

**This document provides installation and start-up instructions for Actaris/ROOTS Regulator models RB1700 & RB4000 series.**

**Warning:** Follow your company's standard operating procedures regarding the use of personal protection equipment (PPE). Adhere to guidelines issued by your company in addition to those contained in this document when installing or repairing natural gas regulators.

**Warning:** This product, as of the date of manufacture, is designed and tested to conform to all governmental and industry safety standards as they may apply to the manufacturer. The purchaser/user of this product must comply with all fire control, building codes, and other safety regulations governing the application, installation, operation, and general use of this meter to avoid leaking gas hazards resulting from improper installation, startup or use of this product.

To ensure safe and efficient operation of this product, Dresser Utility Solutions strongly recommends installation by a qualified professional.

#### **Safety Notes:**

Before installing the pressure regulator in the piping, the following must be checked:

- The upstream and downstream flanges must be parallel and the pressure regulating unit must be capable of being fitted without undue stress.
- The upstream piping must be cleaned from all impurities (sand, welding, slag, etc.)  The pressure regulator must not be visibly damaged.
- The inlet and outlet chamber of the pressure regulator must be perfectly cleaned.

After these checks have been made, the unit can be installed in the piping, making sure that the direction of gas flow corresponds to the arrow on the pressure regulator body.

**We recommend performing installation with the valve body in horizontal alignment.**

The following is recommended:

- An electrically insulating joint upstream and downstream, if the incoming and outgoing piping is made with ferrous material.
- An on/off valve upstream and downstream of the pressure regulator.
- A manometer or pressure gauge upstream and downstream for the regulator.
- An upstream filter.
- A relief valve for accidental overpressure (example: the exposure of the downstream piping to direct sunlight at zero flow.)
- Free passage for maintenance operations
- If the case of an ON/OFF gas load, the downstream volume must be greater than 1 cubic foot per 1000 cubic feet per hour of flow rate.

All variations in diameter downstream must be performed progressively in order to prevent negative turbulence.



**\*\*The RB1700 & RB4000 regulators are equipped with pulsation dampening devices located in the vent and control line connections. Do not remove these devices; connect directly to the regulator.\*\***

The pressure regulator's control line must be connected to the downstream pipe. These connections must be inserted in a straight section of the downstream piping as indicated in the installations diagrams (Figures 1, 2, and 3).

For this purpose, we recommend welding the control line connections on the upper part of the piping in order to prevent impurities and condensate from collecting and obstructing the passage of the gas. Avoid locating the control line piping near sources of heat or direct sunlight.

It is also important to make sure that the control line piping slopes slightly downwards to the pipe (Fig. 7). For adequate operation, the gas velocity at the control line position in the pipe must not exceed those given below:

Low pressure

< 2.9 psig: 50-65 ft/s

Med/high pressure

>2.9 psig: 65-130 ft/s

## Outdoor Installation

When installing RB-series regulators outdoors, the vent must be protected to prevent any type of moisture from entering and freezing.

**Warning** Schedule periodic inspections to check the regulator vent for foreign materials as outlined in DOT PHMSA-RSPA-2004-19856

## Indoor Installation

When installing RB-series regulators indoors, pipe the vent to outside atmosphere using:

- ☑ The shortest pipe length
- ☑ The fewest possible pipe elbows
- ☑ A pipe diameter as equal to the vent size (or larger)

**Warning** Using a vent pipe smaller than the vent connection will limit the regulator's internal relief valve capacity. Protect the pipe's outlet end from moisture and the entry of foreign materials. Specify the correct vent size and pipe threads to make the regulator's vent pipe connection.

## Start-up Procedure (all models)

*To start-up the RB-series regulator*

After the pressure regulator has been installed, make sure that:

- The on/off valve upstream and downstream and the discharge vent pipe are all closed.
- The pressure of the inlet gas is not higher than the established design value.

### **After these checks have been made, proceed as follows:**

1. Partially open the upstream on/off valve slowly just enough to make sure that a very small amount of gas passes.
2. Reset the shutoff valve whenever it has been set for minimum pressure intervention because it will be closed in the absence of pressure (see the paragraph regarding the resetting of the shutoff unit).
3. Check that the pressure rises slowly on the upstream and downstream pressure gauges; the downstream pressure must stabilize around the pre-set value or a value slightly higher (if the pressure continues to rise, interrupt the starting procedure by closing the upstream on/off valve and consult the troubleshooting diagram to identify the cause of the malfunction).
4. After the upstream pressure value has stabilized, open the upstream on/off valve completely.
5. Slowly open the downstream on/off valve until the piping is completely filled.

At this point, the pressure regulator is operative. The same procedure must be used when installing monitor- equipped pressure regulators connected on line with the active pressure regulator (see Fig. 2), bearing in mind that the pressure gauge installed in the section in between the two regulators must indicate the same pressure value as the upstream gauge.

### **Pressure Regulator Setting (See Principle of Operation Schematic)**

The pressure regulator is usually delivered already set to the specifications indicated in the order. Whenever the set pressure must be modified, this value must be set within the setting range of the spring installed.

After first checking the suitability of the spring installed to achieve the desired setting value, proceed as follows:

- To increase the value of the set pressure: rotate the spring adjustment ferrule (lock) nut clockwise using the adjustment wrench until the desired value is reached (which can be read on the gauge downstream).
- To decrease the value of the set pressure: proceed as above, rotating the spring adjustment ferrule counter- clockwise.
- These operations can be performed regardless of whether the pressure regulator is delivering flow or the downstream on/off cock is closed, making sure (in the latter case) to open the discharge plug (control line intake), downstream of the regulator. This valve should be closed after the desired set pressure is obtained.

### **Shutoff Device Setting (on designated models only)**

After first checking the suitability of the spring installed to achieve the desired set pressure, proceed as follows:

- Check the setting of the shut off unit
- To reach the maximum downstream pressure:
  - Close the ON/OFF valve downstream (Fig. 1) and slowly increase the pressure downstream until the desired maximum intervention pressure is reached.
  - In order to correct this value, rotate the overpressure adjustment spring nut clockwise to increase the set pressure and counter-clockwise to decrease the value. (See Principle of Operation Schematic) To reach the minimum downstream pressure:
    - Close the upstream ON/OFF valve (Fig. 1), and slowly discharge the downstream pressure until the desired minimum intervention pressure is reached.
    - In order to correct this value rotate the under pressure adjustment spring nut (See Principle of Operation Schematic) clockwise to increase the setting value, and counter-clockwise to decrease the value.

**IMPORTANT!** The changing of the setting of the shutoff valve must always be performed with the shutoff valve diaphragm chamber under pressure. (See Principle of Operation Schematic)

### **Shutoff Device Reset (Fig.1, 2 & 3)**

The shutoff device must be reset only after first identifying the reason why it triggered in the first place. To restore normal operating conditions the following operations should be performed.

- In order to correct this value rotate the under pressure adjustment spring nut (See Principle of Operation Schematic) clockwise to increase the setting value, and counter-clockwise to decrease the value.

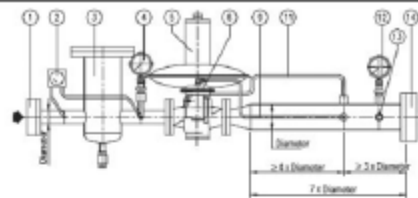
1. Close the ON/OFF valve downstream;
2. Open the valve for the upstream and downstream pressure gauges.
3. Downstream pressure = 0 (discharge any residual pressure by opening the discharge vent pipe).
4. Close the relief and discharge valves.
5. Check the seal of the unit's valve seat by opening the discharge valve (test using bubble system):
6. Slowly rotate the reset lever (See Principle of Operation Schematic) clockwise until the internal bypass is opened. This operation permits the filling of the outlet chamber, the piping downstream and the shutoff valve diaphragm chamber, which can be checked on the gauge positioned downstream
7. After the pressure on the gauge has stabilized, continue using the reset lever until it can be connected to the control levers, and at this point, the reset lever will remain stable in its open position.
8. After these operations have been performed, the shut-off valve will be ready for service and the downstream valve can be slowly reopened.

**When restoring normal operating conditions, the shutoff valve must always be reset whenever the valve is equipped with the minimum downstream pressure intervention function.**

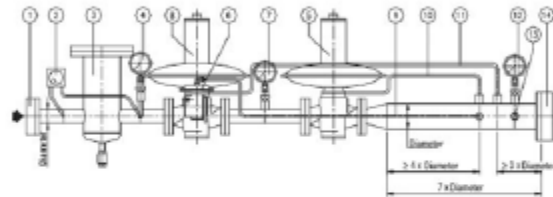
**Key**

- | No. | Description                                 |
|-----|---|
| 1   | Upstream valve                              |
| 2   | Differential pressure gauge                 |
| 3   | Strainer/Filter                             |
| 4   | Upstream pressure gauge                     |
| 5   | Regulator/Monitor                           |
| 6   | Shutoff valve                               |
| 7   | Pressure gauge                              |
| 8   | Monitor Regulator                           |
| 9   | Shutoff valve impulse                       |
| 10  | Regulator impulse                           |
| 11  | Monitor regulator impulse                   |
| 12  | Downstream pressure gauge                   |
| 13  | Discharge vent pipe                         |
| 14  | Downstream valve                            |
| 15  | Upstream isolating connection               |
| 16  | Discharge vent pipe                         |
| 17  | Regulator vent                              |
| 18  | Meter                                       |
| 19  | Peak shaving valve                          |
| 20  | Downstream electrical insulating connection |

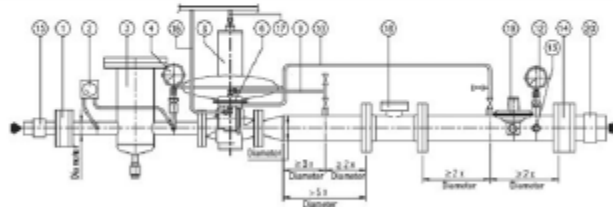
**Fig. 1**



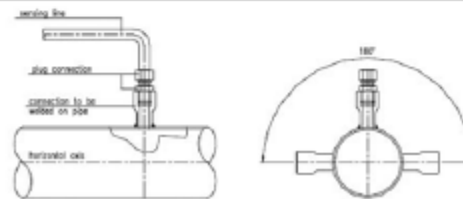
**Fig. 2**



**Fig. 3**



**Fig. 4**



**Figure 1 – Basic setup (shutoff valve only on designated models)**

**Figure 2 – Operator/Monitor Schematic**

**Figure 3 – Includes devices that may be added to the gas train**

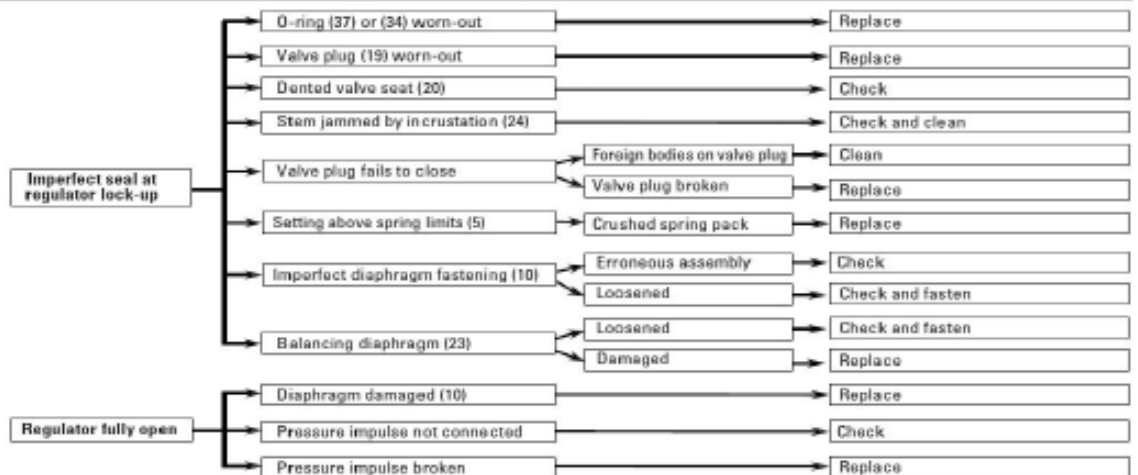
**Figure 4 – Recommended sensing/impulse line installation**

## Troubleshooting Guide

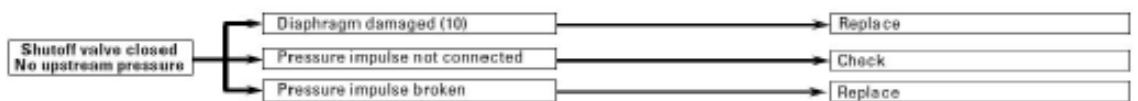
### Malfunction



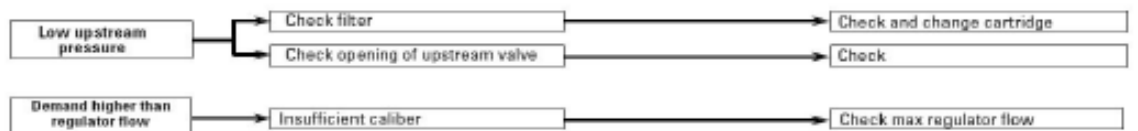
### Pressure Beyond Regulator Setting



### No Flow



### Low Downstream Pressure and Flow





**ROOTS Regulators**

16240 Port Northwest Drive

Houston, TX 77041

T: 1-800-521-1114

F: 1-800-335-5224

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*ROOTS Regulators RB Series Installation*

*TDC-0851-003 for the RB Series Installation*

*DUS.ROOTS.041b*

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