



# Priority Fill Panel Manual

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## **Priority Fill Panel Installation and Service Manual Version No: 1.0.5**

**Model: Compressor Top Up models**

**Date: 7<sup>th</sup> December 2018**

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## Product Identification

### Specifications

**Manual Title** Priority Fill Panel Manual

**Original Publication Date** 22<sup>nd</sup> August 2014

**Models Covered** This manual applies to Priority Fill Panels  
***NOTE:** Do not use this manual for earlier models. Contact Compac for archived manuals if required.*

### Validity

Compac Industries Limited reserves the right to revise or change product specifications at any time. This publication describes the state of the product at the time of publication and may not reflect the product at all times in the past or in the future.

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## Foreword

All Priority Fill Panels are factory set up and tested on CNG. They should not require adjusting.

Please read this manual thoroughly before installing or attempting any service or adjustment.

Failure to do so may result in accident causing death or serious injury.

## Theory of Operation

The idea of a priority panel is to keep some of the storage gas at a higher pressure than 200 bar and use the available pressure of the rest of the storage to fill the vehicle as high as it can.

The compressor works on keeping part of the storage full without having to fill all the storage. Additionally if the high-pressure storage falls below 200 bar the last topping up can be done by the compressor.

This function is called priority filling the storage. The most popular priority filling system is a 3 Bank Priority fill with Compressor Top Up.

The storage is usually divided into 3 banks containing typically 20%, 30%, and 50% of the storage capacity. Although these are called High, Medium and Low banks they are all high pressure storage. The dispenser has 3 input lines from the storage.

This priority panel contains priority valves, which prevent parts of the storage from filling until other parts are full.

For example, the Three Bank Priority Fill Panel with Compressor Top Off initially directs the gas to the Dispenser High Bank Line until it reaches 230 bar. A priority valve then allows gas to pass through to the High Storage Bank. When the High Storage Bank reaches 230 bar the next priority valve allows gas to pass through to the medium storage bank. Similarly when the medium storage bank reaches 230 bar the final priority valve allows the low bank to be filled.

When all the storage reaches 230 bar, the banks all fill together until the compressor shuts off at 250 bar.

Should vehicles be filling while the compressor is running, the priority valves operate to keep the high line to the dispenser full before charging the high bank and thereafter the medium and low banks.

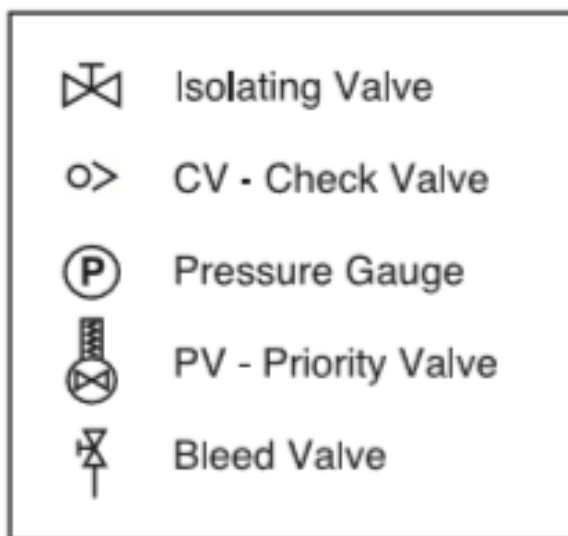
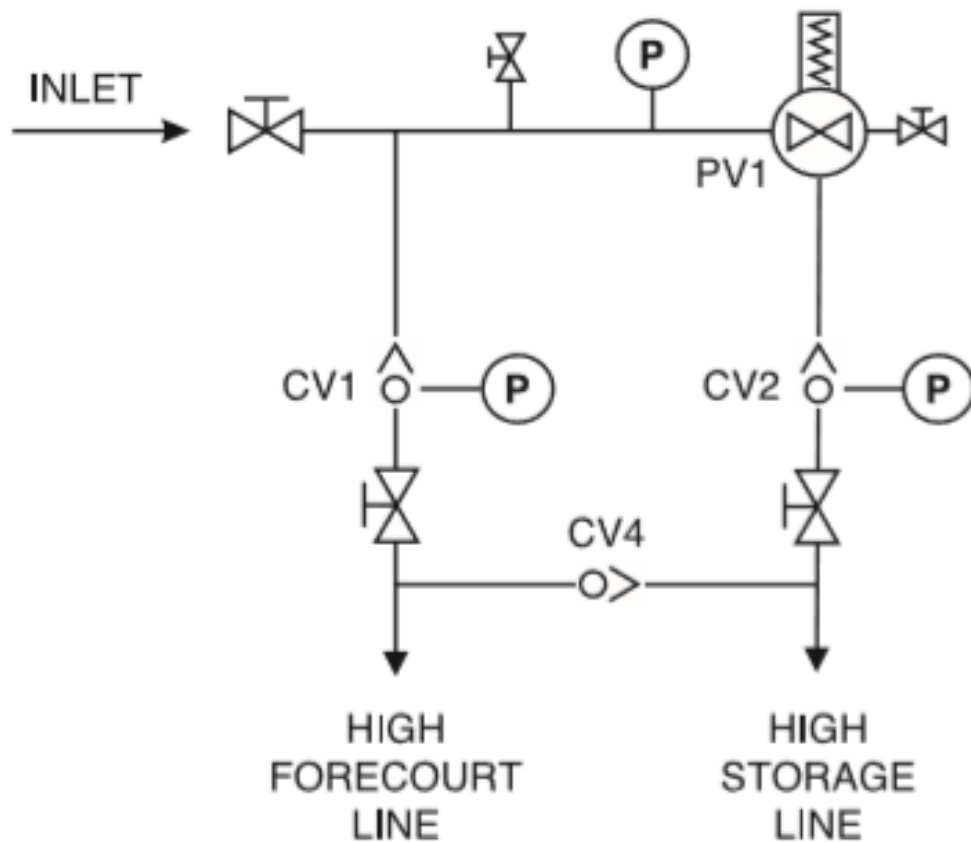
To allow for emergency stopping, panels can be fitted with optional solenoids that will close when power is removed from them. For servicing panels fitted with air actuated valves, refer to Compac air actuated valve supplement.

The Priority Panels come in different configurations to suit different storage arrangements.

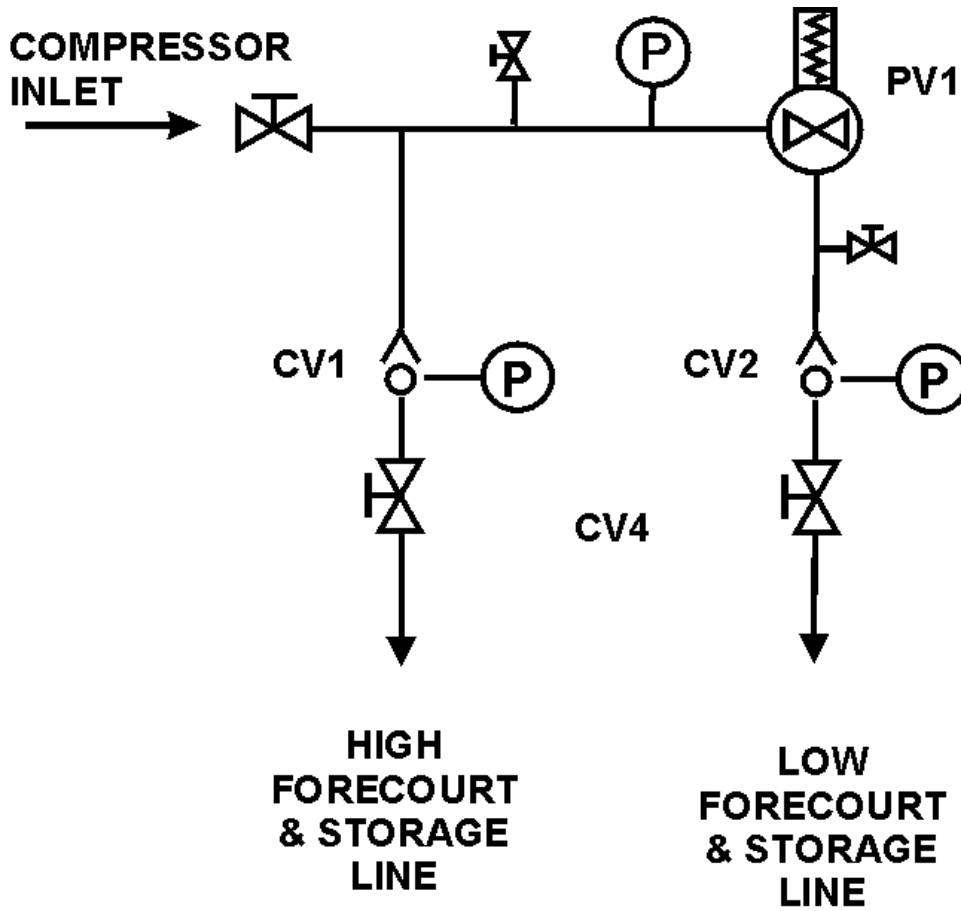


## Schematic Diagrams






### 1B-PFP-CTU One bank priority fill with compressor top up



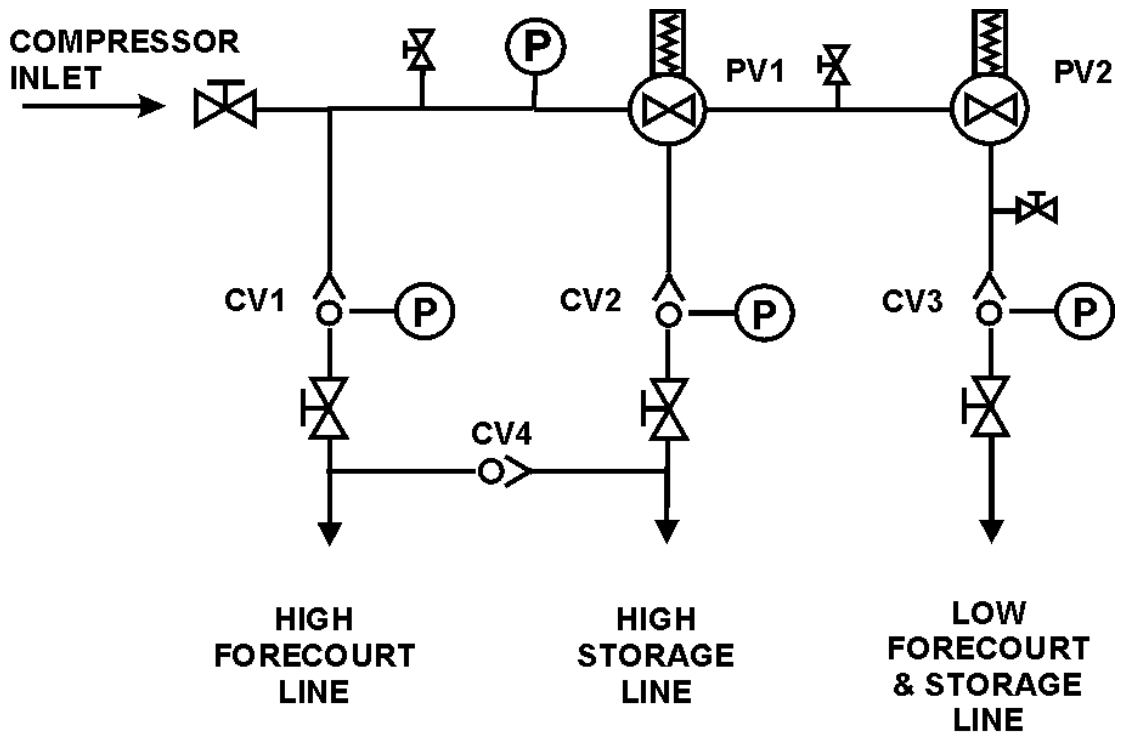
2B-PFP Two bank priority fill








LEGEND

-  **ISOLATING VALVE**
-  **CV - CHECK VALVE WITH GAUGE PORT**
-  **PRESSURE GAUGE**
-  **PV - PRIORITY VALVE**
-  **BLEED VALVE**

**2B-PFP-CTU Two bank priority fill with compressor top up**

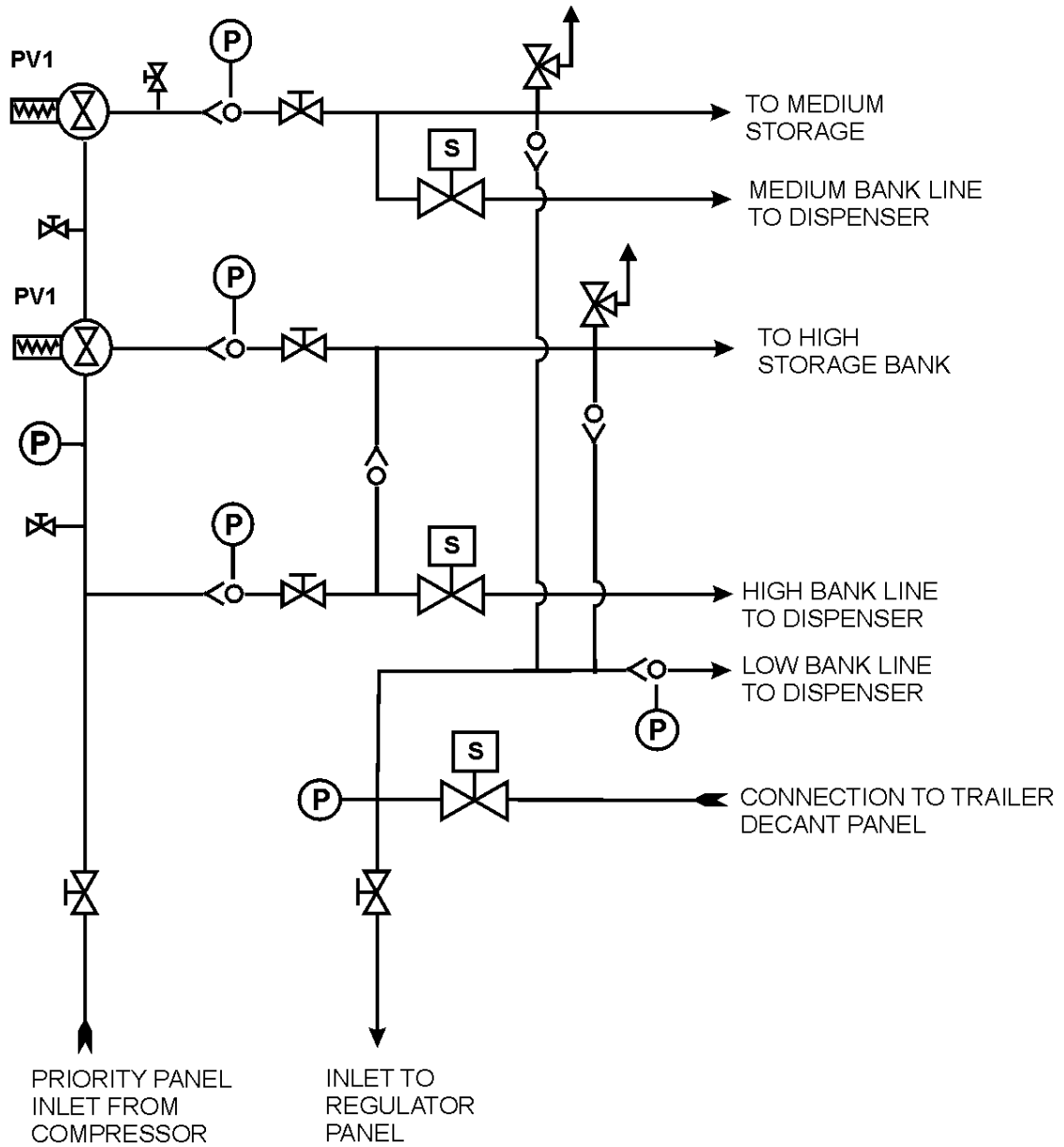


**LEGEND**

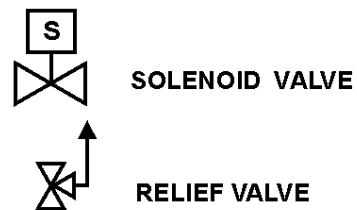
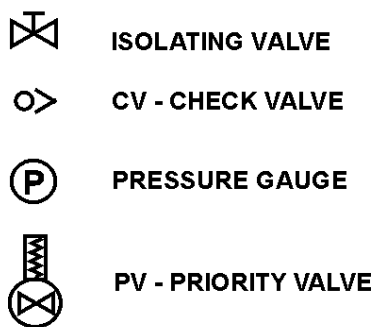
-  **ISOLATING VALVE**
-  **CV - CHECK VALVE WITH GAUGE PORT**
-  **PRESSURE GAUGE**
-  **PV - PRIORITY VALVE**
-  **BLEED VALVE**

**Schematic Diagrams**

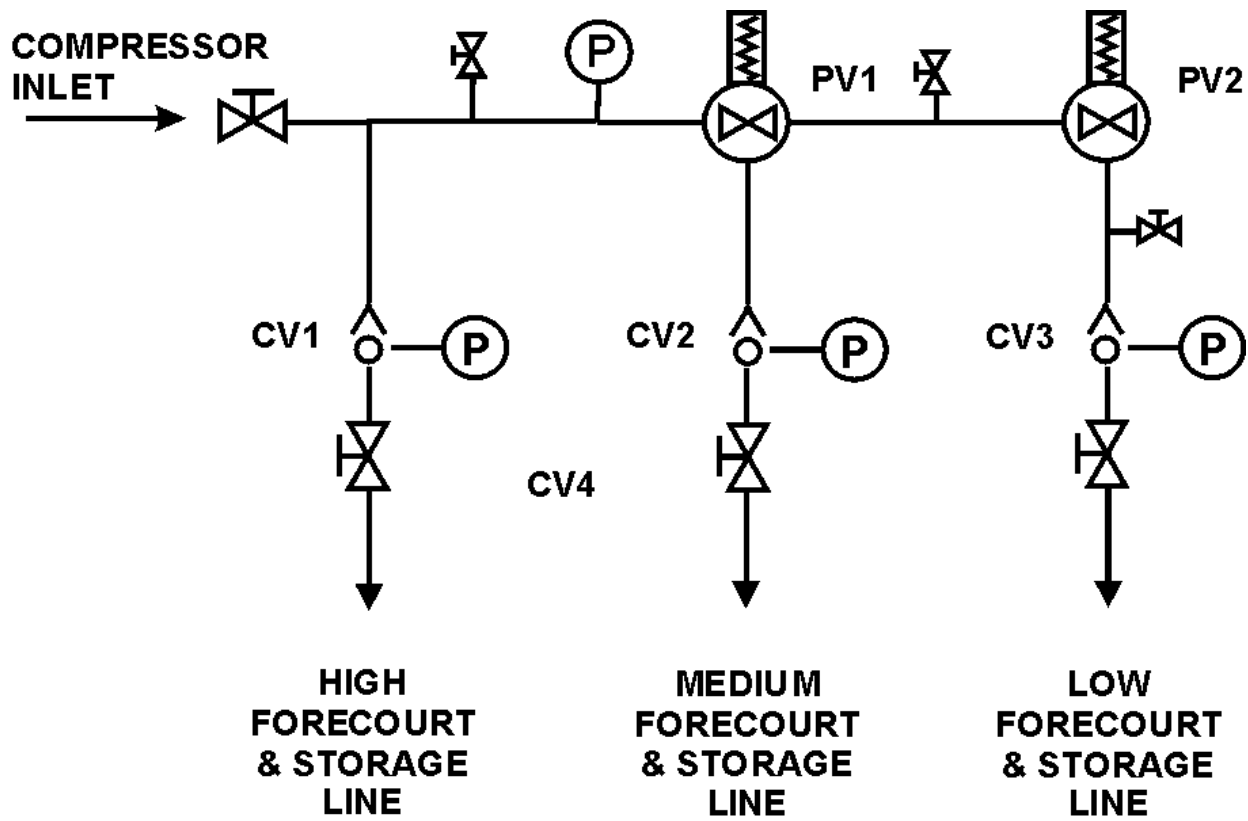
## 2B-PFP-DTR-CTU Two bank priority fill with daughter station and compressor top up








### LEGEND



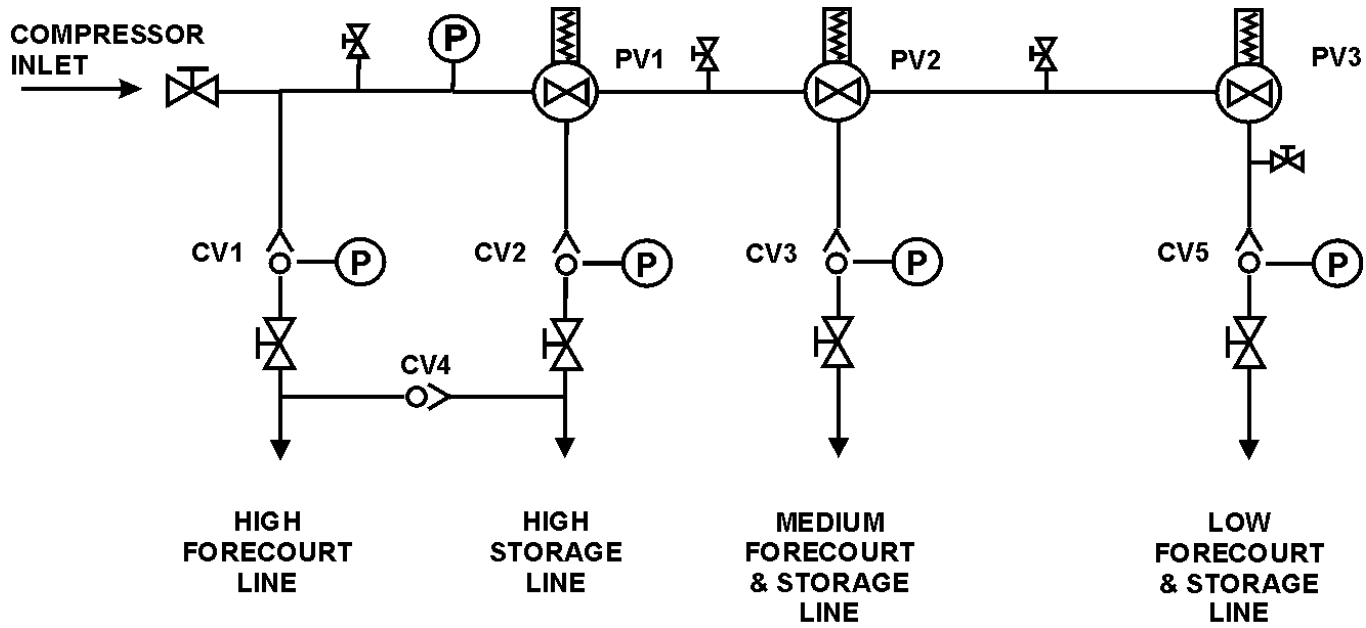
### 3B-PFP-CTU Three bank priority fill








#### LEGEND

-  **ISOLATING VALVE**
-  **CV - CHECK VALVE WITH GAUGE PORT**
-  **PRESSURE GAUGE**
-  **PV - PRIORITY VALVE**
-  **BLEED VALVE**

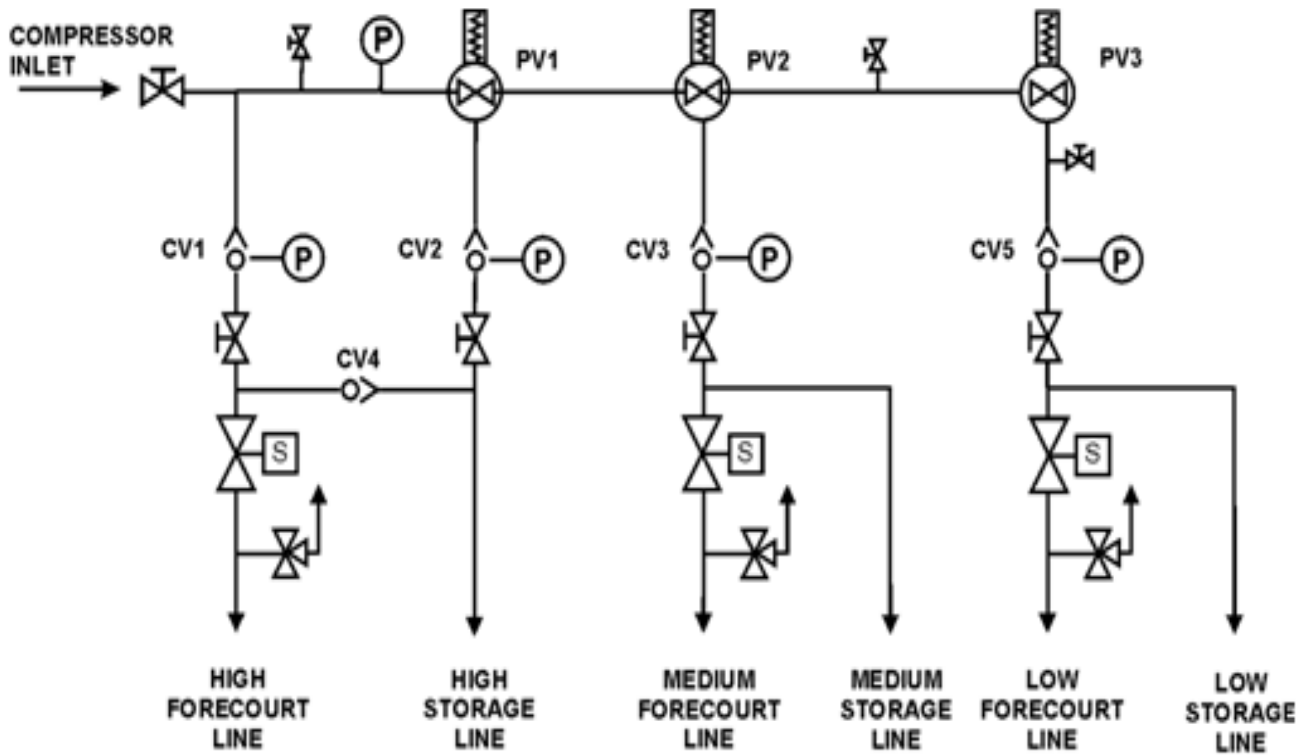
**3B-PFP-CTU Three-bank priority fill with compressor top up**



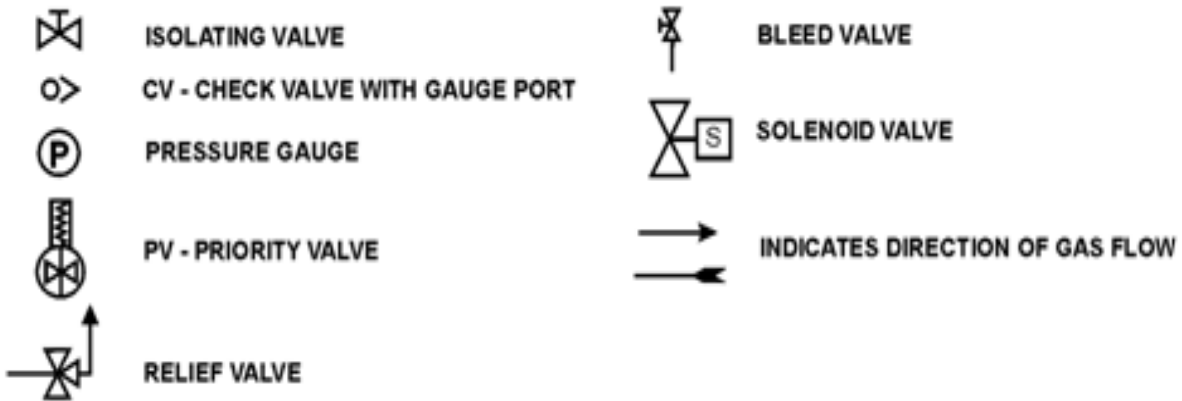
**LEGEND**

-  ISOLATING VALVE
-  CV - CHECK VALVE WITH GAUGE PORT
-  PRESSURE GAUGE
-  PV - PRIORITY VALVE
-  BLEED VALVE

### 3B-PFP-CTU Three bank priority fill with compressor top up and optional solenoid valves



#### LEGEND



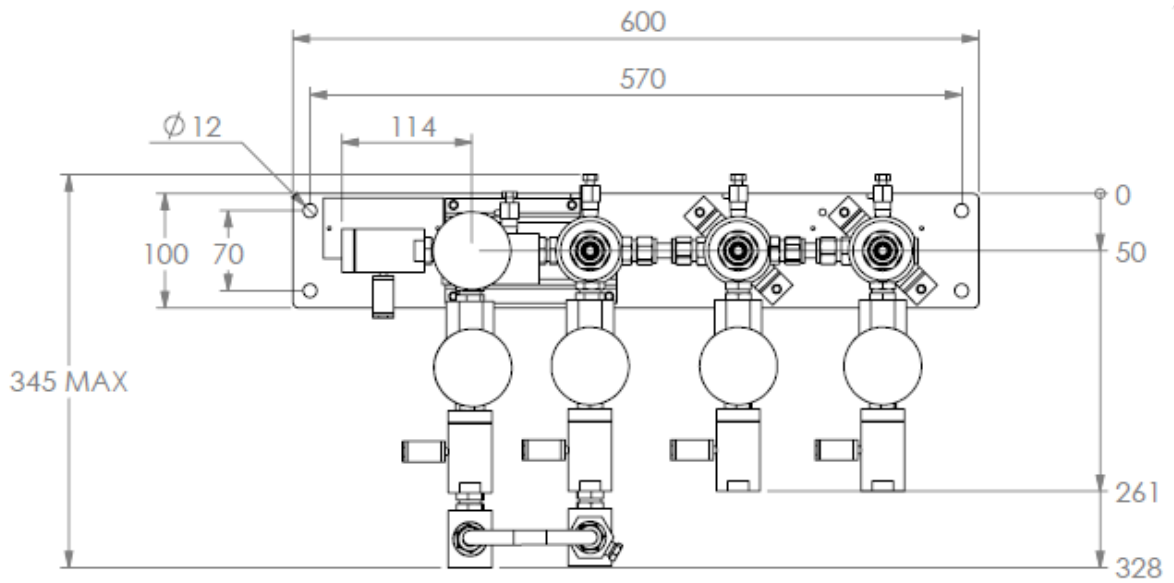
## Installation

Bolt the panel to a solid wall making sure there is clearance for Pipework and easy access to the valves.

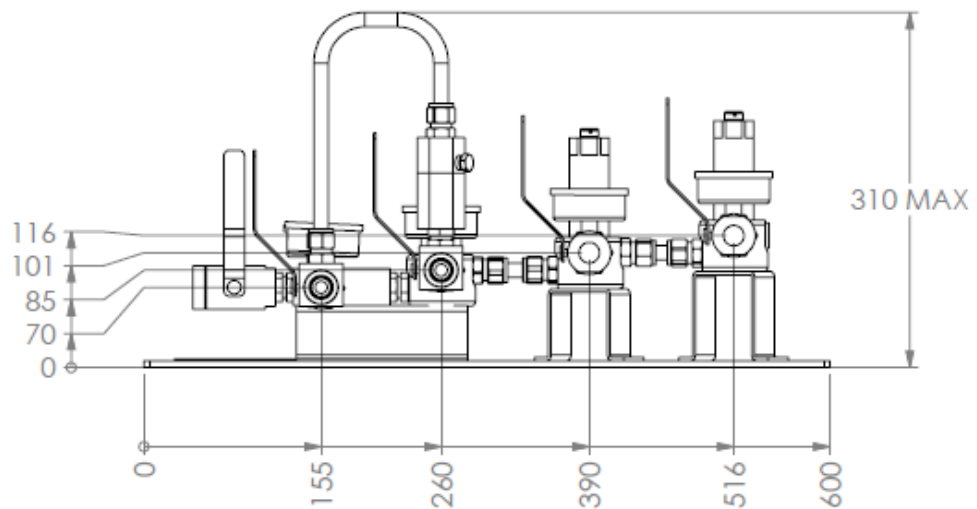
All standard panels use the same mounting plate. Panels with solenoids use a larger mounting plate. Refer to the drawings for mounting details.

Panels with less than three banks just have fewer components mounted on them.

### Standard Priority Panel

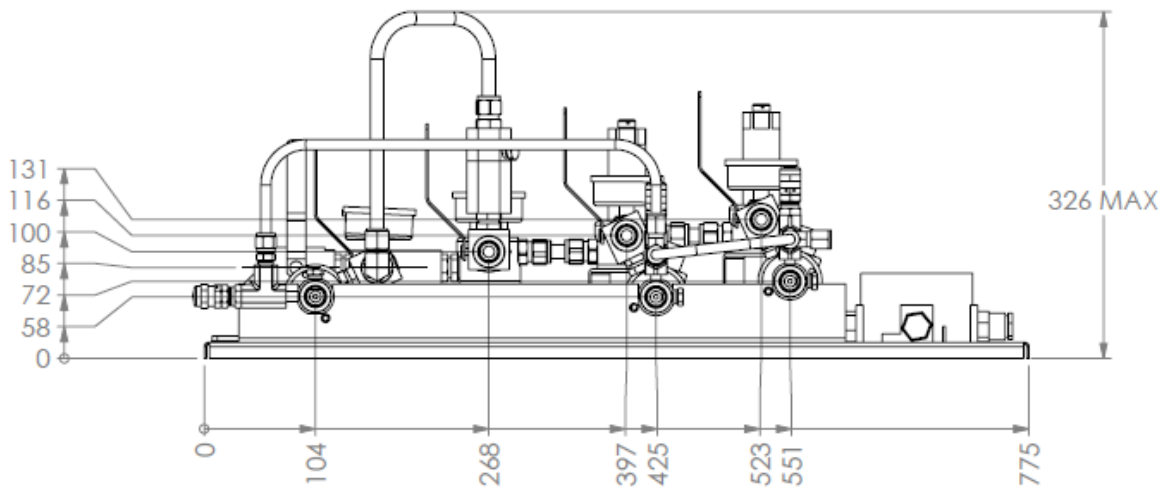
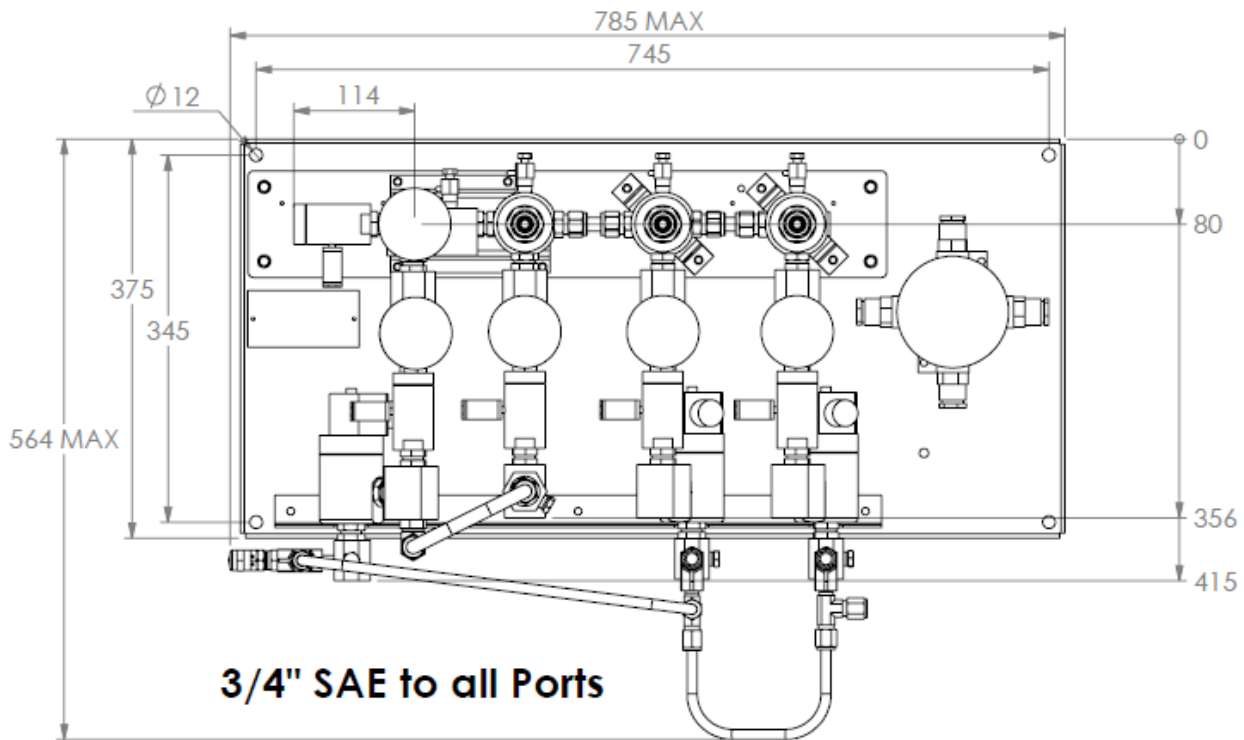


**3/4" SAE to all Ports**





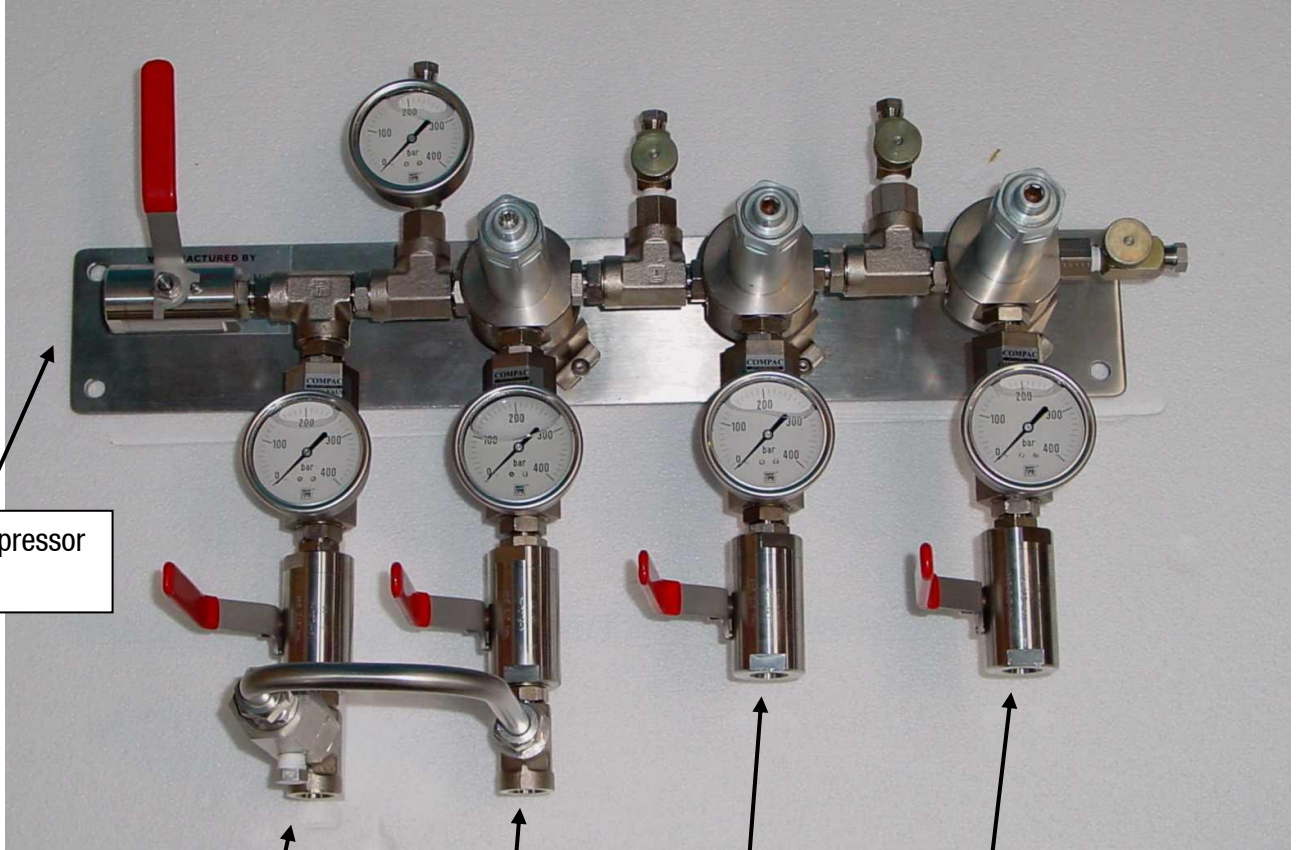
## Priority Panel with solenoid shut off



**Installation**

### Connections

Three bank panel with compressor top up is shown. Other models are similar but with fewer components



Compressor Inlet

High Forecourt Line

High Storage Line

To Medium Forecourt and Storage Line

To Low Forecourt and Storage Line

## Connecting Pipework

All pipes should be thoroughly cleaned and dried before connecting.

### Preparing Pipework

Vents must be provided on all high points and drains must be put in all low points of the Pipework.

All fittings on the priority Panel are ¾" SAE parallel female. Do not attempt to use any other type of fitting.

### Cleaning Procedure for Steel Pipes

Clean and degrease the Pipework by circulation of 8 - 10 % caustic solution through Pipework. This mixture should be at a temperature of approximately 65°C.

Flush out the Pipework with clean water.

To clean out sand, dirt rust scale, etc., circulate a 10% solution of **Hydrochloric Acid** to which has been

added 1/4 - 1/2% of 'ammonia bi-fluoride'. The solution should be heated to a minimum temperature of 65 degrees C and circulated through the Pipework for 4 hours or more, depending on the condition of the Pipework.

Drain all acid from the Pipework and blow out the Pipework with compressed air.

Flush the Pipework with clean water until the PH value is neutral.

Neutralise with 1/4% solution of Citric Acid. Pass this through the Pipework once, or dry out by blowing hot air through the Pipework, then fill with seal oil and drain, then again blow out the Pipework with compressed air.

Blast pipes with Nitrogen at 200 bar, letting the gas expand through the pipes. The Pipework venting should be open to the atmosphere and the 200 bar of Nitrogen fed in to achieve maximum velocity.

Care must be taken to keep pipe openings closed until the compressor is started, this must be done to prevent rusting of and dirt entering the Pipework.

Failure to clear the Pipework of dirt could result in damage being caused to the valve seals and surfaces.

**Note:** Failure to observe appropriate clean procedures will lead to problems with operation and will void any warranties.

## Cleaning Procedure for Stainless Steel Pipework

Stainless Steel Pipework should be blasted with nitrogen at 200bar venting to atmosphere to blow out all traces of dirt, moisture and water.

Any pipe ends should be capped with plastic plugs until connected for use so moisture cannot enter the pipes after blasting.

Failure to clear the Pipework of dirt could result in damage being caused to the valve seals and surfaces.

**Note:** Failure to observe appropriate clean procedures will lead to problems with operation and will void any warranties.

**Note:** Methanol is not recommended as an 'anti-freeze'. If it is used in the wrong concentrations, it causes freezing. It is also very hydroscopic (absorbs water) and can be worse than the water originally present.

## Eliminating water from the system

Water freezes in gas at 250 bar at up to 20°C and this blocks valves and pipes, preventing the flow at gas through the panel.

Care must be taken to ensure no water enters the system during installation. If any water enters the Pipework. Clean and dry again before connecting.

## Removing water from inlet gas

If the Inlet Gas is likely to be saturated, a Gas Drier should be installed on the Compressor Discharge or Inlet to ensure a dew point of -32°C at 250 bar of pressure.

## Connecting Pipework

Make sure that all Pipework fits properly, is in line with the connection and does not put any strain on the fitting or pipe when connected.

Connect the storage pipes to the appropriate valves on the priority panel. The valve threads are 3/4" SAE parallel female.

Connect the forecourt pipes to the appropriate valves on the priority panel. The valve threads are 3/4" SAE parallel female.

## Connecting Threaded SAE Fittings

Compatible Male and Female threads should only be used. All threads used in the Compac Priority Panel are SAE parallel, the seal being made with an o-ring. Thread tape is not required.

Ensure the threads are clean, well-formed and undamaged.

Lubricate o-ring with a lubricant that is compatible with the system.

Screw fitting by hand into the straight threaded port until the metal backup washer contacts the face of the port.

Tighten firmly.

## Connecting Adjustable Threaded SAE fittings

Some fittings used in the Compac Priority Panel are adjustable to allow for positioning of the component.

Ensure the threads are clean, well-formed and undamaged.

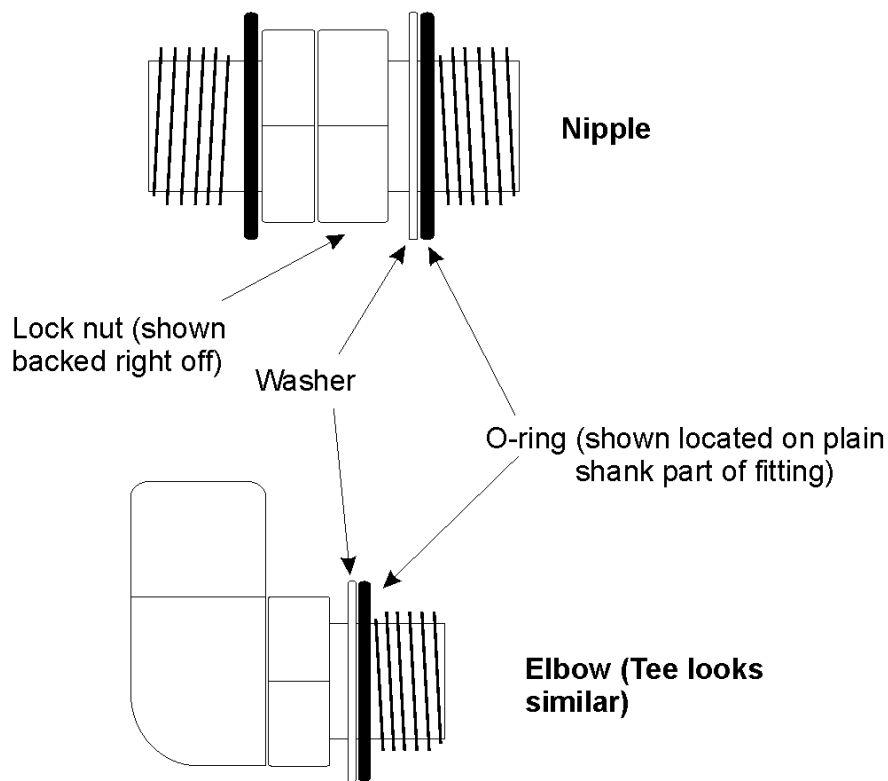
Lubricate o-ring with a lubricant that is compatible with the system.

Back off the lock nut fully so that the o-ring and washer are on the plain shank part of the fitting. (If this is not done the o-ring will be screwed into the threaded part of the fitting and damaged resulting in it leaking.)

Screw fitting into the straight threaded port by hand until the metal backup washer contacts the face of the port.

Position the fitting by backing it off no more than one turn.

Hold the fitting in position and firmly tighten the locknut.



Adjustable 3/4" SAE parallel fittings

## **Connecting Solenoids (option)**

On solenoid equipped models, connect the site emergency stop circuit to the Priority Panel using the sealed junction box. Use an appropriate gland on the inlet cable.

Check the solenoids energise during normal operation and close when the emergency stop is activated.

## **Commissioning**

When all Pipework is connected, pressurise the system and check for leaks.

Check the banks fill in the correct order by observing the pressure gauges.

Check each bank fills to a maximum pressure of 230 bar

## **Operation**

Once commissioned, the priority panel works automatically and requires no further attention.

## **Adjustment**

All settings are made at the factory. No adjustment is required. Service any priority valves that are not operating at the correct pressure. Replace the valve if this does not fix the problem.

## Servicing

### Important Notes

When servicing any CNG Equipment, please take note of the following precautions. Failure to do so may result in serious injury or death.

- Never tighten a fitting under pressure. If a fitting or joint is leaking, totally depressurise the lines first.
- Seals that are in an atmosphere of high-pressure natural gas will expand when exposed to air. They cannot be reused. Always make sure you have a new seal kit with you before repairing a valve.
- Sliding services should be cleaned and lightly greased with O-ring lubricant before reassembly.
- Dirt is a big enemy of CNG Valves. Make sure any service area is spotlessly clean. Make sure all valves are cleaned meticulously when servicing.
- Wet gas will cause freezing problems regardless of filtering. The only solution is to dry the gas or get rid of the water source. When pipes or valves block due to ice formation, depressurise the lines first before disassembly. An attempt to unblock pipes or valves by pouring boiling water over the cold blocked part may work without having to disassemble pipes.
- Be very careful disassembling frozen Pipework as gas pressure that has been contained by an ice blockage may be suddenly released.

### Service Internals

The Compac Priority Panel is very reliable under normal circumstances and requires minimal maintenance unless problems are detected.

### Weekly Checks

Check the sequencing of the valves during operation. This can be done by turning off the inlet isolation valve and then dispensing fuel until the pressure reading on all banks drops below 200 bar. Open the inlet isolation valve and observe the sequencing of the pressure as each bank reaches 230 bar before the next bank starts to fill. The banks should fill in the following sequence: 1. Forecourt line (for compressor top up models) 2. High bank. 3. Medium bank. 4. Low bank. If the banks start to fill together or sequence at a pressure less than 230 bar then servicing is required.

### Monthly Checks

Check the system for leaks every month or more frequently if required. Use a liquid solution and rinse off after use.

**Danger:** Do not use any flame or source of ignition to check for leaks.

## De-gassing the Priority Panel

Before servicing a valve or component the Priority Panel must be de-gassed.

1. Turn off the priority panel isolating valves.
2. There are bleed valves provided to de-gas the priority panel. In the end of each valve there is a bung in case the valve is accidentally opened. Remove the bung before opening the bleed valve. If the bleed valve has been opened and then closed with the bung in there may be some gas trapped behind it. This will escape through cuts in the bung threads as it is removed.

**Note:** *Do not open the bleed valve before removing the bung.*

3. Slowly open the bleed valves. Note that the gauges may still read line pressure as there will be gas trapped between the Isolation valve and the Check valve. If either of these are to be serviced, it will be necessary to carefully separate them to release trapped gas.
4. When all the gauges read zero, still proceed with caution. You should locate yourself in a position such that if the pipe you are depressurising blows off you are not in the line of where the pipe could explode to.
5. Ensure that the bleed valves are closed and re-fit the bungs.

**Note:** *Panels fitted with optional solenoids should be de-gassed while the solenoids are activated. If this is not possible, care must be taken to depressurise the pipe on either side of the solenoid before working on it.*



## Servicing the Priority Valve D-PCI-12

The Seal Kit Part Number is HO-CNGPSK---012. A Seal Kit consists of:

Description	Quantity
O-ring	3
Teflon Back-up Ring	2
Main Seal	1

Make sure you have a spare seal kit available. O-rings that are subjected to Natural Gas at high pressure swell when exposed to air. Once swollen they cannot be reused and must be replaced.

Always use o-ring lubricant to prevent damage to the o-rings.

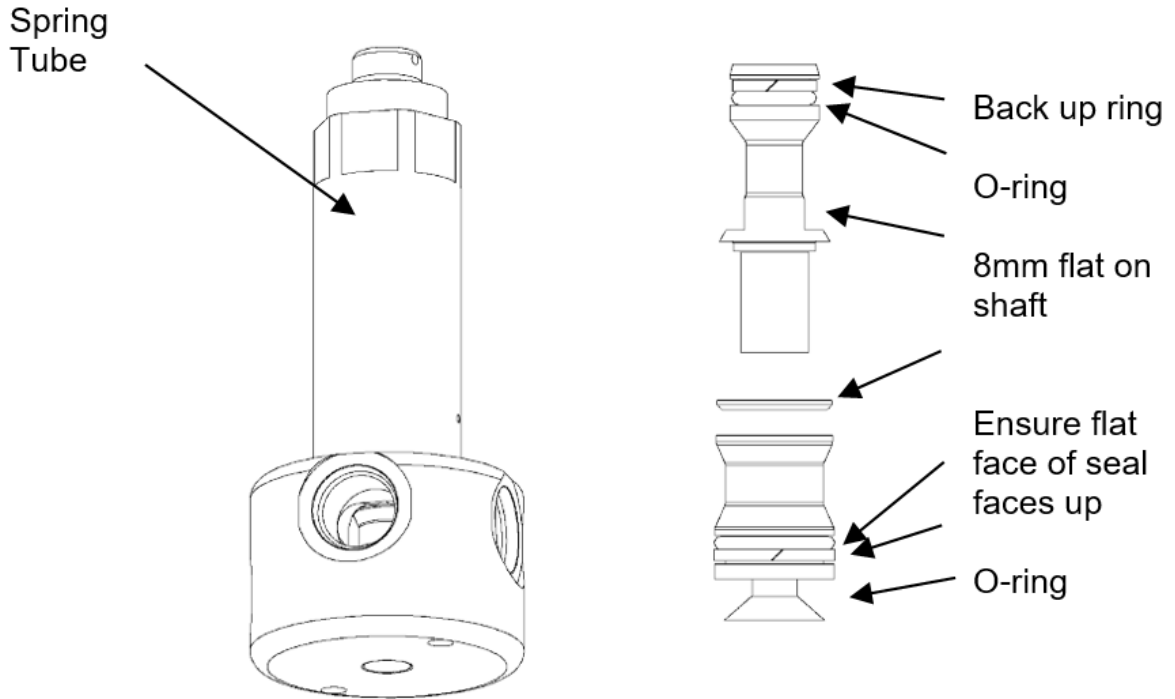
### Procedure

Refer to the diagram

1. Depressurise the priority valve and all surrounding Pipework safely.
2. Unscrew the spring tube (the spring will remain at the set tension).
3. Unscrew and remove the insert holding the piston in place.
4. Push piston out through the top. There is a hole in the bottom of the valve for this purpose.
5. Holding piston by the 8mm flat to stop it turning and being damaged, remove the M6 Capscrew from the bottom.
6. The piston can then be disassembled, and the seals replaced

**Notes:**

- The back-up rings go closest to the ends of the piston, outside the o-rings.
  - Ensure that the flat face of the seal faces up (Refer to diagram)
  - Use o-ring lubricant on the o-rings to increase the service life.
1. Re-assemble the piston
  2. Refit the piston into the priority valve body
  3. Push the piston back into the bore with an allen key, keeping the piston straight and at the same time rotating it clockwise. *It is very important that the piston is kept straight and rotated when refitting back into the body to prevent damage to the seals.*
  4. Replace the insert and spring tube.
  5. Check the pressure setting when gassing up the panel.



## Servicing the Check Valve CVCI-12

The Compac 3/4" Check Valve Model Number CVCI-12 has a working pressure rating of 300 bar.

It uses a metal to metal seat to seal and should never require dismantling and servicing. The piston and inlet half of the check valve are machined as a matched pair. Do not mix these parts with those out of another valve.

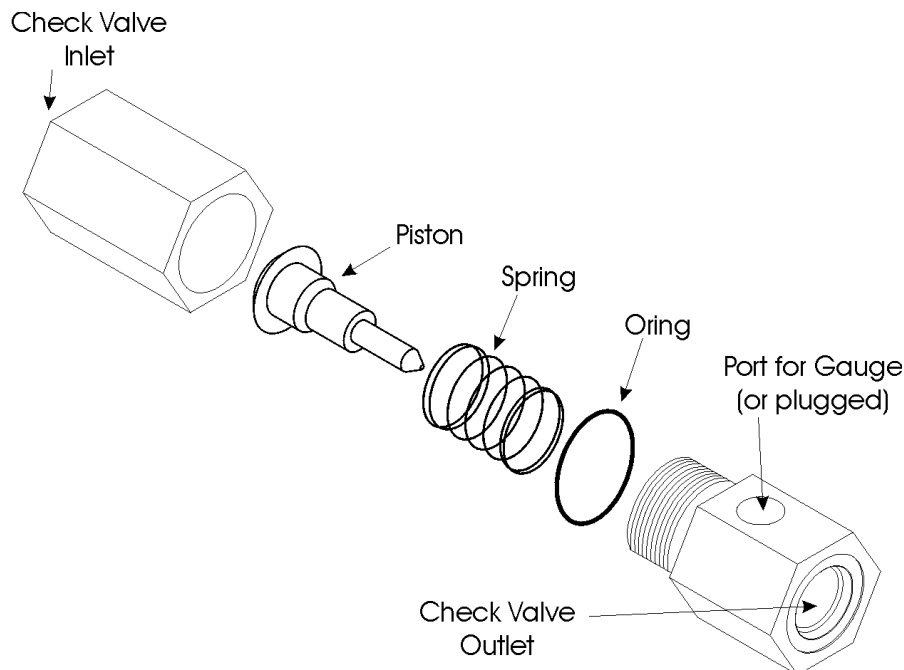
Make sure you have a spare seal kit available. O-rings that are subjected to Natural Gas at high pressure swell when exposed to air. Once swollen they cannot be reused and must be replaced.

Always use o-ring lubricant to prevent damage to the o-rings

The Kit Part number is HO-CNGCSK----012.

### To Service:

1. Depressurise the priority panel and surrounding Pipework.
2. Remove the check valve.
3. Unscrew the two halves of the check valve.
4. Remove the spring and piston.
5. Remove and discard the O-ring.
6. Inspect and clean the two halves of the check valve.
7. Clean the inlet and outlet thread and sealing surface. Coat the inlet nut thread with copper coat.
8. Reassemble the check valve with new O-ring.
9. Reinstall on the panel.
10. Retighten all fittings on the priority panel.
11. Slowly pressurise the priority panel to about 3.5bar checking for leaks. If no leaks slowly increase the pressure at regular intervals checking for leaks.



3/4" SAE Check Valve CVCI-12

## Servicing the Solenoid Valve

These instructions refer to the current Compac S2-350 solenoid valve. The solenoids are available in several types: Standard, high oil and low temperature. Always quote the dispenser serial number when ordering parts and check the model number on the valve body before installation.

**NOTE:** *For applications where the gas has a high oil content, a special piston with an O ring seal is available. If you are having problems, discuss this option with your service agent. If the special piston is used for low oil content gas, no harm will occur, but the service life of the seal may be shortened.*

### Before you start, make sure you have:

- A seal kit - Part number FC-SK-0001
  - 1 x Teflon valve seal
  - 1 x solenoid top O-ring seal
  - 1 x gas return line O-ring seal
- O-ring lubricant
- Solenoid piston - Part number FC-VLV-PSTN-0001 (optional standard)
- Solenoid piston – Part number FC-VLV-PSTN-S2 (optional high oil)
- Solenoid top service kit standard. Part number FC-SVK-0003 (replace valve top if leak detected through stem)
- Solenoid top service kit - low temperature option (-40 degrees C). Part number FC-SVK-0004 (replace valve top if leak detected through stem)

**CAUTION:** Never remove or service the stem. If it is leaking, it must be replaced using the appropriate top service kit.

**CAUTION:** Cleanliness is essential. When working on the open solenoid assembly, cover the opening with a cloth to prevent dust and dirt from entering.

**CAUTION:** O-rings that are subjected to natural gas at high pressure swell when exposed to air. Once swollen, they cannot be reused and **must** be replaced.

**CAUTION:** The Nitrile O-rings have a life span of over 10 years from cure date but improper handling of these O-rings before use can shorten their useful life. O-rings will deteriorate if exposed to ozone or ultraviolet light so keep in original packaging and away from UV light. If in unsure about their condition, do not use old O-rings and order new ones.

**NOTE:** *It is not necessary to remove the solenoid body from the dispenser to service the solenoid seals.*

## Piston Removal

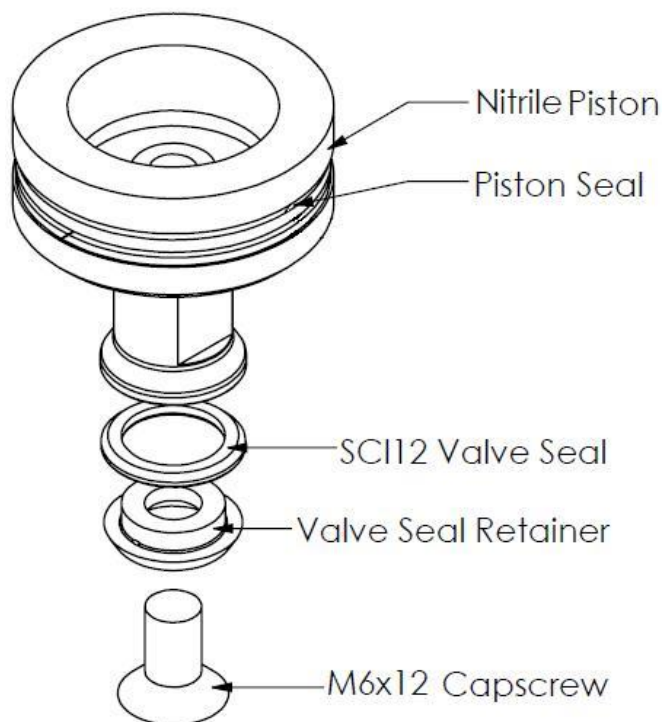
1. De-gas the panel
2. Switch off the power supply to the valve.

**DANGER:** Never remove any electrical components without first switching off the power to the dispenser. Failure to turn off the power could result in an electric shock.

3. Unscrew the solenoid coil retaining nut and move the coil out of the way.
4. Remove the six cap screws from the solenoid top.

**NOTE:** Do not remove the angled grub screw from the solenoid top. This is epoxied in place during manufacture and should never be removed.

5. Remove the solenoid top and remove the old top O-ring seal and gas return O-ring.
6. Remove the solenoid spring.
7. Screw an M6 cap screw into the solenoid piston to withdraw it from the solenoid body.

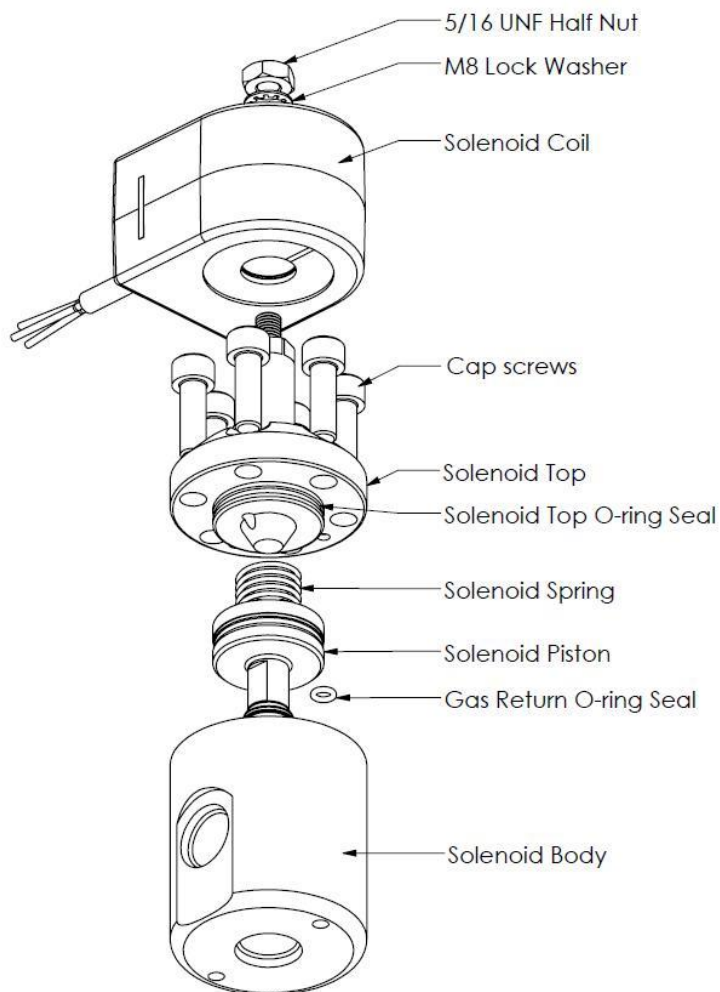


8. Taking care not to damage the piston, hold the flat part of the piston with a spanner to prevent rotation, then unscrew the M6 x 12 mm cap screw from the bottom of the piston. This releases the solenoid seal retainer and valve seal.
9. Discard the old valve seal.
10. Clean all oil and dirt off the components with a clean cloth and check that the bleed hole is not blocked.

*While the solenoid is apart, inspect the solenoid piston centre seal and piston for wear, scratching or damage. Replace piston if required.*

## Replacement

1. Place the new valve seal and seal retainer on the cap screw.
2. Taking care not to damage the piston, hold the flat part of the piston to prevent rotation, and then screw the M6 cap screw into the bottom of the piston.
3. Insert a new gas return O-ring.
4. Insert the piston back into the solenoid body.
5. Insert the solenoid spring.
6. Replace the solenoid top O-ring seal.
7. Place the solenoid top back on the solenoid body, making sure that the locating dowel is engaged.
8. Screw in and tighten the six cap screws.
9. Replace the solenoid coil.
10. Re-gas the panel then check for leaks and correct operation of the valve.



## Removing the Solenoid Coil

**Parts Required:** Replacement solenoid coil **FC-COIL-0005** (Compac S2-350)

**NOTE:** Solenoid coils are not interchangeable between models. Make sure you order the correct one by quoting the serial number. To replace obsolete coils, the entire solenoid will need replacing.

1. De-gas the Panel
2. Switch off and isolate the power supply to the Panel.

**DANGER:** Never remove any electrical components without first switching off the power to the Panel. Failure to turn off the power could result in an electric shock.

3. Remove the lid from the terminal box.
4. Disconnect the appropriate solenoid coil wiring.
5. Undo the nut on the top of the solenoid valve that is securing the coil and remove the coil from the top of the valve.

## Replacement

To install a new solenoid coil, reverse the procedure above.

**NOTE:** Make sure the terminal box is properly sealed.

## Replacing the Complete Solenoid

**Parts Required:**

- Solenoid valve standard 350 bar model (FC-VALVE-0035) or
- Solenoid valve 350 bar O ring seal option for high oil content gasses (FC-VALVE-0036) or
- Solenoid valve 350 bar low temperature option (FC-VALVE-0037)

**NOTE:** Solenoid valves are supplied without coils. If you need the coil it must be ordered as well.

**CAUTION:** Cleanliness is essential. When working on the open pipes and solenoids, cover the openings with a clean, lint-free cloth to prevent dust and dirt from entering.

## Removal

1. De-gas the Panel
2. Switch off the power supply to the Panel.
3. Undo the nut and remove the solenoid coil.
4. Undo the gland nuts connecting the solenoid valve to the pipework and manifold and remove valve

## Replacement

1. Ensuring all surfaces are clean and any sealing plugs are removed from the valve, reconnect the pipework and tighten the gland nuts.
2. Replace the solenoid coil.
3. Repower and re-gas the unit, check for leaks and test for correct operation.

## Servicing the Isolation Valve

Before doing any work on the valve, ensure that the power is off and the system pressure is reduced to atmospheric levels. Ensure that the pressure is removed from both the inlet and outlet ports of the valve.

Check the part number and serial number when ordering spare parts.

Seal kit order number: FC-SK-0029

1. Undo the pipework and remove the valve.
2. Remove the handle.
3. Use a pick to pull out the stem seal and discard.
4. Undo the end cap, remove the valve seat and discard it.
5. Turn the valve stem to the "Closed" position then tap on the end of the ball valve with a wooden or soft plastic dowel (BV ASST) to remove it. Discard the ball.



6. Push the valve stem down into the valve and remove it from the valve body. Discard the valve stem.
7. With a pick, carefully remove the second valve seat taking care not to scratch the internal surfaces of the valve. Discard the valve seat.
8. Remove and discard the O-ring from the end cap.

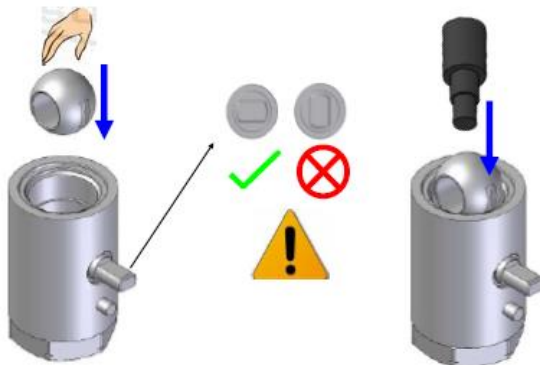


**Reassembly:**

1. Replace the O-ring on the end cap and lubricate with the supplied grease.
2. Fit the new valve seat making sure it is seated properly. Insert the valve stem into the valve body and pull it upwards until it clicks into place.



3. With the valve stem in the “Closed position, insert the ball so the slot engages with the stem.



4. Insert the second valve seat.
5. Install the end cap and tighten to 60 N/m.
6. Install the valve stem gland then the handle, washer and nut. Tighten nut to 3 N/m.
7. Replace the O-rings on the connectors and lubricate. Reinstall the valve. Open and close the valve four times to help install the seals.
8. Repower the dispenser and check for leaks.

**DANGER:** Do not use thread tape or sealing compounds on parallel SAE fittings.

**CAUTION:** O-rings that are subjected to natural gas at high pressure swell when exposed to air. Once swollen, they cannot be reused and must be replaced.