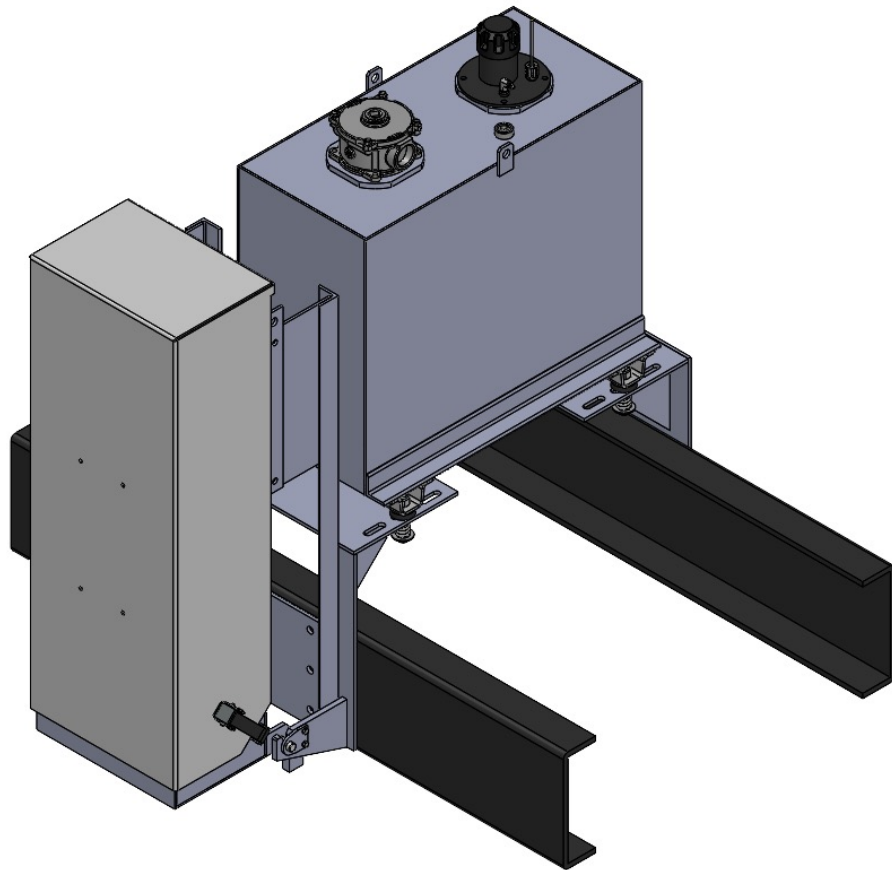


# HYBRID SYSTEM

INSTALLATION AND PARTS MANUAL





# TABLE OF CONTENTS

- Valve Features and Specifications ..... 1
- Components and Assemblies – Hybrid System..... 2
- Hydraulic Installation – Pump Connections ..... 3
- Hydraulic Components and Assemblies – Manifold/Valve Dimensions ..... 5
- Hydraulic Components and Assemblies – Inlet Manifold..... 6
- Hydraulic Components and Assemblies – Inlet Manifold Schematic..... 9
- Hydraulic Components and Assemblies – Power Float Manifold ..... 10
- Hydraulic Components and Assemblies – Power Float Manifold Schematic ..... 13
- Hydraulic Components and Assemblies – PVG 32/48 Valve ..... 14
- Hydraulic Components and Assemblies – PVG 32/48 Valve Schematic ..... 15
- Hydraulic Installation – QD Release Connections ..... 16
- Control Console Installation ..... 17
- Valve Enclosure Wiring ..... 21
- Interfacing to AVL Systems ..... 22
- External GPS Installation..... 24
- Controller Pin-outs ..... 25
- Module Pin-outs ..... 26
- Harness Drawings ..... 31
- Hydraulic Pressure Explained..... 36
- System Installation Checklist ..... 37
- Hydraulic Components..... 38
- Electrical Components – Operator Control Options..... 39
- Electrical Components – Input/Output Module Options ..... 40
- Electrical Components – Sensor and Switch Options ..... 41
- Hydraulic Installation – Filtration Requirements ..... 42
- Troubleshooting..... 43

# INSTALLATION MANUAL FOREWORD

The following installation manual is intended to provide technical information and guidance for a typical Hybrid System. As systems can be configured with certain features and applied to a wide range of applications, technical details can vary, including: wiring diagrams, plumbing installation, cartridge valve configurations, and electrical module I/O configuration. For additional technical information and guidance for a specific system, please contact Muncie Power Products.

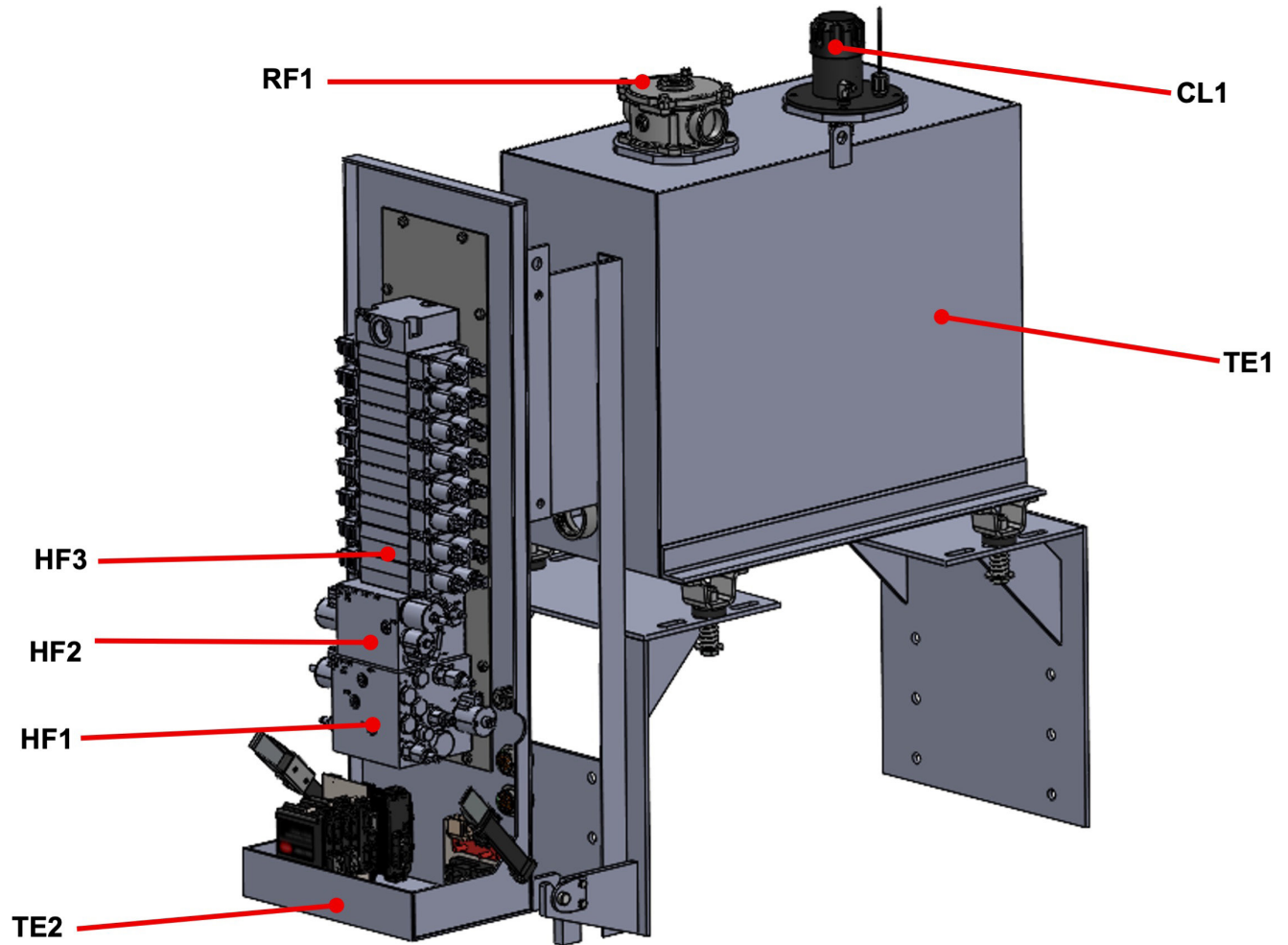
## VALVE FEATURES AND SPECIFICATIONS

### FUNCTIONS, FLOW RATES, AND PRESSURE SETTINGS

- Modular hybrid valve manifold system configured for open or closed center operation.
- Post compensated load sense design:
  - Oil flow supplied to an individual function operates independently of the load pressure associated with that function.
  - Oil flow to each function remains constant, unaffected by the load pressures of other functions, ensuring stable and consistent system performance.
- Main relief is embedded in circuit for system protection.
- Maximum system pressure = 3,000 PSI
- All valve coils are configured for 12 V continuous duty operation. Valve coils are of proportional (pulse width modulated) design where appropriate.
- Manual override functionality equipped on flow controls.
- Vertical enclosure mounting includes hinge for ease of access for maintenance.

# COMPONENTS AND ASSEMBLIES

## DESIGNATION, PART NUMBERS, AND DESCRIPTION



DESIGNATION	PART NUMBER	DESCRIPTION
HF1		Inlet Manifold Assembly
HF2		Power Float Manifold Assembly
HF3		PVG 32 Valve Assembly
RF1 *	TRLF525G10	Return Line Filter Assembly
TE1 *	56M67874SS	Stainless Tank **
TE2	55T41690SS	Stainless Enclosure (Lid Not Shown) **
CL1 *	16T43697	Clean Out Assembly
SG1	31T36377	Sight Gauge (Not Shown)

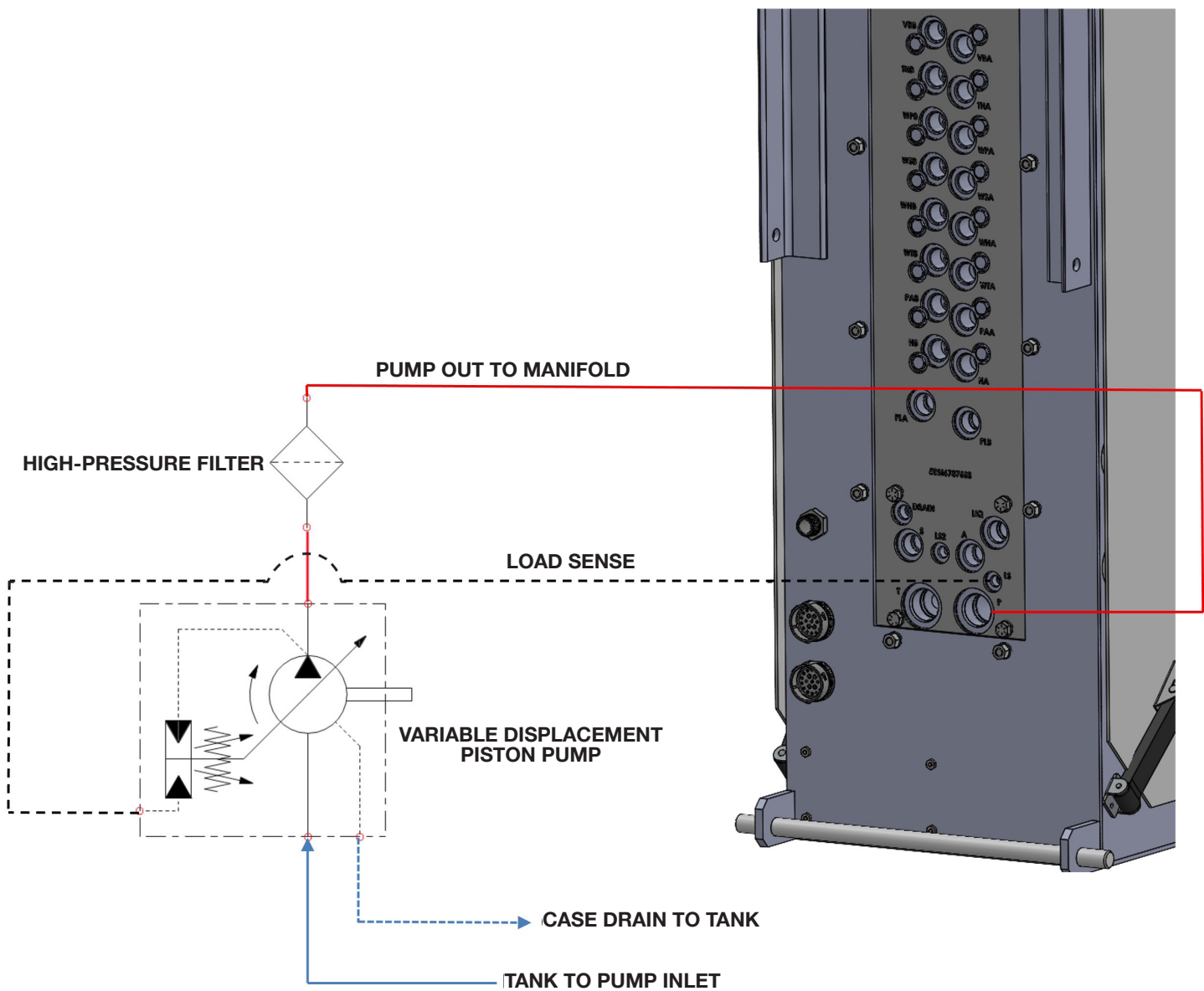
\* Optional

\*\* Powder coated steel optional

# HYDRAULIC INSTALLATION

## PISTON PUMP PLUMBING

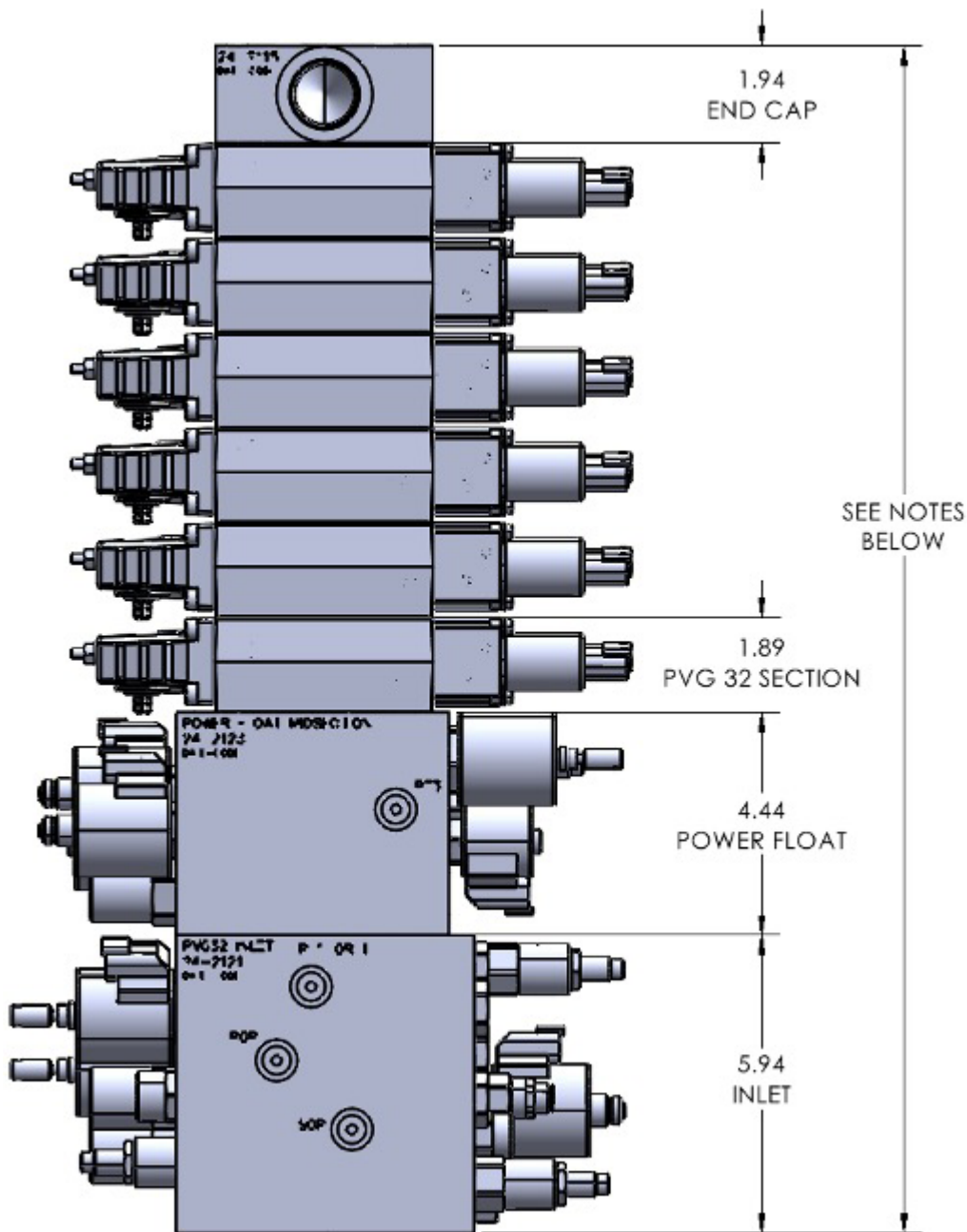
1. Connect the pump inlet to the tank
2. Connect the pump outlet to the high-pressure filter inlet
3. Connect the high-pressure filter outlet to the P port on the manifold
4. Connect the pump load sense to the LS port on the manifold
5. Connect the pump case drain to the open 1" port on the tank





# HYDRAULIC COMPONENTS AND ASSEMBLIES

## MANIFOLD/VALVE ASSEMBLY DIMENSIONS

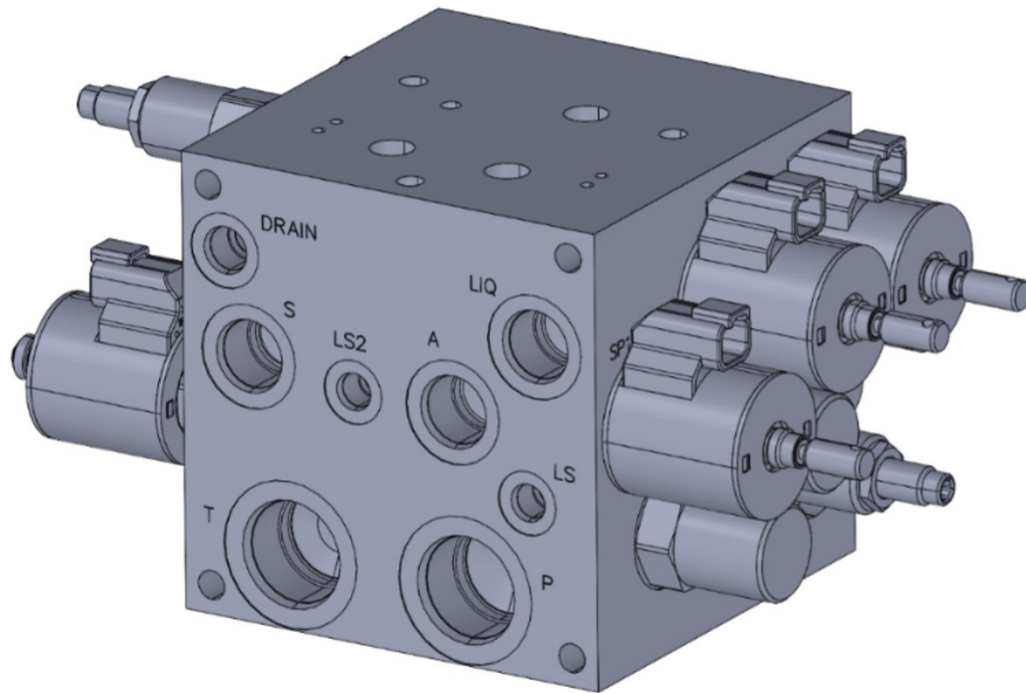


- To determine overall height of manifold/valve stack, add 1.89" for each PVG 32 valve section.
- Maximum PVG 32 valves is 10 per assembly
- Overall height dimension to be determined based on the number of PVG sections/valve functions and power float manifold options.

# HYDRAULIC COMPONENTS AND ASSEMBLIES

## INLET MANIFOLD DESIGNATION, FUNCTION, AND SIZING

FUNCTION	MAX. FLOW	DEFAULT SETTING	MAX. SETTING
Pre-Wet	10 GPM	1,800 PSI	3,000 PSI
Auger	15 GPM	1,800 PSI	3,000 PSI
Spinner	15 GPM	1,800 PSI	3,000 PSI

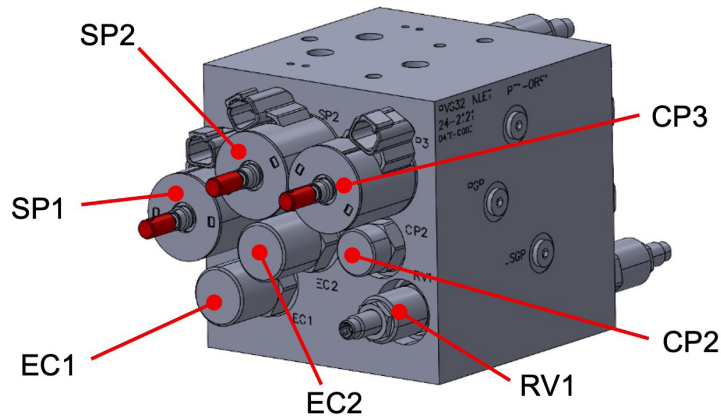


INLET MANIFOLD PORT DESIGNATIONS *		
PORT	FUNCTION	SIZE (SAE)
DRAIN	Drain	6
LIQ	Pre-wet	10
S	Spinner	10
LS2	Load Sense	04
A	Auger	10
LS	Load Sense	04
T	Tank	16
P	Pump	16

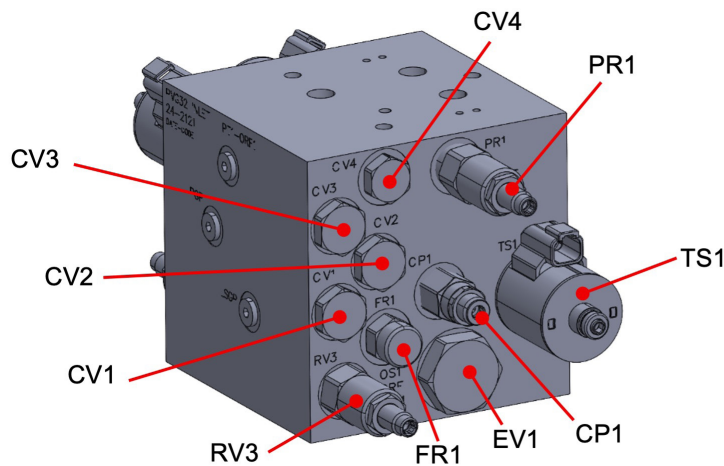
\* Workport designations etched into backing plate of enclosure.

# HYDRAULIC COMPONENTS AND ASSEMBLIES

## INLET MANIFOLD DESIGNATION, FUNCTION, AND SIZING



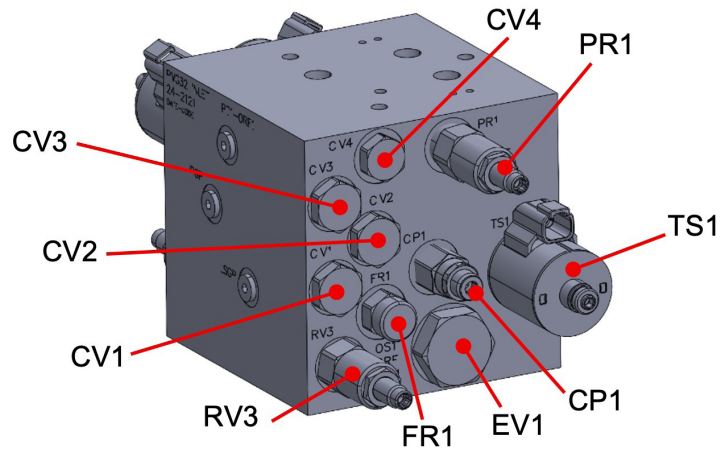
DESIGNATION	PART NUMBER	FUNCTION	DESIGNATION	PART NUMBER	FUNCTION
SP1	SP1020AM0N12ER	Auger Flow Control	EC1	EC12320N160	Auger Compensator
SP2	SP1020AM0N12ER	Spinner Flow Control	EC2	EC12320N160	Spinner Compensator
CP2	EC10320N160	Pre-wet Compensator	RV1	RV1022A0N3528	Clipper Relief
CP3	SP1020AM0N12ER	Pre-wet Flow Control			



DESIGNATION	PART NUMBER	FUNCTION	DESIGNATION	PART NUMBER	FUNCTION
CP1	RVD5820A0N30XXX	Relief	EV1	EV16S340N10	Unloading Comp.
CV1	CV10200N02	Auger LS Check	FR1	FR0820F0N0.2	Load Sense Drain
CV2	CV10200N02	Spinner Load Check	PR1	PR5838A0N05	Relief
CV3	CV10200N02	Pre-wet LS Check	RV3	RV1022A0N2518	Anti-ice Relief
CV4	CV08200N04	Spreader LS Check	TS1	TS3820AM0N12ER	Main Relief

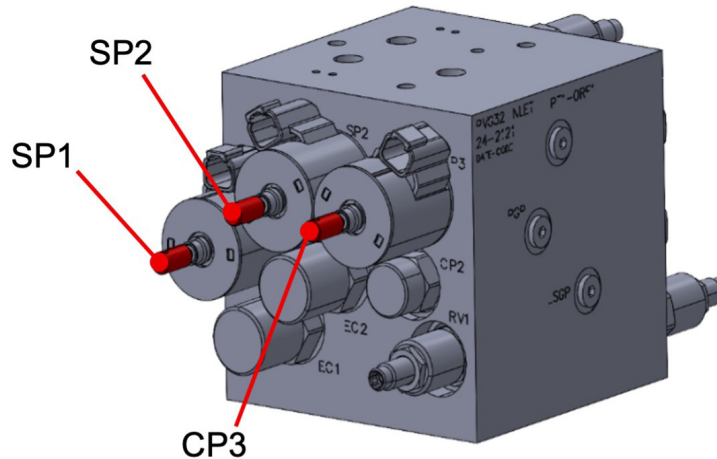
# HYDRAULIC COMPONENTS AND ASSEMBLIES

## INLET MANIFOLD DESIGNATION, FUNCTION, AND SIZING



DESIGNATION	PART NUMBER	FUNCTION	DESIGNATION	PART NUMBER	FUNCTION
CP1	RVD5820A0N30XXX	Relief	EV1	EV16S340N10	Unloading Comp.
CV1	CV10200N02	Auger LS Check	FR1	FR0820F0N0.2	Load Sense Drain
CV2	CV10200N02	Spinner Load Check	PR1	PR5838A0N05	Relief
CV3	CV10200N02	Pre-wet LS Check	RV3	RV1022A0N2518	Anti-ice Relief
CV4	CV08200N04	Spreader LS Check	TS1	TS3820AM0N12ER	Main Relief

## INLET MANIFOLD OVERRIDE OPERATION

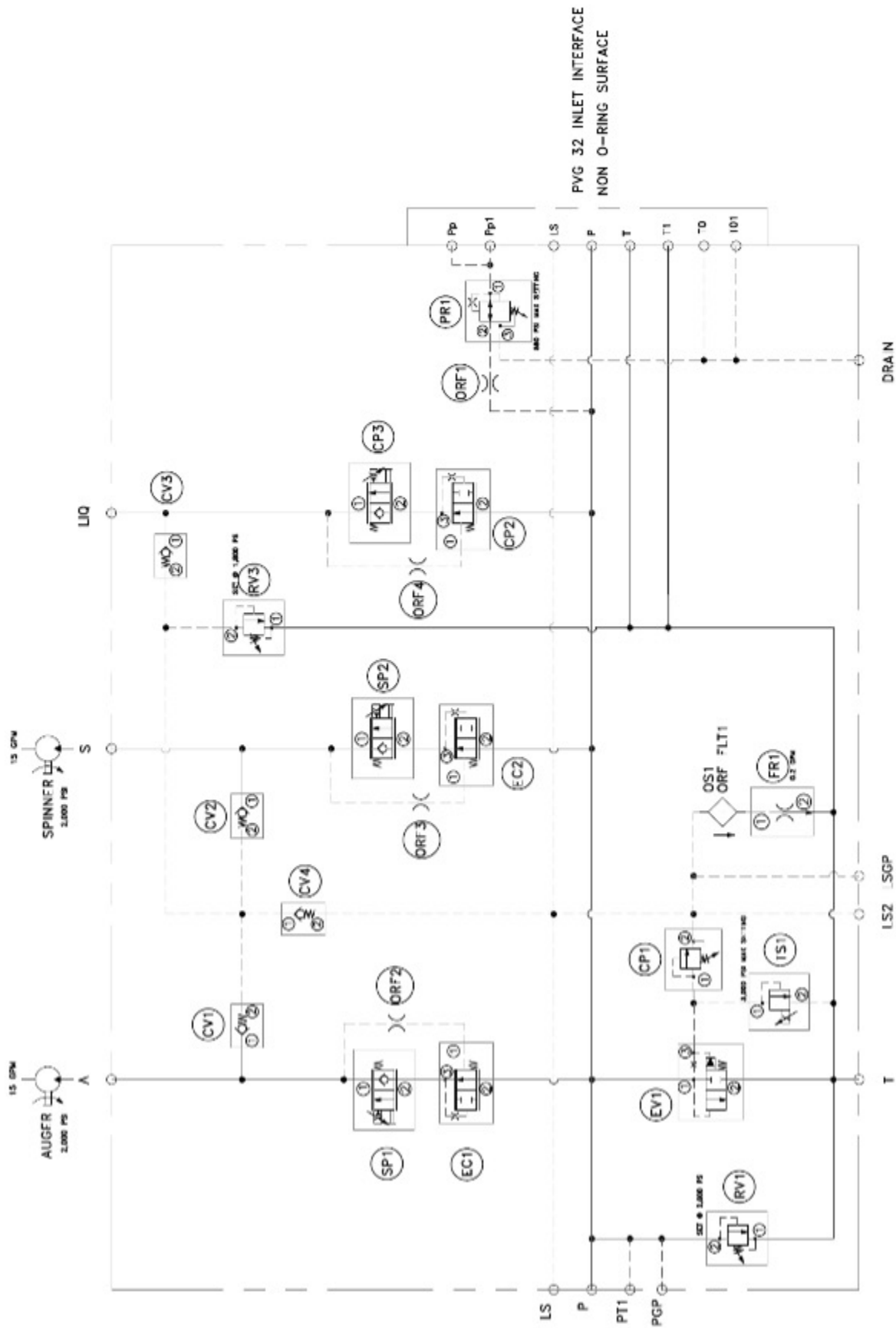


**Note:** TS1 on the Inlet Manifold must be closed before engaging other overrides. To close the valve, loosen (CCW) the lock nut approximately a quarter of a turn. Using an Allen wrench, turn the valve clockwise until it bottoms out. Count the number of turns required to close to insure it can be reset to the correct setting.

FUNCTION	DESIGNATION	FUNCTION
Auger	Engage SP1	Push Down and CCW
Spinner	Engage SP2	Push Down and CCW
Pre-wet	Engage CP3	Push Down and CCW

# HYDRAULIC COMPONENTS AND ASSEMBLIES

## INLET MANIFOLD SCHEMATIC



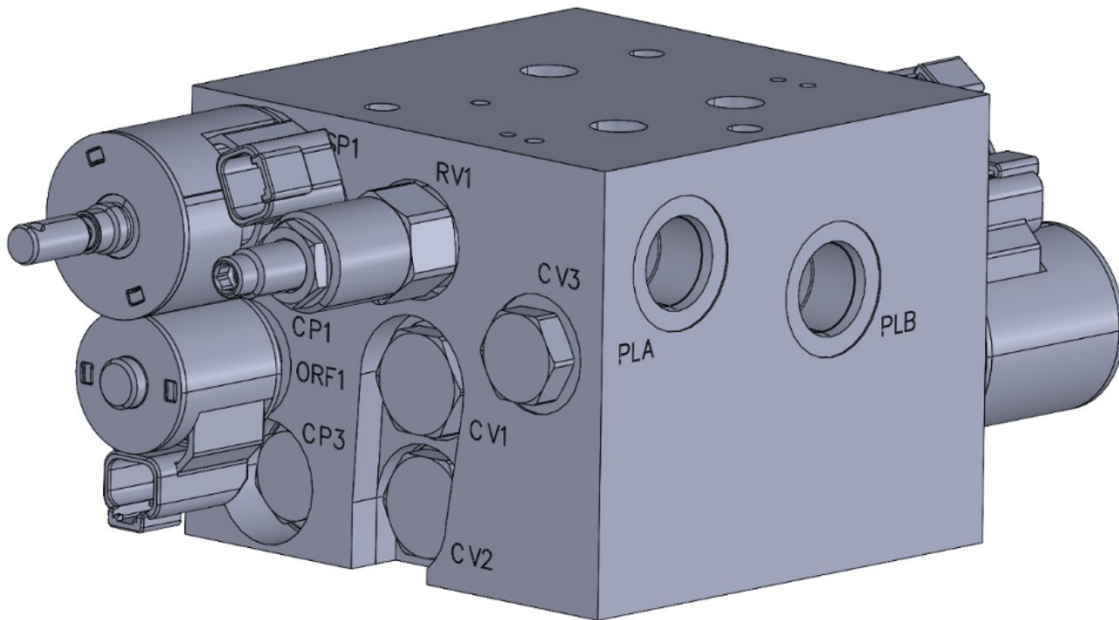
INLET SCHEMATIC

# HYDRAULIC COMPONENTS AND ASSEMBLIES

## POWER FLOAT MANIFOLD DESIGNATION, FUNCTION, AND SIZING

FUNCTION	MAX. FLOW	DEFAULT SETTING	MAX. SETTING
Plow Lift	15 GPM	2,000 PSI	3,000 PSI

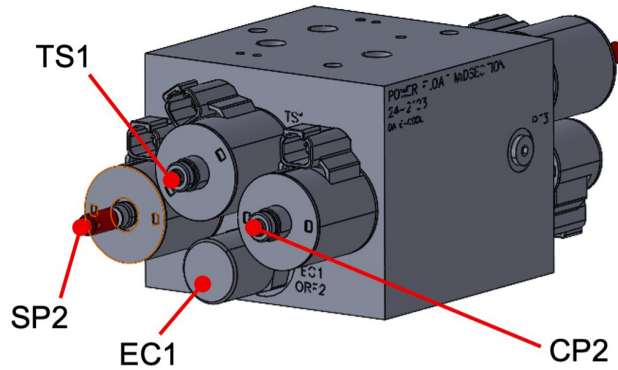
**Note:** Flow rates are estimates based on 250 PSI pump differential setting.



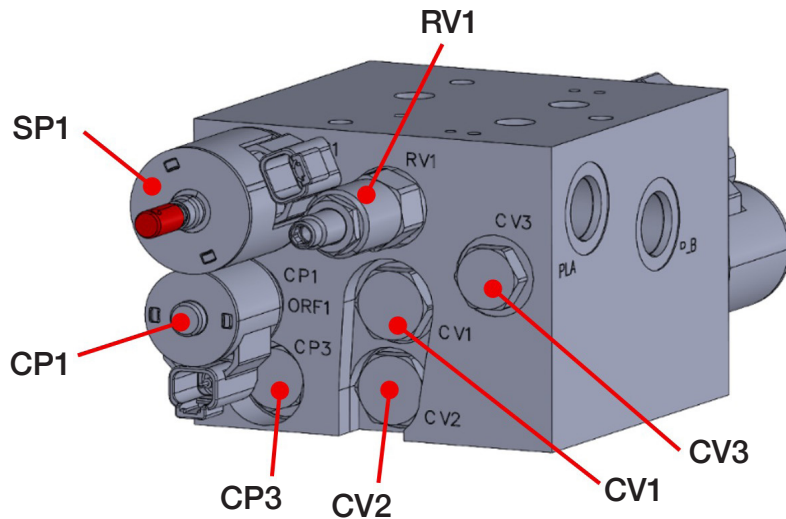
POWER FLOAT MANIFOLD PORT DESIGNATIONS		
PORT	FUNCTION	SIZE (SAE)
PLA	Plow Up	10
PLB	Plow Down	10

# HYDRAULIC COMPONENTS AND ASSEMBLIES

## INLET MANIFOLD DESIGNATION, FUNCTION, AND SIZING



DESIGNATION	PART NUMBER	FUNCTION	DESIGNATION	PART NUMBER	FUNCTION
CP2	TS1036XM0N12ER	Relief	SP2	SP1020AM0N12ER	Plow Up Control
EC1	EC12320N160	Plow Compensator	TS1	TS1036CM0N12ER	Plow PSI Control



DESIGNATION	PART NUMBER	FUNCTION	DESIGNATION	PART NUMBER	FUNCTION
CP1	SV08280N12ER	Power Flow ON-OFF	CV3	CV08200N04	Plow Load Check
CP3	CV08200NXX	Plow Lift LS Check	RV1	RV1022A0N3520	Plow Up Relief
CV1	CV10200N05	Plow Load Check	SP1	SP1220AM0N12ER	Plow Down Flow Check
CV2	CV08200N04	Plow Down LS Check			

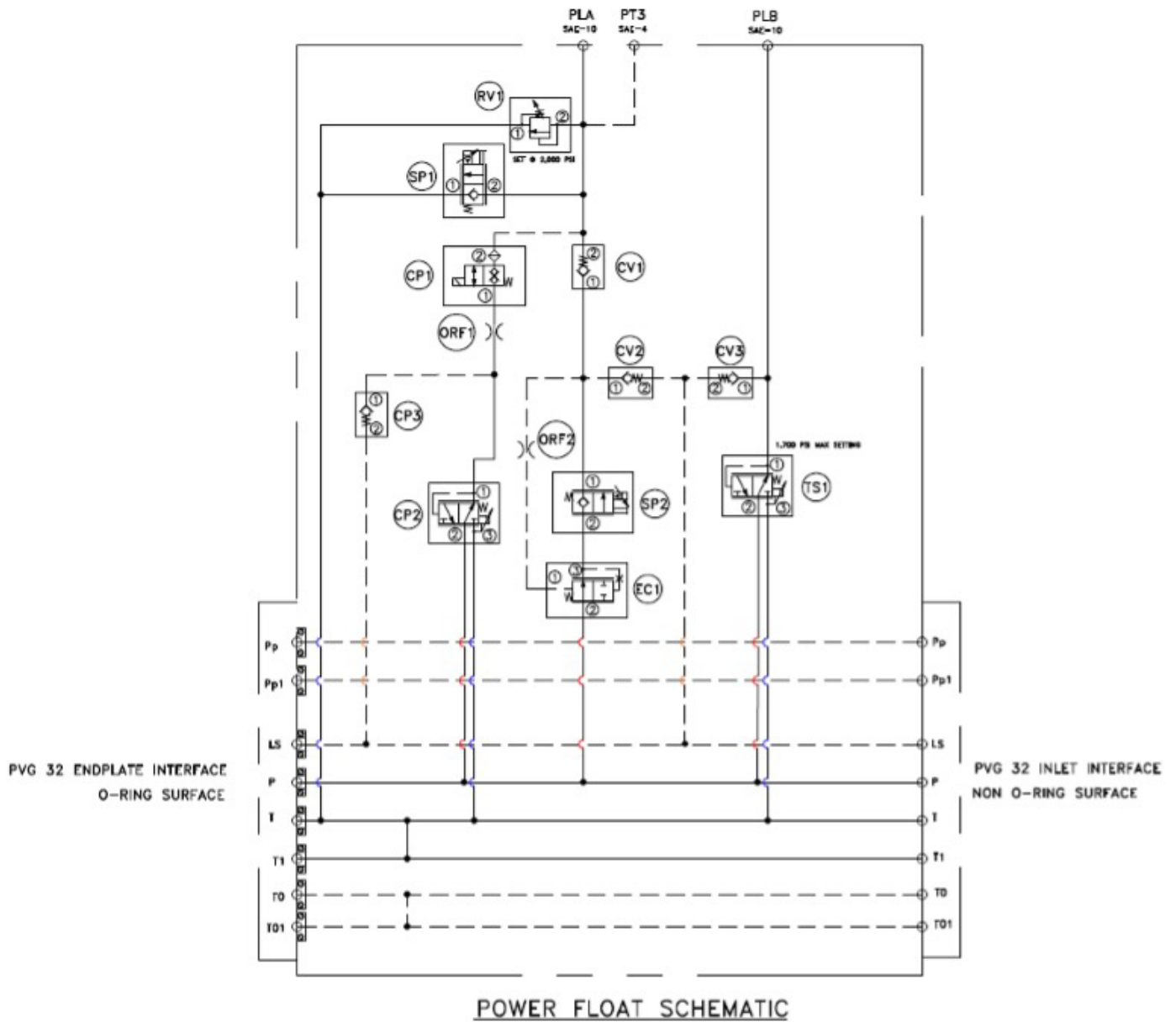
FUNCTION	DESIGNATION	FUNCTION
Power Float ON-OFF	Engage SP1	Push Down and CCW
Plow Up	Engage SP2	Push Down and CCW

### POWER FLOAT MANIFOLD OVERRIDE

**Note:** TS1 on the Inlet Manifold must be closed before engaging other overrides. To close the valve, loosen (CCW) the lock nut approximately a quarter of a turn. Using an Allen wrench, turn the valve clockwise until it bottoms out. Count the number of turns required to close to insure it can be reset to the correct setting.

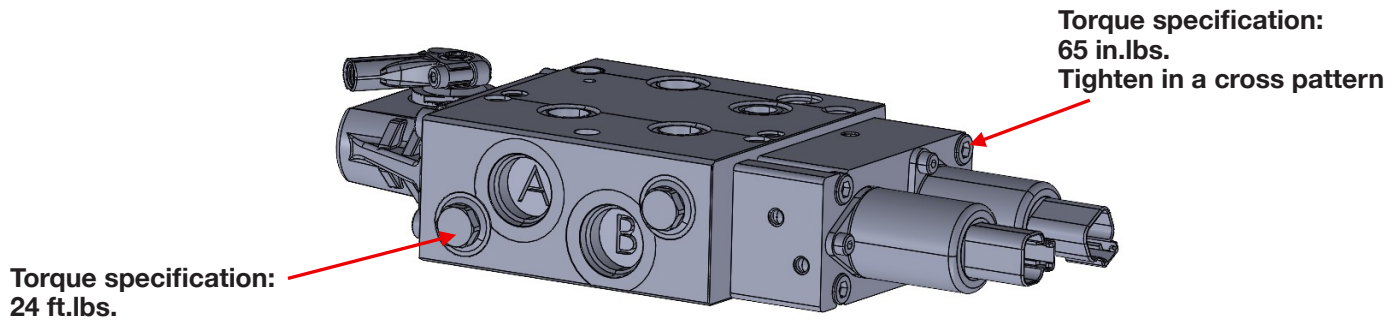
# HYDRAULIC COMPONENTS AND ASSEMBLIES

## POWER FLOAT MANIFOLD SCHEMATIC



# HYDRAULIC COMPONENTS AND ASSEMBLIES

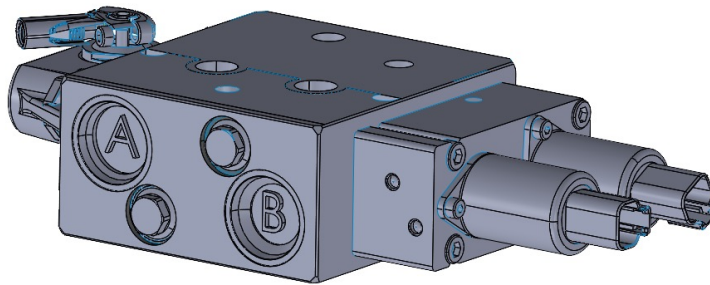
## PVG 32/48 VALVE DESIGNATION, FUNCTION, AND SIZING



PVG 32 valve section with 12 V controls with manual override

FUNCTION	MAX. FLOW	DEFAULT SETTING	MAX. SETTING
PVG 32 w/Pre Comp.	26 GPM	Up to 3,000 PSI	3,000 PSI

INDIVIDUAL VALVE PORT DESIGNATIONS		
PORT	FUNCTION	SIZE (SAE)
A	Per Application	10
B	Per Application	10



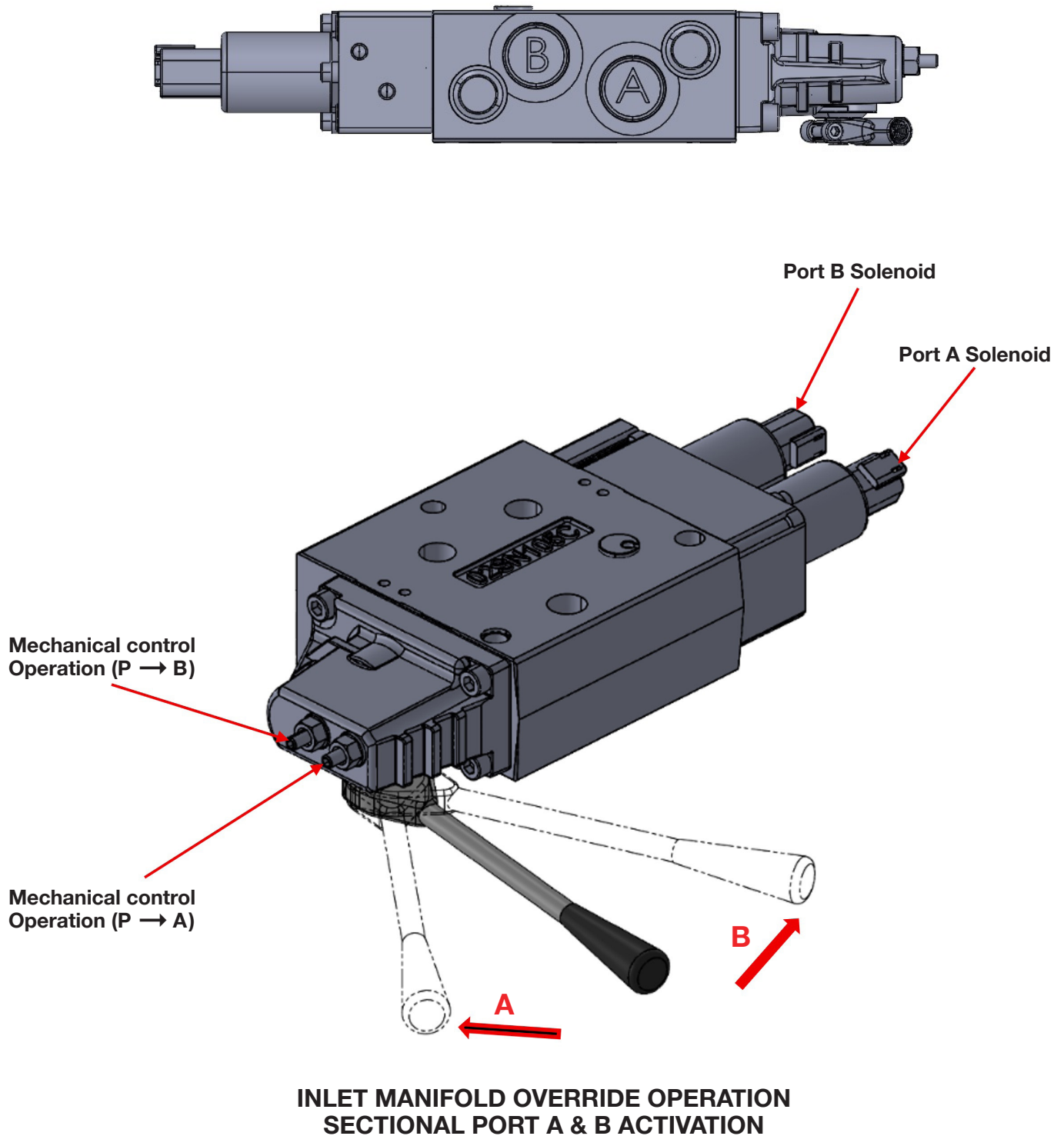
PVG 48 valve section w/12 V controls  
with manual override for high flow applications.

FUNCTION	MAX. FLOW	DEFAULT SETTING	MAX. SETTING
PVG 48 w/Pre Comp.	40 GPM	Up to 3,000 PSI	3,000 PSI

INDIVIDUAL VALVE PORT DESIGNATIONS		
PORT	FUNCTION	SIZE (SAE)
A	Per Application	12
B	Per Application	12

# HYDRAULIC COMPONENTS AND ASSEMBLIES

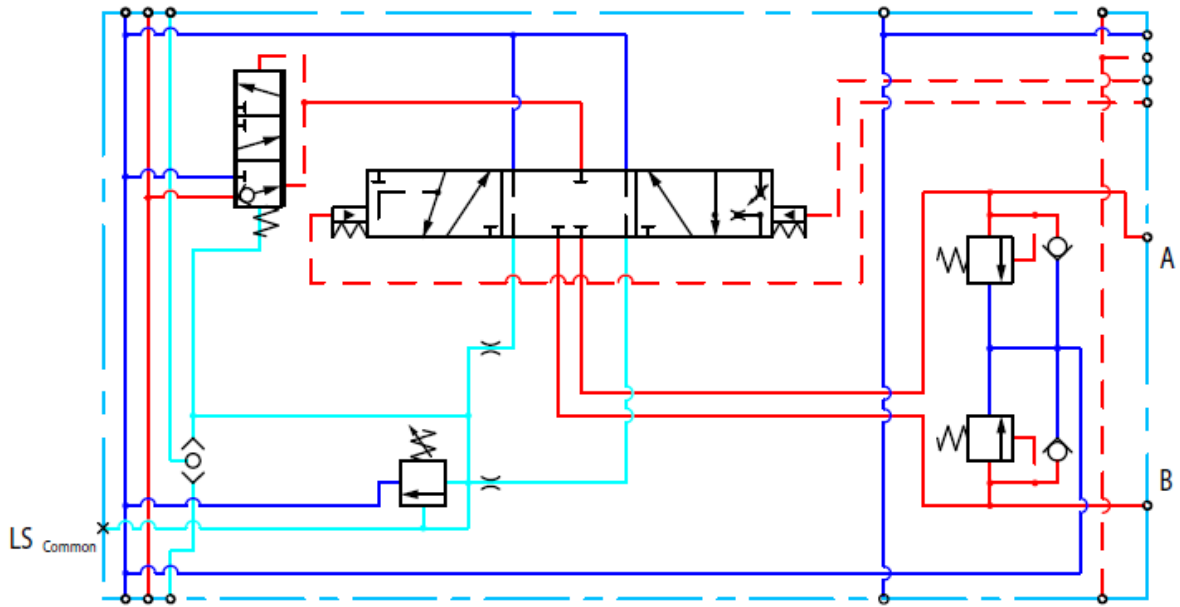
## PVG 32/48 VALVE DESIGNATION, FUNCTION, AND SIZING



**Note:** TS1 on the Inlet Manifold must be closed before engaging other overrides. To close the valve, loosen (CCW) the lock nut approximately a quarter of a turn. Using an Allen wrench, turn the valve clockwise until it bottoms out. Count the number of turns required to close to insure it can be reset to the correct setting.

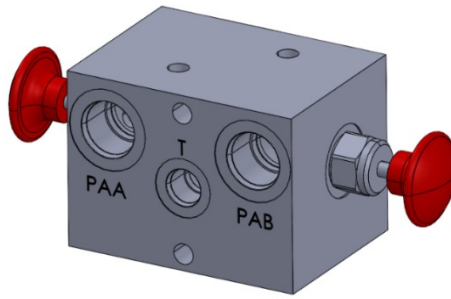
# HYDRAULIC COMPONENTS AND ASSEMBLIES

## PVG 32/48 VALVE MANIFOLD SCHEMATIC



# HYDRAULIC INSTALLATION

## PLOW ANGLE – QD RELEASE MANIFOLD (OPTIONAL)



### Plow Release Manifold

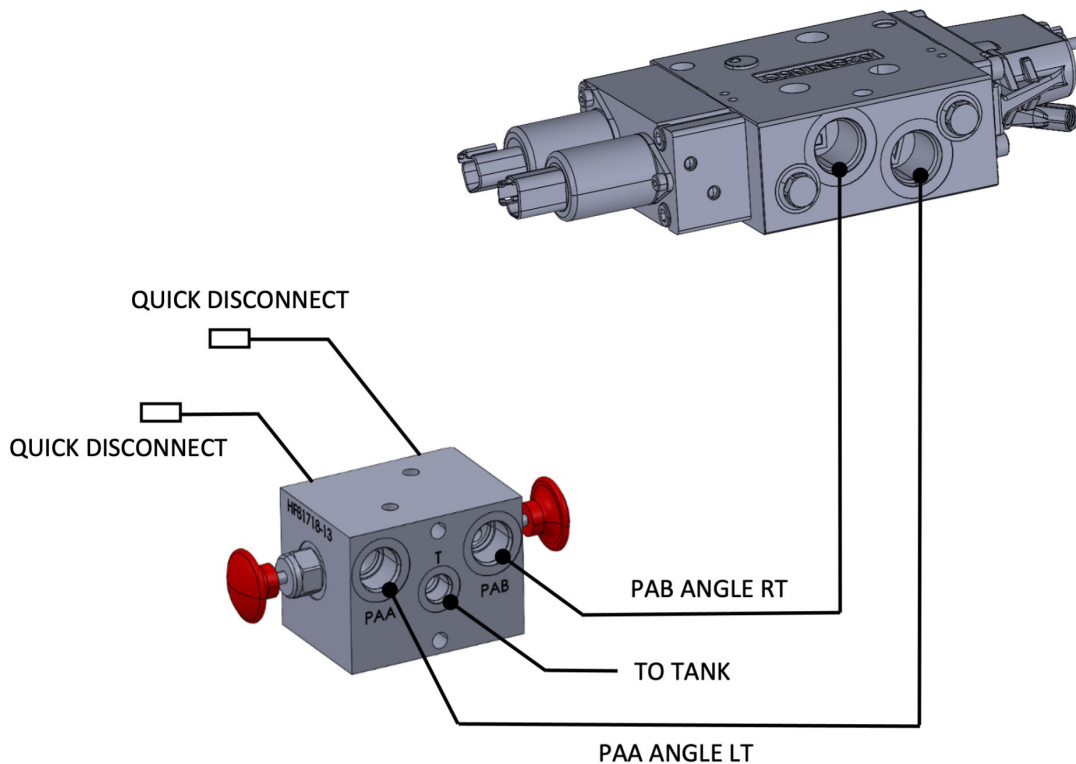
P/N: HF81718-13V

**Purpose:** This manifold is intended to relieve pressure within the plow angle lines. It allows easier connection between quick disconnect fittings.

**Operation Instruction:** Pull actuators to relieve pressure within the plow angle circuit

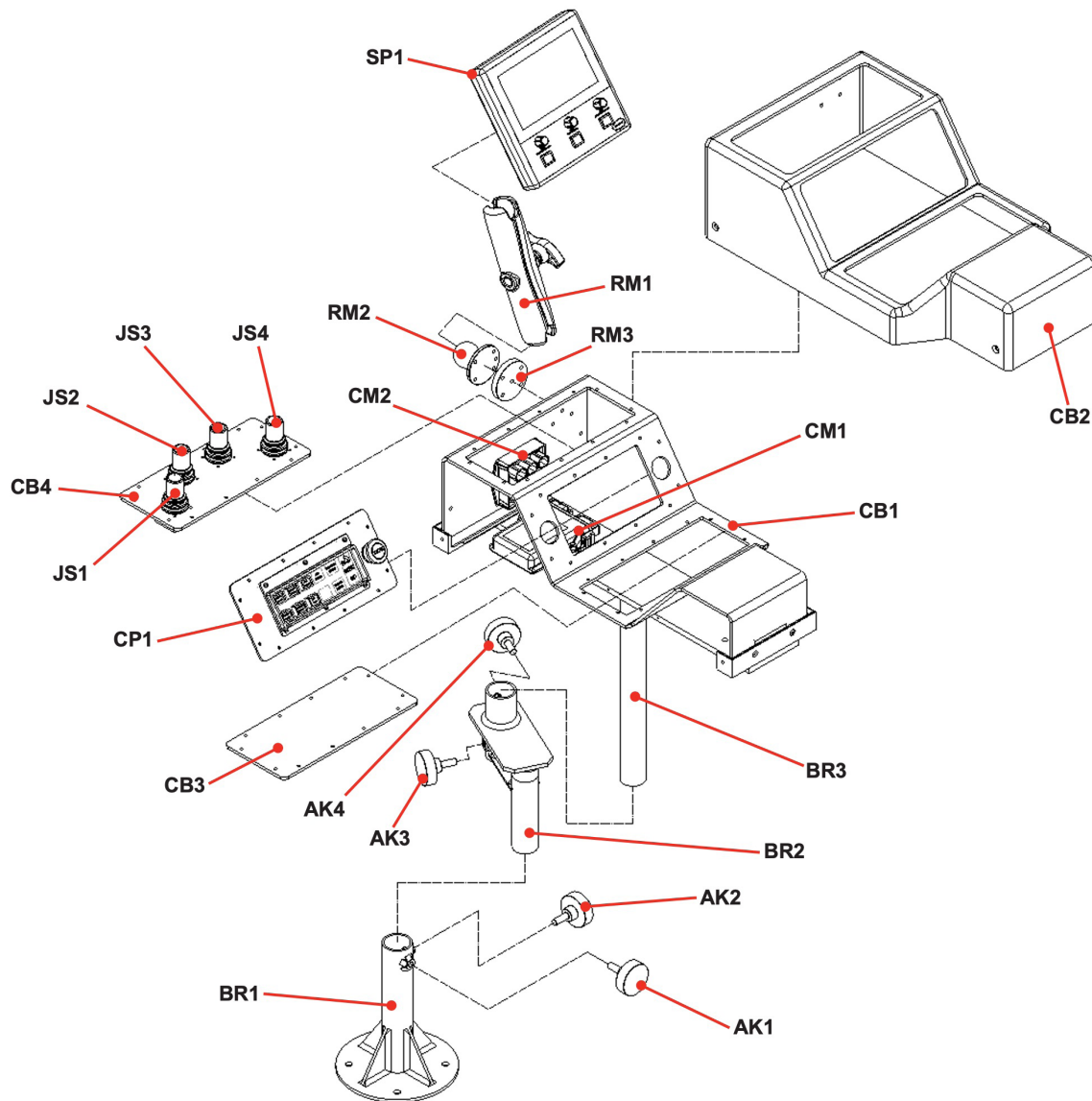
#### Installation Instructions:

1. Locate the T Port – Route connection to tank
2. Locate the PAA Port – Route to the PAA port on the individual PVG 32 valve
3. Locate the PAB Port – Route to the PAB port on the individual PVG 32 valve
4. Locate the PAA1 Port – Route to the plow left cylinder
5. Locate the PAB1 Port – Route to the plow right cylinder



# CONTROL CONSOLE — EXPLODED VIEW

## DESIGNATION, PART NUMBERS, AND DESCRIPTIONS

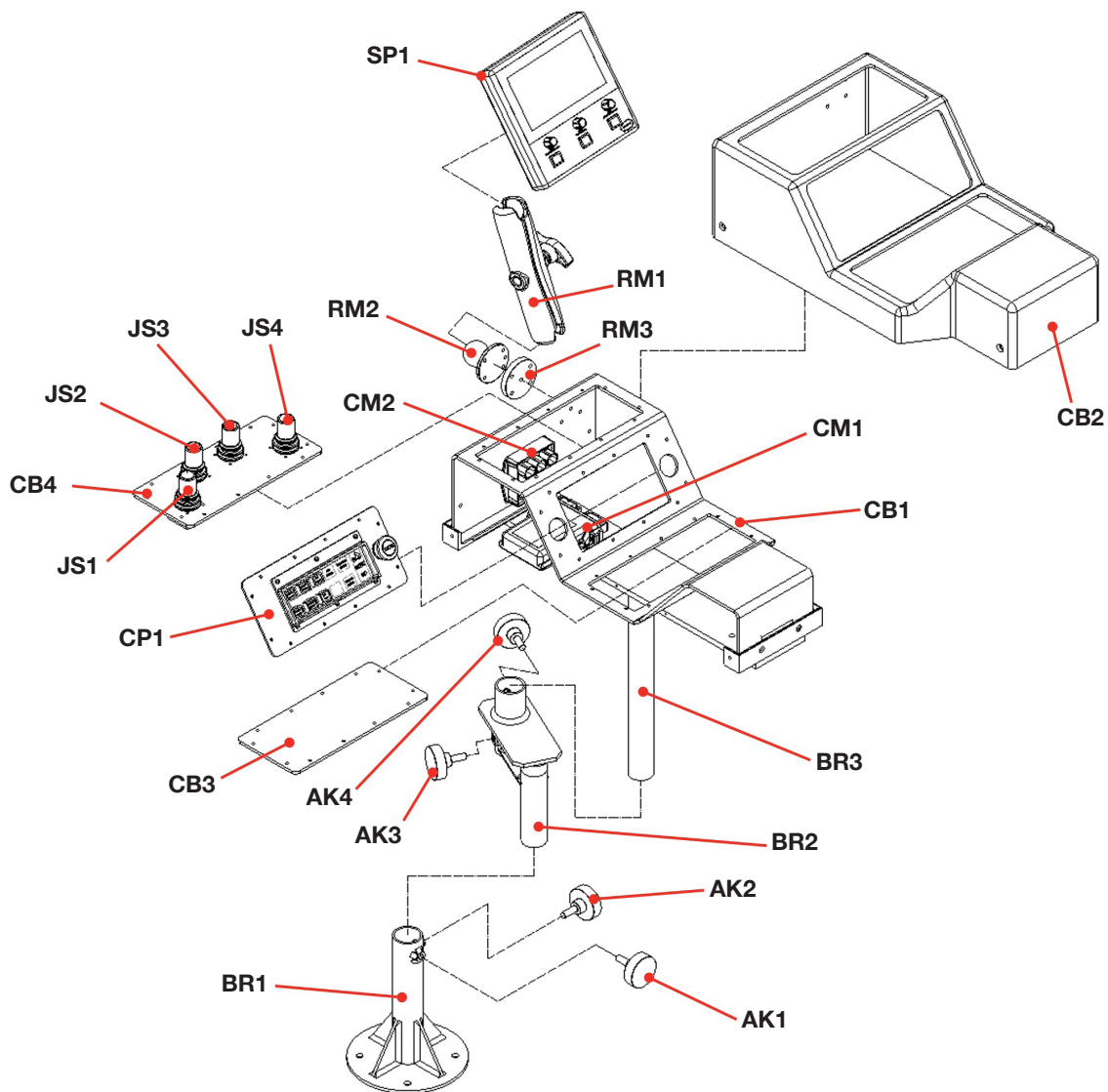


DESIGNATION	PART NUMBER	FUNCTION	DESIGNATION	PART NUMBER	FUNCTION
AK1-AK4	28M40672SHRT	Adjustment Knob	CM2	M3300052CCA1	CAN Splitter Module
BR1	58T43816CT	Mounting Post	CP1	APEMCPAC1	Omni-System® Plus Panel
BR2	58T43933	Extension Bracket	JS1, JS3	EJK2P0DTG4K	Joystick
BR3	58M67282	Console Cradle	JS2, JS4	EJK2P0DTG5K	Joystick
CB1	58M67281	Console Base	RM1	NXCP1ADBCRAK	Ram Dog Bone
CB2	57M67283	Console Cover	RM2	NXCP1AMB	Ram Ball
CB3	36M67293	Blank Plate	RM3	58M67305	Ram Ext. Base
CB4	36M67903	Joystick Plate	SP1	APEMSC7TA2	Spreader Panel
CM1	APEMMFA2	Multifunction Module			

# CONTROL CONSOLE — EXPLODED VIEW

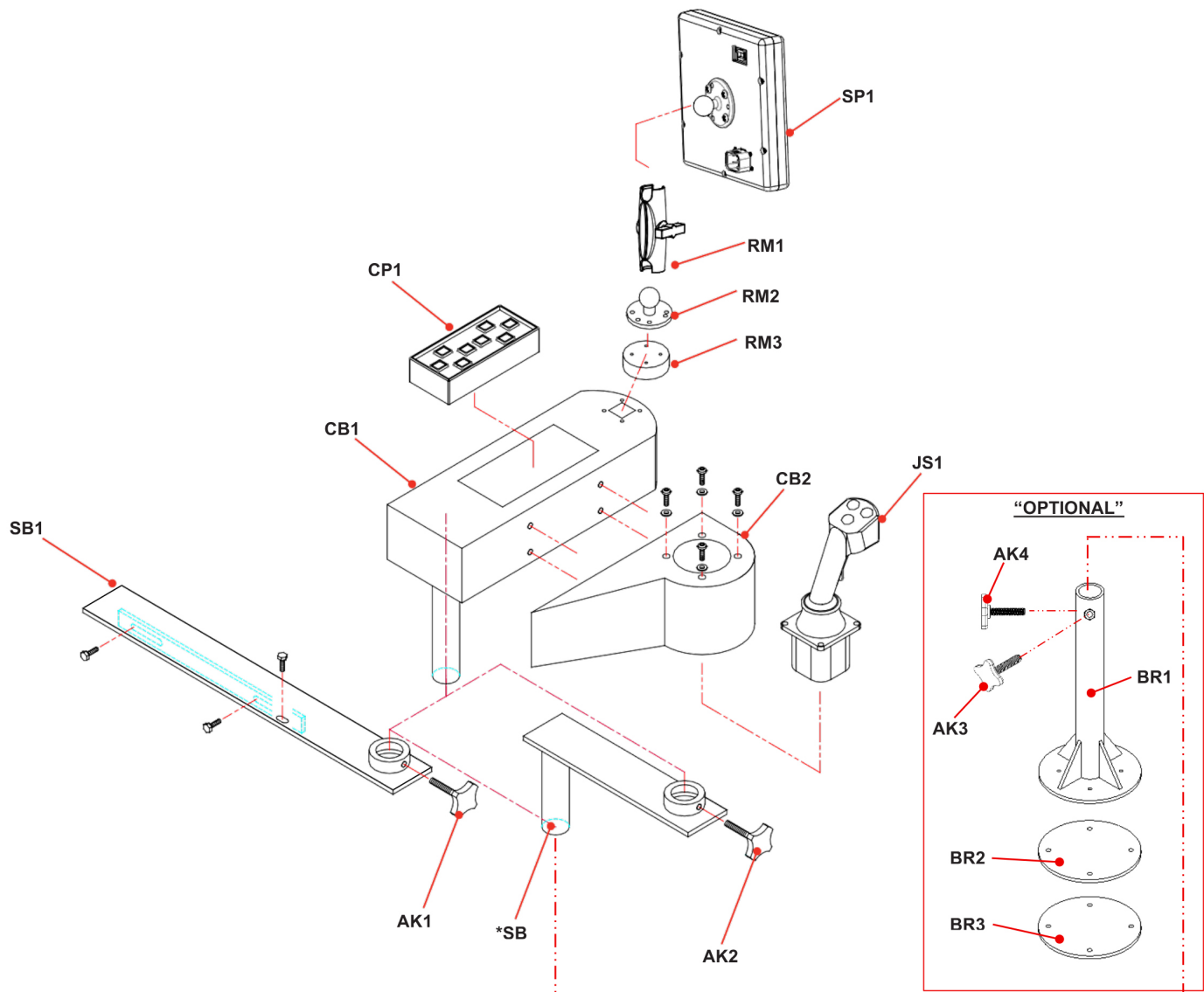
## DESIGNATION, PART NUMBERS, AND DESCRIPTIONS

1. Determine location to be mounted in the truck. Ensure there's adequate clearance around the console and all components in the truck.
2. Drill holes in the floor for mounting the post (BR1).
3. Bolt the mounting post (BR1) to the floor using locking hardware. A backing plate may be required depending on the rigidity of the truck floor.
4. Attach the dog bone (RM1) to the controller (SP1) and console ball (RM2).
5. Adjust the console to desired height and angle. Ensure all adjustment knobs are tight.
6. Connect all wiring and fasten to the structure of the console.



# CONTROL CONSOLE - EXPLODED VIEW

## DESIGNATION, PART NUMBERS, AND DESCRIPTION



DESIGNATION	PART NUMBER	DESCRIPTION	DESIGNATION	PART NUMBER	DESCRIPTION
AK1	28M40672	Adjustment Knob	RM1	NXCP1ADBB	Ram Dog Bone
AK2	28M40672	Adjustment Knob	RM2	NXCP1AMBB	Ram Ball
CB1	57T65318	Spreader Console	RM3	NXCP1ARP	Ram Ext. Base
CB2	57T65316	Joystick Console	SP1	APEMSC7TA1	Spreader Panel
CP1	APCP20170	Cylinder Panel	SB1	58T40644KW	Seat Bracket
JS1	EJK2P3DCAN	Joystick	SB2	58T40863KW	Ext. Bracket *
BR1	58T43816	Floor Mount *	BR3	58T43818SS	Plate *
BR2	13M43819	Gasket *	AK3, AK4	28M40672SHRT	Adjustment Knob *

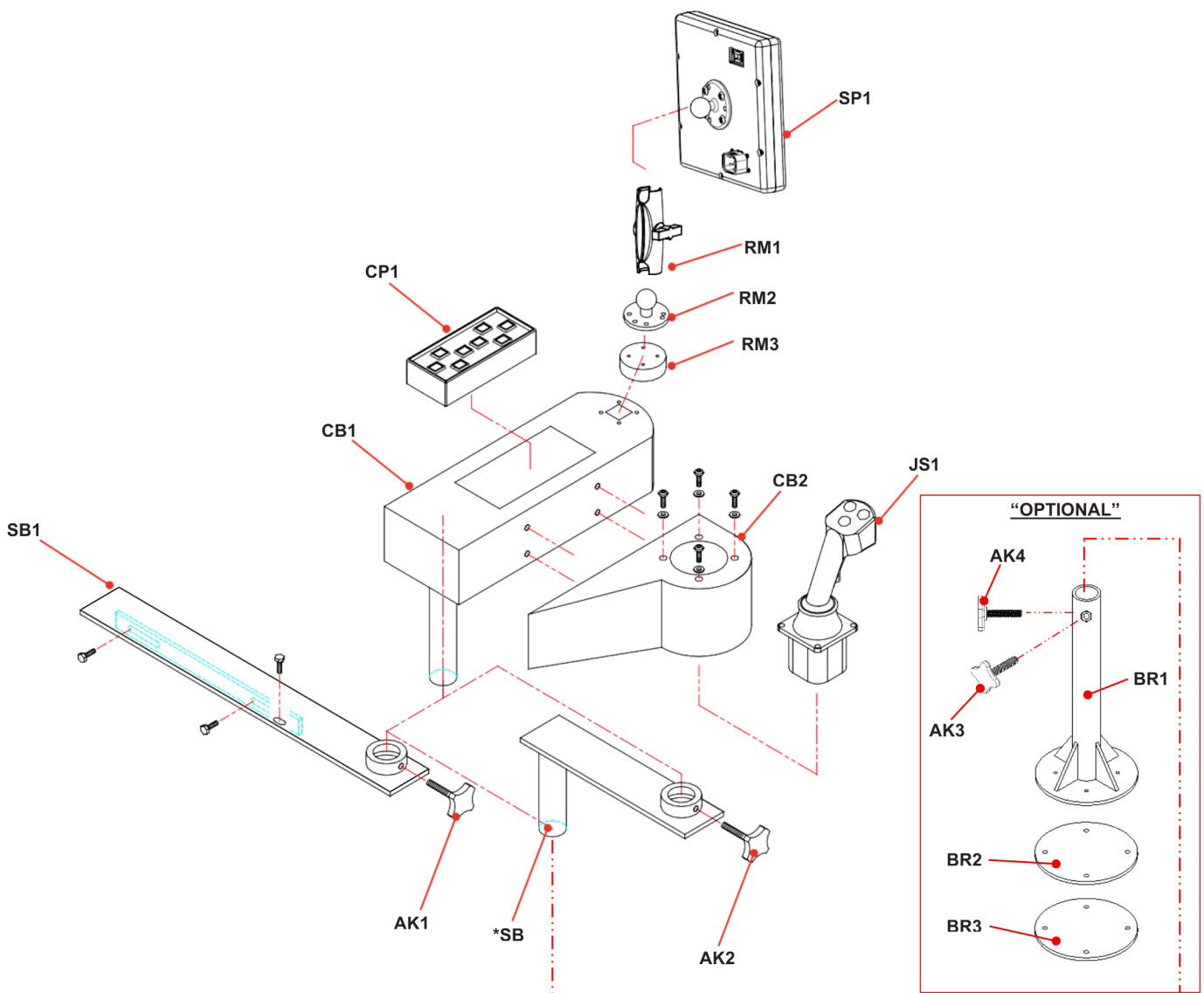
\* Optional component

# CONTROL CONSOLE - EXPLODED VIEW

## INSTALLATION INSTRUCTIONS

- 1 Lean the driver's seat cushion forward.
- 2 Lay the seat bracket across the seat sub-frame with the collet up and pointed toward the center of the truck. The slots in the lower flange of the seat bracket will line up with the bolt holes in the seat sub-frame located toward the front of the seat. Tighten the three (3) hex head cap screws provided.
- 3 Slide and fasten the console into the collet of the seat bracket. Install the (optional) extension arm for more lateral clearance.
- 4 Attach the console mounting base to the spreader controller.
- 5 Using the dog bone, connect the mounting base to the console.

For Optional Floor Mount, see instructions on page 17.

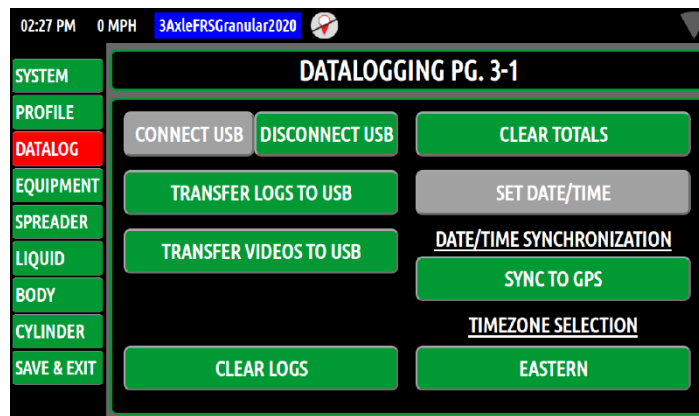




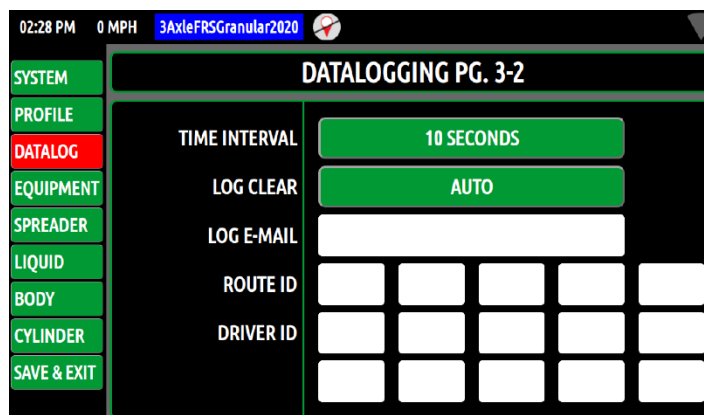
# INTERFACING TO AVL SYSTEMS

## DATA-LOGGING SETTINGS

- Data-logging Overview:** The Omni-System® Plus is designed to capture a snapshot of the system parameters every second and then report this information out via CAN at a configurable interval of 10, 30, 60, 90, or 120 seconds. Typically, the system will report out operator setpoints and sensor status taken within a second of the interval, historic average setpoints, totals since last cleared by the operator, and point-to-point output totals for the Spreader and Liquid.
- Enable Data-logging:** The data-logging system is enabled by default and cannot be disabled. There are several configuration operations that can be associated with the data-logging system. These items can be accessed through the controller's configuration menu.
  - Clearing Totals** – The CLEAR TOTALS button may be used to clear the system's data-logging totals.



- Time Interval** – On page 4 of the Data-logging Configuration Menu, the Time Interval parameter determines how frequently the system will log and transmit data. The options are 10, 30, 60, 90, and 120 seconds.



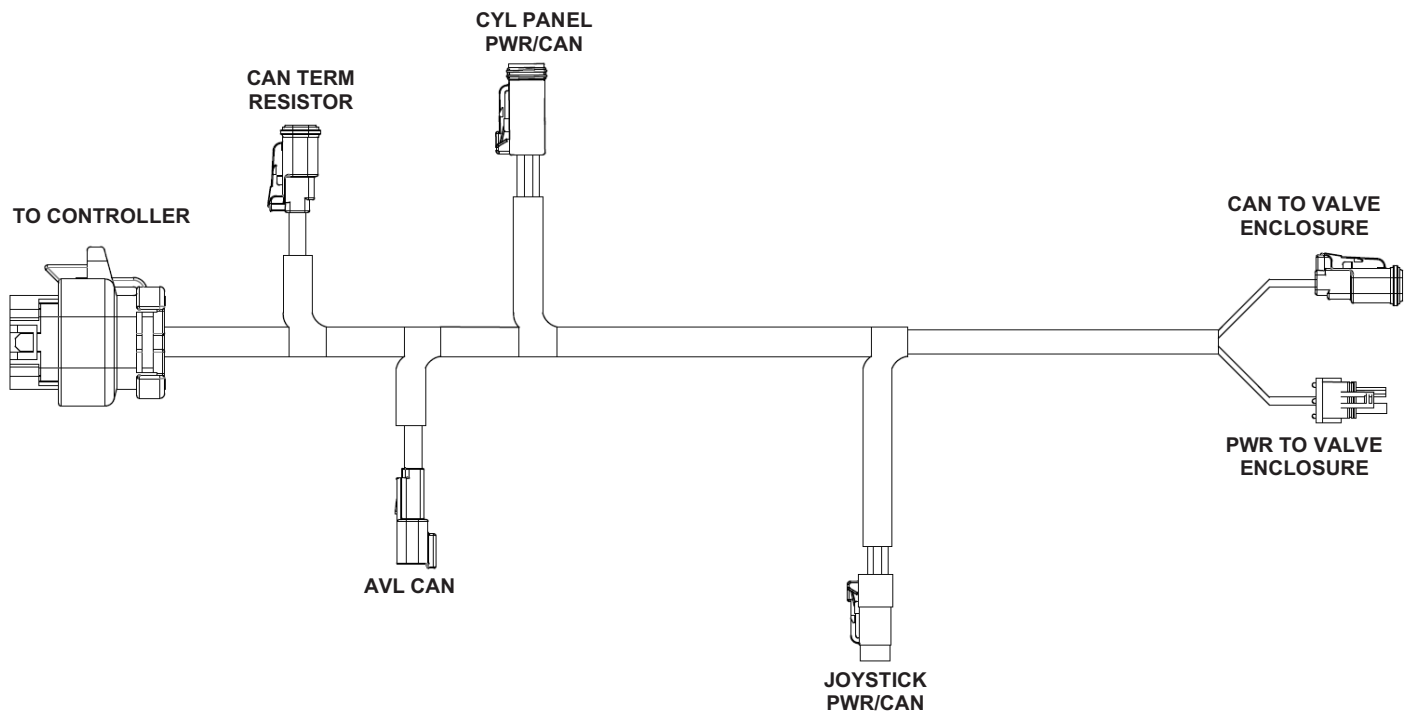
# INTERFACING TO AVL SYSTEMS

## AVL CONNECTIONS

**CAN Connection** – The recommended location to interface into the Omni-System® CAN-BUS is through the dedicated AVL connector of harness P/N: APWH67A. The mating connector is a DT06-2S, which can plug directly into receptacle AVL connector typically located directly under the control console.

**Note:** This will require a 120 ohm terminating resistor to be installed by your equipment for the new Omni-System®/Omni-System® Plus control panel.

- Pin 1 = CAN Hi (Lt. Green Wire)
- Pin 2 = CAN Lo (Blue Wire)



# EXTERNAL GPS INSTALLATION

## OPTIONAL OMNI-SYSTEM® PLUS GPS

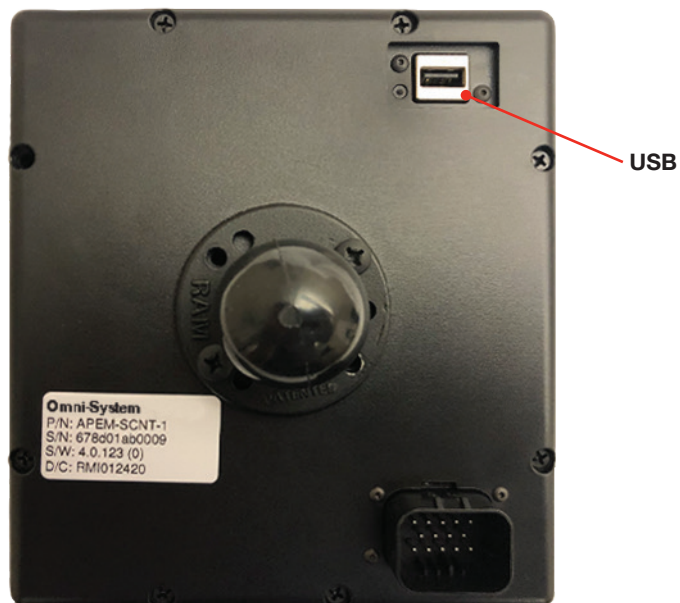
### GPS Sensor Installation

In the unlikely event the internal GPS within the Omni-System® Plus is unable to lock onto a signal within the cab, an external antenna can be utilized.

- 1. Locate** – Locate the GPS antennae (P/N: NXGPS) in the cab within close proximity to the spreader panel using the integrated magnet or provided suction cup. We recommend placing the antenna so that it has clear signal reception.



- 2. Connect** – Plug the GPS USB connector into the USB port located on the back of the spreader controller.



# SPREADER CONTROLLER PIN-OUTS (TYPICAL)

LOCATED IN TRUCK CAB  
(P/N: APEMSC7TA2)

SPREADER CONTROLLER			
PIN	IDENTITY	FUNCTION	COLOR
1	CAN0 L	CAN-BUS	Green
2	CAN0 H	CAN-BUS	White
3	CAN1 L	CAN-BUS	Blue
4	CAN1 H	CAN-BUS	Green
5	+5 V Out	Sensor Supply	Yellow
6	CAN2 L	CAN-BUS	
7	CAN2 H	CAN-BUS	
8	J1708 A	Serial Com.	
9	J1708 B	Serial Com.	
10	+V In	Supply Voltage	Red
11	GND	Ground	Black
12	Dig1		Gray
13	Dig2		Brown
14	Dig3	Ditco Temp Sensor	Orange

NOTE: Settings/pin assignments show are for reference only and may not be indicative of your system. Refer to diagrams under hydraulic enclosure lid for your specific system configuration.

# MODULE PIN-OUTS

PRIMARY MODULE – LOCATED IN TANK ENCLOSURE  
(P/N: APEMPRI1)

PRIMARY MODULE				
PIN	IDENTITY	FUNCTION	COLOR	INPUT TRIGGER STATE
A.1	+V In	12 V Nom. Pwr	Red	-
A.2	+V In SW	12 V Switched Pwr	Red	-
A.3	Relay	Relay Drive	Red	-
A.4	CAN Lo	CAN-BUS	White	-
A.5	CAN Hi	CAN-BUS	Blue	-
A.6	GND	-12 V Nom. Pwr	Black	-
A.7	Output 1 (Freq #1)	Spinner	White	-
A.8	Output 2 (Freq #1)	Auger	Orange	-
A.9	Output 3 (Freq #1)	Pre-wet	Green	-
A.10	Output 4 (Freq #1)			-
A.11	Output 5 (Freq #2)	TS1	Brown	-
A.12	Output 6 (Freq #2)			-
B.1	Dig Input 1	Low Oil	White	GND
B.2	Dig Input 2		Green	GND
B.3	Dig Input 3	Anti-ice Feedback	Blue	GND
B.4	Dig Input 4	Low Liquid Level	Purple	GND
B.5	+5 V	Sensor Supply	Red	-
B.6	Analog Input 1	Pump Pressure	Gray	-
B.7	Analog Input 2	Load Pressure	Green	-
B.8	Analog Input 3	Oil Temperature	Purple	-
B.9	Analog Input 4		Unused	-
B.10	PWM Input 1	Groundspeed	Pink	-
B.11	PWM Input 2	Auger Feedback	Green	-
B.12	Ignition Signal	Ignition	Yellow	-



NOTE: Settings/pin assignments show are for reference only and may not be indicative of your system. Refer to diagrams under hydraulic enclosure lid for your specific system configuration.

# MODULE PIN-OUTS

SECONDARY MODULE – LOCATED IN VALVE ENCLOSURE  
(P/N: APEMSEC1)

PRIMARY MODULE			
PIN	IDENTITY	FUNCTION	COLOR
A.1	+V In	12 V Nom. Pwr	Red
A.2	+V In	12 V Nom. Pwr	Red
A.3	+V In	12 V Nom. Pwr	Red
A.4	CAN Hi	CAN-BUS	White
A.5	CAN Lo	CAN-BUS	Green
A.6	GND	-12 V Nom. Pwr	Black
A.7	+V In	12 V Nom. Pwr	Red
A.8	CAN Lo	CAN-BUS	Green
A.9	CAN Hi	CAN-BUS	White
A.10	Address 1	Module Address	Unused
A.11	Address 2	Module Address	Unused
A.12	+5 V	Input Voltage	Unused
B.1	Output 1 (Freq #1)	Plow Up	Brown
B.2	Output 2 (Freq #1)	Plow Down	White
B.3	Output 3 (Freq #1)	Plow Down Relief	Gray
B.4	Output 4 (Freq #1)	Plow Left	Blue
B.5	Output 5 (Freq #1)	Plow Right	Purple
B.6	Output 6 (Freq #1)	Dump Up	Yellow
B.7	Output 7 (Freq #1)	Dump Down (#1)	Orange
B.8	Output 8 (Freq #1)	Wing Up	Pink
B.9	Output 9 (Freq #2)	Wing Down	Lt. Green
B.10	Output 10 (Freq #2)	Left Boom	White
B.11	Output 11 (Freq #2)	Power Float Relief	Green
B.12	Output 12 (Freq #2)	Power Float ON/OFF	Blue



NOTE: Settings/pin assignments show are for reference only and may not be indicative of your system. Refer to diagrams under hydraulic enclosure lid for your specific system configuration.

# MODULE PIN-OUTS

## SECONDARY MODULE 2 – LOCATED IN VALVE ENCLOSURE (P/N: APEMSEC1)

PRIMARY MODULE			
PIN	IDENTITY	FUNCTION	COLOR
A.1	+V In	12 V Nom. Pwr	Red
A.2	+V In	12 V Nom. Pwr	Red
A.3	+V In	12 V Nom. Pwr	Red
A.4	CAN Hi	CAN-BUS	White
A.5	CAN Lo	CAN-BUS	Green
A.6	GND	-12 V Nom. Pwr	Black
A.7	+V In	12 V Nom. Pwr	Red
A.8	CAN Lo	CAN-BUS	Green
A.9	CAN Hi	CAN-BUS	White
A.10	Address 1	Module Address	Red
A.11	Address 2	Module Address	Unused
A.12	Dig Input 1		
B.1	Output 1 (Freq #1)	Wing Retract	Brown
B.2	Output 2 (Freq #1)	Wing Extend	White
B.3	Output 3 (Freq #1)	Hook Lift Extend	Blue
B.4	Output 4 (Freq #1)	Hook Lift Retract	Purple
B.5	Output 5 (Freq #1)	Anti-ice	Yellow
B.6	Output 6 (Freq #1)		
B.7	Output 7 (Freq #1)		
B.8	Output 8 (Freq #1)		
B.9	Output 9 (Freq #2)		
B.10	Output 10 (Freq #2)		
B.11	Output 11 (Freq #2)	Center Boom	Brown
B.12	Output 12 (Freq #2)	Right Boom	Pink



NOTE: Settings/pin assignments show are for reference only and may not be indicative of your system. Refer to diagrams under hydraulic enclosure lid for your specific system configuration.

# MODULE PIN-OUTS

MOTOR MODULE – LOCATED PRE-WET ENCLOSURE  
(P/N: APEMLIQ1)



PRIMARY MODULE			
PIN	IDENTITY	FUNCTION	COLOR
A.1	Analog Input 1		
A.2	Analog Input 2		
A.3	CAN Hi	CAN-BUS	White
B.1	Dig Input 1		
B.2	Dig Input 3		
B.3	CAN Lo	CAN-BUS	Green
C.1	Dig Input 2		
C.2	Dig Input 4		
C.3			
D.1	PWM IN 1	Pre-wet Feedback	Purple
D.2	PWM IN 3		
D.3			
E.1	PWM IN 2		
E.2	PWM IN 4		
E.3	+V Out		
F.1	Output 3		
F.2	Output 2		
F.3	+5 V Out	Sensor Supply	
G.1	Output 5		
G.2	Output 4		
G.3			
H.1	Output 1	Liquid Output	Orange
H.2	Output 1	Liquid Output	Orange
H.3			
J.1	Output 1	Liquid Output	Green
J.2	GND	Ground	Black
J.3	GND	Ground	Black
K.1	+V In	12 V Switched Pwr	Red
K.2	+V In	12 V Switched Pwr	Red
K.3	+V In	12 V Switched Pwr	Red

NOTE: Settings/pin assignments show are for reference only and may not be indicative of your system. Refer to diagrams under hydraulic enclosure lid for your specific system configuration.

# MODULE PIN-OUTS

MULTI-FUNCTION MODULE – LOCATED IN CONSOLE  
(P/N: APEMMFA2)

PRIMARY MODULE			
PIN	IDENTITY	FUNCTION	COLOR
C.1	+V In	12 V Nom. Pwr	Red
C.2	Digital 2	Plow Down	White
C.3	Digital 3	E-Retract	Brown
C.4	CAN Hi	CAN-BUS	White
C.5	CAN Lo	CAN-BUS	Green
C.6	GND	-12 V Nom. Pwr	Black
C.7	Digital 4		Unused
C.8	Analog 9		
C.9	Analog 10		
C.10	UART TX	Serial BUS	Orange
C.11	UART RX	Serial BUS	Brown
C.12	UART GND	-12 V Nom. Pwr	Black
D.1	Digital Input 1	Deadman	Brown
D.2	Analog Input 1	Plow Up/Down	Purple
D.3	Analog Input 2	Plow Left/Right	White
D.4	Analog Input 3	Dump Up/Down	Orange
D.5	Analog Input 4		
D.6	Analog Input 5	Wing Up/Down	Pink
D.7	Analog Input 6	Wing Extend/Retract	Gray
D.8	Analog Input 7	Hook Lift Extend/Retract	Green
D.9	Analog Input 8		
D.10	+V Out	12 V Nom. Pwr	Red
D.11	+5 V Out	+5 V Out	Yellow
D.12	GND	-12 V Nom. Pwr	White



NOTE: Settings/pin assignments show are for reference only and may not be indicative of your system. Refer to diagrams under hydraulic enclosure lid for your specific system configuration.

# WIRE HARNESSES LOCATION/ASSIGNMENT

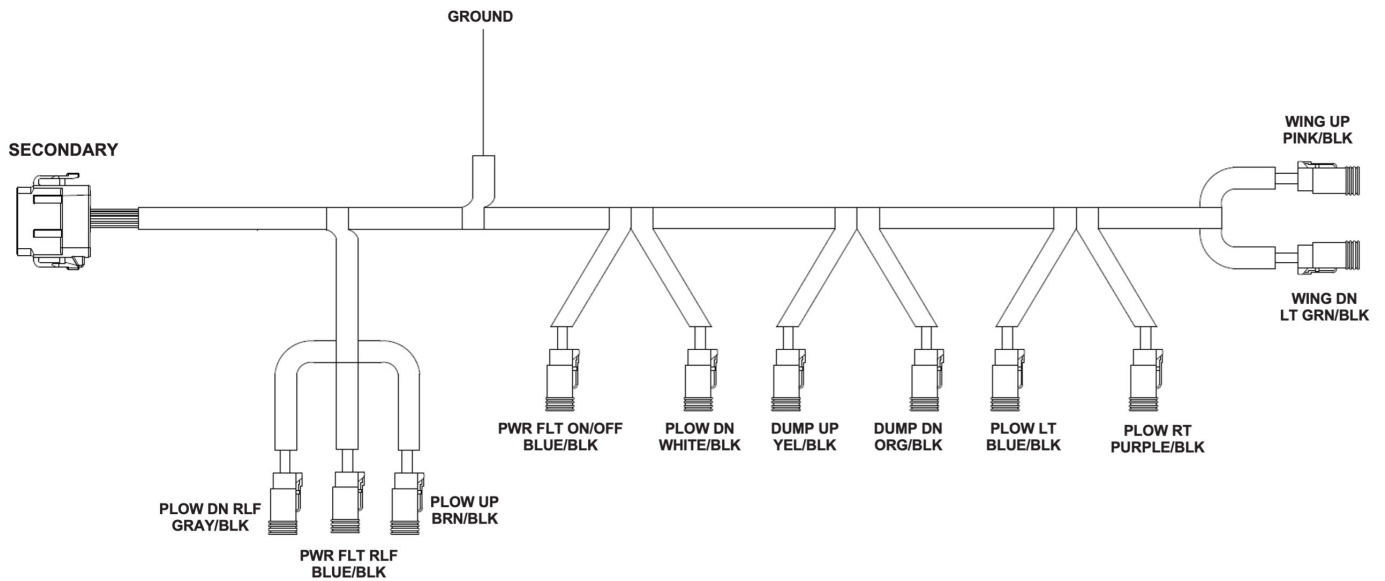
## PART NUMBER, LOCATION, AND FUNCTIONS

STANDARD HARNESS		
HARNESS NUMBER	DESCRIPTION	LOCATION
APWH194A	Hybrid Harness	Valve Enclosure
APWH195A	Hybrid Secondary #2 Harness	Valve Enclosure
APWH196B	Hybrid Secondary #2 Harness	Valve Enclosure
APWH197B	Hybrid Secondary Input Harness	Valve Enclosure
APWH198B	Hybrid Primary Harness	Valve Enclosure
APWH199A	Hybrid Boom Harness	Valve Enclosure

NOTE: Settings/pin assignments show are for reference only and may not be indicative of your system. Refer to diagrams under hydraulic enclosure lid for your specific system configuration.

# WIRE HARNESSES LOCATION/ASSIGNMENT

(P/N: APWH194A)

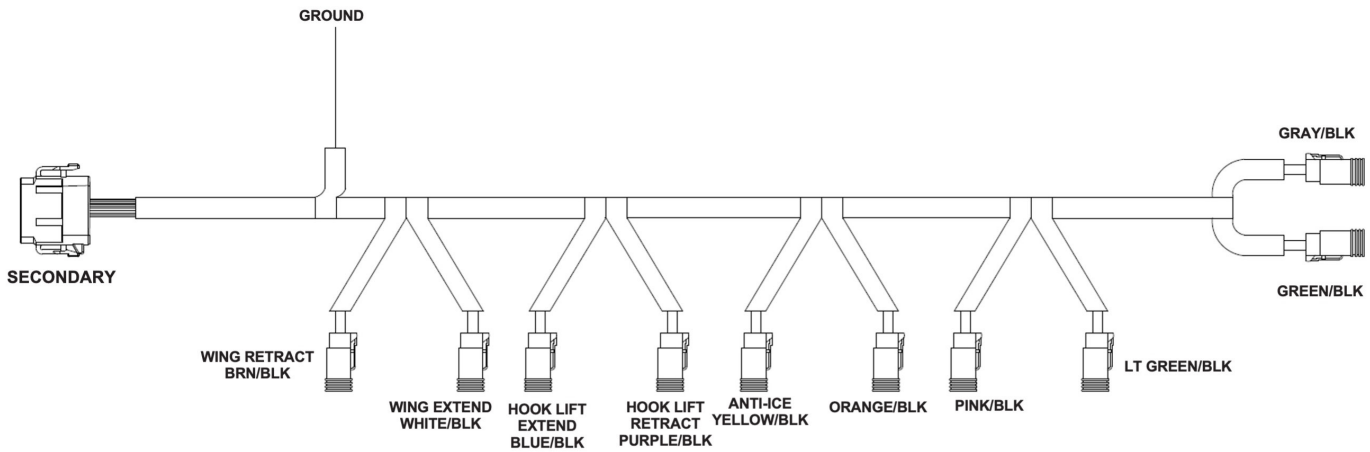


INDIVIDUAL VALVE PORT DESIGNATIONS		
PIN	FUNCTION	WIRE COLOR
B1	Plow Up	Brown
B2	Plow Down	White
B3	Plow Down Relief	Gray
B4	Plow Left	Blue
B5	Plow Right	Purple
B6	Dump Up	Yellow
B7	Dump Down	Orange
B8	Wing Up	Pink
B9	Wing Down	Lt. Green
B10		
B11	Power Float Relief	Green
B12	Power Float ON/OFF	Blue

NOTE: Settings/pin assignments show are for reference only and may not be indicative of your system. Refer to diagrams under hydraulic enclosure lid for your specific system configuration.

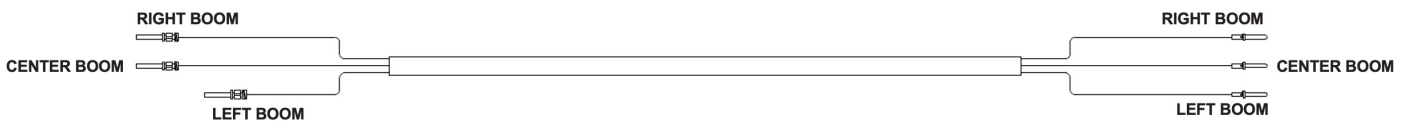
# WIRE HARNESSES LOCATION/ASSIGNMENT

(P/N: APWH194A)



SECONDARY 12 POS. PLUG		
PIN	FUNCTION	WIRE COLOR
B1	Wing Retract	Brown
B2	Wing Extend	White
B3	Hook Lift Extend	Blue
B4	Hook Lift Retract	Purple
B5	Anti-ice	Yellow
B6		Orange
B7		Pink
B8		Lt. Green
B9		Gray
B10		Green
B11		
B12		

(P/N: APWH199A)

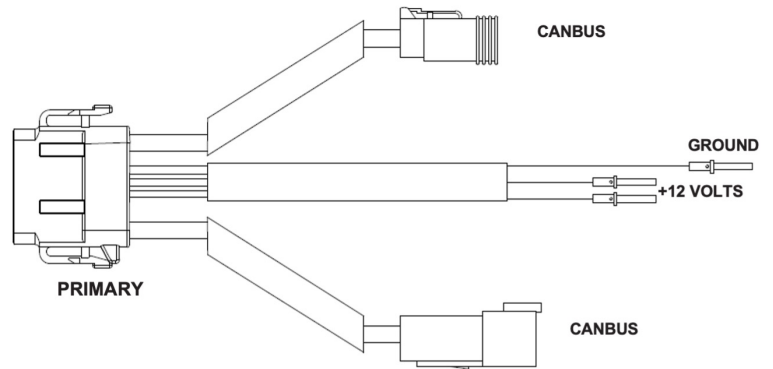


NOTE: Settings/pin assignments show are for reference only and may not be indicative of your system. Refer to diagrams under hydraulic enclosure lid for your specific system configuration.

# WIRE HARNESSES LOCATION/ASSIGNMENT

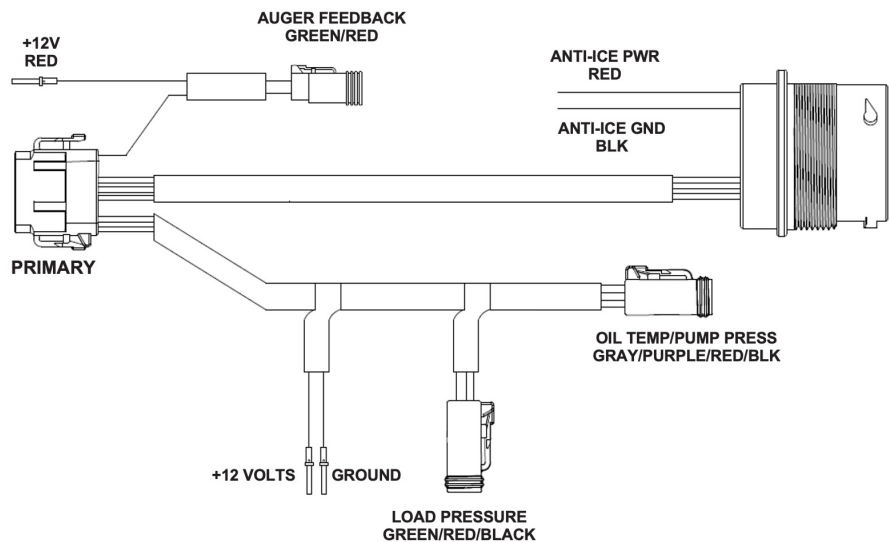
(P/N: APWH196A)

PRIMARY 12 POS. PLUG		
P/N	FUNCTION	WIRE COLOR
A1	12 V Nom. Pwr	Red
A2	12 V Nom. Pwr	Red
A3	12 V Nom. Pwr	Red
A4	CAN Hi	White
A5	CAN Lo	Green
A6	-12 V Nom. Pwr	Black
A7	-12 V Nom. Pwr	Red
A8	CAN Lo	Green
A9	CAN Hi	White
A10	Module Address	Red
A11	Module Address	-
A12	-	-



(P/N: APWH197A)

SECONDARY 12 POS. PLUG		
P/N	FUNCTION	WIRE COLOR
B1	Low Oil	White
B2	-	Green
B3	Anti-ice Feedback	Blue
B4	Low Liquid Level	Purple
B5	Sensor Supply	Orange
B6	Pump Pressure	Gray
B7	Load Pressure	Green
B8	Oil Temp	Purple
B9	-	-
B10	Groundspeed	Pink
B11	Auger Feedback	Green
B12	Ignition	Yellow



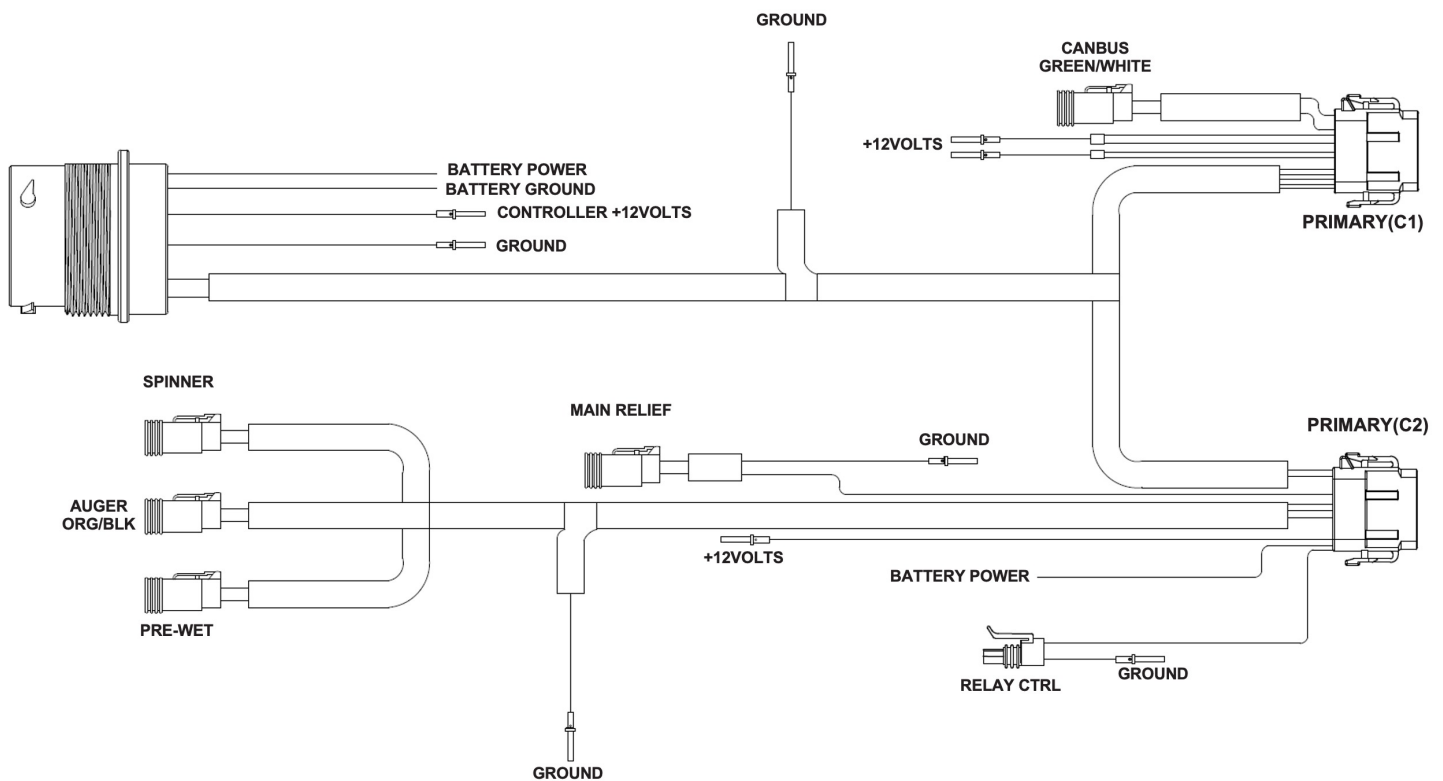
NOTE: Settings/pin assignments show are for reference only and may not be indicative of your system. Refer to diagrams under hydraulic enclosure lid for your specific system configuration.

# WIRE HARNESSES LOCATION/ASSIGNMENT

(P/N: APWH198A)

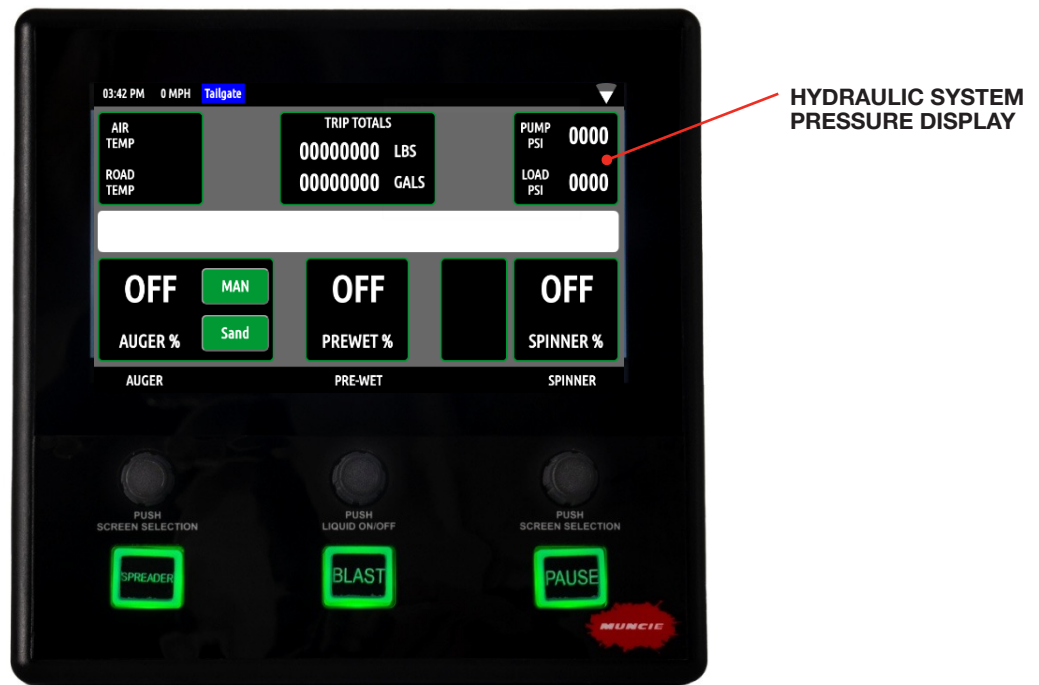
PRIMARY 12 POS. PLUG (C1)		
P/N	FUNCTION	WIRE COLOR
A1	12 V Nom. Pwr	Red
A2	12 V Nom. Pwr	Red
A3	12 V Nom. Pwr	Red
A4	CAN Hi	White
A5	CAN Lo	Green
A6	-12 V Nom. Pwr	Black
A7	-12 V Nom. Pwr	Red
A8	CAN Lo	Green
A9	CAN Hi	White
A10	-	-
A11	-	-
A12	-	-

PRIMARY 12 POS. PLUG (C2)		
P/N	FUNCTION	WIRE COLOR
A1	12 V Nom. Pwr	Red
A2	12 V SW Pwr	Red
A3	Relay Drive	Red
A4	CAN Hi	White
A5	CAN Lo	Green
A6	-12 V Nom. Pwr	Black
A7	Spinner	White
A8	Auger	Orange
A9	Pre-wet	Green
A10	-	-
A11	Main Relief	Brown
A12	-	-



NOTE: Settings/pin assignments show are for reference only and may not be indicative of your system. Refer to diagrams under hydraulic enclosure lid for your specific system configuration.

# PRESSURES EXPLAINED



**Pump PSI** – The pump pressure indicates the inlet pressure from the pump. This pressure will always be approximately 200–300 PSI higher than the load sense pressure. This pressure will never exceed the main relief setting.

**Load PSI** – The load sense PSI indicates the pressure of the hydraulic load. Without any functions operating, the load sense pressure will display approximately 0 PSI (readings of 50–100 PSI are typical).

**Boost/Differential Pressure** – The boost, or differential pressure, is the difference between the pump and the load sense pressures. When equipped with a gear pump, this setting can be adjusted at the boost pressure relief located in the primary valve assembly. When equipped with a piston pump, this setting is adjusted on the pump control module. Muncie Power's valve network requires an approximate differential pressure of 200–300 PSI.

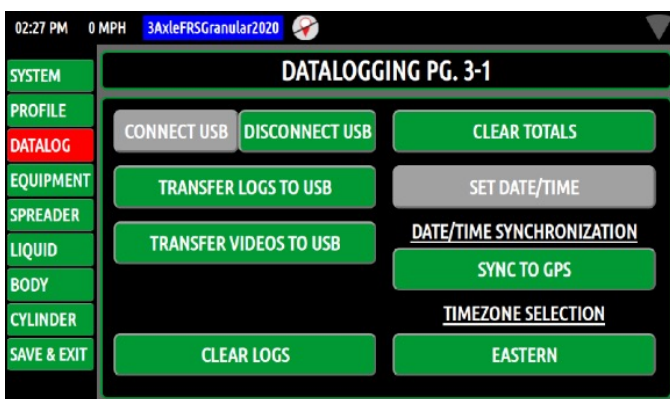
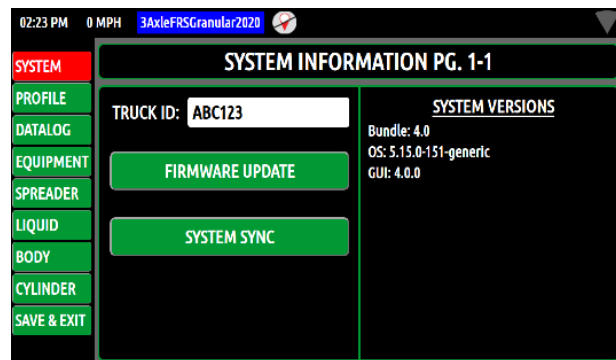
# SYSTEM CHECKLIST

## HYDRAULIC INFORMATION:

1. **Hose and Fittings Secured** – Check that all hose and fittings are secure, away from moving parts, and heat sources.
2. **Leaks** – Check all seals, hose, and filters for leaks.
3. **Quick Couplers** – Check that all quick couplers are fully seated.
4. **Manual Overrides** – Check that all manual overrides are disengaged and pressures are normal.
5. **Foaming Oil** – Check tank for foaming oil.

## WIRING INFORMATION

6. **Controller Power** – Verify controller stays on for 10 seconds after the ignition is disengaged.
7. **Speedometer Input** – Check that the pink groundspeed wire is connected to the truck's speedometer output.
8. **Sensor Functionality** – Check that all sensors are properly connected and functional.
9. **Wiring Connections** – Check that all wiring connectors are properly connected and functional.
10. **Set Truck ID** – Click on the Truck ID and input the appropriate # for the Omni-System® Plus
11. **Set time and date for Omni-System® Plus**  
Click on the date and time box.  
Input the month, day, year, time, and time zone.



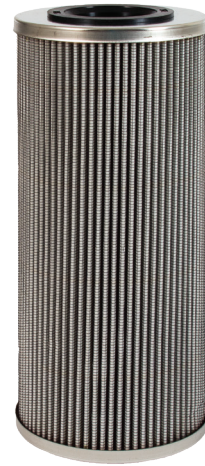
12. **System Calibrations** – Reference the controller configuration manuals to calibrate the speedometer, weighed dump calibration, and actuator trim settings.

# HYDRAULIC COMPONENTS

## PART NUMBERS AND DESCRIPTION



Return Line Filter Assembly  
P/N: TRLF52SG10



Return Line Filter Element  
P/N: TRE501G10



High Pressure Filter Assembly  
P/N: PLFV5010G501612



High Pressure Filter Element  
P/N: PLFV10GRE



Filter Gauge 1  
P/N: FG4



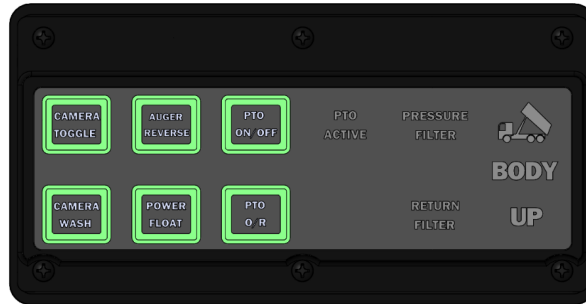
Pressure Gauge  
P/N: 31T43393B2

# ELECTRICAL COMPONENTS AND MODULES

## OPERATOR CONTROL OPTIONS



Omni-System® Plus  
Spreader Controller  
P/N: APEMSC7TA2



6-Button Cylinder Panel  
P/N: APEMCPAC1



Cylinder Panel  
P/N: APEMCPAA2



2 Axis, 3 Function Joystick  
P/N: EJK2P3DCAN



3 Axis, 3 Function Joystick  
P/N: EJK2P3DCAN2



1 Axis, Mini Joystick  
P/N: EJK2P0DTG5K



2 Axis Mini Joystick  
P/N: EJK2P0DTG4K



3 Axis Mini Joystick  
P/N: EJK2P0DTG3K

# ELECTRICAL COMPONENTS AND MODULES

## INPUT/OUTPUT MODULE OPTIONS



Primary Module  
P/N: APEMPRI1



Secondary Module  
P/N: APEMSEC1



Video Module  
P/N: APEMCAM1



Gen 3 Liquid/Anti Ice Module  
P/N: APEMLIQ1



Gen 3 Auxiliary Spreader Module  
P/N: APEMAUX1



Gen 2 Multi Function Module  
P/N: APEMAUX1



CAN Splitter Module  
P/N: APEMCSP1



# HYDRAULIC INSTALLATION

## FILTRATION REQUIREMENTS

1. Clean all hose assemblies before installation.
2. The system should be flushed with a remote filter cart, where possible.
3. High-pressure elements with condition indicators are recommended to minimize valve inlet-side contamination.
4. Upon initial startup, it is recommended to engage the pump and allow the system to cycle oil for 20 minutes before actuating any functions. Contamination frequently occurs during system installation.
5. It is recommended to cycle each of the cylinder functions 10–15 times to ensure that all contamination is dislodged from actuators.

**Failure to provide and maintain required minimum filtration levels may result in premature malfunction or failure.**

<p><b>Recommended Minimum Filtration</b> <b>ISO 4406:1999</b></p> <p><b>SAE J1165</b></p> <p><b>4µm / 6µm / 14µm</b></p>
<p><b>18 / 16 / 13</b></p>

# TROUBLESHOOTING

GLOBAL SYSTEM ISSUES	
Symptom	Possible Cause
System powered, but nothing operates hydraulically	<ul style="list-style-type: none"> <li>• Check controller for shutdown errors and address (hot oil, low oil, low pump PSI)</li> <li>• Verify that the PTO activation solenoid is receiving 12 V and is engaging</li> <li>• Make sure pump is receiving flow from tank (inlet ball valve must be open)</li> <li>• Verify that the pump is producing flow (install flow meter)</li> <li>• Swap Unloading Compensator Cartridge (EV1)</li> <li>• Check pump standby pressure, possibly set too low. It should be set at 300 PSI.</li> <li>• Verify load sense line is routed to pump, not impeded, or collapsed</li> <li>• Check to see if modules are present and recognized in configuration menu</li> <li>• Verify that spreader panel and modules are plugged into CAN connection</li> <li>• Verify modules are on same firmware bundle, correct profile is loaded</li> <li>• Check for module software mismatch</li> </ul>
Electronics do not power	<ul style="list-style-type: none"> <li>• Check to see if ignition input is connected to 12 V</li> <li>• Check power/ground connections</li> <li>• Check fuse</li> <li>• Check to make sure the master module is plugged in</li> <li>• If applicable, check the ignition source fuse on the truck</li> <li>• Check the power relay and connections located within the enclosure</li> </ul>
PTO/pump not engaging	<ul style="list-style-type: none"> <li>• Check for low hydraulic oil/faulty float switch in tank</li> <li>• Check for hot oil shutdown; possibly check the temperature transducer</li> <li>• Check for faulty pump pressure switch</li> <li>• If momentarily works while overriding, check pump pressure switch</li> </ul>
System is overheating/running at main relief	<ul style="list-style-type: none"> <li>• PTO/pump not engaging</li> <li>• Check pressure with motors engaged; investigate seized motor or gearbox.</li> <li>• Investigate the quick disconnect to ensure it is seated correctly</li> <li>• Check all manual overrides to ensure nothing is unintentionally engaged</li> <li>• Swap the downside TS and the hoist downside TS cartridges</li> </ul>
Incorrect cylinders actuating	<ul style="list-style-type: none"> <li>• Check for incorrect profile loaded</li> <li>• Check hydraulic post assignments</li> </ul>
Rough pump engagement	<ul style="list-style-type: none"> <li>• Swap the FR1 load sense cartridge</li> </ul>

# TROUBLESHOOTING

GLOBAL SYSTEM ISSUES	
Symptom	Possible Cause
Primary and/or secondary lost	<ul style="list-style-type: none"> <li>• Check that modules are connected into harnessing within the valve enclosure</li> <li>• Verify the terminating resistor is present</li> <li>• Verify that CAN pins are not bent within the I/O module receptacles</li> <li>• Check CAN harness running between spreader controller and hydraulic enclosure</li> <li>• Check that CAN Hi/CAN Lo pins are properly seated within the connector (cab side)</li> </ul>
PTO constantly engaged	<ul style="list-style-type: none"> <li>• Indicates clutch packs are seized; service and replace clutch pack assembly on PTO</li> </ul>
Milky oil	<ul style="list-style-type: none"> <li>• Check for aerated oil; correct plumbing if necessary to prevent air intrusion</li> <li>• Check for water contamination in oil; either filter or change oil.</li> </ul>
Burnt oil	<ul style="list-style-type: none"> <li>• Drain and replace oil, clean tank, check operating pressures to verify system is operating correctly</li> </ul>
HOIST RELATED ISSUES	
Symptom	Possible Cause
Hoist does not raise	<ul style="list-style-type: none"> <li>• Check the controller speed settings</li> <li>• Check the hoist down manual override (SP5)</li> <li>• Check the hoist down flow control for contamination (SP5)</li> <li>• Check the plumbing (are the HA and HB ports plumbed backwards)</li> <li>• Check the hoist up relief for contamination</li> <li>• Check if the plow cylinder is leaking internally</li> </ul>
Hoist raises but drifts back down slowly	<ul style="list-style-type: none"> <li>• Check the flow control for contamination (SP5 or additional SP)</li> <li>• Check the hoist upside relief (RV4) for contamination</li> <li>• Check standby setting on pump</li> </ul>
Single-acting telescopic hoist lowers slowly	<ul style="list-style-type: none"> <li>• Try increasing the maximum down speed setting</li> </ul>
Hoist lowers too fast or slams while lower	<ul style="list-style-type: none"> <li>• Turn the hoist maximum speeds down on the controller</li> </ul>
Hoist continues momentarily upward or downward after joystick returns to center	<ul style="list-style-type: none"> <li>• Adjust maximum trim settings down to not open valve wide open</li> </ul>

# TROUBLESHOOTING

PLOW SYSTEM ISSUES	
Symptom	Possible Cause
Plow does not raise	<ul style="list-style-type: none"> <li>• Check the controller speed settings in the configuration menu</li> <li>• Check the plow down manual override (SP2)</li> <li>• Check the plow down flow control for contamination (SP2)</li> <li>• Check the plumbing (are the PLA and PLB ports plumbed backwards)</li> <li>• Check the plow down relief (RV5) for contamination</li> <li>• Check if the plow cylinder is leaking internally</li> <li>• Inspect load sense check valve (CV3) blocking signal</li> <li>• Check cylinder panel harness; buttons should change from green to red when pushed</li> <li>• Try resyncing Truck Profile</li> </ul>
Plow raises slowly and drifts back down	<ul style="list-style-type: none"> <li>• Check for contamination in the plow down flow control (SP1)</li> <li>• Check for contamination in the plow up relief (RV5)</li> <li>• Check load holding valve for contamination (CV1)</li> <li>• Check if the plow cylinder is leaking internally</li> <li>• Check to ensure power float is not activated</li> </ul>
Plow lowers too fast or slams down	<ul style="list-style-type: none"> <li>• Decrease the maximum plow down speed settings in configuration menu</li> </ul>
Plow angles slow	<ul style="list-style-type: none"> <li>• Check the controller speed settings</li> <li>• Try replacing EHPR pilot control valves</li> <li>• Verify pump is outputting appropriate flow/displacement</li> <li>• Verify the boost/pump standby is set to at least 300 PSI</li> <li>• Sync Truck Profile</li> </ul>
Plow does not angle (left or right)	<ul style="list-style-type: none"> <li>• Check the plow angle speeds in the controller</li> <li>• Check EHPR1 (plow right pilot) or EHPR2 (plow left pilot)</li> <li>• Check PE2 for contamination</li> <li>• Check the electrical circuit for opens and shorts (look for error messages)</li> <li>• Check crossover relief on plow</li> <li>• Check to see if quick disconnects are seated properly</li> <li>• Check to see if quick disconnect manifold is held open (debris)</li> <li>• Do the cylinder panel buttons change from green to red; if not, check the harness</li> <li>• Sync Truck Profile</li> </ul>

# TROUBLESHOOTING

SPREADER RELATED ISSUES	
Symptom	Possible Cause
Spinner does not operate	<ul style="list-style-type: none"> <li>• Check the controller speed settings</li> <li>• Check the plumbing; check for unintentional deadheading of the function</li> <li>• Check the quick disconnects</li> <li>• If the function operates when switching motors, could have faulty motor</li> <li>• Check the spreader relief valve for contamination</li> <li>• Check CV; is the load sense signal being relayed back to the pump</li> </ul>
Auger/conveyor does not operate	<ul style="list-style-type: none"> <li>• Check the controllers speed settings</li> <li>• Check the plumbing; check for unintentionally deadheading of the function</li> <li>• Check the quick disconnects</li> <li>• Swapping supply to spinner, could have seized hydraulic motor/gearbox</li> <li>• Check the spreader relief for contamination</li> </ul>
No auto/unable to calibrate to truck MPH	<ul style="list-style-type: none"> <li>• Verify the controllers pink speedometer wire is connected to the truck speedometer</li> <li>• Go into Sensor Menu and view if the Primary PWM input is receiving speedometer pulses when moving</li> </ul>
Auger feedback jam error	<ul style="list-style-type: none"> <li>• Verify that the auger feedback sensor is electrically connected to the system</li> <li>• Check feedback sensor to ensure debris is not lodged in turbine</li> <li>• Verify if the hydraulic motor is able to rotate</li> </ul>
Pre-wet feedback jam error	<ul style="list-style-type: none"> <li>• Verify that the pre-wet feedback sensor is electrically connected to the system</li> <li>• Check feedback sensor to ensure debris is not lodged in turbine, seized</li> <li>• Verify there is liquid in the tanks</li> </ul>

# TROUBLESHOOTING

MISCELLANEOUS RELATED ISSUES	
Symptom	Possible Cause
Air/Road temp sensor not functioning	<ul style="list-style-type: none"> <li>• Verify that a sensor is installed and wired correctly</li> <li>• Make sure that the system is configured for the sensor (must be factory configured in profile)</li> <li>• Check the power and ground connections of the sensor</li> <li>• Verify that all the pins are in the correct locations and seated correctly in the connectors</li> </ul>
Air/Road temp sensors are incorrect	<ul style="list-style-type: none"> <li>• Try calibrating the sensor to the controller</li> <li>• Verify the air/road temp sensor is mounted in an appropriate location and not reading exhaust temp</li> <li>• Contact Muncie Power for lens replacement</li> </ul>
PSI not displayed on controller	<ul style="list-style-type: none"> <li>• Verify that the appropriate connector is plugged into the transducer receptacle</li> <li>• Verify that the pins of the connector are seated properly</li> </ul>
Incorrect PSI shown on the controller	<ul style="list-style-type: none"> <li>• Replace pressure transducer</li> </ul>





A Member of the Interpump Group

IN21-05 (Rev. 03-26)

201 East Jackson Street, Muncie, Indiana 47305  
800-367-7867 • Fax: 765-284-6991 • [info@munciepower.com](mailto:info@munciepower.com)

Specifications are subject to change without notice. Visit [www.munciepower.com](http://www.munciepower.com)  
for warranties and literature. All rights reserved. © Muncie Power Products, Inc. (2026)