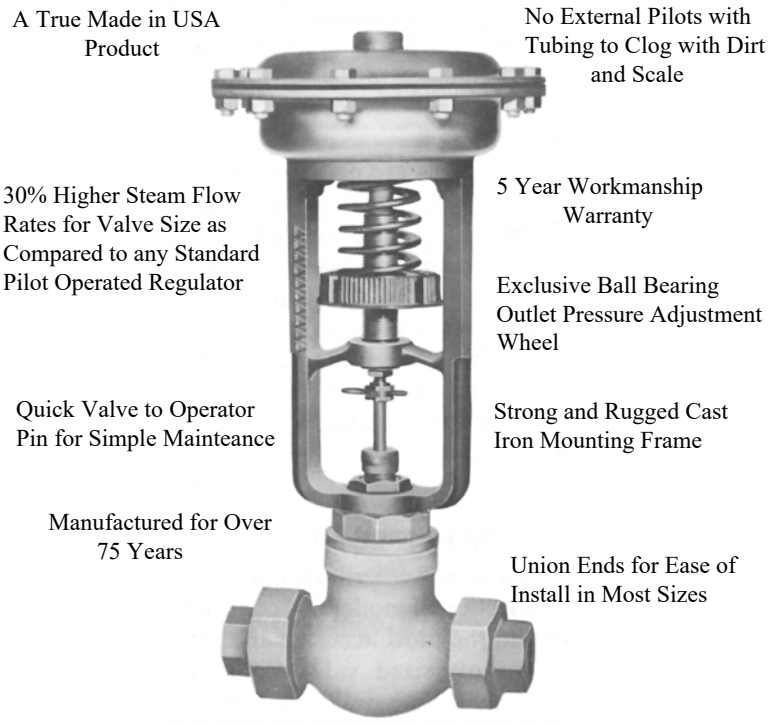
THERMAFLO INCORPORATED SINCE 1986
MANUFACTURERS OF STEAM FIRED SPECIALTY EQUIPMENT
2880 FAIR AVENUE, NEWBERRY, SC. 29108 | PHONE: 704-940-1228



# Pressure Regulators RP-1065-A, RP-1066-A

*Diaphragm actuated, Spring adjusted balanced trim type Pressure Regulator for steam service.*




"Single Seated Piston Balanced Trim Sizes 1/2" to 2" that Shuts Off Dead Tight and Allows Head and Seat Stability Over Wide Steam Demand Flow Ranges"

## FEATURES

- **Valve sizes 1/2" through 2" single-seated. 2-1/2" through 4" double-seated.**
- **All valves stainless steel balanced single seated trim for wide flow range accuracy and tight shutoff**
- **Choice of setpoint control ranges.**
- **Nylon-reinforced, molded Buna-N diaphragm.**
- **Quick-disconnect valve stem feature.**
- **"Lifetime," spring-loaded, Teflon "Chevron" stem packing and no pilots which eliminates dirt in their small passages and mainteance**
- **Polished stainless steel quick-disconnect type valve stem.**
- **Ball bearing adjusting wheel.**
- **Valve designs backed by many years of field service.**
- **All components from a single USA manufacturer.**

## DESCRIPTION

Sensitive, accurate control of reduced pressures is provided by these simple self-operated pressure regulators. They may be used to control steam pressures for heating systems, industrial processes and steam-driven pumps, as well as many other fluid pressure controlling and limiting applications throughout public buildings, institutions, industrial and chemical plants, shipboard installations, etc.

When supplied with reverse-acting valves, these units will open on rising pressure for modulating pressure relief.

These precisely designed pressure regulators are ruggedly constructed, using cast iron alloy of carefully controlled quality for the sturdy frame, molded diaphragms of Buna-N composition, nylon-reinforced for great flexibility and long service life.

Cataloged valves 1/2" through 2" are single-seated, stainless steel trimmed for accurate control on steam applications. The "MA" piston-balanced valves, sizes 3/4" through 1-1/2", permit pressure drops up to the full valve body rating without loss of control accuracy and dead tight shutoff. Sizes 2-1/2 through 4" are fitted with double-seated semi-balanced valves. Double-seated valves are used on services that do not require "dead-end" shutoff. Body material is bronze through 1-1/2" size and cast iron 2" and larger.

## OPERATION

The controlled pressure from the downstream side of the valve is applied to the diaphragm through the tapped case opening. Through the area of the diaphragm, the force exerted by the adjusting spring is balanced by the force created from the pressure. Even small changes in the reduced pressure produce immediate changes in valve position to regulate the pressure downstream.

The setpoint is changed by varying the load on the adjusting spring. Rotating the ball-bearing adjustment wheel so as to compress the spring and increase its force against the diaphragm raises the setpoint. Rotation in the opposite direction lowers the setpoint. The scale along one side of the frame provides a reference for restoring the setpoint when adjustment wheel position has been changed from its normal setting.

| Regulator No. | Diaphragm Size | Adjustable Pressure Ranges, PSIG | Max. Diaphragm Test Pressure, PSIG |
|---|---|---|---|
| RP-1065-A | 5 | 5 - 50<br>10 - 100<br>25 - 150 | 300 |
| RP-1066-A | 10 | 3 - 25<br>5 - 50<br>15 - 75 | 150 |

## ACCURACY OF REGULATION

In general, the greatest accuracy-closest regulation-is obtained with the largest diaphragm and shortest range which will give the required control pressure. For example, a control pressure of 40 psig can be obtained with any of the three ranges in model RP-1065-A and with two of the three ranges in model RP-1066-A. Closest regulation can be expected with the 5 - 50 psi range of model RP-1066-A (size 10 diaphragm). See table for "Accuracy of Regulation."

Unbalanced port areas are not considered in the values tabulated. Small amounts of unbalance are present in single-seated 1/2" "A" valves and in semi-balanced double-seated valves 2" through 4". Under conditions of high pressure drop, the forces opposing valve closure will influence selection of the regulator model (diaphragm size).

## ACCURACY OF REGULATION

Pressure Change, PSI, at the diaphragm for full valve stroke†

| Regulator No. | Adjustable Range PSIG | Valve Size | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1/2* | 1/2** | 1/2 | 3/4 | 1 | 1-1/4 | 1-1/2 | 2 | 2-1/2 | 3 | 4 |
| RP-1065-Al | 5-50 | 2-1/2 | 3 | 4 | 5 | 6-1/2 | 7-1/2 | 9 | 11 | 7-1/2 | 9 | 11 |
| RP-1065-A2 | 10-100 | 5 | 6-1/2 | 7-1/2 | 10 | 12-1/2 | 15 | 17-1/2 | 22 | 15 | 17-1/2 | 22 |
| RP-1065-A3 | 25-150 | 11 | 13 | 16 | 21-1/2 | 27 | 32 | 37 | 48 | 32 | 27 | 48 |
| RP-1066-A1 | 3-25 | 1-1/2 | 1-1/2 | 2 | 2-1/2 | 3 | 4 | 4-1/2 | 6 | 4 | 4-1/2 | 6 |
| RP-1066-A2 | 5-50 | 2-1/2 | 3-1/2 | 4 | 5 | 6-1/2 | 7-1/2 | 9 | 11 | 7-1/2 | 9 | 11 |
| RP-1066-A3 | 15-75 | 5 | 6-1/2 | 8 | 11 | 13 | 16 | 18-1/2 | 24 | 16 | 18-1/2 | 24 |
| Port Area Unbalance Sq. Inches | | .05 | .12 | .21 | 0 | 0 | 0 | 0 | 0 | .51 | .60 | .81 |
| Max. Supply Press., PSIG | | 225 | | | 250 | | | | 125 | | | |
| Max. Pressure Drop, PSI | | 125 | | | 250 | | | | 125 | 100 | 100 | 80 |

† Control is modulating around setpoint
* 1/4" reduced port.
** 3/8" reduced port.

## CAPACITIES, VALVE SIZING

Proper selection of valve size is equally as important as proper selection of model and control range in order to obtain the most accurate and satisfactory control. This table is provided so that a valve can be selected easily based on inlet steam pressure and outlet reduced pressure. The inlet and outlet steam pipe sizes should be selected at a velocity of 6,000 to 10,000 FPM to avoid noise.

**Liquid –** To determine the valve capacity for liquids use the consult a factory representative.

**Steam –** On compressible fluids such as steam or gas, maximum valve capacity is reached at the “critical pressure drop”. The “critical pressure drop” is when the pressure ratio is 0.53 or less. The pressure ratio is determined by dividing the downstream pressure, in psia, by the inlet pressure, in psia. The steam capacity chart maximum flows are stated at the critical pressure drop.

Maximum inlet pressure to reduced pressures should be limited to 20:1 For Example: 100 psig inlet pressure steam the maxium reduced pressure setpoint is 5 psig. When the reduced pressure exceeds 20:1 two valves in series must be selected.

Steam flow demand turndown maximum should be limited to 50:1 For Example a 2" MA valve 100 psig reducing pressure to 15 psig the maximum steam flow rate is 9,988 divided by 50 provides a stable low flow of 199 lbs/hr.

## STEAM CAPACITY

At Critical Pressure Drop

| Valve Size | | 1/2" | 1/2" | 1/2" | 3/4" | 1" | 1-1/4" | 1-1/2" | 2" | 2-1/2" | 3" | 4" |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Port Size | | 1/4" | 3/8" | 1/2" | 3/4" | 1" | 1-1/4" | 1-1/2" | 2" | 2-1/2" | 3" | 4" |
| Valve Type | | A | A | A | MA | MA | MA | MA | MA | FA | FA | FA |
| Valve Cv | | 1.0 | 1.6 | 2.1 | 10.5 | 12.8 | 18.6 | 26.0 | 47.5 | 82.5 | 130.0 | 226.0 |
| Max. Supply Press, PSIG | | 225 @ 100° F<br>150 @ 400° F | | | 250 @ 100° F<br>250 @ 400° F | | | | 175 @ 100° F<br>125 @ 350° F | | | |
| Supply Press. PSIG | Max. Down-stream Press. PSIG | Maximum lbs./hr. Steam based on Supply and Downstream Pressure indicated at left | | | | | | | | | | |
| 15 | 10 | 47 | 83 | 115 | 505 | 660 | 960 | 1,340 | 2,460 | 4,500 | 7,000 | 13,000 |
| 20 | 10 | 54 | 97 | 135 | 590 | 775 | 1,120 | 1,570 | 2,870 | 5,000 | 8,000 | 15,500 |
| 25 | 15 | 62 | 110 | 150 | 675 | 885 | 1,290 | 1,800 | 3,280 | 6,000 | 9,200 | 18,000 |
| 30 | 15 | 70 | 125 | 170 | 760 | 1,000 | 1,450 | 2,020 | 3,700 | 6,500 | 10,000 | 20,000 |
| 40 | 20 | 86 | 150 | 210 | 935 | 1,220 | 1,770 | 2,480 | 4,520 | 8,000 | 13,000 | 24,000 |
| 50 | 25 | 100 | 180 | 250 | 1,100 | 1,440 | 2,090 | 2,930 | 5,450 | 9,500 | 15,000 | 29,500 |
| 60 | 25 | 120 | 210 | 290 | 1,270 | 1,660 | 2,420 | 3,380 | 6,170 | 11,000 | 17,500 | 33,000 |
| 70 | 30 | 135 | 235 | 325 | 1,440 | 1,890 | 2,740 | 3,830 | 7,000 | 12,500 | 20,000 | 39,000 |
| 80 | 40 | 150 | 265 | 365 | 1,620 | 2,110 | 3,070 | 4,280 | 7,830 | 14,000 | 22,000 | 42,500 |
| 90 | 40 | 165 | 290 | 400 | 1,790 | 2,330 | 3,390 | 4,740 | 8,650 | 16,000 | 24,000 | 47,000 |
| 100 | 50 | 180 | 320 | 440 | 1,960 | 2,550 | 3,710 | 5,190 | 9,480 | 18,000 | 26,000 | 50,000 |
| 125 | 60 | 220 | 390 | 535 | 2,380 | 3,110 | 4,520 | 6,320 | 9,988 | | | |
| 150 | 75 | 280 | 450 | 600 | 2,800 | 3,670 | 5,330 | 7,450 | | | | |
| 175 | 90 | | | | 3,340 | 4,290 | 6,270 | 8,590 | | | | |
| 200 | 100 | | | | 3,660 | 4,780 | 6,950 | 9,710 | | | | |
| 225 | 130 | | | | 4,100 | 5,420 | 7,920 | 10,800 | | | | |
| 250 | 140 | | | | 4,510 | 5,900 | 8,560 | 12,000 | | | | |

Selection from this table will generally produce an accuracy of + or - 1 psig either side of setpoint
Only MA Series valves provide tight shutoff. Consult Thermaflo Applications Engineering when higher flows and dead tight shutoff is required above 2" valve size.

## INSTALLATION

The regulator may be installed in a horizontal pipeline with the diaphragm either above or below the line. A water seal must. be provided when the regulator is used on steam applications to prevent damage to the diaphragm by high steam temperatures.

Reservoir 24669-A2 is recommended to provide the water seal.

An adjustable orifice, such as No. 94204, installed in the feeler line will generally improve control and protect both the valve and diaphragm by damping out pressure pulsations. Both sides of the orifice should be flooded by the water seal at all times.

The feeler line should extend at least 2 ft. to 4 ft. downstream from the valve on applications where the

*(Continued next page)*

**INSTALLATION (Continued)** regulator is controlling line pressures such as in a steam main. However a stilling well feeler line system can be installed for shorter distances down to 12".For controlling pressures in a tank or pressure vessel, the regulator should be installed as close to the vessel as possible. The feeler line is connected directly into the vessel or tank. Feeler lines are recommended to be 1/2" stainless steel tubing for maximum sensitivity. A hand valve should be installed in the feeler line to protect the diaphragm from downstream pressure buildup on liquid or non condensable gas service during extended shutdown periods. The regulating valve should be protected by a pipeline strainer. A three-valve by-pass is recommended for ease of servicing.

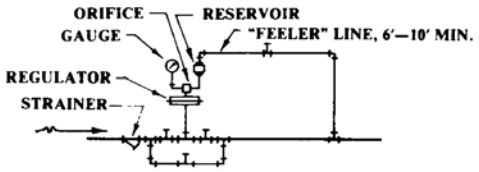



Fig. 1. Typical installation of a Pressure Regulator. Showing feeler pipe connection and pressure gauge. Feeler pipe is connected to reduced pressure side of supply line and at point where control is desired.

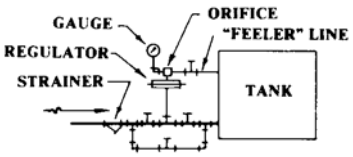



Fig. 2. Showing installation of a Pressure Regulator controlling pressure in a closed vessel. Note regulator is installed as close as possible to the tank.

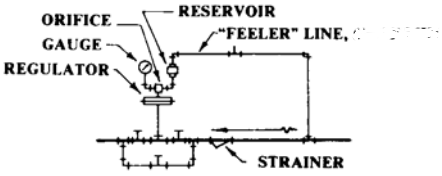



Fig. 3. Showing installation of a modulating Pressure Relief Valve. The feeler pipe is connected to the high pressure or upstream side of the supply line and at point where control is desired.

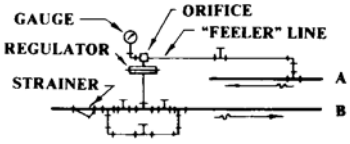
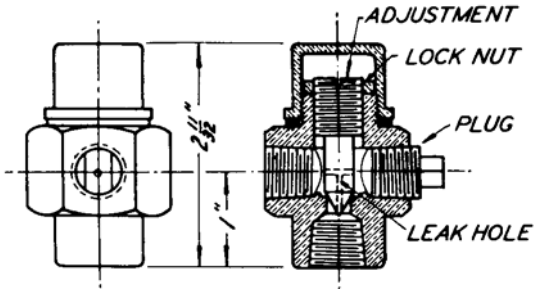



Fig. 4. A typical installation of a Pump Governor. Regulating valve is installed in the steam supply line "B" to pump. Feeler pipe is connected in pump outlet line "A" carrying medium being pumped. Adjustable orifice must be used as shown.

Always install a steam trap drip leg on the inlet and outlet side of the regulator to remove condensate from the steam vapor. This will greatly enhance the life and condition of the inner valve and seats.

**ADJUSTABLE ORIFICE NO. 94204**
(With or without leakhole)



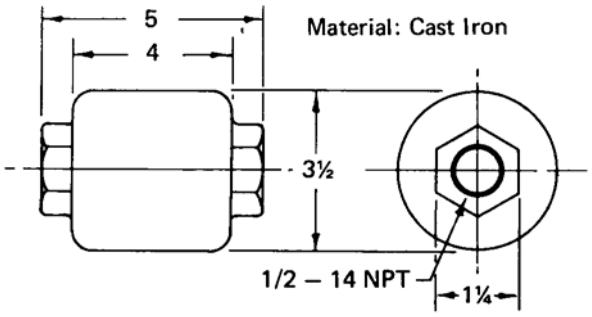

Most types of pressure regulators require a "feeler" pipe for best control. By using this adjustable orifice in the feeler pipe line, rapid pressure fluctuations will be dampened out and more steady control procured.

After the orifice is adjusted for proper flow, the adjustment can be locked by tightening a jam nut as shown in the accompanying drawing. A small passage or leak hole on the 94204-A 1 model is provided in the stem or poppet so that the flow cannot be shut off entirely and thus render the regulator inoperative. The model 94204-A2 does not have a leak hole.

All parts are made of brass. 1/4" pipe connections. Pipe plug may be removed for installation of pressure gauge.

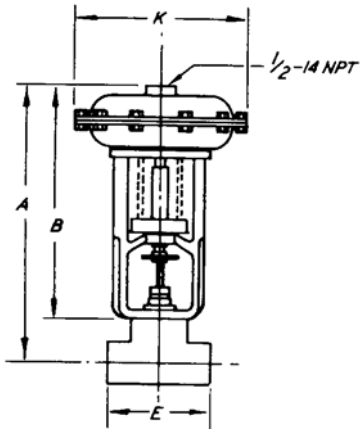
Supplied only on order and at extra cost.

**RESERVOIR NO. 24669-A2**




**HOW TO ORDER**
**When ordering, specify:**
Quantity
Regulator number
Valve size, type, action, etc.
Medium through valve (steam, etc.)
Supply pressure (psig)
Reduced pressure range (psig)
Special features desired
Invoicing and shipping instructions

**DIMENSIONS, SHIPPING WEIGHTS**




| Valve Size | 1/2* | 1/2** | 1/2 | 3/4 | 1 | 1-1/4 | 1-1/2 | 2 | 2-1/2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve Type | A† | | | MA-Single-Seated Piston Balanced | | | | FA-Double-seated | | | |
| Body Material | Bronze | | | | | | | Cast Iron | | | |
| Valve Trim | Stainless Steel | | | | | | | | | | |
| End Connections | Female Threaded Unions | | | | | | | 125 lb. Cast Iron Flanges | | | |
| E | 4-3/4 | | | 6-57/64 | 7-1/8 | 7-1/2 | 8-1/2 | 7 | 7-3/4 | 8-5/8 | 10-1/4 |

**Regulator No. RP-1065-A**

| A | 13-3/16 | | | | 14-3/4 | | 14-15/16 | 15-5/8 | 16 | | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| B | 11-1/4 | | | | | | | | | | |
| K | 4-3/4 | | | | | | | | | | |
| Shipping Weight | 19 | 19 | 20 | 22 | 26 | 30 | 34 | 78 | 86 | 106 | 154 |

**Regulator No. RP-1066-A**

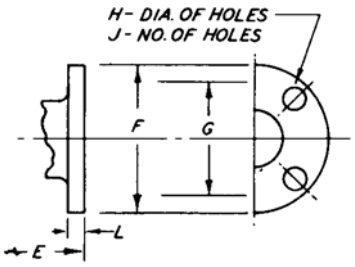
| A | 13-3/16 | | | | 14-3/4 | | 14-15/16 | 15-5/8 | 16 | | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| B | 11-1/4 | | | | | | | | | | |
| K | 6-5/16 | | | | | | | | | | |
| Shipping Weight | 21 | 21 | 23 | 24 | 28 | 32 | 36 | 80 | 88 | 108 | 156 |

* 1/4" reduced port.

** 3 /8" reduced port.

† Single Seated

NOTE: On special order, bronze body valve with bronze trim can be furnished in 2", 2-1/2", 3" and 4" sizes, with class 150 flanges.




## FLANGE DIMENSIONS

| Valve Size, Inches | F | G | H | J | L |
|---|---|---|---|---|---|
| 2 | 6 | 4-3/4 | 3/4 | 4 | 1/2 |
| 2-1/2 | 7 | 5-1/2 | 3/4 | 4 | 3/4 |
| 3 | 7-1/2 | 6 | 3/4 | 4 | 3/4 |
| 4 | 9 | 7-1/2 | 3/4 | 8 | 15/16 |