

Relays

Series 63 Constant Differential Flow Controllers

Introduction

Features & Benefits

- ▶ Versatile and design accommodates liquids or gases and wide range of OEM needs
- ▶ Powder coating provides improved corrosion resistance

Description

The Series 63 Constant-Differential Relays are used in conjunction with an external needle valve to provide constant volume flow rates of liquids or gases over a continuously adjustable range.

For gas flow applications, compressibility must be considered if a constant mass flow is desired. Therefore, models are available for constant upstream or downstream reference pressure.

For liquids, which are not compressible, the constant volume flow will also be a constant mass flow, regardless of upstream or downstream pressures. As such, mass flow is independent of pressure changes.

The relay's needle valve determines rangeability and capacity. Four models are available.



Supply Pressure

Minimum: At least 5 psig greater than the maximum downstream pressure of the needle valve-controller combination

| Maximum: | Needle Valve Open |
|-------------|-------------------|
| Model 63BD | 250 psig |
| Model 63BDL | 250 psig |
| Model 63SD | 500 psig |
| Model 63SDL | 500 psig |

Ambient Temperature Limits

Model 63BD & BDL: -40 to 180°F (-40 to 82°C)
 Model 63SD & SDL: -40 to 250°F (-40 to 121°C)

Controlled Differential

3.1 ±.5 psig (others optional)

Materials

| | Brass Units | 316 SS Units |
|--|---------------------|--------------|
| Body | Brass | 316 SS |
| Diaphragm | Neoprene | KYNAR |
| Differential Spring | 18-8 SS | 316 SS |
| Valve Plunger & Seat | 303 SS | 316 SS |
| Plunger Spring (used in "D" 63BD models only) 63BD-L | 316 SS Phos. Br. | 316 SS |

Ratings

Ambient Temperature

-40 to 180°F (-40 to 82°C)

Specifications

Range Limits

@20 psig supply
 Model 63BU & Model 63SU
 Maximum: 1.1 scfm
 Minimum: 0.01 scfm

Model 63BUL & Model 63SUL
 Maximum: 2800 sccm
 Minimum: 13 sccm

Supply Pressure

Minimum: At least 5 psi greater than the maximum downstream pressure of the needle valve-controller combination

| Maximum: | Needle Valve | |
|----------|--------------|----------|
| Model | Closed | Open |
| 63BU | 100 psig | 250 psig |
| 63BUL | 50 psig | 250 psig |
| 63SU | 50 psig | 500 psig |
| 63SUL | 250 psig | 500 psig |

Ambient Temperature Limits

Model 63BU & Model 63BUL: -40 to 180°F (-40 to 82°C)
 Model 63SU & Model 63SUL: -40 to 250°F (-40 to 121°C)

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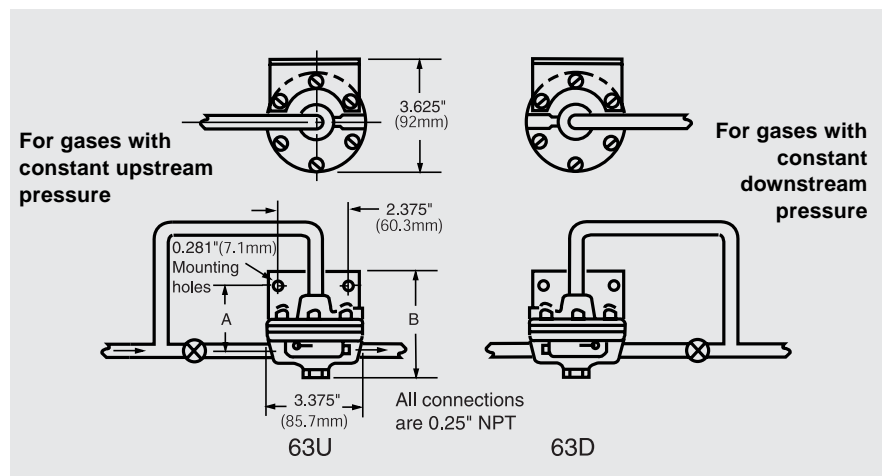
Technical data

Flow Capacity Formula

| | Higher Range Models 63BD and 63SD; 63BU and 63SU | Low Flow Models 63BD-L and 63SD-L; 63BU-L and 63SU-L |
|---|--|---|
| GAS FLOW-CAPACITY | | |
| Maximum at less than critical flow ¹ | $SCCM = 4000 \sqrt{\frac{\Delta P \times Pd \times 530}{SG \times T}}$ | $SCCM = 400 \sqrt{\frac{\Delta P \times Pd \times 530}{SG \times T}}$ |
| Maximum at critical flow ¹ | $SCCM = 2000 P_u \sqrt{\frac{1 \times 530}{SG \times T}}$ | $SCCM = 200 P_u \sqrt{\frac{1 \times 530}{SG \times T}}$ |
| Minimum controllable flow | Approximately 1/200 of maximum | $SCCM = 8 \frac{\Delta P (P_u + Pd)}{R_v T}$ |
| LIQUID FLOW-CAPACITY | | |
| Maximum | $CCM = 470 \sqrt{\frac{\Delta P}{SG}}$ | $CCM = 47 \sqrt{\frac{\Delta P}{SG}}$ |
| Minimum | Approximately 1/200 of maximum | $CCM = .06 \frac{\Delta P}{R_v}$ |
| NEEDLE VALVE SIZING (With 3 psi drop across valve) | | |
| For any liquid | $Kn = \frac{CCM}{6550 \sqrt{\frac{1}{SG}}}$ | |
| For any gas | $Kn = \frac{SCCM}{49000 \sqrt{\frac{1 \times P_n \times 530}{SG \times T}}}$ | |

Mounting Dimensions

| Model | DIM. A | DIM. B |
|-------|--------|--------|
| 63BU | 2 1/8" | 3 1/4" |
| 63BUL | 2 1/8" | 3 1/4" |
| 63SU | 2 3/8" | 3 1/2" |
| 63SUL | 2 3/8" | 3 1/2" |
| 63BD | 2 1/8" | 3 1/2" |
| 63BDL | 2 1/8" | 3 1/2" |
| 63SD | 2 3/8" | 3 3/4" |
| 63SDL | 2 3/8" | 3 3/4" |



Note: Dimensions for 63D are mirrored from 63U

1) Critical flow exists when the ratio of upstream pressure (P_u) to downstream pressure (P_d) is equal to or less than approximately 0.53