



INSTALLATION, OPERATING
& MAINTENANCE MANUAL

REFUELLING CONTROL FLYTE VALVES

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1. Introduction

The Refuelling Control Valve (RCV) is a float operated servo valve, designed to limit the amount of liquid fed into a tank to a precise level. It can be used in a wide range of chemical and hydrocarbon storage applications where emphasis is being placed on careful handling of liquids.

A special feature of the valve is that it allows the tank to be controlled up to capacity, increasing utilisation and therefore reducing the number of deliveries to static installations.

The servo valve provides positive sealing and reliable operation without external power. The float mechanism is used to seal off the servo chamber, via a hole in the valve head; the servo effect closes the valve head against the liquid flow.



2. Areas of Application

The Refuelling control valve has been utilised in the following applications;

- i) Fuel tank level control.
- ii) Chemical or Hydrocarbon storage control.
- iii) Single point filling of multiple tanks.
- iv) Engine coolant / Anti-Freeze.
- v) When used in conjunction with Dry Break Coupling can be used for spill free tank filling.

3. Operation

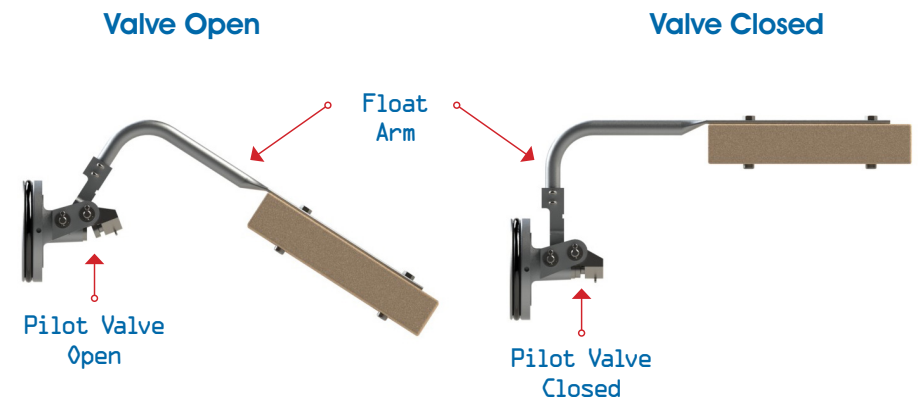
When a filling nozzle is connected to the RCV in its open state (Float down see Fig 1), the filling process can be started.

When the filling process is started, the bleed hole in the valve head allows fluid to pass through the valve head and the pilot valve, this creates no back pressure and the valve head is free to be pushed towards the back of the RCV body and the fill fluid enters the storage vessel through the RCV fill holes in the body.

When the fill medium level increases the float is lifted upwards which closes the pilot valve causing a back pressure to build up behind the valve head (Float up see Fig 1). The servo effect closes the valve head against the flow of fill fluid when the pressure differential becomes higher behind the valve head, causing the valve head to seal against the valve body.

Note: After filling the vessel it is possible for very small amounts of fill fluid to pass back through the valve head to the external of the vessel, to remove this issue AMS recommend that the RCV is used in conjunction with a Dry Break Coupling to avoid any spillage.

Fig 1.



4. Installation

4.1 Removal of transport packaging

Remove the RCV carefully from the transport packaging; never forcibly remove the RCV from the packaging.

Always handle the RCV by the Valve body, gently supporting the float arm.

Do not lift the RCV up by the float arm as this can cause the float arm to bend and can result in the RCV failing to shut off or cause an adjustment of the shut off position. Both circumstances could lead to overflowing of the medium.

The float arm is temporarily locked in position to prevent any damage during the transportation, it is important that this temporary transportation lock not be removed until the RCV is ready for installation to prevent damage to the float arm.

4.2 Storage

The RCV should be stored with the temporary transportation lock still in position and placed on a storage shelf so that it is seated on the flange with the float arm and float in the vertical position. Care should be taken when placing other storage items around the RCV to avoid damage to the float or float arm.

4.3 Pre-Installation

Prior to installing the RCV a visual inspection and manual function check of the valve should be performed.

4.3.1 Visual Inspection

Visually inspect the RCV for signs of damage; attention must be made to the float, float arm and the pilot valve (see Fig 1).

Installation

4.3.2 Functional Check

To functionally check the RCV prior to installation please follow the actions below;

- i) Hold the RCV by the valve body with the float arm in the open position (see Fig 1).
- ii) Gently lift the float arm to the closed position (see Fig 1) and hold it in this position.
- iii) Place a finger over the bleed hole in the valve head to seal the hole and depress the valve head towards the rear of the RCV body, resistance should be felt due to the slight build up in back pressure behind the valve head.
- iv) Continue to depress the valve head while gently lowering the float arm opening the pilot valve, the resistance should now decrease as the back pressure is released passed the pilot valve.
- v) If depressing the valve head with the float arm in the closed position, no resistance is detected the valve is not functioning correctly and maintenance is required to establish the fault (see Maintenance section).

Note: *It is important to ensure that the bleed hole is completely sealed when performing the functional check.*

Installation

4.4 Installation

Ensure that the visual inspection and functional checks are completed prior to installing the RCV.

- i) Ensure that the gasket provided with the RCV is fitted to the inside of the RCV flange face.
- ii) Hold the RCV by the flange allowing the float arm to be in the open position.

Note: *The 3 fill holes in the RCV body should be facing the side and bottom of the vessel.*

- iii) Taking care not to damage / knock the float or float arm, insert the RCV through the vessel mounting aperture, never force the RCV through the vessel aperture as this could cause damage to the RCV.

Note: *Once the RCV is inserted to the vessel Do Not Rotate the RCV.*

- iv) Align the RCV gasket and flange mounting holes with the vessel flange mounting holes and fix in place using suitable bolts / nuts and washers

Note: *A new gasket should be used every time the RCV is removed for maintenance (AMS P/N: SV7011).*

If a Dry Break Coupling (DBC) is being used in conjunction with the RCV, this is installed to the RCV in step iv. prior to fixing the RCV to the vessel.

Place a gasket onto the DBC flange and align the flange mounting holes with the RCV mounting holes and fix the DBC & RCV to the vessel with suitable bolts / nuts and washers.

Note: *There are no special alignment requirements for the DBC.*

5. Maintenance

Although the RCV's have a considerable operating life span, AMS recommend that the RCV's are routinely checked for correct operation and form part of a planned maintenance schedule.

Reliability of the valve is entirely dependent on the cleanliness of the fuel. Other factors effecting reliability include handling of the valve and the operation circumstances.

In a workshop environment with a clean tank and clean fuel with no particulates present, the valve is designed to work continuously for 4 years. The 4 yearly inspection is classed as a failure for the purposes of calculating a MTBF figure giving 35040 hours of service.

However, the recommended maintenance frequency of the RCV in "Field" operation is dependent on a number of factors including the handling of the valve prior to installation, filling flow rate, frequency of filling, fuel quality and speed of train over track quality when the valve is not submersed in fuel. It is recommended that the valve head external distributor seal (P/N SV332, see fig 2) is replaced at least bi-annually due to the friction damage that may occur over a high number of operations. Where the tank or fuel is also known to have particulate build up/debris then annual inspection and replacement of seals is the minimum recommendation.

When inspecting the valves as part of a maintenance procedure, any signs of damage to the valve head, valve body, base cap, pivot arm, pivot mechanism, pitting/scratches on the pilot valve or damage to the float and float arm will require the product to be returned for repair.

Note: *Maintenance of the RCV should only be carried out by competent personnel familiar with the RCV and only repaired using genuine spares purchased from AMS. AMS cannot accept responsibility for any RCV which has not been repaired or serviced by AM Sensors Ltd.*

To replace the external distributor seal the RCV will need to be removed from the vessel and disassembled following the procedure overleaf.

Maintenance

5.1 Disassembly Procedure

- i) Remove the RCV from the vessel, taking care not to damage the float or float arm during the removal process.
- ii) Holding the RCV body vertical, remove the Circlip retaining the Base Cap in position (see Fig 3) and carefully lift the Circlip over the float arm and float.
- iii) Once the Circlip has been removed, hold the base cap and gently ease away from the RCV body. Carefully place the Base Cap assembly onto a clean working area.

Note: DO NOT pull the Base Cap from the RCV body by using the float or float arm.

- iv) Remove the spring from the RCV body.
- v) Remove the valve head assembly from the RCV body by pushing the valve head from the flange face towards the rear of the RCV body, once removed place onto a clean working area.
- vi) Place the RCV body onto a clean working area.
- vii) Inspect the valve head for signs of indents or scratches which can affect the valve performance, if any signs of damage is found to the valve head then it should be returned to AMS for a repair assessment.
- viii) Remove and replace the external distributor seal ensuring that the seal is correctly fitted and is seated correctly on the valve head body.
- ix) Inspect the valve head seal (AMS P/N: SV20) for signs of damage or wear, if damage or wear is found then the complete valve head assembly must be returned to AMS for replacement as special tooling is required to complete the operation.
- x) Remove and replace the Base Cap O-Ring seal.
- xi) Clean the pivot assembly and pilot valve. Inspect for signs of damage including pitting or scratches on the pilot valve.

Maintenance

5.2 Re-assembly Procedure

Inspect all of the removed components and once deemed fit for duty (i.e. no visible damage) the RCV can be reassembled as follows:

- i) Using Silicon grease apply a thin film around the internal bore of the valve body.
- ii) Lightly grease the external distributor seal using silicon grease and re-install into the RCV body ensuring correct orientation. Push the valve head until it is completely installed into the RCV body.
- iii) Install the spring in to the RCV body so that it is seated in the valve head spring groove.
- iv) Install Base Cap Assy into the RCV body ensuring that the locating Pin is aligned with the slot on the RCV body.

Note: Do Not handle the Base Cap using the float or float arm.

- v) Compress the Valve Head / spring and Base Cap in the RCV Body and install the Circlip ensuring that it seats firmly in the groove on the RCV Body.
- vi) Inspect the RCV to check it is correctly assembled and functionally check the operation following step 4.3.2.

Maintenance

As part of the routine inspection the RCV float and float arm should be inspected for signs of damage or wear.

Signs of damage can include:

- Float arm bent or dented.
- Float damaged.
- Pivot arm not at 90° to valve body when in the closed position.
- Pilot valve not seating correctly when the valve is in closed position.
- Spindles loose or damaged.

Note: Under no circumstances should any part of the Base Cap (apart from O-Ring) / Float or Float Arm be dismantled.

If there is any sign of damage to the float arm or float mechanism then the valve should be returned to AMS for repair along with a completed declaration returns form, to ensure the correct specification of materials and parts maintaining the original purchase specification.

5.3 Spare Parts List

SV332	External Distributor Seal
18038	Base Cap O-Ring
SS17	Spring
58020	Circlip
SV7011	Gasket

6. Repairs & Servicing

Our service exchange program can ensure prompt replacement of RCVs during your maintenance scheduling; ask one of our sales team for further information.

In addition to the service exchange program, AMS offer repairs on an as required basis. RCVs returned to AMS are assessed and an assessment report would then indicate the level of repair required to the RCV.

AMS offer a number of repair / refurbishment options, these range from basic through to complete. Any RCV requiring more work than stated below is deemed beyond economical repair and should be replaced.

6.1 Refuelling Control Valve Basic Refurbishment

Part No: RCV-ABR

Body Material: Cast Aluminum Version

Includes strip, clean, replacement of seals and spring, reassembly, pressure test, 12 months warranty.

Specifications Covered:

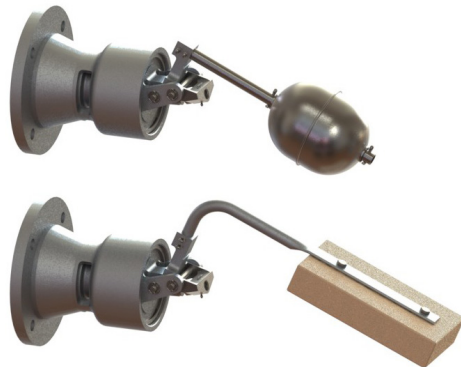
Body Type	Standard Mounting
Body Material	Cast Aluminium
Float Type	Dual Plasticell / St / St Version
Base Cap Material	Cast Aluminium
Valve Head Material	Cast Aluminium
Pivot Arm Type	Vertical
Pivot Arm Material	Cast 316 st/st
Float Arm Model	Various
Float Arm Material	Aluminium and St / St Versions

Repairs & Servicing

Detail:

Refurbishment of aluminium body refuelling control valve with standard body type design. Work to include:

- Check functionality of components
- Strip valve fully
- Inspect valve body, base cap, pilot valve, valve head, pivot arm, float arm and float for any signs of damage or wear
- Replace External Distributor Seal
- Replace Valve Head Seal
- Replace Base Cap O-ring Seal
- Replace Base Cap Retaining Ring/Circlip
- Replace Spring
- Clean debris from valve head, pivot mechanism and pilot valve
- Reassemble components
- Complete pressure and functionality checks



Repairs & Servicing

6.2 Refuelling Control Valve Standard Refurbishment

Part No: RCV-ASR

Body Material: Cast Aluminum Version

Includes strip clean, replacement of seals and spring, circlips, locating spindles/split pins, float arm, float reassembly, pressure test, 12 month warranty.

Specifications Covered:

As per RCV-ABR detailed on page 11.

Detail:

Refurbishment of aluminium body refuelling control valve with standard body type design. Where necessary, work as RCV-ABR plus the following:

- Replace spindles and locating clips
- Replace Float Arm
- Replace Float

6.3 Refuelling Control Valve Complete Refurbishment

Part No: RCV-ACR

Body Material: Cast Aluminum Version

Includes strip clean, replacement of seals and spring, circlips, locating spindles/split pins, float arm, float, pivot arm, pivot spindles, valve head, base cap, reassembly, pressure test, 2 months warranty.

Specifications Covered:

As per RCV-ABR detailed on page 11.

Repairs & Servicing

Detail:

Refurbishment of aluminium body refuelling control valve with standard body type design. Where necessary, work as RCV-ABR plus the following:

- Replace Base Cap
- Replace Pivot Arm
- Replace Pilot Valve
- Replace Pilot Valve Carrier
- Replace Valve Head

6.4 RCV Spares pack p/n: (Various dependent on RCV model)

RCV Maintenance Spares Pack: Valve Head Seal, Distributor Seal, Base Cap Seal, Gasket, Circlip and Spring.

All Repaired RCV's carry a 12 month warranty from date of despatch.

Repairs and Servicing

Fig 2. Valve Head

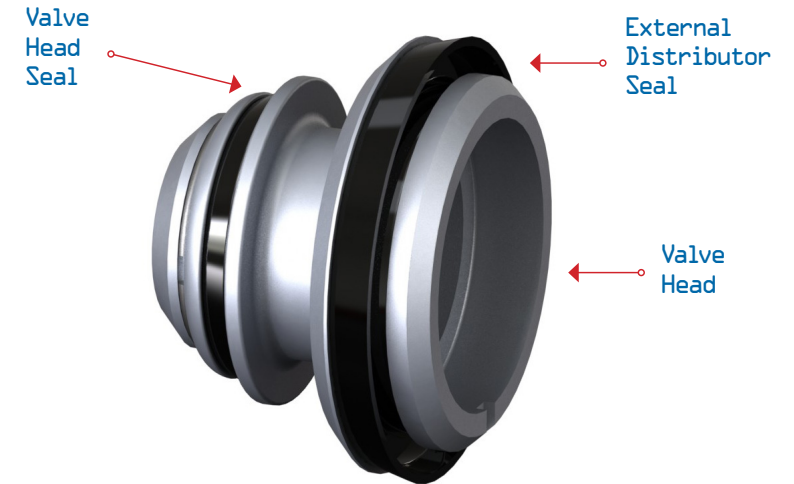
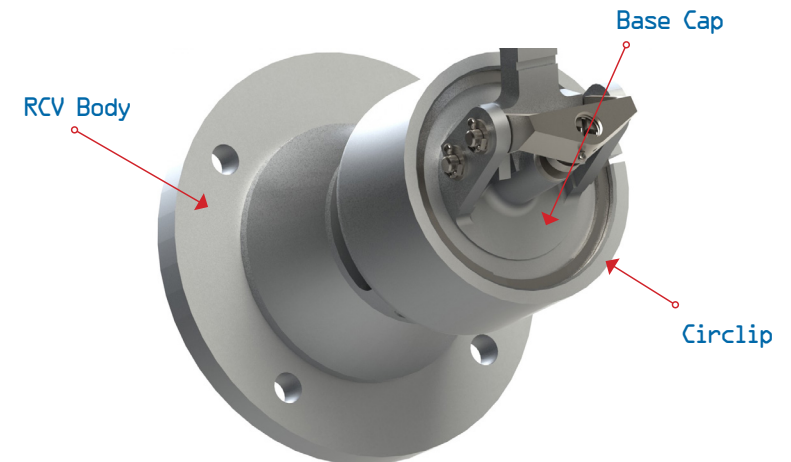
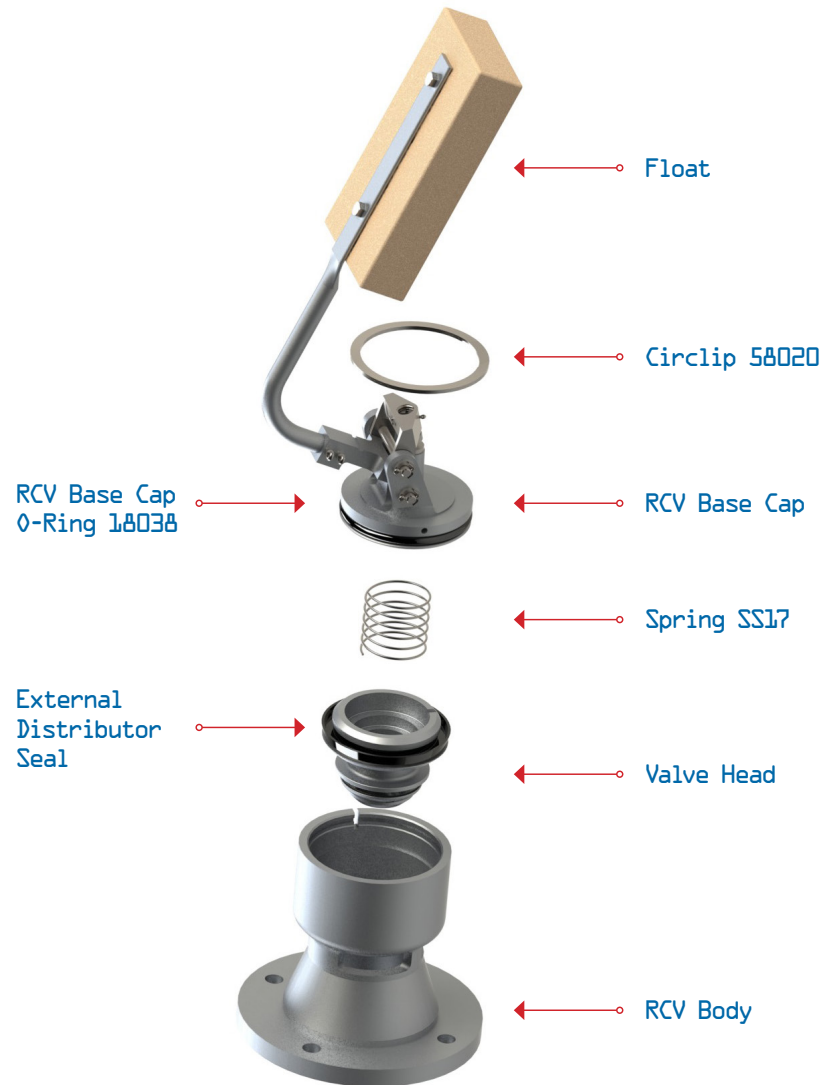


Fig 3. RCV Base Cap & Circlip



Repairs and Servicing

Fig 4. RCV Exploded View



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