

# BCV-980

## Biopharmaceutical Control Valve

### Description

The Malema Sensors® BCV-980 is a compact, cost-effective, high-performance pinch control valve designed for use with Single-Use flexible tubing systems in the Biotechnology and Pharmaceutical industries. The intelligent control valves utilize Malema's proprietary integral PID control algorithms. The valve monitors up to four analog signals from external sensors or controllers and modulates the valve position accordingly.

The BCV-980 has two modes of operation: remote, and automatic. Status is reported through a local LED display, via multiple analog outputs, multiple alarm outputs, and digital communication using Malema Addressable Sensor Network (ASN) over RS-485 and the Malema GUI interface.

The BCV-980 is manufactured from non-magnetic 316L Stainless Steel, fits through a standard ¼ DIN panel cutout (88mm X 88mm), and accommodates panels of varying thickness.

### Key Features

- ¼ DIN (88 mm x 88 mm) size Panel mount for tubing sizes 1/8" through 1" ID
- Integrated solution – single enclosure for valve and control electronics
- Local LED status display
- Remote or autonomous set point selection
- Multiple 4–20 mA analog inputs and outputs
- Serial communications via Malema Addressable Sensor Network over RS-485
- All electrical cabling is facilitated from the rear panel, resulting in easy installation
- All exposed surfaces are 316L Stainless Steel for wash-down applications (IP65)

### Applications

- Bio-pharmaceutical manufacturing
- Ultra-pure water production
- Media preparation
- Aseptic biochemical production
- Food and beverage processing
- Cosmetics
- Semiconductor processing
- Tangential flow filtration
- Liposome extrusion

## Principle of Operation

The BCV-980 has two modes of operation:

### 1. Remote mode

- Control from a remote location or computer

### 2. Automatic mode

- Device responds to a control signal and one or more process sensors (e.g. Pressure, Flow rate, Temperature, pH, Conductivity), modulating valve position according to input conditions

## Input Channels

One to four analog input channels are available. A single input channel provides for control from a remote location or computer or other control device. Dual input channels provide for Sensor Controller applications where a remote control device provides a set-point and the BCV-980 adjusts flow or pressure to bring a sensor reading into compliance with the set-point signal utilizing Malema's expert, rule based, PID control algorithms. Three or more Input Channels provides for sophisticated control applications including TFF/Cross Flow Filtration

## Output Channels

A single Output Channel provides for a current valve position status signal to a remote location or computer controller. Multiple Output Channels provide for cascading control loops or control of pumps or other attached devices.

## TFF Control

Utilizing Malema's sophisticated and proprietary PID control algorithms, the BCV-980 operating in Automatic mode can be set to independently control pressure or flow through tangential flow filtration modules. An integrated position encoder remembers process conditions allowing for rapid return of settings following process disruptions or changes, reducing overshoot.

The BCV-980 executes the TMP (Transmembrane Pressure) equation:

$$\text{TMP} = \frac{(P_1 + P_2)}{2} - P_3$$

Where:

TMP = External Control Value

$P_1$  = Supply Pressure

$P_2$  = Retentate Pressure

$P_3$  = Filtrate Pressure (generally 0 psig)

Assumes BCV-980 is installed on the Retentate line.

Other calculations, including flow control or pressure control are available on application.

**Performance Specifications**

Fluid Temperature	4° – 60°C *
Ambient: Temperature/Humidity	0° – 40°C / 30% – 80% RH, non-condensing
Maximum Expected Operating Pressure	6 bar (g)
Differential Pressure Range	0 – 6 bar (d)

\* Consult the factory for higher temperature applications

**Electrical Specifications**

Power Supply Input	24 V DC ± 10%
Current Consumption	4 A max, 1 A typical
Alarm Signals	Max 30 Vdc, 200 mA NPN open collector
Control Signal In *	4 – 20 mA, 1–5 V DC, 0–5 V DC, 0 – 10 V DC
Signal Out (Valve Position)	4 – 20 mA

\* Up to four external analog signals. Implements standalone TFF control

**Material Specifications**

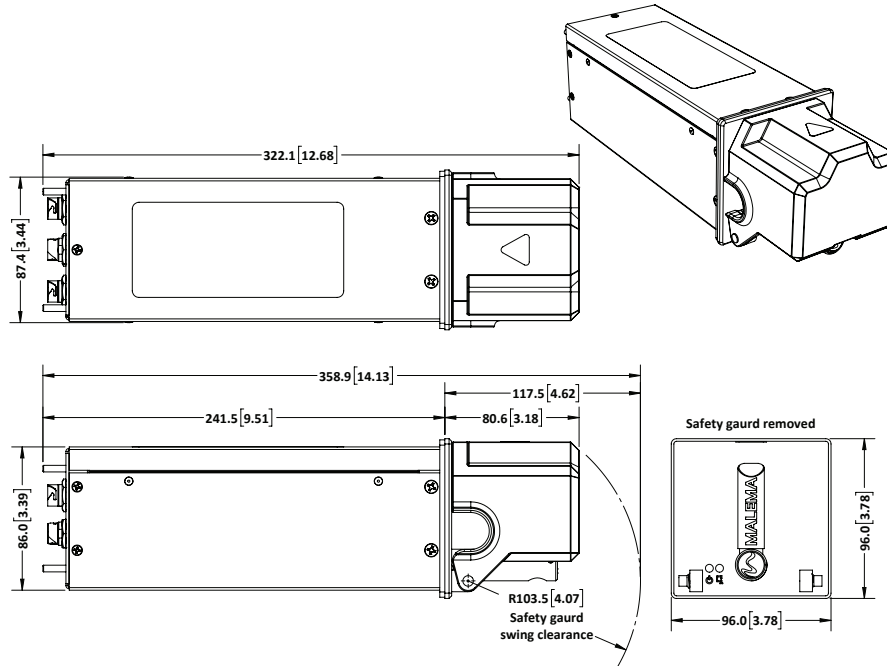
Wetted parts	None
Non Wetted Parts, Enclosure	Non-magnetic 316L Stainless Steel, Non-magnetic Powder-coated Stainless Steel

**Physical Specifications**

Mounting Orientation	Performance unaffected by mounting orientation
Fluid Connections	1/8" – 1" ID flexible tube, braided or un-braided
Ingress Rating	NEMA 4X (optional)
Panel Mounting	Universal thickness — accommodates any panel thickness
Panel Cutout	1/4 DIN (88mm x 88mm)
Mass	2.6 kg – 3.3 kg

**Dimensional Drawings**

FOR REFERENCE ONLY



**Power and Signal Connections**

Use a dedicated power supply with 24 V DC ( $\pm 10\%$ ).

The configuration of the 12 pin-connectors is given in the table below.

12 Pin Connector Configuration		
Pin No.		Description
1	RED	+24 VDC
2	BLACK	WARNING OUT; OPEN COLLECTOR
3	PINK	ALARM OUT; OPEN COLLECTOR
4	GREY	DIGITAL OUTPUT
5	BLUE	RS485 A+
6	WHITE	RS-485 B-
7	RED/BLACK	SETPOINT INPUT; could be 4 to 20 mA; 0 to 5 VDC; 0 to 10 VDC or 1 to 5 VDC
8	WHITE/BLACK	DIGITAL INPUT 0
9	YELLOW	ANALOG OUT 1; An analog output signal proportional to valve position, 4 mA = valve closed, 20 mA = valve fully opened.
10	BROWN	ANALOG OUT 2; Analog output signal proportional to $\mu P$ temperature <sup>2</sup> ; 4 mA = 0° C, 20 mA = 100° C
11	GREEN	GROUND
12	VIOLET	GROUND

## Ordering Information

Model Code													Description	
BCV-980	-	S	2	S	N	-	1	1	4	2	-	3	-***	Multiple-size Pinch Control Valve
	-													
Exposed Materials	S												316L SS face plate, Powder-coated steel enclosure, 1/4 DIN Panel Mount	
	W												316L SS face plate, 304 SS NEMA 4X Enclosure Bench-top	
Tube sizes	0												1/32" to 1/4" ID	
	2												1/8" to 1" ID	
Panel Seal	E												EPDM	
	K												FKKM	
	N												Nitrile	
	S												Silicone	
	V												FKM	
Draw Bar Seal	E												EPDM	
	K												FKKM	
	N												Nitrile	
	S												Silicone	
	V												FKM	
													-	
Electrical Connectors	0												1x 12-pin Hirose Connector	
	1												4x 12-pin Hirose Connector	
Input Voltage	1												24 V DC ±10%	
Analog Input Signals	1												1x 4-20 mA	
	4												4x 4-20 mA	
Analog Output Signals	2												2x 4-20 mA	
													-	
Function	3												Autonomous and Remote	
													-XXX	
													Unique PN identifier	

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#### Corporate Headquarters

1060 S Rogers Circle  
Boca Raton, FL 33487

P: (561) 995-0595 F: (561) 995-0622

#### West Coast Headquarters

2329 Zanker Road  
San Jose, CA 95131

P: (408) 970-3419 F: (408) 970-3426

#### Asia Pacific Headquarters

35 Marsiling Industrial Estate 3, Unit #02-06  
Singapore 739257

P: (65) 6482-3533 F: (65) 6484-4231