/
Safety

Overview

- The SurePoint Spartan injection system, for use with Force Evo product, is designed to be installed on planters in conjunction with a carrier product that is installed separately from the contents of this manual. Consult your SurePoint dealer or accompanying product manual for the carrier system setup and rate control.
- When selecting the right SurePoint Spartan pump for injected product, much consideration should be given to full implement width versus the smallest section resolution in order to properly select the high and low rate pump that fits the application.
- *Refer to the Spartan Pump Sizing section on page 16 for pump model sizing calculation.*
- Contact your local SurePoint dealer for assistance with installation, maintenance or service of the injection system.

Rinsing and flushing

To achieve the best performance and longest life of the SurePoint Force Evo Injection system and Spartan pump, proper care and maintenance should be performed daily during operation as well as at the conclusion of the planting or seeding season.

- All rinsing and flushing of the system should be done with **RV Antifreeze** in accordance with the Force Evo product label. **Flushing with water will cause coagulation when mixed with Force Evo product.**
- Always wear proper personal protective equipment when operating the Force Evo system, in accordance with the product MSDS sheet and label.
- Ensure the system has been depressurized before servicing or flushing the system.
- **Flush the carrier product lines and injection pump and system plumbing if the system will not be used for an extended period of time (overnight or for several hours).**
- If product is allowed to sit in the system for an extended amount of time, the product can solidify and create a potentially dangerous situation to service the system. This will also shorten the life of the plumbing system and pump.

Winterization

- It is recommended to flush your carrier fertilizer pump and complete injection system with adequate amounts of **RV Antifreeze before storing for extended periods**. At the beginning of the next season, begin with RV Antifreeze to verify the system is in working order with no leaks.
- Consult your SurePoint dealer for end of year service for optimum system performance and longevity.



Cleaning

Under no circumstance should the Spartan pump be cleaned with a pressure washer. The intense pressure generated by pressure washers may penetrate seals of the sensitive electronic components and cause irreversible damage. While wearing proper PPE, clean Force Evo product connectors with **RV antifreeze** using provided spray bottle.

System Operation and Maintenance

A

Introduction/
Safety

Pre-season Service

(A little time spent here may prevent some downtime when you want to be rolling.)

1. Spray product connectors with RV antifreeze to clean and lubricate.
2. Visually check entire fertilizer application / carrier and injection systems (hoses, fittings, harnesses, etc.) for any signs of wear or damage.
3. On the display, recheck all setup screens to verify correct setup.
4. Fill system with **RV antifreeze** and run in Manual mode (Section Test or Calibrate PWM Limits) to verify components and system are in working order.
5. Tighten all clamps. Loose clamps may be evident by leaks on the output side of the system. Loose clamps from the tank to the pump are not always apparent, but can be sources of air getting into the system which can create issues.
6. Push in tubes at all Quick-Connect fittings so they are seated tightly. Tubes that are not fully seated are not always obvious, but may allow air in, which can cause check valves to leak. Replace o-ring seals as necessary.
7. Remove and clean the strainer. Be sure strainer is tightened securely so it will not suck air. Replace strainer bowl o-ring as necessary.
8. Be sure all rows are flowing and that all metering tubes/orifices are open. Note: It will take a higher flow rate with water to create enough pressure to open all the check valves. It may require operating the carrier system as well as the injection system.
9. Run an Auto Check or Nozzle Flow Check to verify that system will lock on to a Target Rate.
10. Ensure no water is left in the system from pre-season startup testing before using Force Evo product as the two are incompatible and may solidify in the plumbing system.



CAUTION

Application pumps can deliver liquid at high pressure (290 PSI). Be sure the 100 PSI Pressure Relief Valve (PRV) is installed and functioning so system pressure will be kept under 100 PSI. Check hoses, hose clamps, and liquid fittings regularly and repair or replace loose connections.



Force Evo Cabinet Kit

508-05-100100

B
System
Components



Spray Bottle, RV Antifreeze, nitrile gloves, and goggles provided with cabinet kit



Plumbing Components for cabinet interior provided and installed by DCI

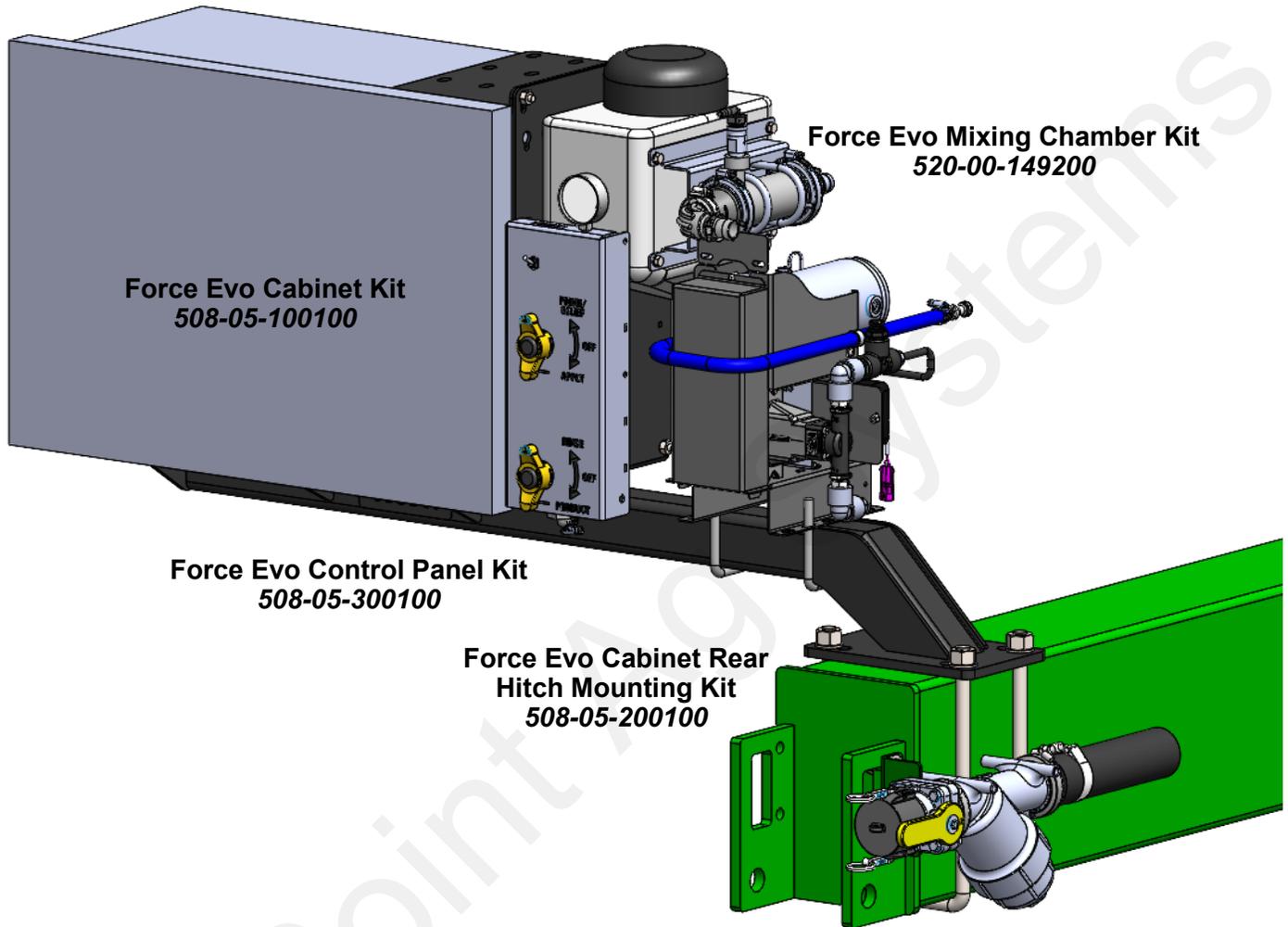


**FOR
INSTALLATION
CALL
866-801-4356**



Installation Instruction:

1. The Force Evo Cabinet is typically mounted to the rear implement hitch, ensure clearance with other factory installed equipment including row unit travel, folding or unfolding operations of the planter, etc.
2. Allow for the injection pump to be mounted as near as possible to the product cabinet to keep plumbing hoses short to reduce the amount of product/waste created from flushing or operating the system.
3. Mount the cabinet to the mounting bracket using provided hardware bag.



- Before mounting the cabinet assembly, select a location that will not interfere with moving parts on the implement under normal folding, leveling or planting operations.
- Force Evo Boxes must be orientated with the connector down, therefore the cabinet must be mounted to allow the boxes and connectors to be installed in this way.
- The injection point will be downstream of the main fertilizer/carrier pump and mixing chamber may be installed on the cabinet assembly. Take into consideration the location of the fertilizer/carrier pump and distribution plumbing installation location.
- Keep all Force Evo product hoses as short as possible to eliminate waste and potential for priming issues.
- The Force Evo Cabinet has the capability for four (4) product containers weighing approximately 25 lbs (11.3 kg) per container and a cabinet weight of 140 lbs (63.5 kg). Ensure that the structure that the assembly is mounted to is capable of supporting the Cabinet / Plumbing assembly.
- Install the plumbing system in accordance with the following pages. Deviations from the recommended installation may create field performance issues or potentially dangerous situations.

See Page 12 and 13 for system plumbing



Rear Hitch Mounting Kit

508-05-200100

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	380-1066	3/4" U-bolt Kit - fits 8" x 12" tube - (8" opening) - includes Flat & Lock washers, Nuts	2
2	380-1106	3/8" U-bolt Kit - 3-1/16 IW x 4-1/2 IL with 2" Thread Square Bend U-bolt w/ Hex Lock Nuts	2
3	470-5369Y1	Force Evo Offset Hitch Mount - Weldment	2

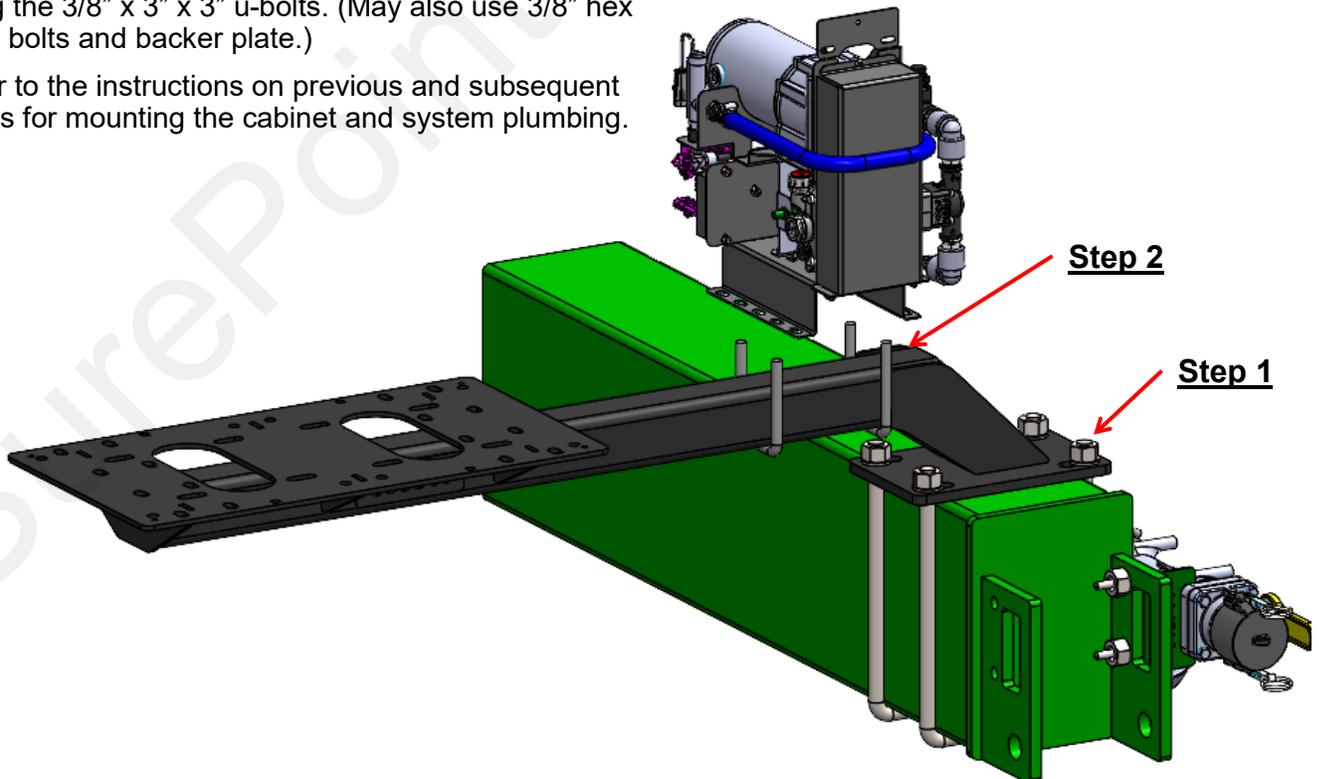
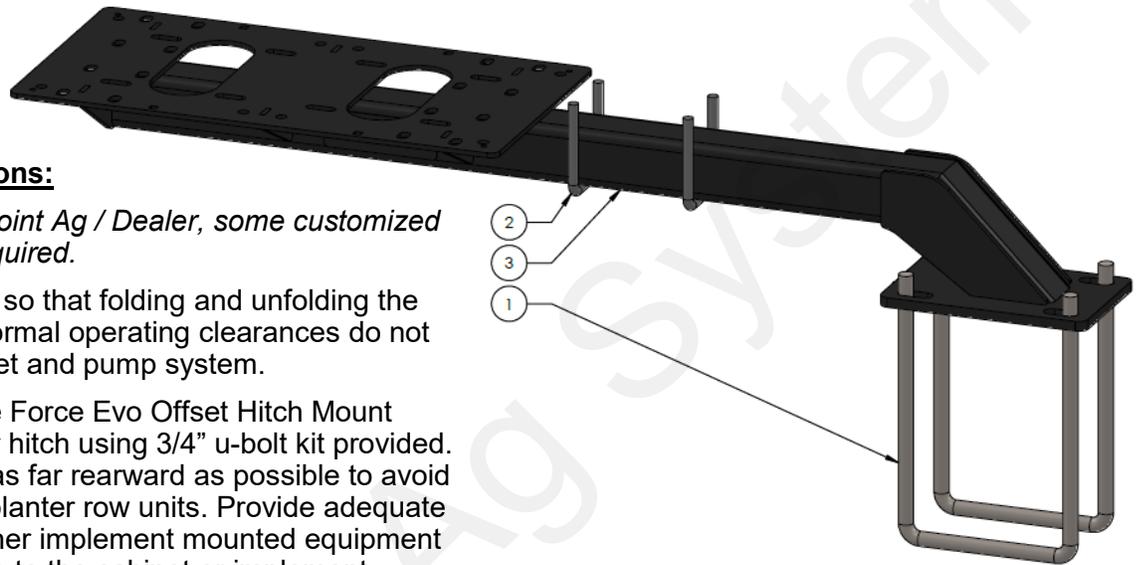
*Cabinet mounting hardware provided with the cabinet, hardware bag is inside the cabinet.

*Larger U-bolts provided for 24R Planter (8" x 16").

Installation Instructions:

*Completed by SurePoint Ag / Dealer, some customized fabrication may be required.

1. Mount the cabinet so that folding and unfolding the implement, and normal operating clearances do not obstruct the cabinet and pump system.
2. Loosely mount the Force Evo Offset Hitch Mount bracket to the rear hitch using 3/4" u-bolt kit provided. Slide the bracket as far rearward as possible to avoid interference with planter row units. Provide adequate clearance from other implement mounted equipment to prevent damage to the cabinet or implement.
3. Loosely mount the Spartan Pump to the support bar using the 3/8" x 3" x 3" u-bolts. (May also use 3/8" hex head bolts and backer plate.)
4. Refer to the instructions on previous and subsequent pages for mounting the cabinet and system plumbing.



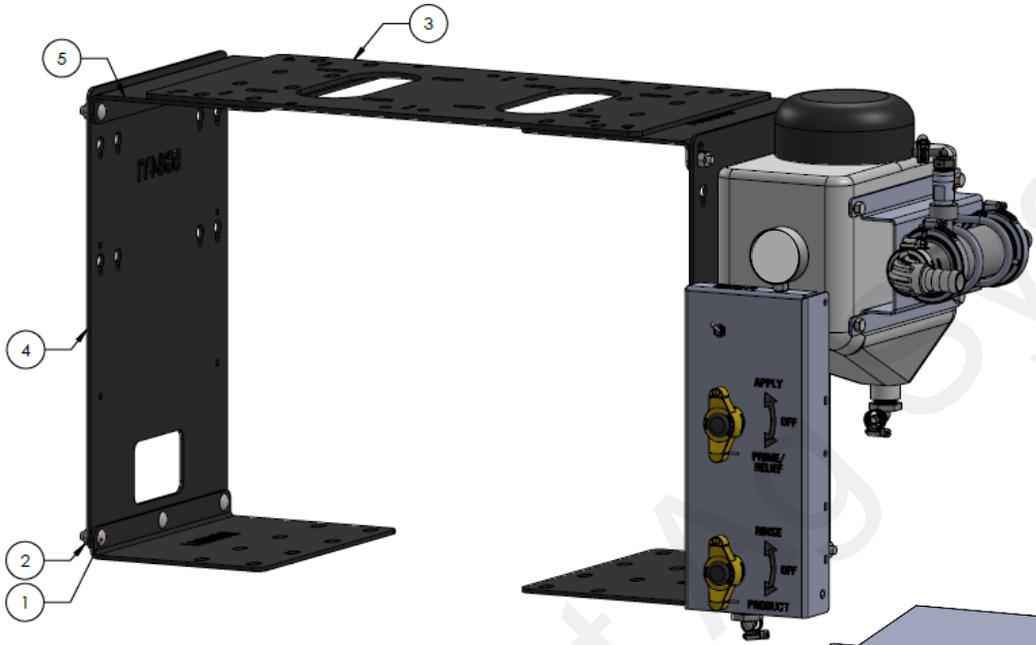


Force Evo Dual Cabinet Mounting Kit

508-05-200250

B
System
Components

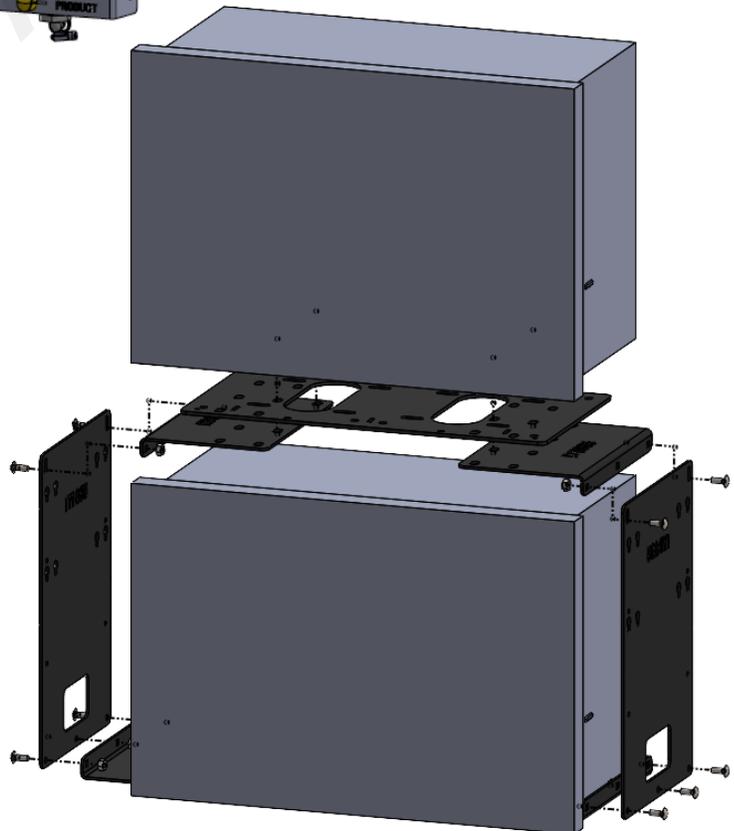
ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	304-060100-5	Carriage Bolt - 3/8" x 1" G5	5
2	323-06	3/8" Flange Nut	5
3	470-5365Y1	Force Evo Offset Hitch Mount - Cabinet Mount Plate	1
4	470-5684Y1	Force Evo Dual Cabinet Mounting Bracket	1
5	470-5685Y1	Force Evo Dual Cabinet Spacer Bracket	1



Installation Instructions:

Sometimes for larger implements, it is desired to install two cabinets for increased product volume. The mounting brackets are modular by design so that the same brackets for the first cabinet design can be used to mount the second cabinet.

1. Assemble (2) 470-5685Y1 and 470-5684Y1 using 3/8" hardware provided in kit.
2. Mount the cabinet mount plate, 470-5365Y1, to the spacer brackets.
3. Connect the plumbing from the two cabinets using the provided tee fittings.

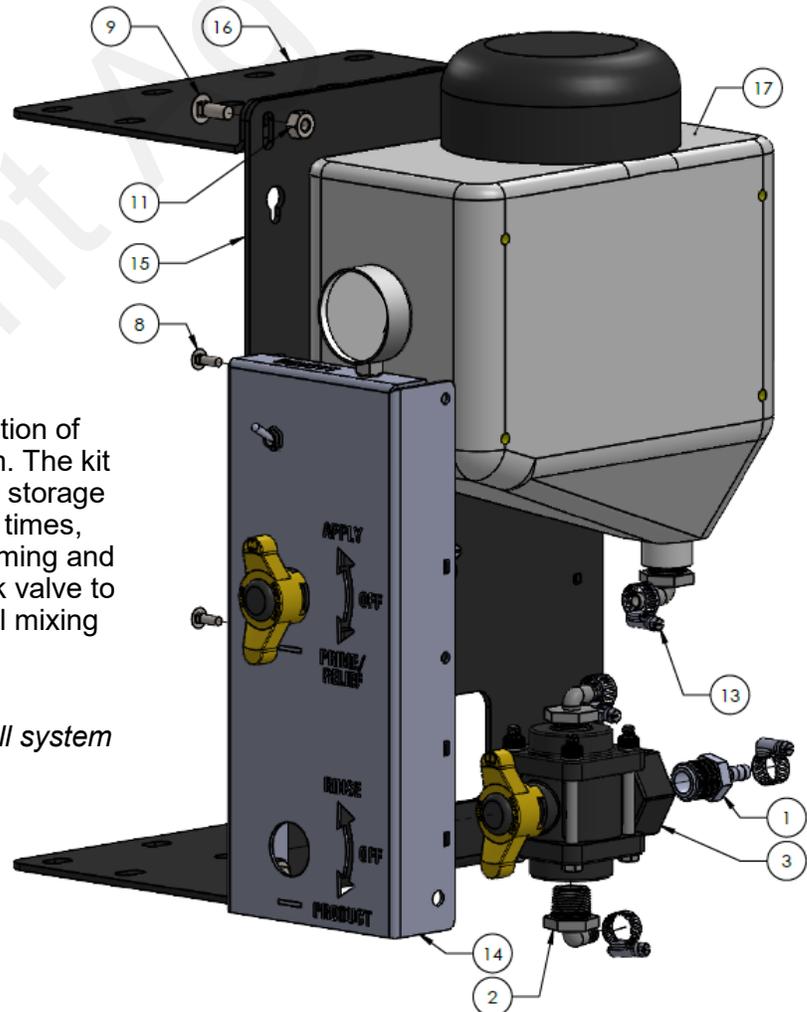




Force Evo Outlet / Control Panel Kit

508-05-300100

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	101-075038	3/4" MPT x 3/8" HB	2
2	101-075038-90	3/4" MPT x 3/8" HB - 90 Degree	5
3	102-075MV-3BL	3/4" Manifold 3-way Valve - Bottom Load	2
4	217-3466Y1	Sealed Toggle Switch for Outdoor Mounting with 2 pin MP150 Shroud Connector	1
5	281-025	Bulk 1/4" OD Poly Tubing	20
6	283-038-15018560	Bulk 3/8" EVA Clear Reinforced Tubing	160
7	300-050008-5	5/16" x 1/2" Hex Head Bolt - G5	4
8	304-040012-5	Carriage Bolt - 1/4" x 3/4" G5	2
9	304-060100-5	Carriage Bolt - 3/8" x 1" G5	5
10	320-04	1/4" Nut	2
11	323-06	3/8" Flange Nut	5
12	331-05	5/16" Lock Washer	4
13	350-0605	SS Hose Clamp - Size 6 - 7/8" Diameter	11
14	470-5683Y1	Force Evo Control Panel - Weldment	1
15	470-5684Y1	Force Evo Dual Cabinet Mounting Bracket	1
16	470-5685Y1	Force Evo Dual Cabinet Spacer Bracket	3
17	727-05-SP0003-RT-BLACK	3 Gallon Square Tank, Black	1



Control Panel System

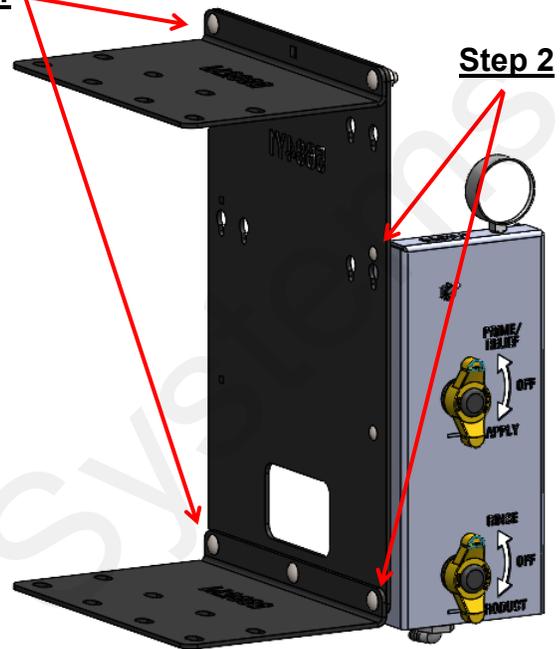
This kit is designed to simplify the operation of flushing, priming, and operating the system. The kit provides a 3 Gallon tank for RV Antifreeze storage for flushing the injection system multiple times, keeps plumbing hoses short for ease of priming and product volume reduction, contains a check valve to prevent backflow from the in-line chemical mixing chamber.

Refer to plumbing assembly diagram for full system operation.

Installation Instructions:

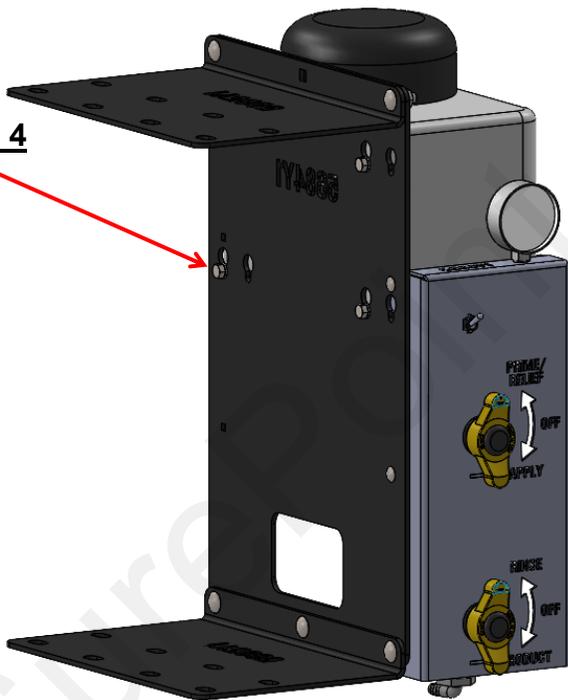
1. Assemble (2) 470-5685Y1 and 470-5684Y1 mounting brackets using 3/8" hardware provided in kit.
 2. Mount Control Panel assembly to 470-5684Y1 using 1/4" hardware and (1) 3/8" carriage bolt. *Some pre-assembly may be necessary such as installing the valves before mounting the control panel.*
 3. Remove the nut and lock washer from the bolted valve assembly and install on the valve mounting tabs. Take care not to overtighten the bolts after installation.
 4. Mount Rinse Tank using 5/16" hardware provided in kit.
 5. Slide completed assembly underneath Cabinet and secure using cabinet mounting hardware provided with cabinet. (Use another 470-5685Y1 as a spacer on opposite end of cabinet.)
 6. Mount Mixing Chamber assembly to rinse tank using hardware provided in mixing chamber kit.
- (Refer to Pages 12 and 13 for plumbing layout)

Step 1

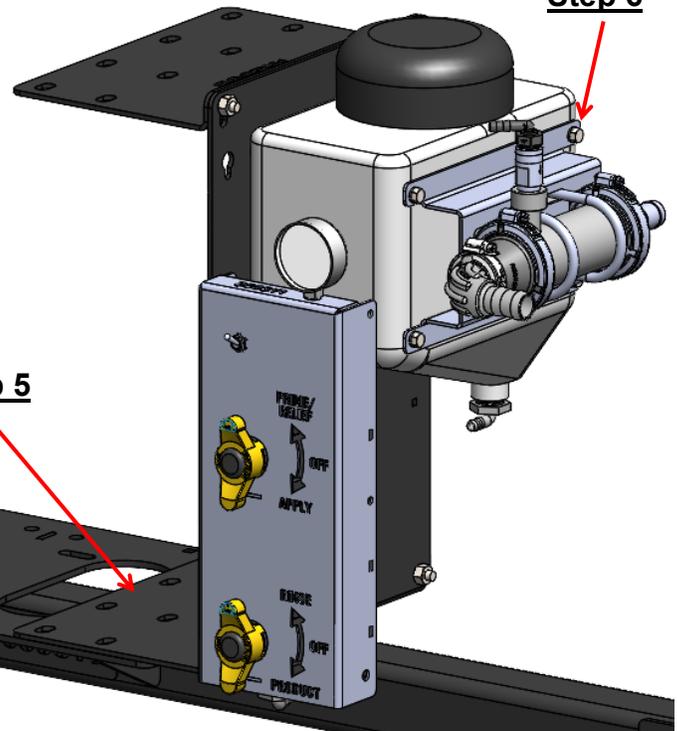


Step 2

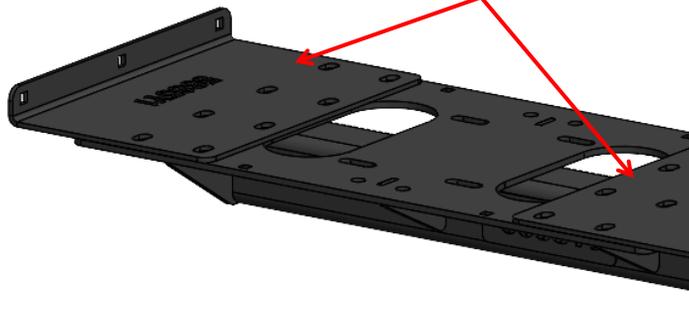
Step 4



Step 6



Step 5

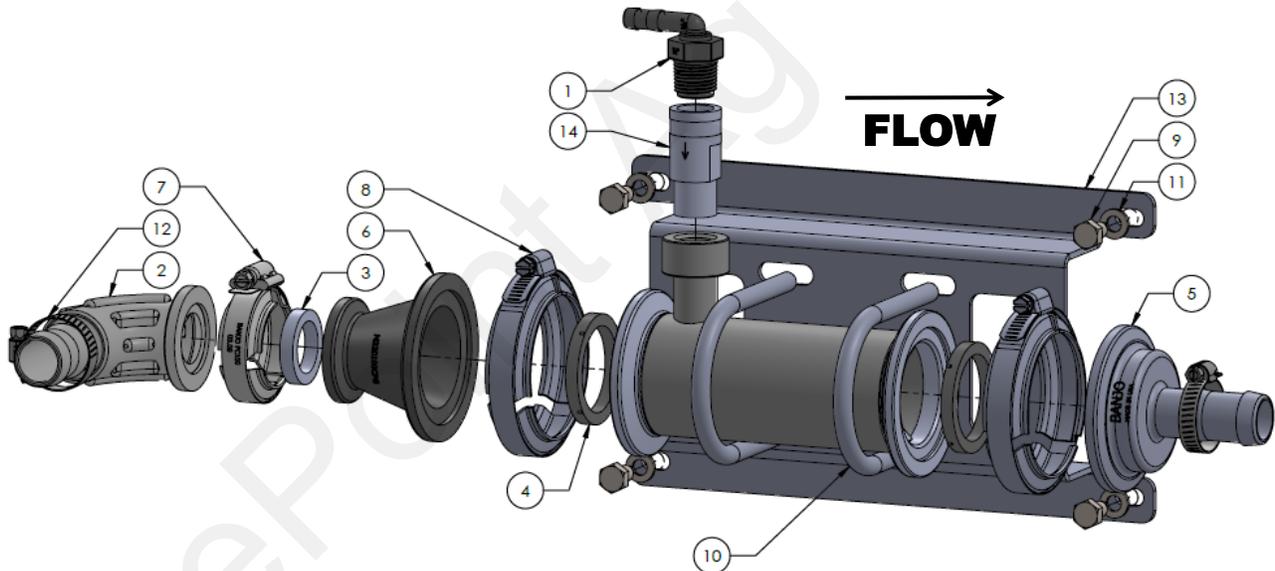




In-Line Mixing Chamber Kit

520-00-149200 - Force Evo Mixing Chamber Kit

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	101-050038-90	1/2" MPT x 3/8" HB - 90 Degree	1
2	105-100BRBSWP90	1" Manifold x 1" HB - 90 Degree Sweep	1
3	105-100G	1" EPDM Manifold Gasket	1
4	105-200G	(FOR FC220s) 2" EPDM Manifold Gasket for 220 Series Manifold Fittings	2
5	105-220100BRB	2" Full Port Manifold x 1" HB	1
6	105-220100CPG	2" Full Port x 1" Reducer Flange	1
7	105-FC100	1" Manifold Clamp	1
8	105-FC220	2" Full Port Manifold Clamp	2
9	300-050008-5	5/16" x 1/2" Hex Head Bolt - G5	4
10	302-UB202	M200 U-Bolt Assembly	2
11	331-05	5/16" Lock Washer	4
12	350-1608	SS Hose Clamp - Size 16 - 1-1/2" Diameter (fits 1" AG200)	4
13	470-5690Y1	SurePoint SS Mixing Chamber Mounting Bracket - Direct to Rinse Tank	1
14	716-333-0011-102	1/2" SS N-Serve Checkvalve - 12 PSI w/ Extreme Viton	1



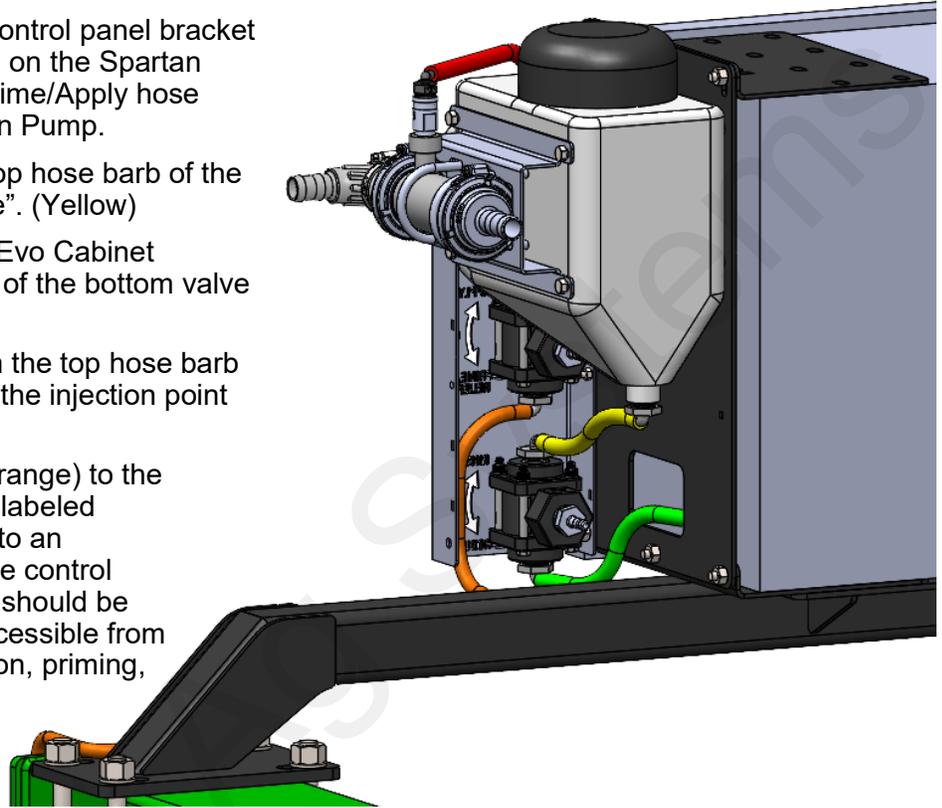
Installation Instruction:

1. If not pre-assembled, assemble the plumbing fittings as shown. Flow direction arrows are indicated.
2. Use thread sealant on pipe thread connections and connect the discharge from the Spartan injection 3-way valve to the mixing chamber hose barb. See Pages 12 and 13 for complete system plumbing.
3. Align and install manifold gaskets and tighten clamps. Do not overtighten.
4. Route the carrier system hoses to the Inlet and Outlet 1" Hose barbs of the mixing chamber assembly.

Use only RV Antifreeze to flush out or pressure test the system!

Plumbing Notes:

1. Install the pressure gauge in the control panel bracket and route the inlet to the tee fitting on the Spartan Pump assembly, or tee into the Prime/Apply hose using fittings provided with Spartan Pump.
2. Route the rinse tank hose to the top hose barb of the bottom 3-way valve labeled "Rinse". (Yellow)
3. Connect the hose from the Force Evo Cabinet plumbing to the bottom hose barb of the bottom valve labeled "Product". (Green)
4. Connect the application hose from the top hose barb of the top valve labeled "Apply" to the injection point of the mixing chamber. (Red)
5. Connect the Prime/Relief hose (Orange) to the bottom hose barb of the top valve labeled "Prime/Relief" and route the hose to an appropriate location, away from the control panel or user interface. This hose should be routed to a location visible and accessible from the control panel for flow verification, priming, and relieving pressure.

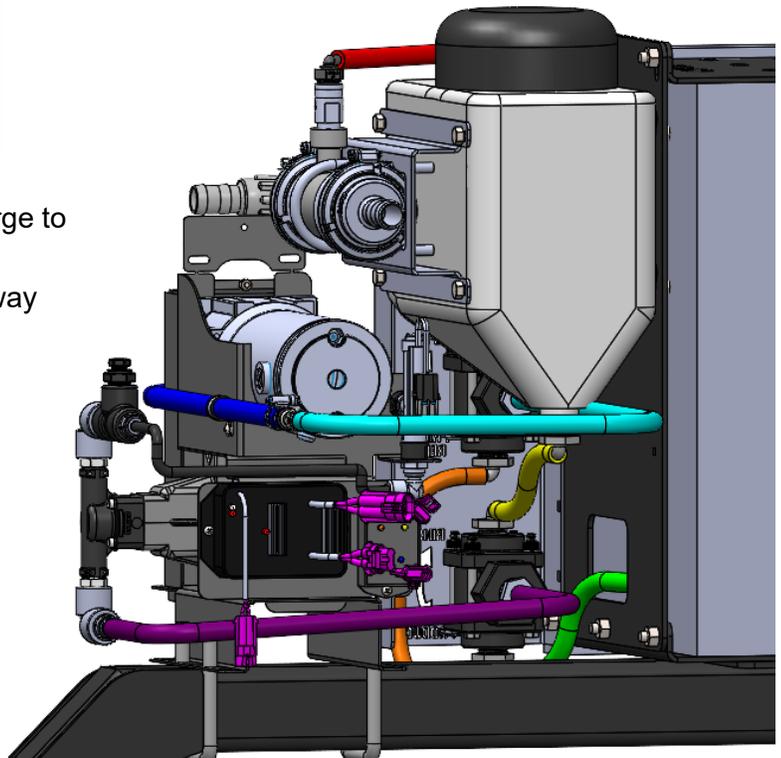


	Apply Hose	18"
	Prime/Relief Hose	60"
	Rinse Hose	12"
	Product Hose	12"
	Prime/Apply to Pump	30"
	Rinse/Product Hose to Pump	28"

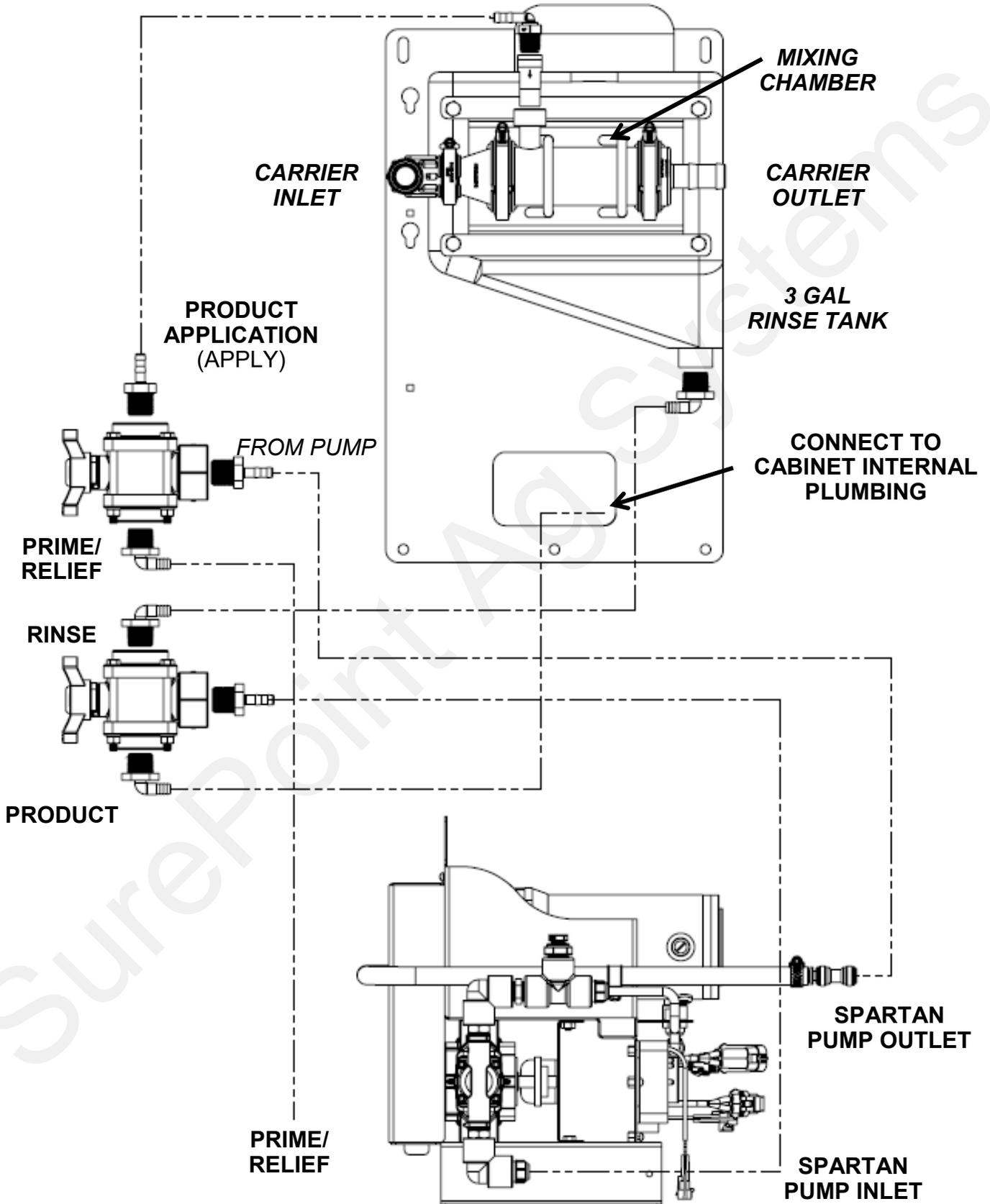
6. Route the product hose from the pump discharge to the bottom port of the top 3-way valve. (Blue)
7. Route the pump inlet hose from the bottom 3-way valve to the pump inlet as shown. (Purple)

General Notes:

1. Use pipe sealant on all pipe thread fittings and tighten with a wrench. Do not overtighten plastic plumbing fittings or they may crack.
2. Keep all hose lengths as short as possible to reduce product volume and waste from flushing the system.
3. Push hose all the way on the hose barb and tighten with hose clamps to secure the hose.



System Plumbing





Replacement Parts

508-05-500100

B System Components

In addition to the replacement parts on previous pages, the kit components below allow the pump to remain in peak operating performance.

Part Number	Description	Qty
291-10-52002224	Head Replacement Assembly for Spartan Injection Pump	1
291-10-52.0011.81	Bushing, 28mm POM	2
291-10-10.2028.00	Stem seal, 28x34,2x4,2 mm	2
291-10-10.3079.10	O-ring, 1,78x34,65 mm EPDM	2
101-075038	3/4" MPT x 3/8" HB	4
101-050038	1/2" MPT x 3/8" HB	4
101-075038-90	3/4" MPT x 3/8" HB - 90 Degree	4
113-01-038038	Stem to HB - 3/8" Stem x 3/8" HB	2
113-06-038050-P	QC to MPT - 3/8" QC x 1/2" MPT - polypropylene	2





System Plumbing Control Panel Operation

C System Operation

The operation of the 3-way valves in the system control panel allows the operator to easily prime, relieve system pressure, rinse and apply product.

CARRIER SYSTEM FLUSH: Run the system in manual mode (nozzle flow check) for a period of time that allows for the flushing of Force Evo product from carrier distribution plumbing.

RINSE / FLUSH: Product in the injection system that has not been mixed with carrier may remain stable for a couple of days. If a delay longer than this period of time will occur, it is important to rinse the system. To rinse the injection system with RV antifreeze, first ensure that the 3 gallon tank is full. Position the bottom 3-way valve to “Rinse” and they top valve to “Apply”. Note: You will need to ensure fertilizer application system section valves are open and product has a flow path through the system. Provide adequate flush product to completely evacuate the injection system as well as the carrier system downstream of the mixing chamber or solidification of product can occur.

WINTERIZE: The same steps from the Rinse / Flush process apply to winterization.

PRIME: To prime the application system with product, ensure all Force Evo connections have been made and the internal valve in the cabinet is open. Position the bottom 3-way valve to “Product” and the top valve to “Prime/Relief”. Watch for the discharge in the prime hose then switch the valve to “Apply”. This process helps remove the air from the system and ensure a smooth start to the application. *Follow all safety procedures when working with Force Evo product.*

PRESSURE RELIEF: Before servicing or doing maintenance on the system, change the top valve position to Prime/Relief in order to relieve the pressure from the pump. Take care and follow safety protocols when servicing the system.





Spartan Injection Pump Rate Calculation / Model Selection



The success of the injection application system is highly dependent on proper pump selection. Changes in implement speed or application rate must be considered to ensure the pump can meet the desired operating conditions.

First, calculate the flowrate per row (FPR) using the formula below. It is important to calculate a range of implement speeds that may vary during planting or seeding as this can affect the entire system capabilities.

$$\text{FPR} = \frac{\text{Rate} \times \text{Row Spacing} \times \text{Implement Speed}}{5,940 \text{ (Acres)}}$$

$$\text{FPR} = \frac{\text{Rate} \times \text{Row Spacing} \times \text{Implement Speed}}{60,000 \text{ (Hectares)}}$$

FPR = Flow Rate Per Row Oz/min (dL/min)

Rate = Oz / Acre (dL/ha) Application Rate

Implement Speed = MPH (km/hr)

Next, find the system range by multiplying the FPR by the number of rows on the implement. Again, it is recommended to do this for the varying speed ranges or product application rates that match actual operating conditions.

Example:

Using the table below (Section 7.1 Product Label) the maximum rate for a 30" planter is 10 oz/min. Vehicle speed will range from 5 - 10 MPH.

$$\text{FPR} = \frac{10 \text{ (oz/min)} \times 30 \text{ in Row Spacing} \times 5 \text{ (mph)}}{5,940 \text{ (Acres)}}$$

$$\text{FPR} = \frac{10 \text{ (oz/min)} \times 30 \text{ in Row Spacing} \times 10 \text{ (mph)}}{5,940 \text{ (Acres)}}$$

FPR = 0.25 oz /min @ 5 MPH

FPR = 0.5 oz /min @ 10 MPH

Fluid Ounces of Force Evo Required per Acre for Typical Row Spacings						
Row Spacing	38"	36"	30"	22"	20"	15"
Linear Ft per Acre	13,758	14,520	17,424	23,760	26,136	34,848
Fluid Ounces/1000 ft of row						
0.46 fl oz	6.5 fl oz	7.0 fl oz	8.0 fl oz	11.0 fl oz	12.0 fl oz	16.0 fl oz
0.57 fl oz	8.0 fl oz	8.5 fl oz	10.0 fl oz	13.5 fl oz	15.0 fl oz	20.0 fl oz



Force Evo System Operation

C
System
Operation

General Operation:

- The Force Evo Cabinet houses the Force Evo product chemical boxes, product is not to be transferred to a product tank or the 3-gallon rinse tank.
- When the product has been completely removed from the chemical boxes, disconnect the CPC connector. Once all four chemical boxes are empty, refill the cabinet with a brand new boxes and connect to plumbing system. Discard of the empty chemical box in accordance with the manufacturer.
- Prior to operation or after an extended period of non-use, it is recommended to flush the injection lines and clean the connectors with RV Antifreeze to rinse debris from the system. Antifreeze and a spray bottle are included with the cabinet for this purpose.

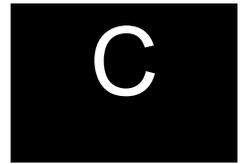
Charging the System & Operation:

- Fertilizer/Carrier system and injection system must be charged with product to ensure the system is applying product at the start of the field. A pre-check must be run prior to application to ensure the system is running properly.
- Install new chemical boxes and connect the CPC connectors to the chemical boxes as shown.
- To prime the application system with product, first connect only one Force Evo connection and ensure the internal valve in the cabinet is open. Position the bottom 3-way valve on the pump control panel to "Product" and the top valve to "Prime/Relief". Watch for the discharge in the prime hose then switch the valve to "Apply". This process helps remove the air from the system and ensure a smooth start to the application. *Follow all safety procedures when working with Force Evo product.*
- Connect remaining chemical boxes and repeat the priming process to eliminate air in the pump inlet hose.
- Charge the injection line to the carrier mixing chamber and manually open carrier system section valves if applicable to allow product to charge the carrier distribution plumbing system.





Spartan Injection Pump Models



ALL SYSTEMS: These flowmeter settings are pulses per ounce, but for some controllers this number will be entered as pulses per gallon. Therefore the controller thinks it is measuring gallons when it is really measuring ounces. This will happen on controllers that only measure gal/acre, and only allow one decimal on the gal/acre rate. Set the Rate using the number of ounces per acre you want. For example, to apply 32 oz/acre, set the rate at 32 gal/acre. The display will read gpa, but it will actually be applying oz/acre.

Operating Caution: Pump will produce up to 290 PSI. Limit operating pressure to 80 PSI. Pressure with water will be less than pressure with a thicker, heavier product.

Specifications

Voltage: 12 VDC Pump Speed: 0-120 RPM Current: 16.3 Amps

Spartan Injection Pump Model #	115	125	135	145
Flow Range (oz/min)	1-10	3-20	6-40	10-80
Flow Cal (pulses/oz, but some controllers may use this as pulses/gal)	1700	890	450	220
Commander II Flow Cal	3400	1780	900	440

Original John Deere Rate Controller Calibration Settings

PWM Settings-Control Valve Calibration—222 or 322 PWM Low Limit—9 (adjust in field-may need lower)
 Use Flow Cal number above and Units—Gal For 32 oz/acre, enter Rate as 32 gal/acre.

NEW John Deere Rate Controller 2000 and Raven RCM Calibration Settings

Control Valve Setup: See also 396-3639Y1 SurePoint Spartan and JDRC 2000.

PWM CLOSE Valve Response—10-15 Control Deadband—2% Coil Frequency—100 High Limit—100
 Low Limit—10 PWM Startup—10-15 Flowmeter Cal—See Flow Cal chart above: Flowmeter Units: fl.oz.

Rate Setup: Set Decimal Shift at 2: for 32 oz/acre, set rate at 0.25 gpa

RAVEN RCM - Valve Response = 1. If valve is too aggressive: Advanced Tuning : P = 5, S = 0.9.

Valve Response Rate, Low Limit, and PWM Startup can be adjusted if needed for best operation in the field.

If pump will not get down to the desired rate, lower the PWM Low Limit. If pump oscillates and will not lock on to the rate, decrease the Valve Response Rate. If pump is slow to adjust, increase the Valve Response Rate (on GRC, increase the first Valve Calibration digit). Raven RCM Valve Response may need to be as low as 1 or 2.

To test pump, go to **Diagnostics > Tests > select appropriate Product number > Calibrate PWM Limits.**

This test allows you to run the pump without the controller turning off the pump because it doesn't read flow yet.

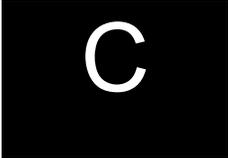
Run this test. Observe DC(%) and flow (gal/min) as you speed up the pump. The flow may only be 0.1 or 0.2 gal/min. Be careful not to build more pressure than system will handle.

You can also run a **Nozzle Flow Check** with a Test Speed and Test Rate.

On the Run screen, SurePoint recommends putting **DC% (PWM Duty Cycle)** as one of the Display Settings that you can monitor for this product.

Settings for SurePoint Spartan injection pump

Typical settings. Adjust as needed for best performance on your system in the field.



SurePoint SENTINEL

Control Speed 100 PWM Minimum 5
Flow Cal—see chart above For 32 oz/acre, enter Rate as 32

SurePoint Commander II

Valve Control Speed (CAL-Control Speed)—(-3) PWM Minimum (Special CAL 3--Area)—5
Flow Cal—see chart above For 32 oz/acre, enter Rate as 32

Trimble Field-IQ Module for FmX

Allowable Error 2% Lower PWM Limit and Minimum Response 5%
Drive Calibration Proportional --5 All other gains 0 (Newer software uses Proportional instead of Integral)

Ag Leader Control

Checkmark in Close Flow Control valve when rate off PWM Gain 311
Zero Flow Offset and PWM Standby 5 Allowable Error 2%

Pro 700 AccuControl

AccuControl Valve Calibration > Advanced Calibration > Integral Gain—0.2 Breakout—2%
Dead Zone—2% Advanced PWM > PWM Minimum—5

ADJUSTMENTS

Valve Control Speed (Gain) , PWM Low Limit (Minimum), and PWM Startup can be adjusted if needed for best operation in the field.

If pump will not get down to the desired rate, lower the PWM Low Limit. At low output, the pump may run at 5% PWM Duty Cycle or less. At higher outputs, the PWM Low Limit can be raised.

If pump oscillates and will not lock on to the rate, decrease the Valve Control Speed (Gain). If pump is slow to adjust, increase the Valve Control Speed (Gain).

Closely monitor the gallons applied and the acres worked for correct flowmeter adjustment. Adjust the flow cal as needed for best accuracy in the field. (If you need to apply more, increase the flow cal. If you need to apply less, decrease the flow cal.)

IMPORTANT - RINSE AND FLUSH

If using a suspension liquid, use constant agitation and FLUSH when you will be stopped for an hour or more. If it is a product that might set up, it can ruin the pump. Install a rinse tank if needed. Only use RV Antifreeze with Force Evo product.

OIL

SurePoint uses and recommends Mobil Super 5000 5W-30 oil for the Spartan.

RPM SENSOR, FLOW SWITCH, SIGNAL CONDITIONER

See page 4 for important information on these components of the flow-measuring system. Flow is measured indirectly by using the pump RPM. The positive displacement pump outputs a known amount for each pump revolution. A floating flow switch verifies that liquid is flowing. If the pump is turning, but the float is down, the display will show NO FLOW.

SurePoint Ag Systems

Fertilizer Application and Control Experts

John Deere Rate Controller
and
SurePoint Spartan Injection Pump

PWM Settings	
Control Valve Calibration	<input type="text" value="222"/>
Coil Frequency	<input type="text" value="100"/>
High Limit	<input type="text" value="255"/>
Low Limit	<input type="text" value="9"/>

Calibrate PWM Limits

Control Valve Calibration 222 or 322

If the system is slow getting to the Target Rate, increase the first digit of the Control Valve Calibration. If the system overshoots above and below the Target Rate, decrease the first digit.

Low Limit 9 (Decrease if pump needs to run slower)

This must be set here to “jump-start” the pump. If the pump stalls and won’t get to rate on start-up, increase this setting 1 digit at a time.

PWM High Limit could be set lower to prevent the pump from running at a high speed. (Most systems will be below 160 on the PWM Duty Cycle.)

*Also on System screen, enter the **flow cal** for the pump you are using.*

See the first page of this document for flow cal numbers. Use the number in the chart, set flowmeter units as Gal. This will cause the controller to measure the output in ounces, even though the screen will say gallons.

Implement	System	Alarms	Rates
Low Tank Level (gal) <input type="text" value="20"/> Alarm? <input type="checkbox"/>			
High Alarm (% above target rate) <input type="text" value="20"/> <input checked="" type="checkbox"/>			
Low Alarm (% below target rate) <input type="text" value="20"/> <input checked="" type="checkbox"/>			
Pressure Sensor 1 Alarm?			
Minimum (psi) <input type="text" value="10"/> <input type="checkbox"/>			
Maximum (psi) <input type="text" value="80"/> <input checked="" type="checkbox"/>			

Flowmeter Calibration	<input type="text" value="440"/>
Flowmeter Units	<input type="text" value="gal"/>

These are suggested settings for **Alarms**.

If using a Pressure Sensor, set the Alarms as shown.

The SurePoint Injector Pump is capable of achieving 290 PSI. Operating pressure should be kept at 80 PSI or less.

Operating pressure with water will typically be less than the pressure that will be experienced with thicker, heavier products.

Implement	System	Alarms	Rates
Rate 1	<input type="text" value="32.0"/>	Minimum Flow Rate	<input type="text" value="0.0"/>
Rate 2	<input type="text" value="0.0"/>	Enter minimum flow rate required to maintain spray pattern. This is also the flowrate used when manual button is pressed.	
Rate 3	<input type="text" value="0.0"/>		
Rate Smoothing	<input checked="" type="checkbox"/>	<input type="text" value="10"/>	%

Rates

Set the desired Rate in **oz/acre** (ignore the gal/ac label on the screen). With the settings shown on this sheet, the flow will be measured and reported in **ounces** (oz/acre, oz/min, etc.).

After the system is plumbed, and the settings shown above have been entered, SurePoint recommends:

1. Run a **Section Test. Diagnostics—Tests—Section Test**. This will verify that you can start the pump and speed it up and slow it down. **Keep the pressure at 80 PSI or less during the Section Test.**
2. Run a **Nozzle Flow Check** with typical operating Rate and Speed to verify that the controller will lock on to the Target Rate. (Enter the Rate in **oz/acre**) You can change the speed to check out various possible operating speeds.
3. Do a **Catch Test** to verify the Flowmeter Calibration. Catch the output from the pump and compare that to what the flowmeter calculated. Adjust the Flowmeter Calibration number as needed. Increase the flow cal if you need to pump more. Decrease the flow cal if you need less.

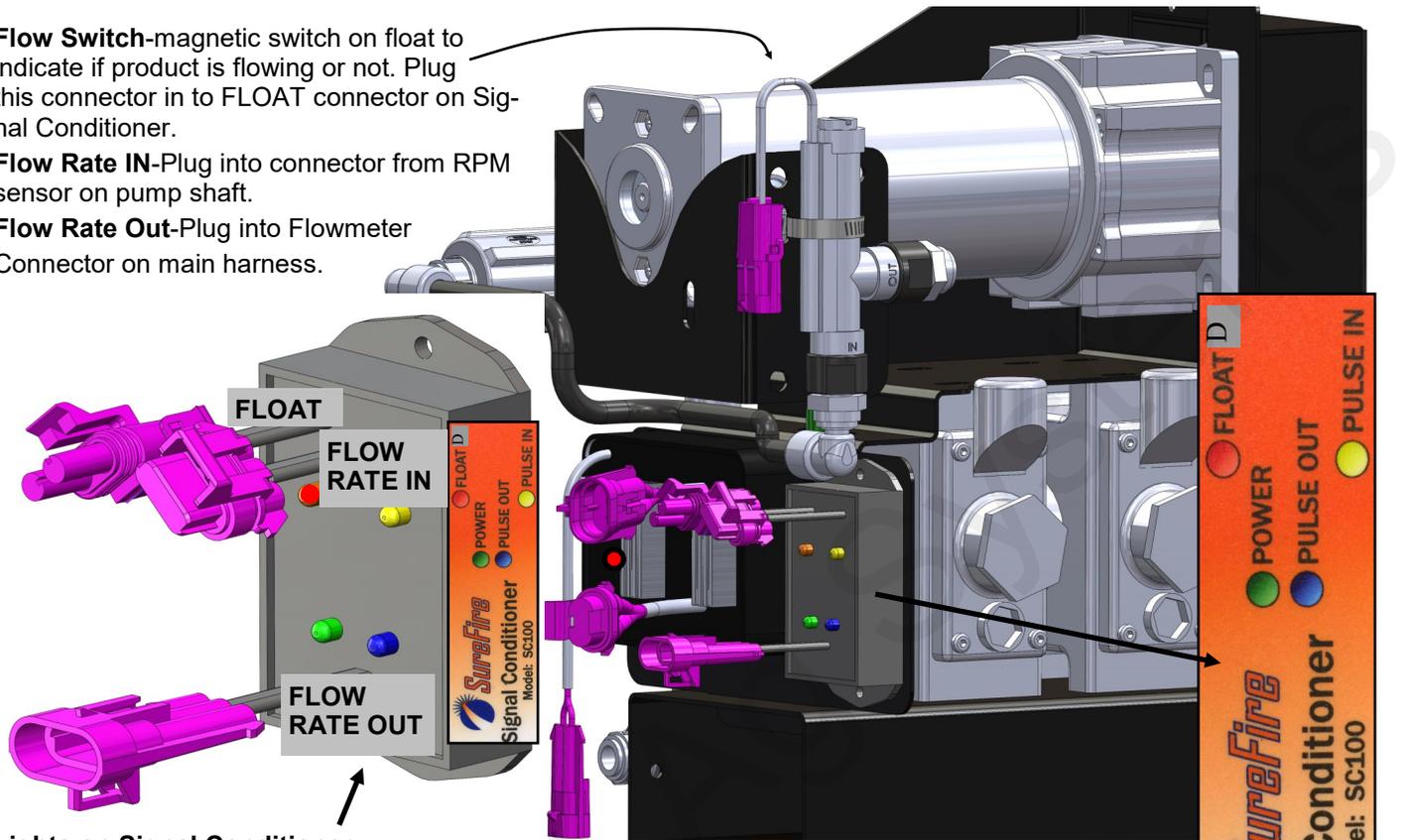


The flowmeter on the Spartan is a pump RPM sensor that is calibrated to convert the pump RPM to flow measured in oz/min. To be certain that liquid is actually flowing, a flow switch with a floating magnetic switch is in the flow line. If the tank is empty, the float will go down, telling the controller that there is no flow. If the flow switch malfunctions and tells the controller there is no flow when there is flow, you can run the system without the flow switch by unplugging the flow switch and plugging in the jumper connector to the Float connection on the Signal Conditioner.

Flow Switch-magnetic switch on float to indicate if product is flowing or not. Plug this connector in to FLOAT connector on Signal Conditioner.

Flow Rate IN-Plug into connector from RPM sensor on pump shaft.

Flow Rate Out-Plug into Flowmeter Connector on main harness.



Lights on Signal Conditioner:

Normal operating mode: Green and Blue steady on. Yellow pulsing quickly.

Green-Steady ON-is receiving power from flowmeter connector on harness.

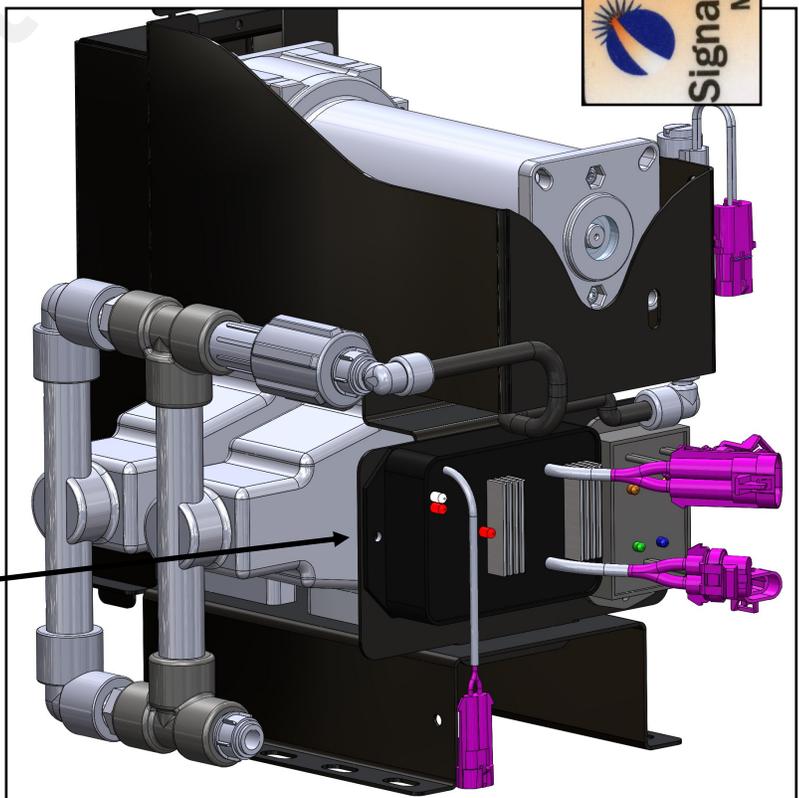
Blue- should be ON when system is running. Indicates Signal Conditioner is sending out pulses to controller.

Yellow—Quick pulses while system is running indicates it is receiving pulses from the RPM sensor on the pump shaft.

Red-should be OFF. Red light ON indicates that float is down or is malfunctioning if fluid is flowing. Red light ON means no pulses are being sent to the controller. (When Red light first comes ON, pulses will be sent for about 10 seconds). To bypass the float (Flow Switch) unplug Flow Switch connector from Float connector on Signal Conditioner, and plug jumper into Float connector. Red light should go out.

Lights on EPD module:

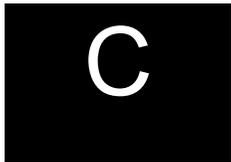
Red light by fins-steady blink (once per second) indicates power from battery. When system is running, this light goes steady red, and red light in corner turns on (maybe not as bright) indicating PWM signal.



40 Amp PWM EPD

(Pulse Width Modulated Electric Pump Driver)

Item Number: 205-18385 (replaces 205-18007 and -18120)



The Electric Pump Driver powers the electric pump by providing a pulse width modulated signal to control pump speed. It needs to have a power connection and wiring capable of carrying up to 40 amps of current. **It must be connected directly to the tractor battery.** SurePoint recommends 10 gauge wire (or heavier) if extending harnesses in the field.

PWM Connection on pump final harness 207-3461Y2 (or other)

(200-03-18220 if using Commander II or PWM connector on final pump harness on any controller)

Plugs into connector from pump motor

Connector from pump motor

Adapter
201-3130Y1

There may be an extension from the hitch to the pump

Troubleshooting Tip:

The LED in the center above the fins should have a slow steady blink (once per second) when the EPD is receiving power from the battery. When the pump is turned on, this light should go steady red, and there should be a red light (PWM signal) in the corner. The center light will go off after 5 minutes of inactivity.



Troubleshooting Tip:

If the pump won't run, connect the power and pump connector directly together to give pump full 12 volts directly from battery. This will tell you if the pump is the problem or if something else is wrong. The pump will be running at full speed, so don't leave them connected this way for long. Disconnect pump outlet hose so high pressure does not cause damage.

Use EPD **Power Harness Extensions** as needed

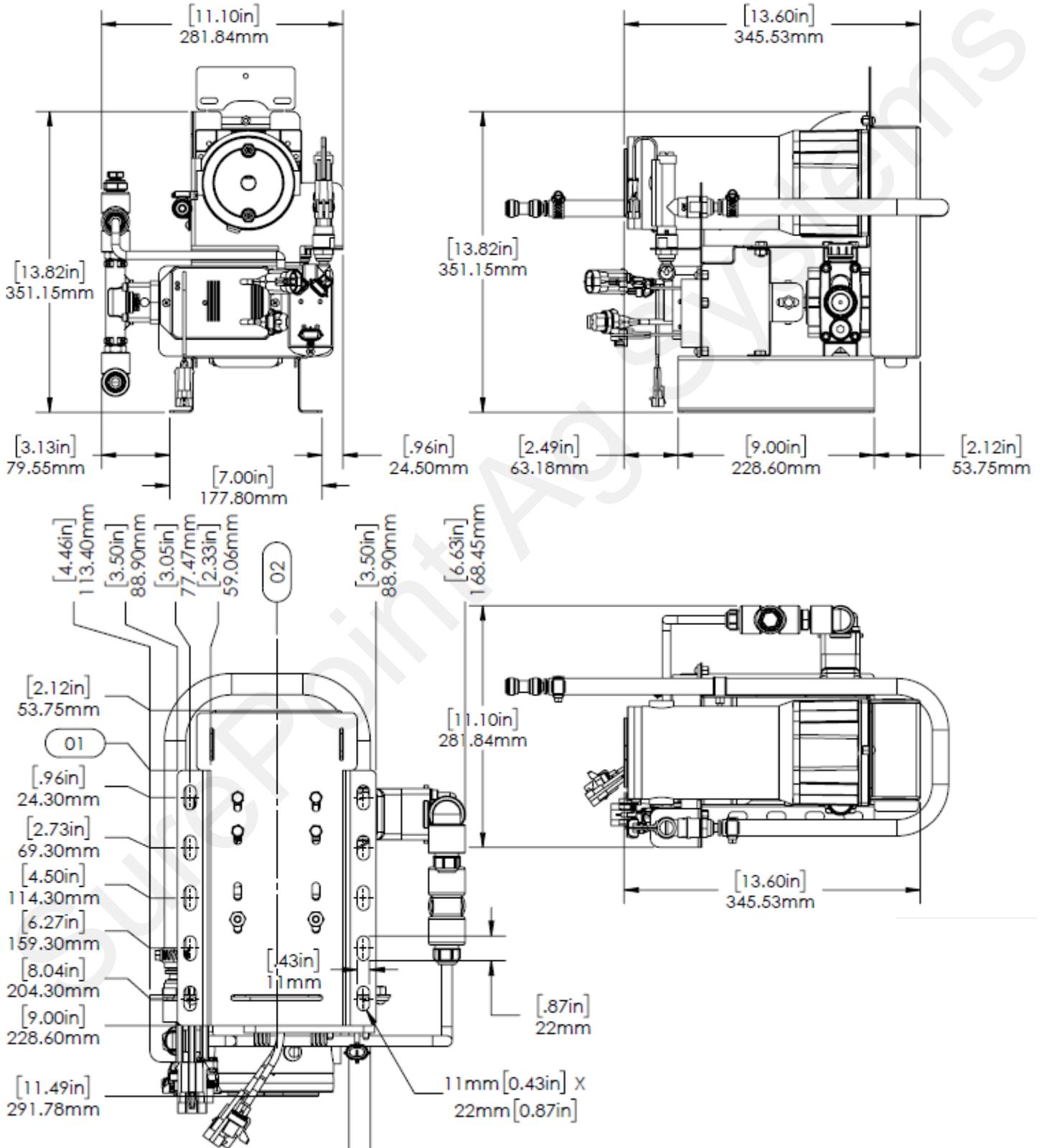
(These have Anderson Connectors)		Wire Size
206-02-3120Y1	1' Extension	10 gauge
206-02-3121Y1	5' Extension	10 gauge
206-02-3122Y1	10' Extension	8 gauge
206-02-3123Y1	20' Extension	8 gauge
206-02-3124Y1	30' Extension	30' and longer—6 gauge
206-02-3125Y1	40' Extension	
206-02-3126Y1	50' Extension	
206-02-3127Y1	60' Extension	
206-02-3128Y1	2' Anderson Ext w/ Power Switch-8 AWG	

SurePoint recommends a single long extension harness as multiple connectors will reduce voltage, increase current and hurt performance of your electric pump system.



Spartan 115 Overall Dimensions

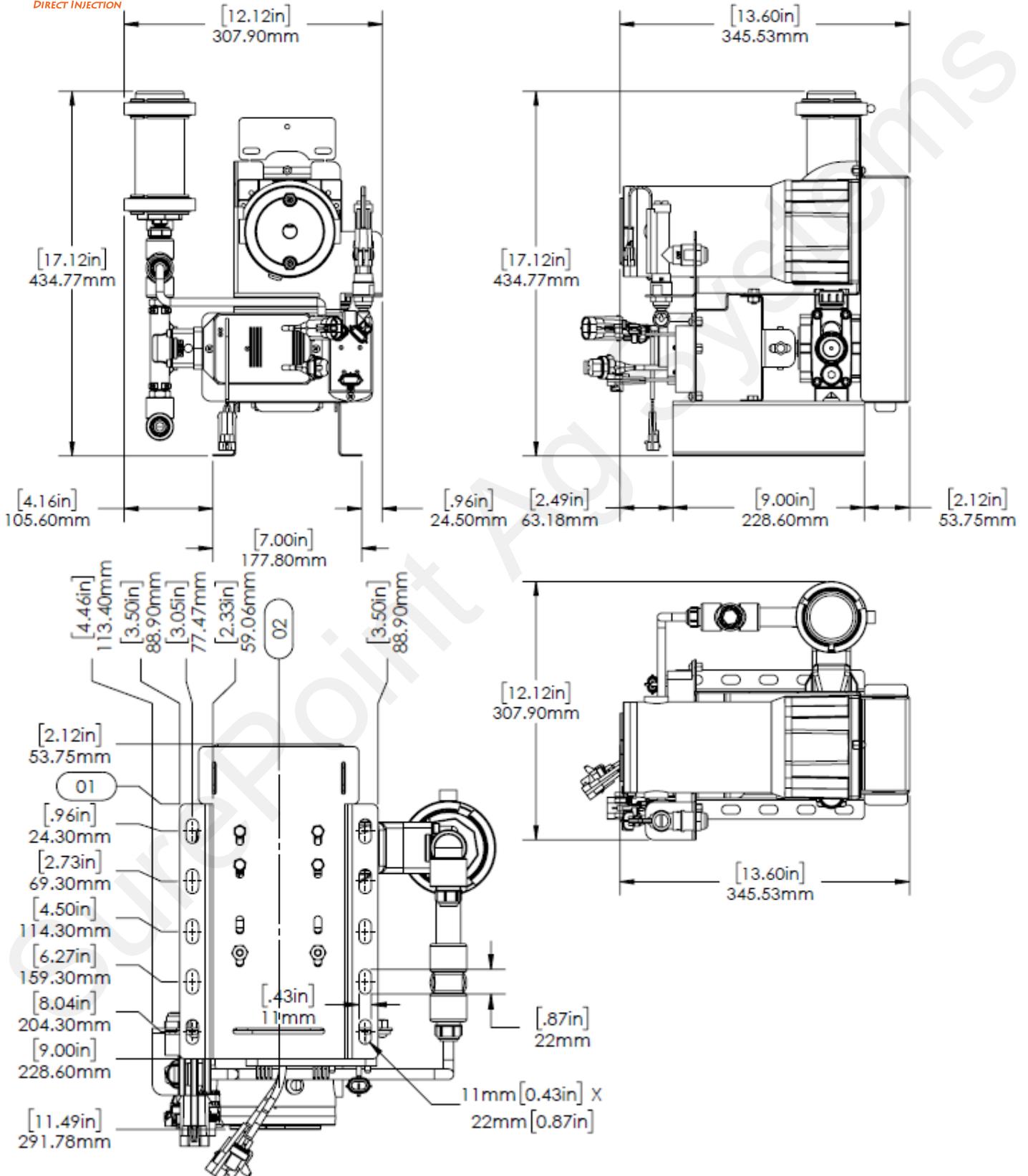
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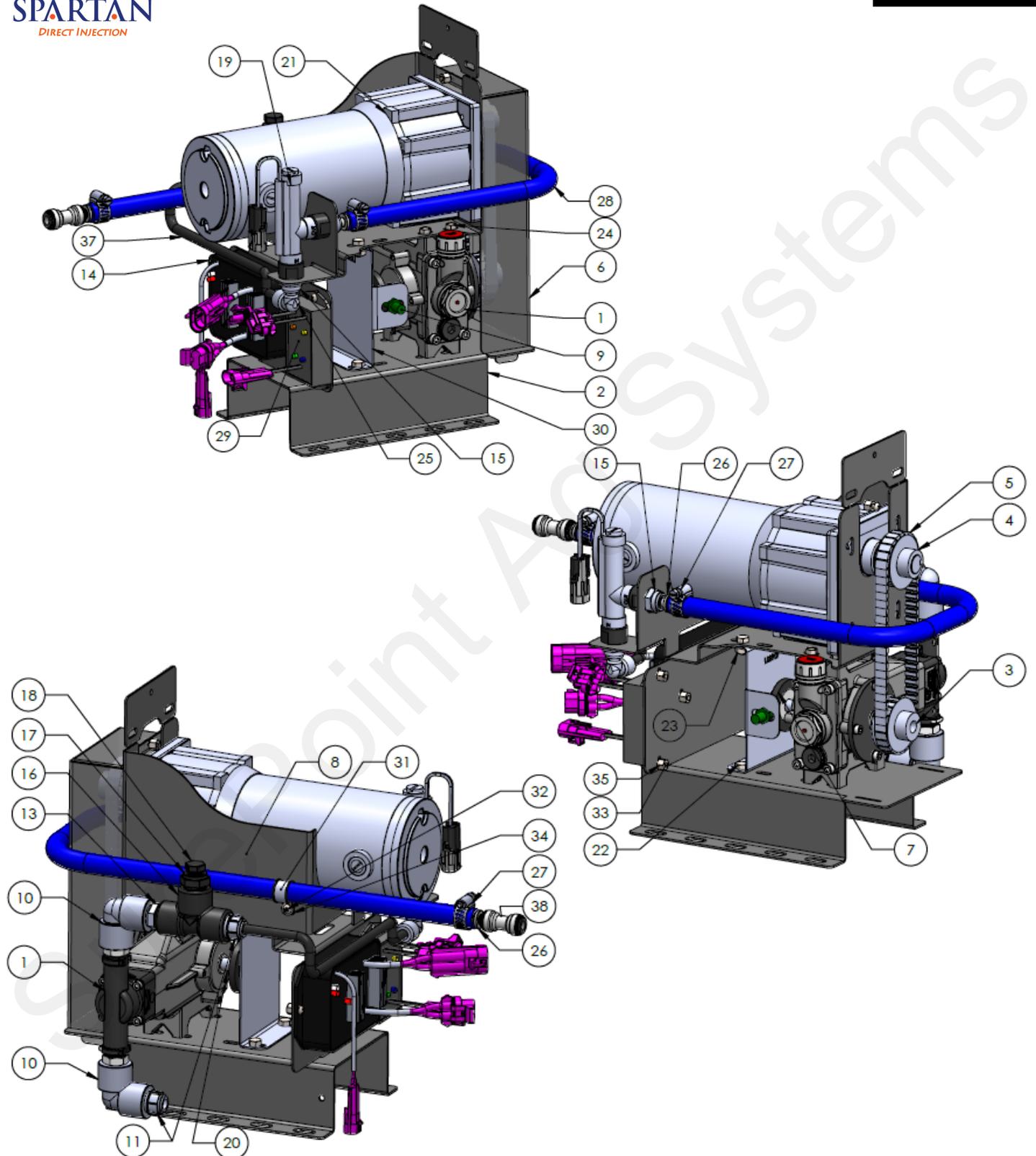
Spartan 125 Overall Dimensions

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Spartan 115 Assembly and Parts Breakdown





Spartan 115 Assembly and Parts Breakdown

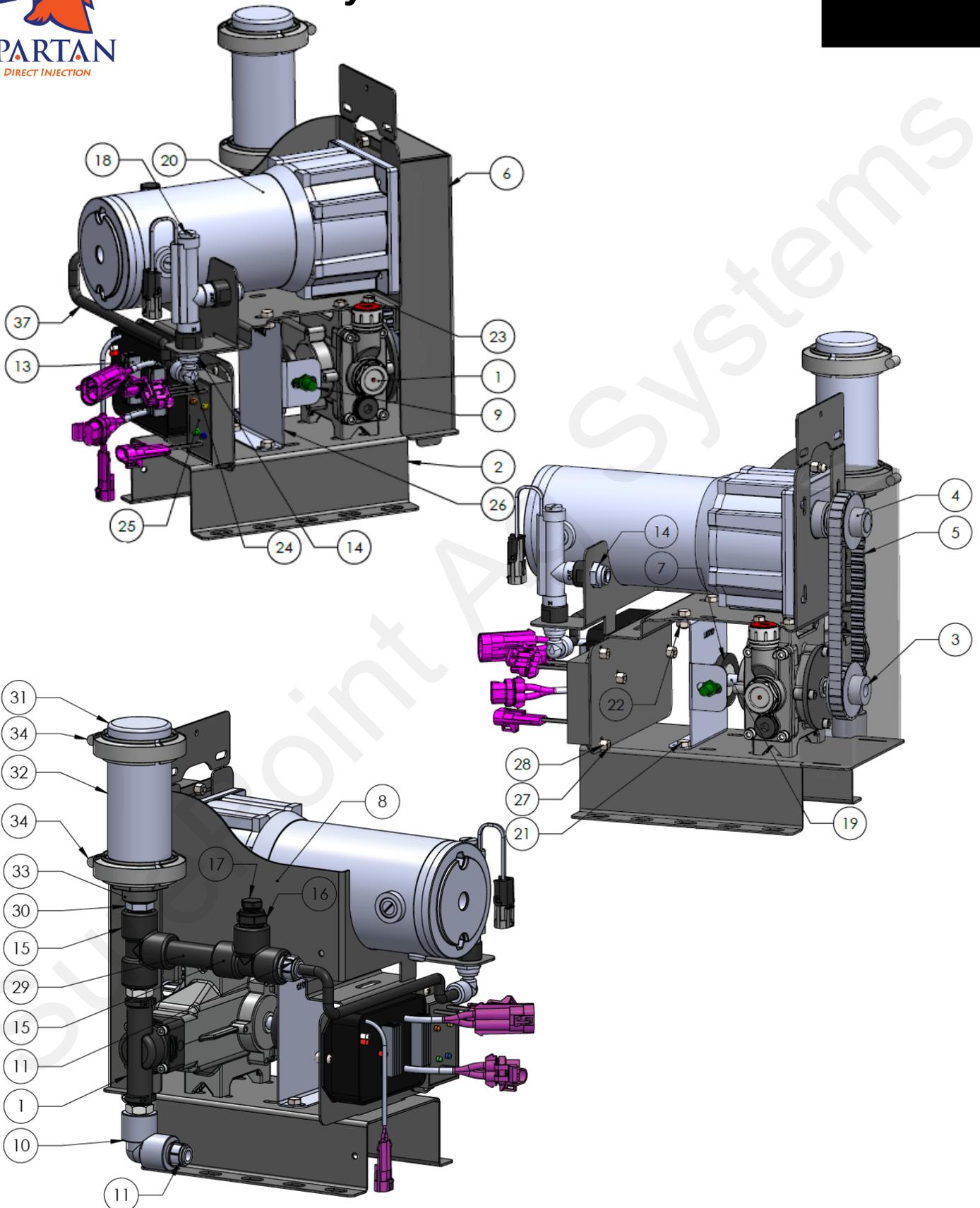
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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	290-10-52.0000.20	Plunger Metering Pump	1
2	470-2065A1	Base Sheet Metal	1
3	367-A 6Z 4M16DF12512	12mm ID Timing Pulley 16 Teeth	1
4	367-A 6Z 4-16DF050020	5/8" ID Timing Pulley 16 Teeth	1
5	367-187L050	187L050 18.5" Timing Belt	1
6	470-2067A1	Belt Sheild Sheet Metal	1
7	204-04-P32B25R32	P32B25R32 Modified with 12mm ID, 32 pulse Target	1
8	470-2066A1	Motor Mount Sheet Metal	1
9	203-01-13096	Hall-effect Flow Sensor Cable 5'	1
10	100-050EL-90	1/2" Pipe Elbow	2
11	113-06-0038050-P	QC to MPT - 3/8" QC x 1/2" MPT	2
12	201-2119Y1	Injection Pump Flow Wiring Harness	1
13	100-050NIP-SH	1/2" Short Nipple	1
14	205-18385	PWM EPD with MP480 Connectors	1
15	113-06-038025-P	QC to MPT - 3/8" QC x 1/4" MPT	2
16	100-050TEE	1/2" TEE	1
17	100-050025RB	1/2" MPT x 1/4" FPT Reducer Bushing	1
18	100-025PLUG	1/4" Pipe Plug	1
19	204-06-3381Y1	Spartan Flow Switch (2-80 oz/min)	1
20	383-1439K411-ONE Pump	Keyway Target Shaft - 12mm	1
21	756-7930-7513	Gear Motor 5/8" Shaft - 76.2 in/lb - 12 VDC - 16.24 Amps	1
22	300-040008-5	1/4" x 1/2" Hex Head Bolt-G5	4
23	323-04	1/4" Flange Nut	4
24	300-M610MM-SS	M6 x 10MM Hex Head Bolt - SS	8
25	113-12-038038-P	Stem Elbow - 3/8" Stem x 3/8" QC	1
26	113-01-038050-P	Stem to HB - 3/8" Stem x 1/2" HB - Polypropylene	2
27	350-0605	SS Hose Clamp - Size 6 - 7/8" Diameter	2
28	284-050-A4086-48in	1/2" Blue Chem Hose - 300PSI - 48"	1
29	204-01-4208Y1	Assembled Signal Conditioner - 16 pulse avg (2 PIN WP Tower - Compac Flow Switch)	1
30	470-4168Y1	RPM Sensor Bracket	1
31	352-11EPDM	EPDM Clamp	1
32	340-100012	Machine Screw - Size 10 x 3/4"	1
33	340-100008-24	Machine Screw - Size 10 x 1/2" - 24 Thread Count	5
34	330-1024	Size 10 Flat Washer	1
35	321-1024	Size 10 Nylock Nut 24 Threads	6
36	470-3359Y1-SS	Cam - 2.1375mm (3-20 oz/min)	1
37	281-038-Spartan115	3/8" Tubing x 12" Long	1
38	113-14-038038	QC to QC - 3/8" QC x 3/8" QC	1



Spartan 125 Assembly and Parts Breakdown

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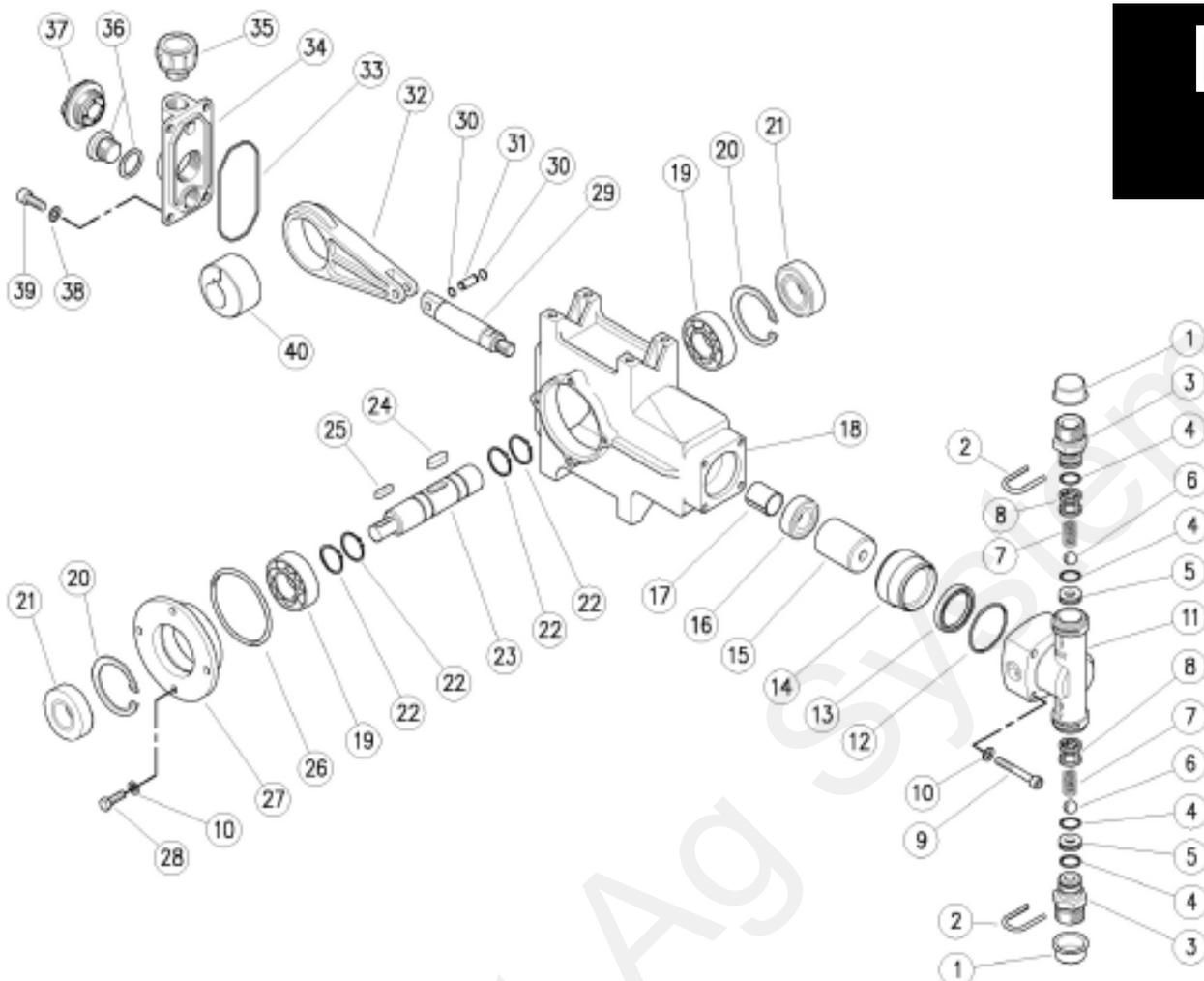




Spartan 125 Assembly and Parts Breakdown

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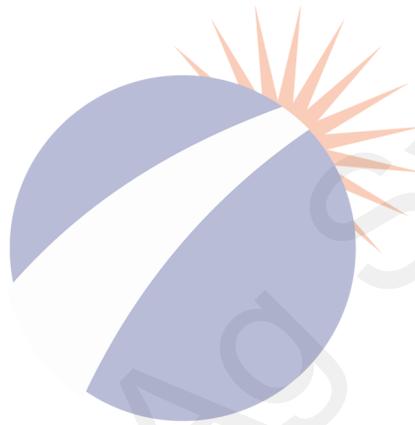
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7	204-04-P32B25R32	P32B25R32 Modified with 12mm ID, 32 pulse Target	1
8	470-2066A1	Motor Mount Sheet Metal	1
9	203-01-13096	Hall-effect Flow Sensor Cable 5'	1
10	100-050EL-90	1/2" Pipe Elbow	1
11	113-06-0038050-P	QC to MPT - 3/8" QC x 1/2" MPT	2
12	201-2119Y1	Injection Pump Flow Wiring Harness	1
13	205-18385	PWM EPD with MP480 Connectors	1
14	113-06-038025-P	QC to MPT - 3/8" QC x 1/4" MPT	2
15	100-050TEE	1/2" TEE	2
16	100-050025RB	1/2" MPT x 1/4" FPT Reducer Bushing	1
17	100-025PLUG	1/4" Pipe Plug	1
18	204-06-3381Y1	Spartan Flow Switch (2-80 oz/min)	1
19	383-1439K411-ONE Pump	Keyway Target Shaft - 12mm	1
20	756-7930-7513	Gear Motor 5/8" Shaft - 76.2 in/lb - 12 VDC - 16.24 Amps	1
21	300-040008-5	1/4" x 1/2" Hex Head Bolt-G5	4
22	323-04	1/4" Flange Nut	4
23	300-M610MM-SS	M6 x 10MM Hex Head Bolt - SS	8
24	113-12-038038-P	Stem Elbow - 3/8" Stem x 3/8" QC	1
25	204-01-4208Y1	Assembled Signal Conditioner - 16 pulse avg (2 PIN WP Tower - Compac Flow Switch)	1
26	470-4168Y1	RPM Sensor Bracket	1
27	340-100008-24	Machine Screw - Size 10 x 1/2" - 24 Thread Count	5
28	321-1024	Size 10 Nylock Nut 24 Threads	5
29	100-050NIP-3	1/2"X3" Nipple	1
30	100-050NIP-SH	1/2" Short Nipple	1
31	105-200PLG	2" Manifold Plug	1
32	105-200CPG	2" X 2" STANDARD PORT FLANGE	1
33	105-200PLG050	2" Manifold Plug x 1/2" FPT	1
34	105-FC200	2" Manifold Clamp	2
35	105-150G-V	1 1/2" EPDM Gasket - Viton	2
36	470-2266Y1	Spartan 125 Cam - 4.275mm	1
37	281-038-Spartan125-135	3/8" Tubing x 12" Long	1



Pos.	PN	Description	Qty	K1	K2	K3	K4
1	15.3700.00	Plug, 20,5 mm pvc	2				10
2	29.0087.51	U-bolt, Sst.	2				10
3	52.0016.51	Valve coupl., 1/2M Bsp Sst.	2				1
4	10.3060.18	O-ring, 1,78x12,42 mm EPDM	4	*			5
5	52.0012.51	Seat, 7x15,9x4,5 mm Sst.	2	*			1
6	14.7443.25	Ball, 11/32" Sst. Aisi 316	2	*			5
7	52.0010.51	Spring, 0,3x7,1x7,5 mm Sst.	2	*			1
8	25.1337.84	Ball cage	2	*			1
9	16.1869.35	Screw, DIN912 M6x35 mm z.pl.	4				5
10	14.3560.61	Washer, 5,3x10x1 mm	8				10
11	52.0015.84	Pump head, PA black	1				1
12	10.3079.10	O-ring, 1,78x34,65 mm EPDM	1	*			10
13	10.2028.00	Stem seal, 26x34,2x4,2 mm	1	*			4
14	52.0011.81	Bushing, 28mm POM	1				1
15	52.0008.51	Plunger, 28 mm	1				1
16	10.2016.30	Seal ring, 16x30x7 mm	1	*			3
17	10.4216.18	Bushing, DU 16x18x20 mm	1				5
18	52.0014.44	Pump housing, alum.	1				1
19	11.4320.42	Ball-bearing, 20x42x12 mm	2				2
20	10.1042.00	Snap ring, I 42	2				5
21	10.2020.42	Seal ring, 20x42x7 mm	2	*			3
22	10.1020.00	Snap ring, E 20	4				5
23	52.0005.61	Pump shaft	1				1
24	12.3006.18	Feather, 6x6 mm	1				5
25	12.3004.16	Feather, 4x4 mm	1				5
26	10.3080.00	O-ring, 1,78x56,87 mm	1	*			5
27	52.0002.41	Case flange, alum.	1				1
28	16.1871.14	Screw, DIN933 M6x14 mm z.pl.	4				10
29	52.0007.61	Plunger shaft	1				1
30	10.0956.00	Snap ring, E 6	2				5
31	52.0006.61	Plug, 6x20mm	1				1
32	52.0003.34	Pump connecting rod, alum.	1				1
33	10.3081.63	O-ring, 1,78x63,22 mm	1	*			10
34	52.0001.44	Coperchio alum. per carter	1	*			1
35	15.3726.00	Oil plug 3/8" Bsp+seal	1				5
36	15.3738.10	Oil plug 3/8" Bsp+seal	1				5
37	15.3734.00	See-through oil plug 3/4" Bsp+seal	1				5
38	14.3568.00	Washer, 5,4x11x1 mm	4				10
39	16.1868.00	Screw, DIN912 M6x16 mm z.pl.	4				10
40	52.0004.61	Cam ring	1				1
40	52.0004.61	Cam ring (1)	1				1

Kit	PN	Description	Qty
K1	52.0018.24	Pump Seals-Kit, 28mm 7x1pcs.	1
K2	52.0021.24	Spares-kit, suct.+deliv. valves,4x1pcs.	1

(1) 52.0000.02



SurePoint

Ag Systems



asdfasdf

Warranty

B

System
Components

SurePoint Ag Systems