



Chart Cryogenic Components Division * 407 7th Street NW * New Prague, MN 56071

APPS-160 USER MANUAL



**MANUAL PART NUMBER
11004146
REV #4**

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APPLICABLE PRODUCTS

10826658

REVISION LOG	DESCRIPTION
REV #1 (03/08/00)	Review and update manual and spare parts list.
REV #2 (09/14/00)	Add operation section.
REV #3 (12/05/00)	Replace rupture disc #1910042 with relief valve #11482105
REV #4 (05/11/01)	Replace solenoid # 10831035 with #11542577

Purpose:

The APPS (Adjustable Pressure Phase Separator) is used to lower the delivery pressure and saturation point of liquid nitrogen. Liquid nitrogen at high pressure will flow into the APPS, and exit at a much lower pressure. The liquid nitrogen saturation pressure / temperature will also be reduced. Liquid nitrogen enters the APPS through a solenoid valve, and exits through an Chart style 1-inch vacuum insulated female bayonet. A differential pressure switch maintains the liquid level in the cylinder. The internal pressure of the cylinder is controlled by the combination of a pressure switch connected to a solenoid valve and a back-pressure regulator. If the pressure exceeds the set point of the back-pressure regulator, the pressure switch activates a solenoid valve to rapidly vent the APPS down to the desired working pressure.

Function:

The APPS comes from the factory ready to be put into service. Simply connect the inlet and outlet lines and wire a 110-volt line to the electrical junction box. Before introducing liquid to the APPS or the transfer line connected to the APPS, thoroughly purge the entire system with dry nitrogen gas. Any ice in the system can cause the solenoid valves to operate erratically.

The APPS comes preset from the factory for a working pressure of 50 psig. To change the operating pressure of the APPS, connect the APPS to a nitrogen source and turn the power switch to the on position. Next, set the back-pressure regulator on the vent to the desired pressure by turning the adjusting screw on the top of the regulator. It may be necessary to plug the outlet of the solenoid vent valve to make this adjustment. Then, open the housing on the pressure switch, which is connected to the vent solenoid valve, and adjust the set screw in the pressure switch to a value of approximately 3 psi higher than the regulator. Be very careful during this process, the wiring is carrying 110 V AC and is powered if the main switch is in the on position. Refer to the pressure switch users guide for more information. It may be necessary to plug the outlet on the back-pressure regulator to make this adjustment.

The liquid level is maintained in the APPS by use of a differential pressure switch connected to the inlet solenoid valve. This switch may require adjustment when the APPS is received. The set points on the switch can be adjusted up or down depending on whether the APPS liquid level is high or low. If the unit vents liquid while filling, adjust the high-level control screw up (counter clockwise). Please note that this may also require that the low-level screw be adjusted up before the high-level screw can be adjusted. If the unit runs out of liquid during normal operation, adjust the low level control screw down (clockwise). Typically, the two control screws should be set as close as possible to each other (i.e. adjust the high level screw up to the desired set point, then adjust the low level screw down until it contacts the high level screw). To completely reset the level control, start with both set screws all the way up. Next, adjust the two screws down together (adjust the lower screw one-half turn, then the upper screw one-half turn and continue this process to keep the screws as close as possible to each other while lowering them). The fill solenoid valve will click open at some point during this process and will shut off when the level reaches a certain point. The screw should be lowered until the fill solenoid shuts off when the level gauge indicates the cylinder is about $\frac{3}{4}$ full. The APPS will now be ready for operation.

Application:

The APPS 160 is to be used in lower volume, low pressure liquid applications. Often times the APPS 160 is used when a second bulk storage tank is not an option due to space or budget constraints.

Location:

The unit is designed for installation beside the higher-pressure bulk system outside or prior to the application.

Specification:

Please refer to the following chart and drawing details for the features of this unit.

Height	61 9/16 inches
Width	30 3/16 inches (20 inch OD cylinder)
Weight	210 lbs
Capacity	160 liters / 42.27 gallons
Cryogenic Fluids	Nitrogen, Argon (Oxygen if specified when ordered)
Inlet Connection	½" Male 45° Flare Fitting
Outlet Connection	1" Female Chart Bayonet
Vent Connection	½" Female Pipe Thread with vent pipe
Maximum Allowable Working Pressure	100 PSI
Maximum Operating Pressure	50PSI
Maximum Inlet Pressure	200 PSI
Maximum Withdrawal Rate	15 gallons per minute continuous
Power Requirements	110 volt / 60 hz 200 watts
Applicable Codes the unit is designed	ASME Section 8, Division 1

Installation:

1. Remove the unit from the packaging.
2. Install unit into location of application.
3. Bolt the unit down using supplied hardware, if desired.
4. Provide 110 V AC power to the control box.
5. Connect the liquid supply to the APPS unit inlet connection using flex hose provided.
6. Connect the outlet connection to the application.
7. Install rain cover using bolts on liquid level gauge protector.
8. If possible purge unit with dry gas, then slowly introduce liquid to the unit.
9. **First fills will have excessive gas venting due to the unit not being cooled down to cryogenic temperature. This may cause excessive pressure rise in the unit. If excessive pressure is noted, close or throttle inlet valve to regulate this pressure.**
10. Once the unit has cooled down the level of liquid will rise until the differential pressure switch sends a signal to close the inlet valve.
11. The amount of filling will depend on the amount of liquid being used out of the phase separator.
12. Due to natural evaporation, the unit will eventually lose enough liquid to refill on its own with no call for liquid from the use point

Operation:

The APPS power switch must be in the on (1) position for operation. The APPS is off when the switch is in the 0 position. The LN2 supply line must be open to the APPS inlet plumbing. When the APPS is on, the LN2 level and outlet pressure are automatically controlled. The uninsulated inlet and vent plumbing will frost during use.

To stop operation of the APPS, turn the switch to the off (0) position. This will stop the APPS from refilling, however LN2 will still be supplied through the outlet until the APPS reservoir is empty.

Recommended Spare Parts:

All of the components on the APPS are rated for at least a ten-year life. However, the following parts are recommended to insure minimal loss of down time if a part should fail.

Part Number	Description
11482105	Relief Valve, 100 PSIG
11542577	Solenoid Valve

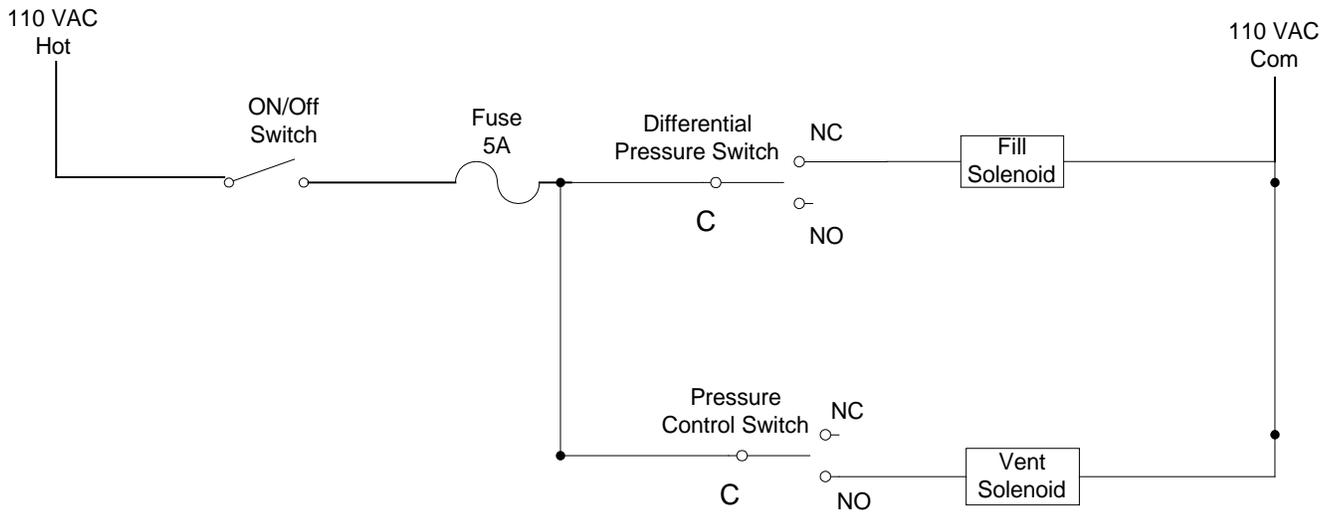
Please contact Chart if you should need further assistance with this product.

CHART

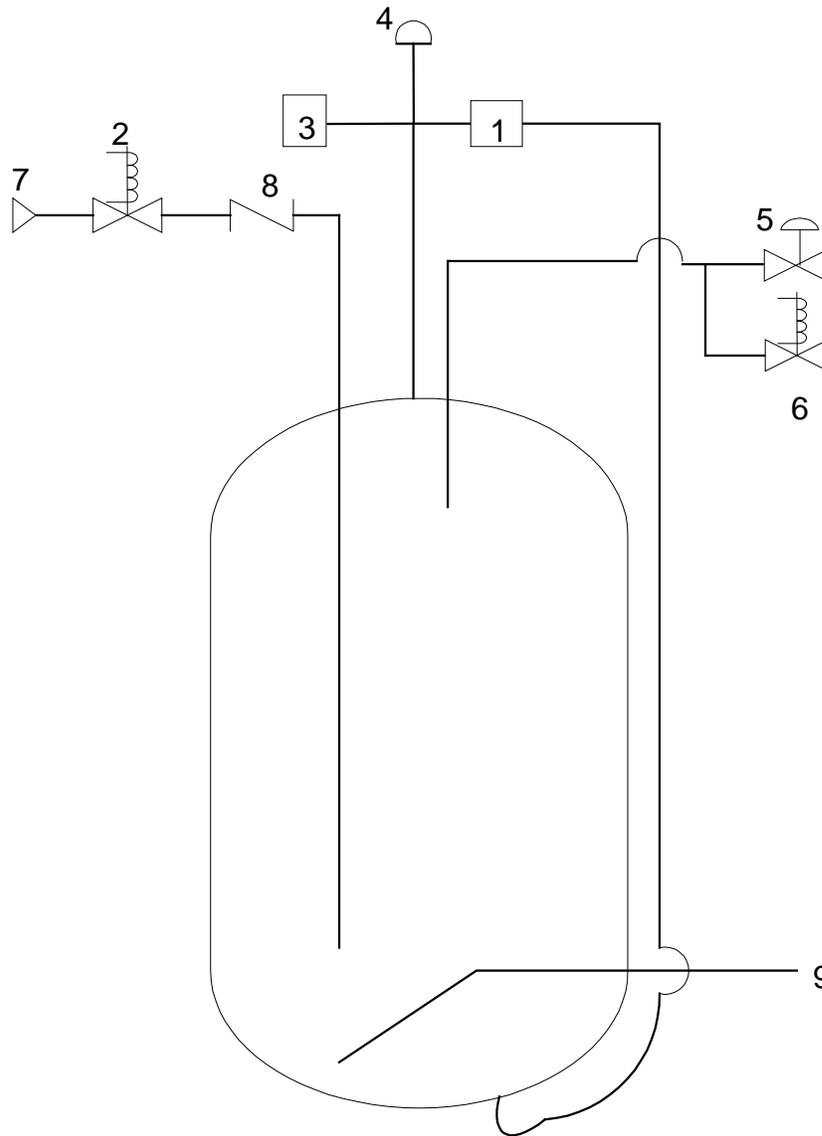
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Illustrations

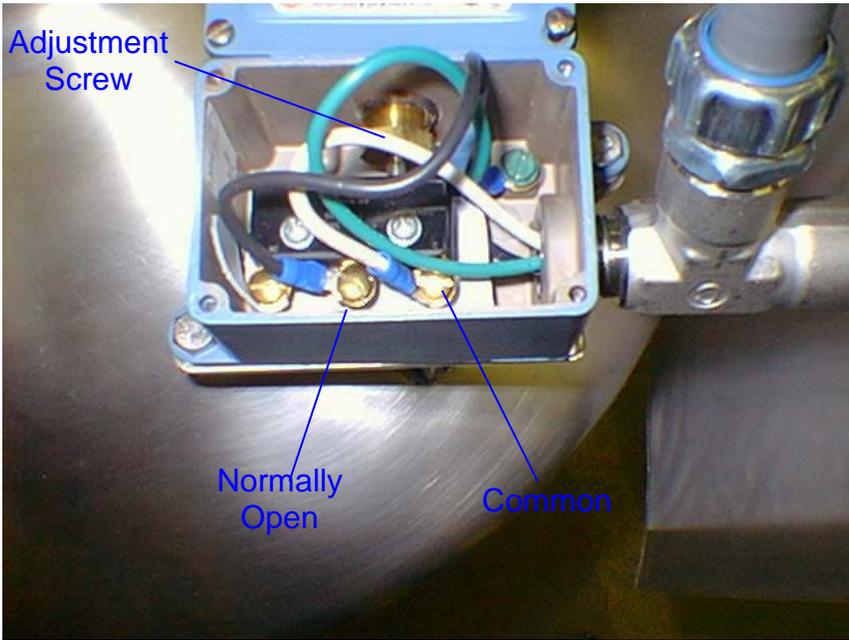
APPS Wiring Diagram

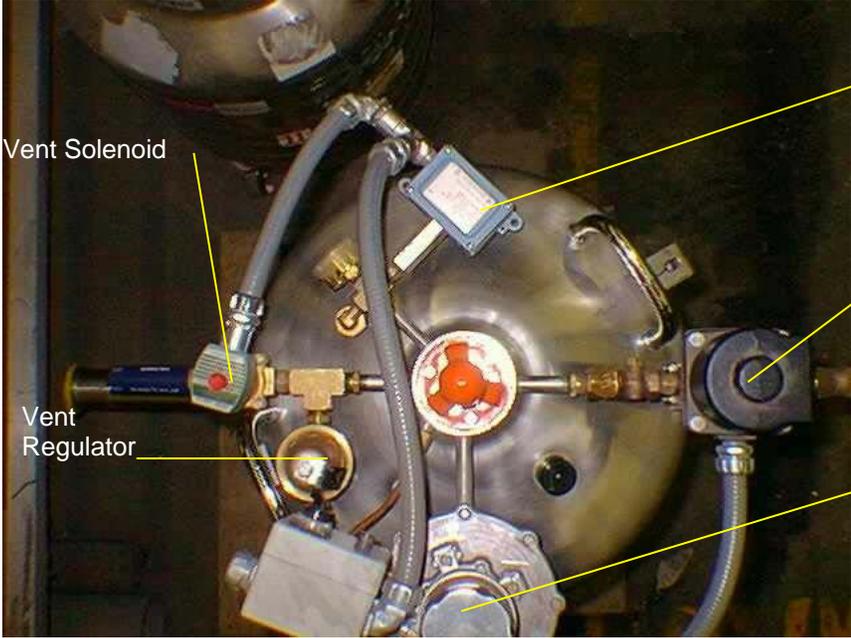


APPS Schematic



Item	Description	Chart P/N
1	Diff. Pressure Switch	10807166
2	Fill Solenoid Valve	11542577
3	Vent Pressure Switch	10805996
4	Relief Valve (100 PSIG)	11482105
5	Vent Back Press. Regulator	2110582
6	Vent Solenoid Valve	11542577
7	Strainer	4910082
8	Check Valve	1713572
9	1 Inch Female Bayonet	3513261





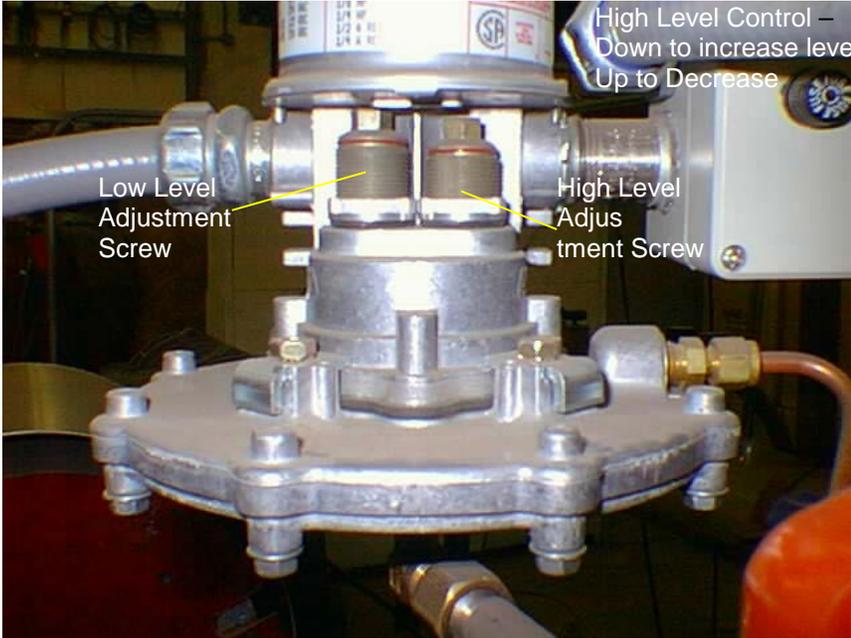
Vent Pressure Switch

Vent Solenoid

Fill Solenoid Valve

Vent Regulator

Differential Pressure Switch For Level Control



High Level Control -
Down to increase level
Up to Decrease

Low Level Adjustment Screw

High Level Adjustment Screw