

BLACKMER BYPASS VALVES

INSTALLATION OPERATION AND MAINTENANCE INSTRUCTIONS

EBSRAY MODEL: RV18

RV18CBS2, RV18CBS3, RV18VRS10, RV18VRS14, RV18VRS19

967020

INSTRUCTIONS NO. 551-E00

Section	551
Effective	Aug 2015
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SAFETY DATA



This is a SAFETY ALERT SYMBOL.

When you see this symbol on the product, or in the manual, look for one of the following signal words and be alert to the potential for personal injury, death or major property damage



Warns of hazards that WILL cause serious personal injury, death or major property damage.



Warns of hazards that CAN cause serious personal injury, death or major property damage.



Warns of hazards that CAN cause personal injury or property damage.

NOTICE:

Indicates special instructions which are very important and must be followed.

TABLE OF CONTENTS

Page

GENERAL

Description	2
Nameplate codes	2

INSTALLATION

Piping	3
Checking the External Bypass Valve Pressure	3
Bypass Valve Adjustment	4
Operational Checks	4

MAINTENANCE

Periodic Inspection	4
Preparation for Disassembly	5
Disassembly	5
Inspection	5
Reassembly	5

PARTS DESIGNATION	6
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Numbers in parentheses following individual parts indicate reference numbers on Parts Designation page.

Blackmer instruction manuals and parts lists may be obtained from Blackmer's website (www.blackmer.com) or by contacting Blackmer Customer Service.

NOTICE:

Blackmer external bypass valves MUST only be installed in systems which have been designed by qualified engineering personnel. The system MUST conform to all applicable local and national regulations and safety standards.

This manual is intended to assist in the installation and operation of Blackmer bypass valves, and MUST be kept with the bypass valve.


Blackmer bypass valve service shall be performed by qualified technicians ONLY. Service shall conform to all applicable local and national regulations and safety standards.

Thoroughly review this manual, all Instructions and hazard warnings, BEFORE performing any work on the Blackmer bypass valves.

Maintain ALL system and Blackmer liquefied gas pump operation and hazard warning decals.

SAFETY DATA


⚠WARNING



Hazardous machinery can cause serious personal injury.

Failure to disconnect and lockout electrical power or engine drive before attempting maintenance can cause severe personal injury or death


⚠WARNING



Hazardous or toxic fluids can cause serious injury.

If pumping hazardous or toxic fluids, system must be flushed and decontaminated, inside and out, prior to performing service or maintenance

⚠WARNING



Hazardous pressure can cause serious personal injury or property damage

Disconnecting fluid or pressure containment components during pump operation can cause serious personal injury or property damage.

⚠WARNING



Hazardous pressure can cause serious personal injury or property damage

Failure to relieve system pressure prior to performing external bypass or pump service can cause serious personal injury or property damage. Systems with meters will still be pressurized even after the hose is emptied

NOTICE

Blackmer bypass valves **must** only be installed in LPG systems that have been designed by qualified engineering personnel and operated and maintained by qualified technicians. The system **must** conform to all applicable local and national regulations and safety standards (specifically, lpg systems **must** conform to NFPA 58). This manual **must** be kept with the bypass valve and be reviewed **before** installation, putting into operation or performing any maintenance work.

DESCRIPTION

The EBSRAY Models RV18 Bypass Valves are intended to enable control and setting of pump and system differential pressures only. They are spring actuated devices that by design cannot be positively shut-off.

These Bypass Valves are listed by Underwriters' Laboratories for liquefied petroleum gas (LPG) service

Two configuration options are available:

1. **Constant Bleed System (CBS)** option which provides for controlled 'bleed-off' of vapor enhancing self priming and vapor clearing capabilities of the pump.
2. **Vapor Removal System (VRS)** option which provides rapid flow-through of vapor until liquid reaches the valve and then closes off the vapor orifice for maximum pump efficiency. i.e. fulfils an excess-flow valve type of function.

Technical Data is for standard materials of construction. Consult Blackmer Material Specs for optional materials of construction.

The Ebsray RV Model No. Code on the Nameplate identifies the valve type and spring fitted to the Bypass valve.

Example: RV18CBS2-023-02U01

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Spring Code

RV18 Springs

Spring Code	Working Differential Pressure Range	Maximum Differential Pressure at the Rated Maximum Flow
01	550 to 950 kPa (80 to 138 PSID)	1050 kPa at 200 litre/min (152 PSID at 53 US GPM)
02	600 to 1350 kPa (87 to 196 PSID)	1440 kPa at 200 litre/min (210 PSID at 53 US GPM)

INSTALLATION

INSTALLATION

On liquefied gas systems, an external bypass valve, piped back to the supply tank, is necessary for maximum pump performance and longer pump life. The bypass valve must be installed in the correct position on the discharge side of the pump. (The word "IN" is cast on the inlet port of the bypass valves.) The bypass valve will automatically prevent excessive pressure resulting from accidental pump overspeeding, discharge shut-off, or highly restrictive receiving systems.

Correct installation and operation is essential. Service life is enhanced by periodic inspection and careful maintenance.

Size the external bypass valve and its piping to accommodate the full flow from the pump when the pump's discharge line is closed and the pump is running at its rated maximum speed.

When installing the external bypass valve, it is essential that the pipe and fittings from the discharge port of the bypass valve be sized properly. Excessive backpressure resulting from friction loss in the bypass valve discharge piping will cause a higher pressure than the actual bypass valve setting.

For more information on sizing and friction loss, refer to the Blackmer Liquefied Gas Handbook - Bulletin 500-001 (or Bulletin 33 for other liquids) for pipe friction tables.

On liquefied gas systems, the external bypass valve discharge must be piped back to the liquid or vapor section of the supply tank never to the pump inlet. This method of piping should also be used when pumping volatile liquids from an underground tank or at high vacuum.

NOTICE

NEVER allow water or any corrosive product to enter the Bypass Valve (e.g. for hydrostatic testing of pipework). Severe internal damage may result.

If the Bypass Valve is not installed and commissioned immediately, special preservative techniques will be required. Low pressure nitrogen can be used to purge, seal and protect the Bypass Valve from the effects of condensation and atmospheric corrosion. Alternately a ¼ cup (60 mL) of diesel may be poured into the valve.

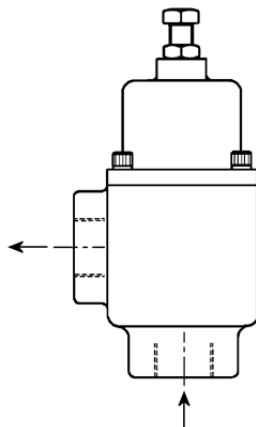
PIPING

The bypass valve should be installed with the adjusting screw in the 12 O'clock (up) position. Mounting the valve horizontally may cause increased wear on the spool valve. Flow must be into the port marked "IN".

Remove pipe scale and other foreign material such as PTFE tape residue from the connecting pipelines. Apply a suitable pipe thread sealant to the male threads before fitting.

Never draw piping into place by use of force at the port connections of the Bypass Valve.

All piping should be supported independently and line up accurately with the Bypass Valve ports.



External bypass valves shall be sized and adjusted so the maximum pressure of the system does not exceed the lowest service pressure rating of any component used in the delivery system.

NOTICE:

At temperatures below -20° F (-28.9° C) materials have reduced impact strength. Provisions should be made to prevent tools and other objects from impacting any pressure containing components of the pumping system.

CHECKING THE EXTERNAL BYPASS VALVE PRESSURE

1. Install a pressure gauge equipped with a needle valve or snubber in the pump discharge gauge port. Install a pressure gauge on the tank and record the tank pressure.
2. Connect the delivery hose to the receiving tank.
3. Check all valves. The shut-off valve in the pump's discharge line and the shut-off valve in the bypass return line should be open.
4. Start pumping at the normal rate. Make sure the supply tank outlet valve is wide open and check the direction of shaft rotation to be sure it matches the direction of the arrow on the pump.
5. To check the external bypass valve setting, gradually close the shut-off valve in the pump's discharge line and record the gauge pressure. The difference between this reading and the tank pressure (before pumping) is the external bypass valve setting.
6. For pumps with an internal relief valve (i.e., most PD pumps): The external bypass valve must be set at least 25 psi (1.72 bar) **less** than the pump's internal relief valve setting.

To check the pump's internal relief valve pressure setting: Gradually close the shut-off valve in the bypass return line. Then slowly close the shut-off valve in the pump's discharge line while watching the gauge pressure on the discharge side of the pump. Record the peak differential pressure (the difference between the discharge and inlet pressure) when the internal relief valve begins to open. NOTE: It is important to read the peak pressure just before the pump relief valve opens. Once recirculation starts through the pump relief valve, vaporization will cause the pressure to fall quickly. For more information on the pump relief valve settings and adjustments, refer to the installation instructions for the specific pump.

After the internal relief valve setting has been determined, reopen the shut-off valve in the pump's discharge line and the shut-off valve in the bypass return line.

INSTALLATION

EXTERNAL BYPASS VALVE ADJUSTMENT

1. Remove the seal wire and loosen the locknut (10).
2. To increase the pressure setting, slowly turn the adjusting screw (8) inward, or clockwise.
3. To reduce the pressure setting, slowly turn the adjusting screw (8) outward, or counterclockwise.
4. Ensure that there is an appropriate pressure gauge fitted to Pumps' main discharge viewable while setting the Bypass Valve.
5. Rotate the Bypass Adjusting Screw (8) anti-clockwise until there is no resistance against the screw. This is the Bypass Valve's minimum pressure setting.
6. Ensure that the system is set such that 100% of the Pump's flow is directed through the Bypass Valve
7. Start the Pump and ensure that liquid is flowing through Bypass Valve. This should be detectable audibly (by listening) or by feeling the valve/pipework (by hand).
8. Screw in the Bypass Valve Adjusting Screw (8) not exceeding two turns per minute until the desired differential pressure is reached.
9. While retaining the Adjustment Screw (8), tighten the Locknut (10) against the Bypass Valve Cover (2).

10. After setting the Bypass Valve is completed, wire and seal the Adjusting Screw, using the holes provided in the head of Adjusting Screw and lug on Bypass Valve Cover.

NOTE: Bypass Valves characteristically exhibit two distinct pressures during their operation:

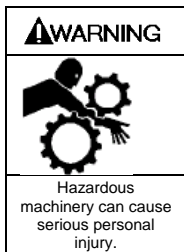
- 1) The 'setting' or 'cracking' pressure which occurs when the Bypass Valve first opens i.e. initial bypassing begins against the preset spring load.
- 2) 'Maximum' pressure, which occurs when the full flow of the bypassed product passes through the Bypass Valve.

It is important to ensure both these above characteristics are understood fully in order to correctly apply the Bypass Valve.

OPERATIONAL CHECKS

Inspect the external Bypass Valve frequently during the first few hours of operation for such conditions as leaks, excessive heating, vibration or unusual noises etc.

MAINTENANCE



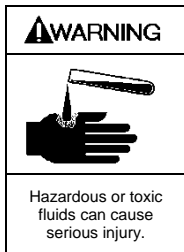
Failure to disconnect and lockout electrical power or engine drive before attempting maintenance can cause severe personal injury or death

Hazardous machinery can cause serious personal injury.



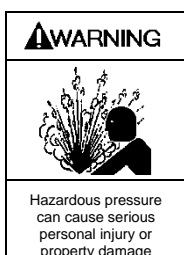
Disconnecting fluid or pressure containment components during pump operation can cause serious personal injury or property damage.

Hazardous pressure can cause serious personal injury or property damage



If pumping hazardous or toxic fluids, system must be flushed and decontaminated, inside and out, prior to performing service or maintenance

Hazardous or toxic fluids can cause serious injury.



Failure to relieve system pressure prior to performing pump service can cause serious personal injury or property damage. Systems with meters will still be pressurized even after the hose is emptied

Hazardous pressure can cause serious personal injury or property damage

NOTICE:

Maintenance shall be performed by qualified technicians only. Follow the appropriate procedures and warnings as presented in this manual.

LUBRICATION

No 'in service' lubrication is required on Ebsray Model RV18 Bypass Valves.

PERIODIC INSPECTION

Periodic Inspection of the Bypass Valve, Pump System and Ancillary Equipment is required to maintain safety, conformity, operational functionality and reliability.

Annual inspection and testing of the internal relief valve (if applicable) and the external bypass valve operation and setting is recommended.

Maintenance inspections should be performed at a maximum interval of three months or 500 hours operation. More frequent inspections may be necessary dependent upon usage, site conditions, operation, etc.

If any abnormal condition is discovered, cease operation of pump system immediately and take action to rectify the problem.

For safe operation, the following items should be included in the routine periodic inspection:

- a. Inspect the Bypass Valve for leaks, vibration, abnormal noises, signs of overheating, discoloration, etc.
- b. Check Bypass Valve differential pressure setting.

MAINTENANCE

PREPARATION FOR DISASSEMBLY

1. Isolate Bypass Valve from liquids/vapor in inlet and discharge lines, depressurize and purge any toxic, flammable, corrosive or air hardening liquid/vapor.
2. Ensure the associated Pump Motor power supply has been isolated, before proceeding with disassembly.
3. Once exposed to the atmosphere, immediately protect the valve with from corrosion. A ¼ cup (60 mL) of diesel may be poured into the valve

DISASSEMBLY

Refer to the Parts Designation drawings.

1. Unlock Adjusting Screw Locknut (10).
2. Release Spring pressure by rotating Adjusting Screw (8) anti-clockwise.
3. Unscrew four Capscrews (9) holding Valve Cover (2) onto Housing (1). **NOTE:** There will be a slight spring pre-compression remaining.
4. Remove the Valve Cover (2) and O-Ring (2), together with the Spring Cap (2) and its O-Ring (6).
5. Remove Spring Cap (2) and O-Ring (6) from Valve Cover (2).
6. Remove Spring (5) and Valve (3a, 3b) from Housing (1).
7. **VRS OPTION ONLY:** Carefully remove Circlip (14) from inside Valve (3a), then remove Ball (12) and Spring-Vent (13).

INSPECTION

1. Inspect Housing (1) and valve bore for damage or wear. If required, remove Housing and replace.
2. Check Valve (3a, 3b) for damage or wear. If required, replace valve.
3. Inspect Spring - Bypass (5), replace if broken or damaged.
4. It is advised that O-Rings (6, 7) be replaced at every overhaul.
5. Check Valve Cover (2), Spring Cap (4), Adjusting Screw (8) and Locknut (10) for damage. Replace as required.
6. **VRS OPTION ONLY:** Check condition of Ball (12), Spring - Vent (13) and Circlip (14). Replace as required.

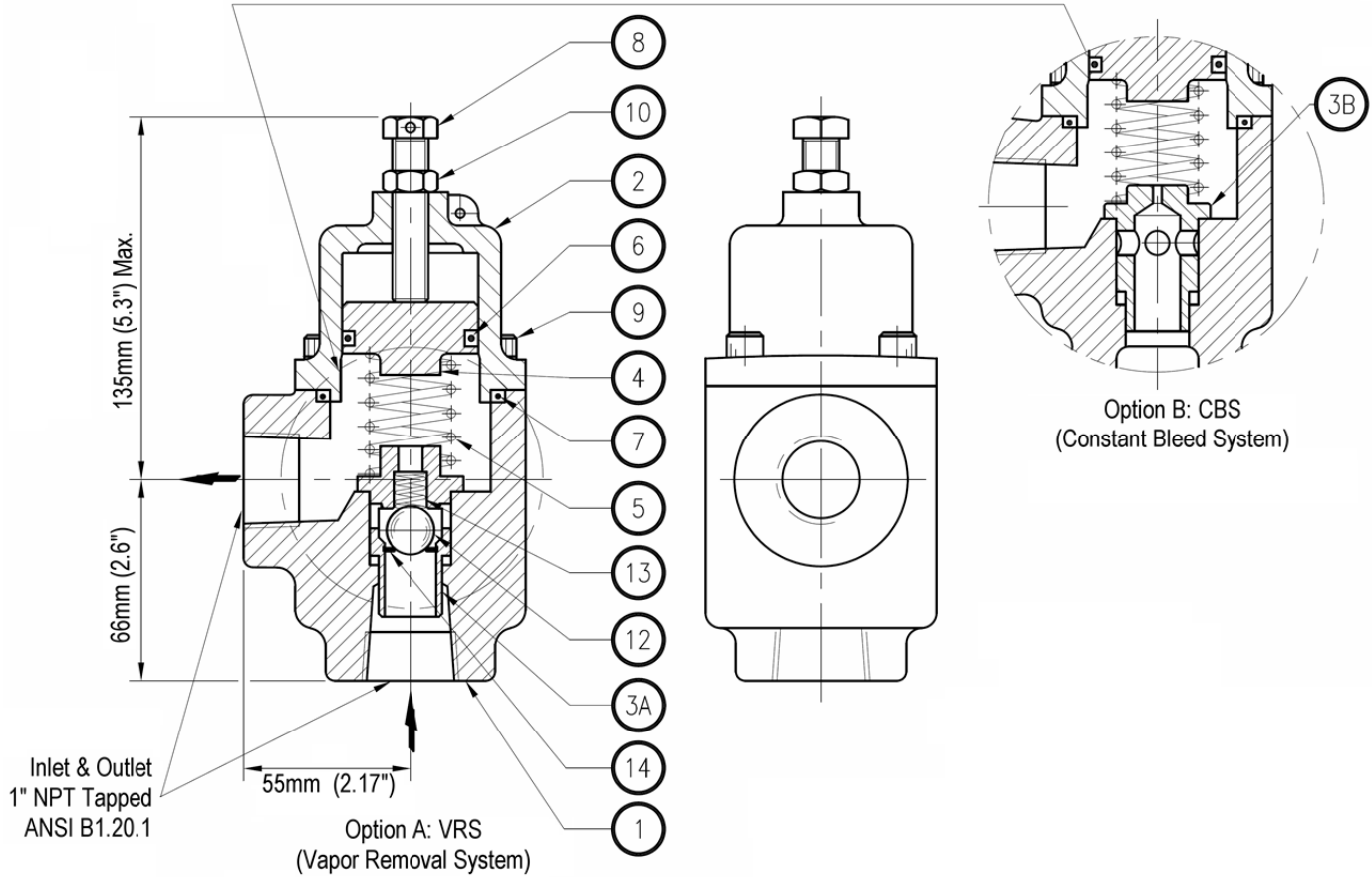
REASSEMBLY

Refer to the Parts Designation drawings.

4. **VRS OPTION ONLY:** Insert Spring - Vent (13) into Valve (3a) with large end seating in Valve, insert Ball (12) after Spring - Vent and retain in place with Circlip (14), ensuring Circlip locates correctly in groove.
5. Fit Valve (3a, 3b) into Housing (1), ensuring freedom of movement.
6. Fit Spring - Bypass (5) on to top of Valve (3a, 3b).
7. Lightly smear all O-Rings (6, 7) with a compatible good quality detergent free, light oil before assembly.
8. Fit O-Ring (7) to Valve Cover (2).
9. Fit O-Ring (6) to Spring Cap (4) and insert into Valve Cover (2) with spring location boss facing out.
10. Fasten Valve Cover (2) to Housing (1) using four capscrews (9). Torque to 16 ft-lb (22 N-m).
11. After recommissioning, adjust differential pressure as per 'BYPASS VALVE ADJUSTMENT'.

PARTS DESIGNATION

MODELS: RV18 Inline Bypass Valves.



Ref.	Description	Qty	Ref.	Description	Qty
1	Housing NPT	1	7	O-Ring, 1/8x2	1
2	Valve Cover	1	8	Adjusting Screw	1
3a	Valve	1	9	Socket Hd Capscrew M8x1.25x25	4
3b	Valve	1	10	Nut Hexagon Head Metric	1
4	Spring Cap	1	12	Ball	1
5	Spring Bypass	1	13	Spring Vent	1
6	O-Ring, 1/8x1-7/16	1	14	Circlip	1

Spare Parts Inquiries

To facilitate Parts inquiries, please provide Blackmer with:

- Model and Serial Number on the valve nameplate.
- Ref. # and Description from the Parts Designation table.
- Quantity required.

Visit www.blackmer.com for complete information on all Blackmer products

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