MODEL 80-1

AUTOMATIC PRESSURE CONTROLLER

DATA SHEET

80-1 FEATURES

- Compatible with a variety of pressure sensors and valves
- Built-in power supply
- Fully self-contained, stand alone module
- Manually operable
- Filament failsafe
- Interfaces with Model 80-3 to provide three additional pressure set points
- Remote interfacing capability

TYPICAL APPLICATIONS

- Sputtering/sputter etching
- Reactive sputtering
- Ion beam etching
- Ion/reactive ion milling
- Tube backfilling

80-1 GENERAL DESCRIPTION

The Model 80-1 Automatic Pressure Controller is designed to maintain a preset pressure by controlling an inlet gas valve. The control system is comprised of the 80-1 Controller, a pressure transducer, and a control valve (either a magnetically actuated proportional type or a piezo-electric type). The 80-1 Controller operates by comparing a signal from any pressure transducer which outputs a DC voltage proportional to pressure, such as a Vacuum General Capacitance Manometer, with a preset pressure set point. If the actual pressure differs from the preset pressure, an output voltage drive signal is sent to the inlet control valve to adjust the valve orifice opening, and vary the gas flow through the system, therefore raising or lowering system pressure to the desired level.

The 80-1 can also be used as the heart of a multigas pressure and flow control system when incorporated with a Model 80-5 Flow Display Module and one or more Model 80-4 Flow/Ratio Controllers. In this application, the 80-1 controls the main gas flow, the 80-5 displays the main gas flow, and the 80-4 can either slave to the 80-5 in a desired percentage (ratio) or add a gas as a constant flow depending upon the particular process.

The Model 80-1 also interfaces with the Vacuum General Model 80-3 Extended Set Point Module to provide three additional pressure level set points.

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MODEL 80-1
SPECIFICATIONS

POWER AND TEMPERATURE	
Input voltage	90, 115, 220 V AC as required
Input frequency	60 Hz
Input wattage	30 watts max.
Fuse size	1/8 amp, "Slow-Blow"
Connector type	Corcom
Ambient temperature	0°C to 50°C
CONTROL ACCURACY AND RANGE	
Control accuracy	.25% of set point
Pressure control range	.05% to 100% of full scale of pressure transducer
Repeatability	± .1% of control range
INPUT SIGNALS	
Input voltage	0 to ±10 V DC max. (analog signal proportional to pressure)
Input impedance	200 KΩ
Remote functions: (for close, open, failsafe and ext. set point enable)	
TTL LO enable	Sink 1 mA max.
TTL HI enable	Source 1 mA max.
Extended set points	0 to +1 V DC into 100 KΩ max.
ELECTRICAL OUTPUT SIGNAL	
Control valve drive	Solenoid type: 0 to +20 V DC, 130 mA into 90Ω max. Piezo-electric type: 0 to +120 V DC
RELAY OUTPUT SIGNAL	
Voltage and current rating	30 V DC @ 2 amps max.; 125 V AC @ 1 amp max.
INTERNAL POWER SUPPLIES	
Voltage/current/regulation	+15 V DC ±1.3% @ 180 mA max. (regulated); −15 V DC ±1.3% @ 70 mA max. (regulated); +5 V DC ±1.3% @ 350 mA max (regulated)
CABLE (TO VALVE)	
For model 79-X valve	Model 0-1C; 3 pin cinch to BNC- 8′
For model 77-10M valve	Model 0-1C-M; BNC to TNC- 8′
WEIGHT	3.25 lbs; 1.47 kilograms
DIMENSIONS	
Width (front panel)	3.375″; 8.57 cm
Height (front panel)	3.5″; 8.89 cm
Depth	12.0″; 30.48 cm
Clearance for connecting cables, etc.	3.0″ approx.; 7.62 cm approx.
Mounting screw	6-32 flat-head

VALVE SPECIFICATIONS

VALVE TYPE	79-X — magnetically actuated solenoid; 77-10M — Piezo-electric
FLOW RANGE	79-X — 0 to 5000 sccm (0 to 10 SLM avail.); 77-10M — 0 to 500 sccm
OPERATING VOLTAGE	79-X — 6 to 10 V DC; 77-10M — 30 to 100 V DC
GAS COMPATIBILITY	79-X — see materials; 77-10M — see materials
OPERATING CURRENT	79-X — 70 mA nominal; 77-10M — <10 mA nominal
MATERIALS	79-X — 303 SS; viton (79-5A/B, 79-6A/B) or buna (79-7A/B)
	77-10M — SS, viton, Teflon, silver plated crystal
TEMPERATURE RANGE	79-X — 40°F to 180°F; 77-10M — 10°C to 60°C
RESPONSE TIME	79-X — 5 milliseconds; 77-10M — 2 milliseconds
CLOSED LEAK RATE	79-X — 6×10^{-6} sccm air or less; 77-10M — 6×10^{-8} sccm or less
MAXIMUM PRESSURE DIFFERENTIAL	79-X — 45 psig. (15-20 nominal); 77-10M — 50 psig.
ELECTRICAL CONNECTOR	79-X — 3 pin cinch; 77-10M — std. BNC

OPTIONS

EXTENDED SET POINTS

Model 80-3 provides three additional pressure set points. They are manually or remotely selectable.

FLOW DISPLAY

Model 80-5 provides digital flow display of controlled gas when used with model TMFS-XX-XXXX flow sensor.

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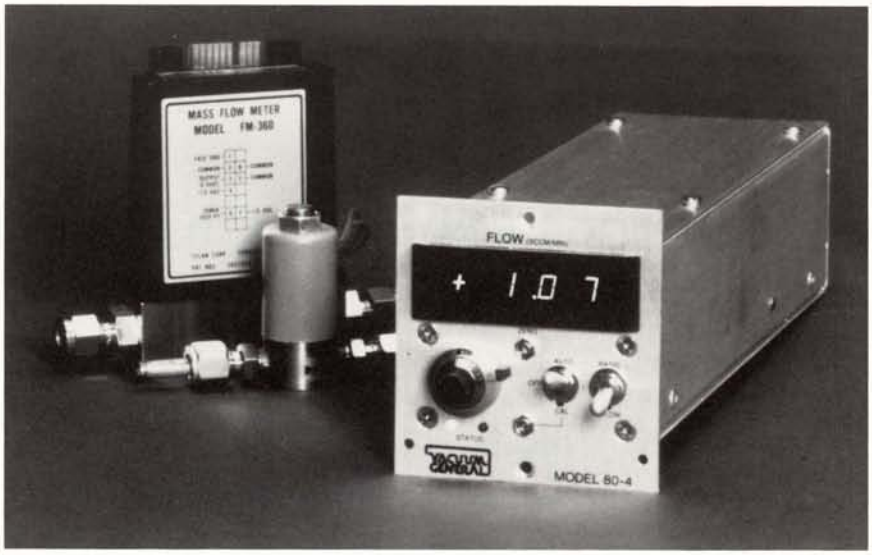
MODEL 80-4

AUTOMATIC FLOW/RATIO CONTROLLER

DATA SHEET



80-4 FEATURES

- Built-in power supply
- Fully self-contained, stand alone module
- 3½" digit direct read flow display
- High RF immunity
- Front panel zero and calibration adjusts
- Interfaces with Model 80-3 to provide these additional flow level set points
- Remote interfacing capability

TYPICAL APPLICATIONS

- Plasma etching
- Plasma deposition
- Plasma desmearing
- Reactive sputtering
- CVD/LPCVD/Plasma CVD
- Diffusion
- Laser flow control

80-4 GENERAL DESCRIPTION

The model 80-4 is a single gas flow/ratio controller designed to provide precise closed loop control of inlet process gas flow. The complete channel consists of the 80-4 module, a thermal mass flow sensor and a magnetically actuated proportional control valve. The flow information is received from the flow sensor and compared with a preset gas flow setpoint. A drive signal is then sent to the control valve to maintain the desired flow level. A front panel calibration pot is provided, thus allowing direct, digital readout in standard cubic centimeters per minute of true mass flow. When in the ratio mode, the controller uses flow information from a primary flow source to provide constant ratios from 0-100% of that flow.

Two methods of flow selection are available; one from the preset potentiometer on the front panel, and the other by input of an external set point on the rear panel. The on-off function can also be accomplished manually from the front panel or by logic signals via a rear panel connector.

When multigas flow and pressure control are desired, the 80-4 will control a slave gas that will ratio to a main channel being controlled by a primary gas controller such as the Vacuum General Model 80-1 Automatic Pressure Controller. The flow information from the main channel is sensed by a thermal flow sensor and passed on to the 80-4 through the Model 80-5 Flow Display Module.

80-4 modules can be linked together in any desired quantity for applications requiring several channels of flow - flow/ratio control.

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MODEL 80-4
SPECIFICATIONS

POWER AND TEMPERATURE	
Input voltage	90, 115, 220 V AC as required
Input frequency	60 Hz
Input wattage	10 watts max.
Fuse size	1/8 amp, "Slow-Blow"
Connector type	Corcom
Ambient temperature	0° C to +50° C
CONTROL ACCURACY AND RANGE	
Control accuracy	.25% of set point
Flow control range	.5% to 100% of full scale of flow sensor
Repeatability	.1% of control range
Response time (utilizing Vacuum General approved control valves and flow sensors).	• Approximately 2 seconds from closed position of valve to 98% of set-point setting • Approximately .5 seconds from one set point setting to another
Control time	8 seconds typical to final stable control
INPUT SIGNALS	
Input voltage from flow sensor	0 to +5 V DC typical (analog signal proportional to flow)
Flow sensor input impedance	50 KΩ
Remote function (close valve)	
1. TTL LO enable	Sink 1 mA max.
2. TTL HI enable	Source 1 mA max.
Extended set points	0 to +1 V DC into 100 KΩ max.
ELECTRICAL OUTPUT SIGNALS	
Control valve drive	Solenoid: 0 to +20 V DC, 130 mA into 90Ω max.
Output power for flow sensor	+15 V DC ±2% @ 50 mA; −15 V DC ±2% @ 50 mA
Flow output signal	0 to +1 V DC into 1 KΩ, proportional to flow
INTERNAL POWER SUPPLIES	
Voltage/current/regulation	+15 V DC ±1.3% @180 mA max. regulated; −15 V DC ±1.3% @ 70 mA max. regulated; +5 V DC ±1.3% @ 350 mA max. regulated
COMPATIBLE CONTROL VALVES	
Vacuum General models 79-5A, 6A and 7A	Magnetically actuated proportioning type
Vacuum General models 79-5B, 6B and 7B	Magnetically actuated proportioning type
Vacuum General model 79-5, 6, 7 (Brooks)	Magnetically actuated proportioning type
COMPATIBLE FLOW SENSORS	
Vacuum General TMFS-XX-XXXX Series	Thermal mass flow sensor
Vacuum General 77-360-XXX, 77-361-XXXX, and 79-4 series	Thermal mass flow sensor
CABLE (TO VALVE AND FLOW SENSORS)	
For model TMFS/79-X	Model 0-4C-T; 7 pin amphenol to 15 pin amphenol and 3 pin cinch
For model 77-360/79-X, 77-361/79-X, and 79-4/79-X	Model 0-4C; 7 pin amphenol to edge card and 3 pin cinch. 8′ std.
WEIGHT	3 lbs; 1.36 kilograms
DIMENSIONS	
Width (front panel)	3.375″; 8.57 cm
Height (front panel)	3.5″; 8.89 cm
Depth	12.0″; 30.48 cm
Clearance for connecting cables, etc.	3.0″ approx.; 7.62 cm approx.
Mounting screw	6-32 flat-head

OPTIONS

Extended set points	Model 80-3 provides three additional pressure set points. They are manually or remotely selectable.

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TMFS Series
MASS FLOW SENSORS

DATA SHEET

TMFS FEATURES

- Fast response
- Excellent repeatability and zero stability
- High RFI Immunity
- Simplicity of maintenance and operation
- No foldover
- Wide range availability: 0-1; 0-10; 0-100; 0-1000 SCCM; 0-10 SLM full scale

TYPICAL APPLICATIONS

Semiconductor processing
- — Plasma etching
- — Plasma deposition
- — Plasma polymerization
- — Diffusion
- — Epitaxy
- — Crystal growing
- — CVD/LPCVD

- Chemical processing
- Gas blending
- Laser gas control
- Synthetic fuel processing

GENERAL DESCRIPTION

The TMFS Series Mass Flow Sensors are designed to provide accurate, repeatable measurement of mass flow of gases for a wide range of commercial applications. Flow measurement range for the TMFS Series spans from .05 SCCM to 10 SLM over five different models. The only materials exposed to process gases are stainless steel and either viton or buna, thus allowing use wiht a wide variety of gases both corrosive and non-corrosive.

The TMFS Series operate on the principle of laminar flow splitting. The main flow passes through a laminar flow element which generates a pressure drop that is linearly dependent on the flow. This pressure drop forces a small amount of flow through a measuring element that is also in laminar flow. This element is a capillary tube, and since its flow is laminar it is also linear with the forcing pressure which then makes it proportional to the main flow. The measurement of this smaller flow, suitably scaled, becomes the output of the flow sensor. The actual measurement is accomplished by means of heated sensors attached to the outside of the tube. These sensors form part of an electrical bridge which detects the temperature difference between the sensors. The design is such that the temperature difference between the sensors is linearly proportional to the flow over the range of flows encountered.

The TMFS Flow Sensors are available in 0-1, 0-10, 0-100, 0-1000 SCCM and 0-10 SLM full scale models.

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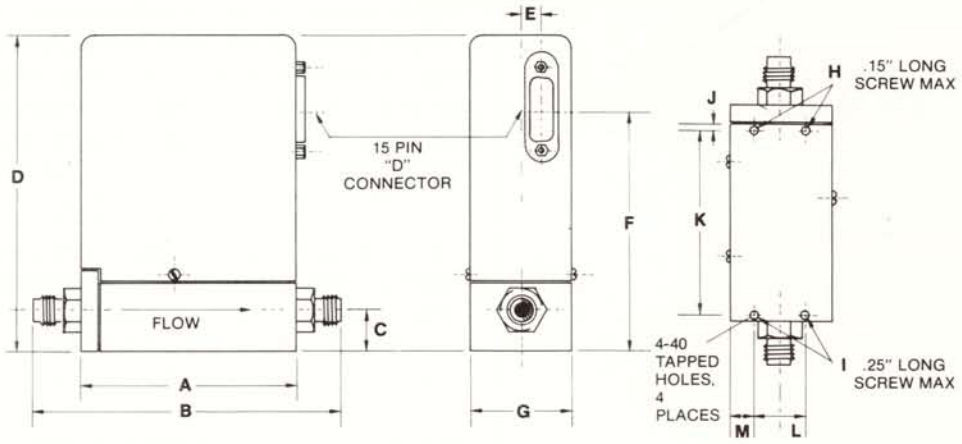
TMFS

SPECIFICATIONS

Accuracy (includes linearity) @ 25°C when zeroed.	±2% of reading, ±.01% of full scale
Resolution	.01% of full scale
Response time	2.5 secs. to within ±2% of final flow
Repeatability	±.2% full scale
Temperature effect on zero	.05% full scale/°C
Temperature effect on span	.25% full scale/°C
Ambient gas and temperature range	5° to 40°C
Output signal	0-5 V DC
Output impedance	.1 k Ω
Input power	+15 V DC @ 60 mA; -15 V DC @ 10 mA
Minimum load resistance	5 K Ω
Standard ranges	0-1, 0-10, 0-100, 0-1000 SCCM; 0-10 SLM.
Gas fittings	¼" compression type standard; other sizes and types availble on special request
Foldover	None
Weight	2 lbs; .91 kilograms
Mounting information	4-40 tapped holes, 4 places
Orientation	Flow axis parallel to earth surface
Electrical connector	
Flow sensor end	AMP 206913-1, 15 Pin
Cable end	AMP 205205-1, 15 Pin

OUTLINE DRAWING



	INCH	CM		INCH	CM		INCH	CM
A	3.20	8.13	F	3.56	9.04	K	2.75	6.99
B	4.56	11.58	G	1.5	3.81	L	.75	1.91
C	.62	1.57	H	.15	.38	M	.375	.95
D	4.70	11.94	I	.25	.64			
E	.30	.76	J	.10	.25			

ORDERING INFORMATION

SERIES DESIGNATION	FITTING	FLOW RANGE
TMFS	01 = ¼" compression	0001 = 1 SCCM f.s.
	02 = CAJON 4 VCR	0010 = 10 SCCM f.s.
		0100 = 100 SCCM f.s.
		1000 = 1000 SCCM f.s.
		010L = 10 SLM f.s.

EXAMPLE: TMFS-01-0001 = TMFS with ¼" compression fitting, 1 SCCM full scale.

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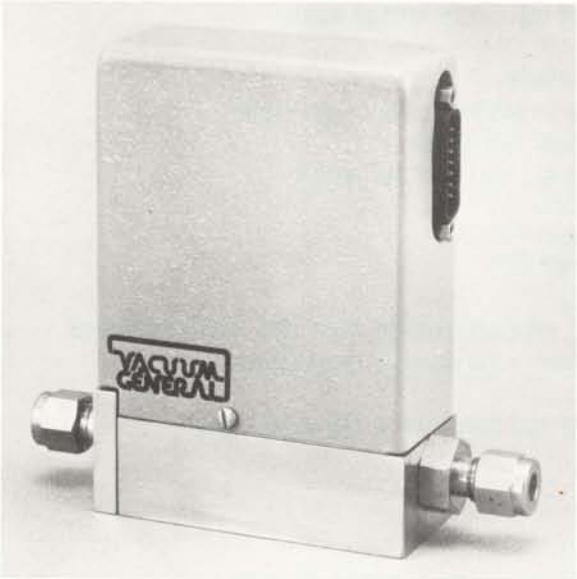
TMFC SERIES
MASS FLOW CONTROLLERS

DATA SHEET



TMFC FEATURES

- Fast response
- Excellent repeatability and zero stability
- High RFI immunity
- Simplicity of operation and maintenance
- Normally closed control valve
- No foldover
- Wide range availability: 0-1, 0-10, 0-100, 0-1000 SCCM, 0-10 SLM full scale.

TYPICAL APPLICATIONS

- Semiconductor processing
  - — Plasma etching
  - — Plasma deposition
  - — Plasma polymerization
  - — Diffusion
  - — Epitaxy
  - — Crystal growing
  - — CVD/LPCVD
- Chemical processing
- Gas blending
- Laser gas control
- Synthetic fuel processing

GENERAL DESCRIPTION

The TMFC series Mass Flow Controllers are designed to provide accurate, repeatable, quick-response control of gas flows from as low as .05 SCCM up to 10 SLM. Each controller consists of a flow sensor, a valve, control electronics, and a base and bypass assembly, all comprising one self-contained device. The only materials exposed to process gases are stainless steel and either viton or buna, thus allowing use with a wide variety of gases both corrosive and non-corrosive.

Flow information is output via a 0 to 5 volt signal proportional to flow from the flow sensor, which operates on a heat transfer principle to measure mass flow. The signal is then compared to a preset reference voltage from a potentiometer or other suitable voltage source. An error signal is produced from the comparison, which then gets transmitted to the valve as a drive signal to adjust the flow rate until the desired level of flow is reached.

The valve utilized is a magnetically actuated proportioning type which provides steady, precise control, fast response, and is normally closed with no power applied. The TMFC series comes with ¼" compression fittings standard, although a variety of other fitting types are optionally available.

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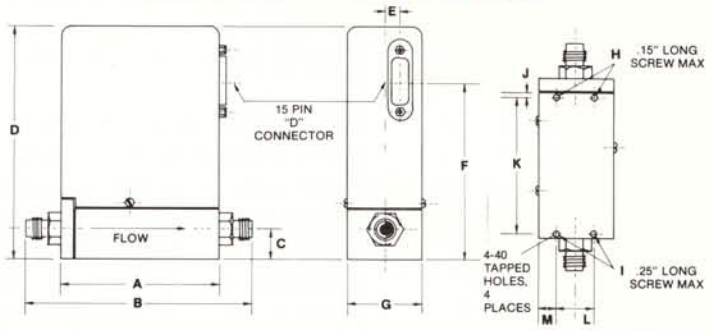
TMFC

SPECIFICATIONS

Accuracy (includes linearity) at 25°C when zeroed.	±2% of reading, ±.01% of full scale
Resolution	.01% of full scale
Response time	2.5 seconds to within ± 2% of set point
Control range	.5% to 100% of full scale
Regulation	.1% of reading, ±.01% of full scale
Repeatability	±.2% full scale
Temp. effect on zero	.05% full scale/°C
Temp. effect on span	.25% full scale/°C
Ambient gas and temp. range	5°C to 40°C
Output signal	0 to 5 V DC proportional to flow; 0-1 V DC optional
Command signal	0-5 V DC from 1 kΩ source impedance
Foldover	None
Input power	+15 V DC @ 150 mA; -15 V DC @ 20 mA
Output impedance	.1 kΩ
Minimum load resistance	5 kΩ
Recommended differential pressure	15-20 psig.
Max. differential pressure	500 psig.
Standard ranges	0-1, 0-10, 0-100, 0-1000 SCCM, 0-10 SLM
Gas fittings	¼" compression type standard. Other sizes and types available on special request.
Weight	2.1 lbs.; 9.52 kilograms
Mounting information	4-40 tapped holes, 4 places
Orientation	Flow axis parallel to earth surface
Electrical connector	
Flow controller end	AMP 206913-1, 15 Pin
Cable end	AMP 205205-1, 15 Pin

OUTLINE DRAWING



	INCH	CM		INCH	CM		INCH	CM
A	3.20	8.13	F	3.56	9.04	K	2.75	6.99
B	4.56	11.58	G	1.5	3.81	L	.75	1.91
C	.62	1.57	H	.15	.38	M	.375	.95
D	4.70	11.94	I	.25	.64			
E	.30	.76	J	.10	.25			

ORDERING INFORMATION

SERIES DESIGNATION	FITTING	FLOW RANGE
TMFC	01 = ¼" compression	0001 = 1 SCCM f.s.
	02 = CAJON 4 VCR	0010 = 10 SCCM f.s.
		0100 = 1000 SCCM f.s.
		1000 = 1000 SCCM f.s.
		010L = 10 SLM f.s.

EXAMPLE: TMFC-01-0001 = TMFC with ¼" compression fitting, 1 SCCM full scale.

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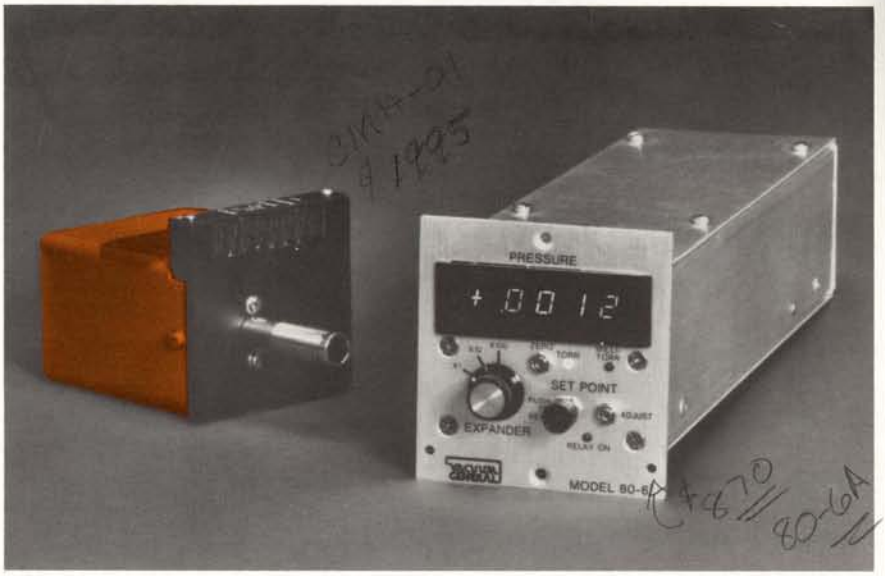
HIGH ACCURACY VACUUM GAUGE

VACUUM GENERAL®

DATA SHEET



VACUUM GENERAL'S CM SERIES CAPACITANCE MANOMETER

- Total absolute pressure measurement independent of gas composition
- Maximum immunity from RF interference
- Inconel construction for use in corrosive environment
- Single sided design, only metal exposed to gas
- High accuracy and resolution
- Wide range of pressures from 1 x 10^{-6} torr to above atmosphere
- CMT models available offering enhanced zero stability for greater performance at low pressure ranges.

VACUUM GENERAL'S MODEL 80-6 PRESSURE DISPLAY MODULE

- Built-in power supply
- Fully self-contained, stand-alone module
- 4½ digit direct read pressure display
- Expander switch for high reading resolution
- Response speed selection switch
- Pressure relay setpoint (2 setpoints optional)
- Front panel zero adjust
- Rack mountable
- Dimensions:
  Width front panel — 6.75"; 17.15 cm
  Height front panel — 3.5"; 8.89 cm
  Depth — 12.0"; 30.48 cm

THE CM SERIES

The new Vacuum General CM Series Vacuum Gauge utilizes a sophisticated, state of the art design to accurately sense pressures from as low as 1 x 10^{-6} torr to above atmosphere. Its single sided design with inconel construction makes it highly effective for use in corrosive environments. Total absolute pressure measurement is accomplished independent of gas composition by measuring the deflection of a diaphragm. The circuitry of the CM series has been designed to provide maximum immunity to RF interference. All models feature floating input and output with respect to ground, and the sensing cavity is capable of being earthed without the use of ceramic isolators. Measurement errors due to ground loops are thus eliminated at many installations where ground loops would normally present a measurement problem.

The CMT models, part of the CM series, are available offering enhanced zero stability for greater performance at low pressure ranges. Both the CM and CMT models feature a patented* design that enhances performance and enables the utmost in accuracy and stability with a minimum of complexity and cost.

*US Patent #3,557,621

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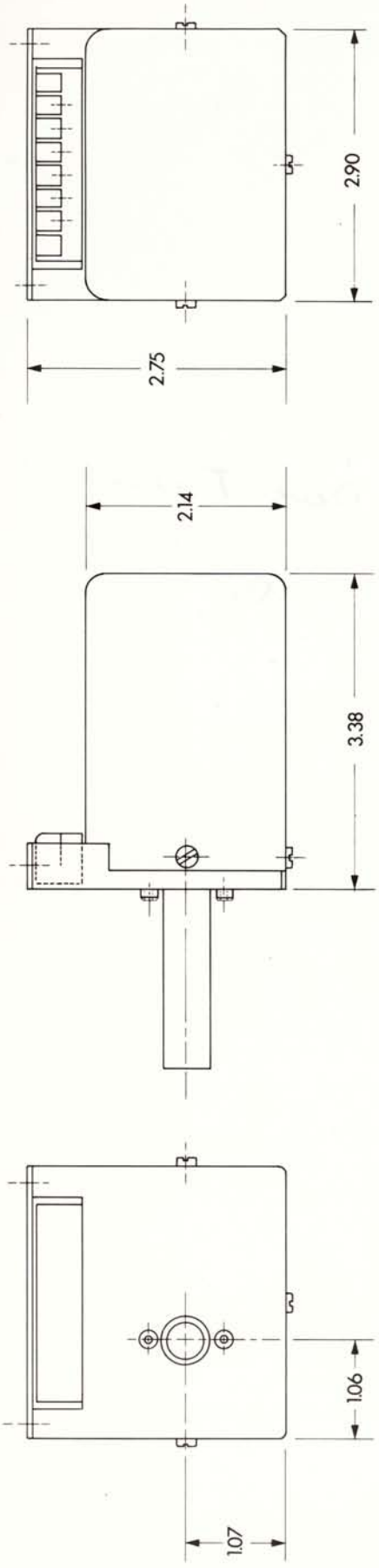

VACUUM GENERAL®

TYPICAL OPERATING PERFORMANCE

Accuracy (at 25°C when zeroed)
CM .5% of Reading
CMT .15% of Reading

Temp. Effects on Zero
CM .01% Full Scale/°C
CMT .006% Full Scale/°C

Temp. Effects on Span
CM .04% of Reading/°C
CMT .04% of Reading/°C

"8 weeks"
CMH 01
1995
.15%

Resolution
Dependent upon readout, .001% full scale with Vacuum General 80-6 4½ digit display.

SPECIFICATIONS

Input Power:	+15 VDC approx. 100 MA
Output:	0 - 10 VDC into 5kΩ Load
Dimensions (excluding inlet tube):	L 3.38" W 2.90" H 2.75"
Sensing Cavity Volume:	20 cc
Weight:	1.5 lbs.
Response Time:	5 millisec
Ambient Temp. Range:	5°C-45°C

ORDERING INFORMATION

EXAMPLE: CM-01-100

MODEL	FITTINGS	RANGE
CM	XX	01 = 1 TORR FULL SCALE
CMT	(see below)	10 = 10 TORR FULL SCALE
01		100 = 100 TORR FULL SCALE
$1450 .15% (12 weeks)		1000 = 1000 TORR FULL SCALE

Models available CM or CMT

Fittings (same for CM+CMT models)
01 No fitting — ½" O.D. tube std.
02 KF-10 Flange with seals and clamp
03 Mini conflats with mates
04 CAJON ULTRATORR
05 CAJON 8 VCO
06 CAJON 8 VCR
07 2¾" conflats with mates
09 CAJON 6 VCO

Ranges available

CM		10 TORR	100 TORR 1,000 TORR
CMT	1 TORR	10 TORR	

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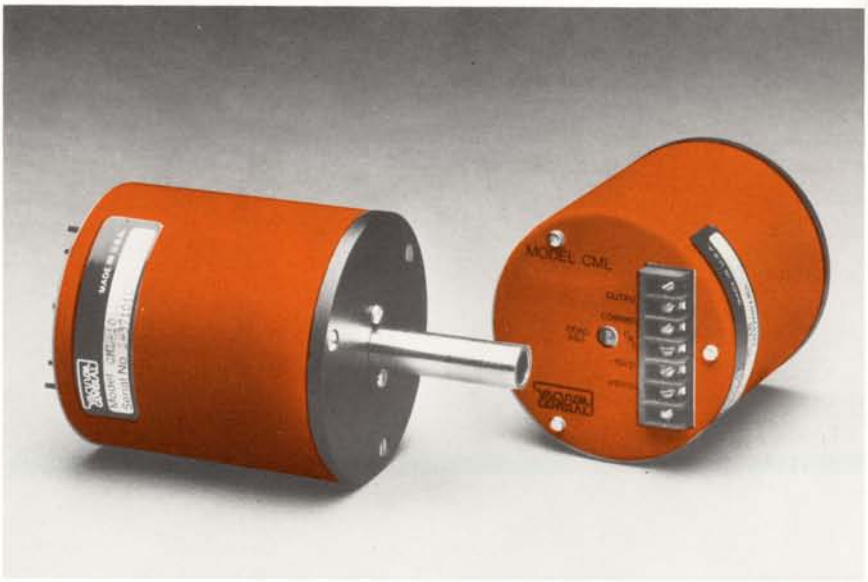
CML SERIES

CAPACITANCE MANOMETER

DATA SHEET



CML FEATURES

- High zero stability
- Fast return to zero after overpressures
- Corrosion resistant inconel construction
- High RF immunity
- Single-sided, two electrode design
- Low cost

TYPICAL APPLICATIONS

- Plasma deposition
- Plasma etching
- Plasma desmearing
- Diffusion processing
- Epitaxial processing
- Ion nitriding

GENERAL DESCRIPTION

The CML Series Capacitance Manometers utilize a sophisticated, state-of-the-art design to provide accurate, repeatable pressure measurement from as low as 1×10^{-2} TORR to 1000 TORR. Its single-sided design with inconel construction makes it highly effective for use in corrosive environments. Total absolute pressure measurement is accomplished independent of gas composition by measuring the deflection of an inconel diaphragm toward two electrodes positioned directly behind it in a reference vacuum cavity.

The circuitry of the CML has been designed to provide maximum immunity to RF interference. All models feature floating input and output with respect to ground, and the sensing cavity is capable of being earthed without the use of ceramic isolators. Measurement errors caused by ground loops are thus eliminated at many installations where ground loops would normally present a problem.

The CML series is available in 0-10, 0-100, and 0-1000 TORR full scale models.

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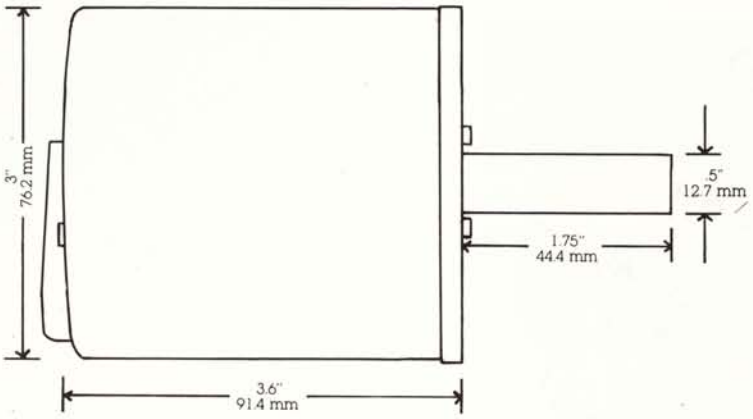
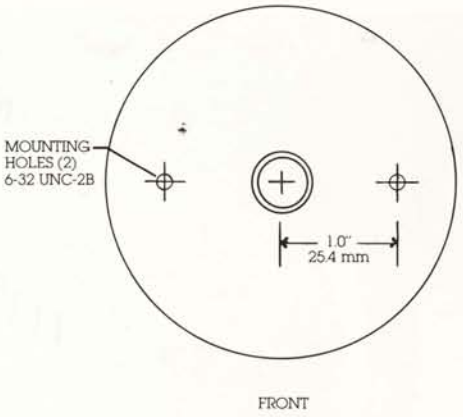
CML Series Capacitance Manometer





SPECIFICATIONS

Accuracy: 1.5% of reading when zeroed at 25°C, ±.001% Full Scale. (Accuracy includes Linearity, Hysteresis, Long Term Stability, and Reference Standards.)

Pressure Ranges (Full Scale): 10, 100, 1000 TORR (MMHg) Absolute.

Measurement Range: 3 Decades Below Full Scale.

Resolution: 0.01% Full Scale.

Temperature Effect on Zero: .01% Full Scale /°C

Operating Temperature Range: 5°C—45°C.

Temperature Effect on Span: .04% of Reading /°C.

Response Speed: 5 Milliseconds.

Sensing Cavity Volume: 20 cc.

Materials Exposed to Process: Inconel, 304 Stainless Steel.

Overpressure Without Damage: 1.5 Atmospheres.

Input Power Required: + and — 15 volts DC @ 10mA

Output Signal: 0 – 10 VDC into 5 KΩ Load.

Weight: 1.125 lb. (510 grams).

ORDERING INFORMATION*

Series Designation	Fitting	Pressure Range
CML	**01** – No Fitting — ½" OD Tube Std.	**10** TORR (MMHg)
	02 – KF-10 Flange with Seals/Clamps	**100** TORR (MMHg)
	03 – Mini-Conflat Flange	**1000** TORR (MMHg)
	04 CAJON ULTRATORR Flange	
	05 – CAJON 8 VCO Flange	
	06 – CAJON 8 VCR Flange	
	07 – 2¾" Conflat Flange	
	09 – CAJON 6 VCO Flange	

*EXAMPLE: CML – 01 – 10 equals CML with 1/2" OD Tube, 10 TORR Full Scale.

PRESSURE DISPLAYS

Model 80 – 6A Pressure Display Module with one Pressure Set Point.
Model 80 – 6B Pressure Display Module with two Pressure Set Points.

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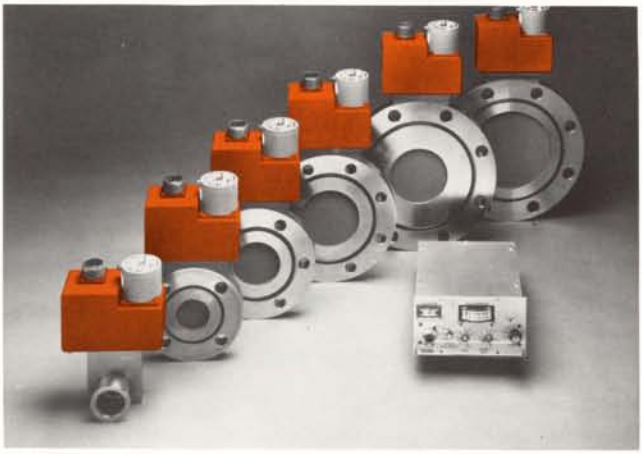
MDV SERIES

MOTOR DRIVEN THROTTLE VALVES & MODEL 80-2 CONTROLLER

VACUUM GENERAL®

DATA SHEET



SYSTEM FEATURES

MDV SERIES:

- All stainless valve construction
- No primary elastomer seals
- Unique throttle plate design for accurate control over a wide range of pressures and low conductances
- Fast response
- Available in 1½", 2", 3", 4", 6", and 10" models

80-2 AUTOMATIC VALVE CONTROLLER:

- Compatible with a wide variety of pressure transducers
- Valve position indicator
- Manually operable
- Soft start
- Interfaces with Model 80-3 for 3 additional pressure set points
- Remote interfacing capability

TYPICAL APPLICATIONS

- LPCVD
- Plasma CVD
- Atmosphere CVD
- Plasma etching
- Plasma deposition
- Plasma desmearing
- Reactive ion etching
- Diffusion
- Sputtering/sputter etching

GENERAL SYSTEM DESCRIPTION

The MDV Series "Butterfly" Throttle Valves feature a unique throttle plate design for accurate, repeatable control in vacuum chambers in the range of pressures from 1×10^{-6} TORR to above atmosphere. Control is achieved by the rotation of a throttle plate with a bore providing fast response, full open to full closed in 3.5 seconds. Conductance of the valve is smoothly varied with an approximately constant percentage characteristic over four decades of conductance. This is accomplished by a specially designed throttle plate. The MDV Series, although not designed to be total shut off valves, have a leak through rate when closed of less than one ten-thousandth of their full scale conductance.

The MDV Series is used in conjunction with Vacuum General Model 80-2 Automatic Throttle Valve Controller shown above, as well as a suitable pressure transducer such as a Vacuum General capacitance manometer for complete closed loop pressure control. The controller operates by comparing a signal from a pressure transducer to a preset pressure set point. If the actual pressure differs from the preset pressure, an output drive signal is sent to the valve to adjust the throttle plate position and therefore raise or lower system pressure to the desired level by varying the exhaust line conductance.

The valves are all stainless steel except for the three stage, dual elastomer vacuum seal which has been specifically designed for corrosion protection from etch and deposition process gases. Valve sizes available are: 1½", 2", 3", 4", 6" and 10" ASA. Adaptor flanges are available going from ASA to other connections, including KF Series flanges.

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MODEL 80-2
SPECIFICATIONS

POWER AND TEMPERATURE

Input voltage	90, 115, 220 V AC as required
Input frequency	60 Hz
Input wattage	60 watts max.
Fuse size	3/4 amp "Slow-Blow"
Connector type	Corcom
Ambient temperature	0° C to 50° C

CONTROL ACCURACY AND RANGE

Control accuracy	.25% of set point
Pressure control range	.05% to 100% of full scale of pressure transducer
Repeatability	±.1% of control range

INPUT SIGNALS

Input voltage from transducer	0 to ±10 V DC (analog signal proportional to pressure)
Input impedance	200 KΩ
Remote functions: (for close, open, hold, and softstart)	
TTL LO enable	Sink 1 mA max.
TTL HI enable	Source 1 mA max.
Extended set points	0 to +1 V DC typical; 0 to +10 V DC max., 100 KΩ impedance

ELECTRICAL OUTPUT SIGNAL

Throttle valve drive (4-pole stepping motor)	30 V DC @ 250 mA each winding. (300 steps/second max.)

INTERNAL POWER SUPPLIES

Voltage/current/regulation	+15 VDC ±1.3 percent @ 1500 mA maximum, regulated −15 VDC ±1.3 percent @ 250 mA maximum, regulated + 5 VDC ±1.3 percent @ 1 amp maximum, regulated

CABLE (TO MDV)

Model 0-2C, MS to MS - 8'

WEIGHT

6 lbs; 2.72 kilograms

DIMENSIONS

Width front panel	6.75"; 17.15 cm
Height front panel	3.5"; 8.89 cm
Depth	12.0"; 30.48 cm
Clearance for connecting cables	3.0" approx.; 7.62 cm approx.
Mounting screw	6-32 flat head

OPTIONS

EXTENDED SET POINTS

Model 80-3 provides three additional pressure set points. They are manually or remotely selectable.

HALF-RACK MODEL

80-2 with front panel width dimension of 8.4" available if desired.

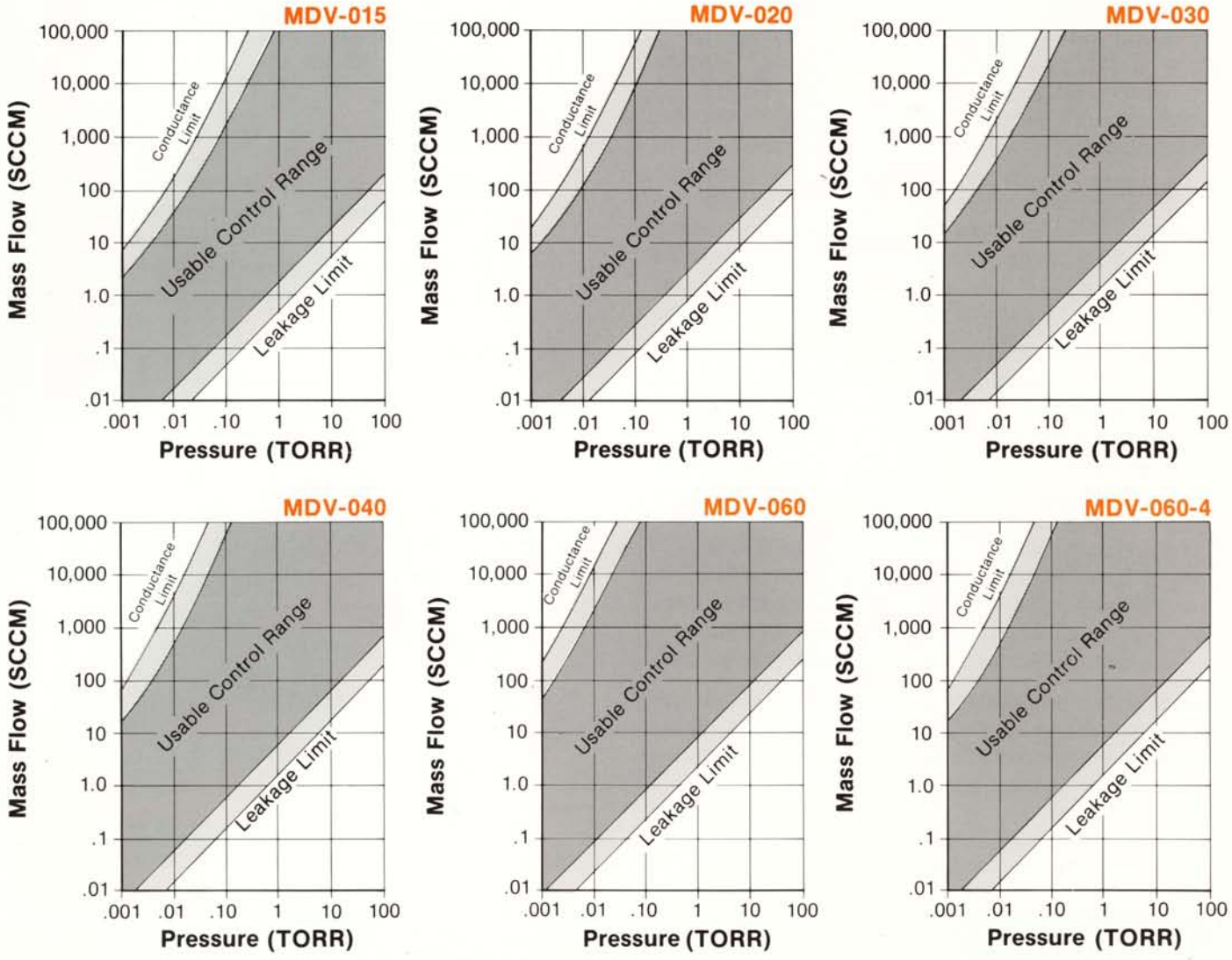
MDV SERIES THROTTLE VALVES

SPECIFICATIONS

Maximum pressure differential	1 Atmosphere
Full closed leak rate	<1/10,000 of full scale scale conductance
Compatible controllers	Vacuum General Models 80-2, 78-2, and 78-62.
Motor type	4-pole stepping motor
Drive assembly output torque	
Start/stop	240 ounce/inches
Running	430 ounce/inches
Input voltage and current	30 V DC @ 250 mA (each winding)
Opening and closing rate	300 steps/second max.; 1 step = ½ degree (approx.)
Full closed to full open speed	3.5 seconds normal, variable slower using soft start.

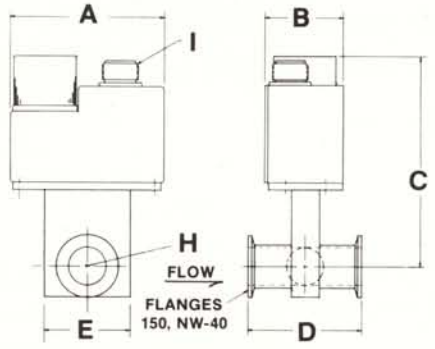
MDV SERIES THROTTLE VALVES

CONTROL RANGE CURVES

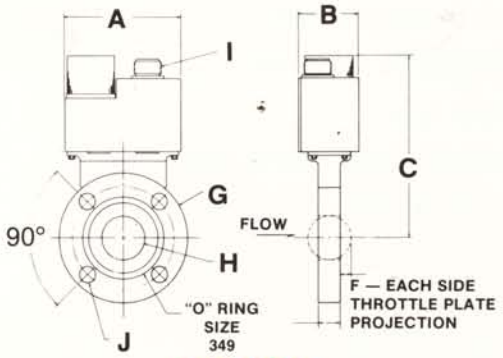


MDV SERIES THROTTLE VALVES

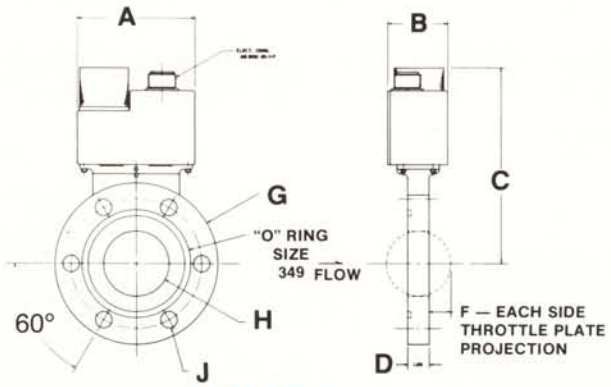
OUTLINE DRAWINGS



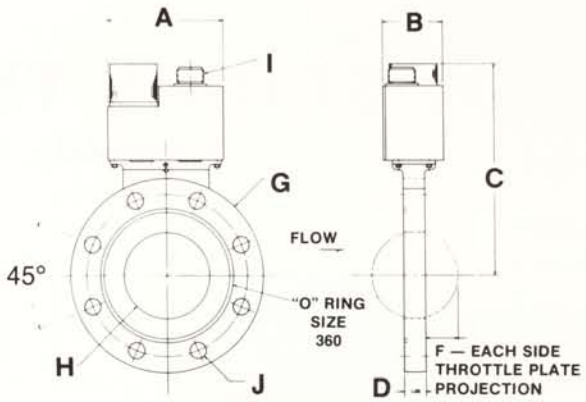
MDV-015



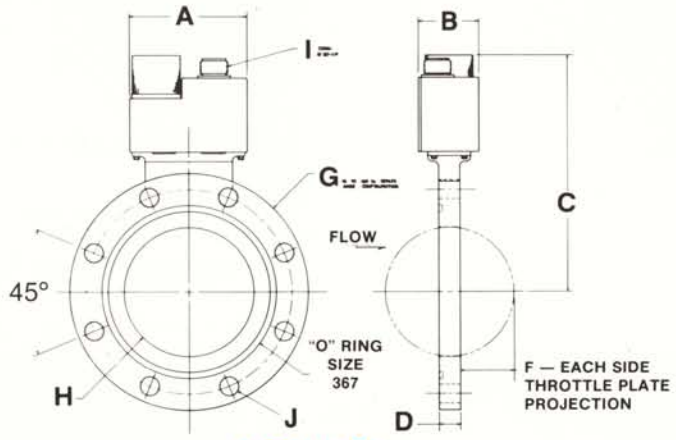
MDV-020



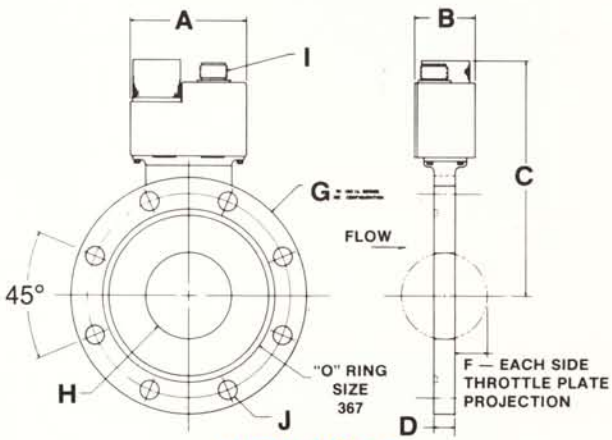
MDV-030



MDV-040



MDV-060



MDV-060-4

MODEL LETTER	MDV-015 IN/CM	MDV-020 IN/CM	MDV-030 IN/CM	MDV-040 IN/CM	MDV-060 IN/CM	MDV-060 IN/CM
A	5.40/13.72	5.40/13.72	5.40/13.72	5.40/13.72	5.40/13.72	5.40/13.72
B	2.80/7.11	2.80/7.11	2.80/7.11	2.80/7.11	2.80/7.11	2.80/7.11
C	7.15/18.16	8.50/21.59	9.10/23.11	9.88/25.10	11.00/27.94	11.00/27.94
D	4.56/11.58	1.00/2.54	1.00/2.54	1.00/2.54	1.00/2.54	1.00/2.54
E	3.00/7.62	—	—	—	—	—
F	—	.50/1.27	1.00/2.54	1.50/3.81	2.50/6.35	1.50/3.81
G*	—	6.00/15.24	7.50/19.05	9.00/22.86	11.00/27.94	11.00/27.94
H	1.50/3.81	2.00/5.08	3.00/7.62	4.00/10.16	6.00/15.24	4.00/10.16
I	— ALL USE ELECTRICAL CONNECTION MS 3102-20-11P —					
J	—	.75 Ø on 4.75 Ø BC	.75 Ø on 6.00 Ø BC	.75 Ø on 7.80 Ø BC	.875 Ø on 9.50 Ø BC	.875 Ø on 9.50 Ø BC
	—	1.91 Ø on 12.07 Ø BC	1.91 Ø on 15.24 Ø BC	1.91 Ø on 19.05 Ø BC	2.22 Ø on 24.13 Ø BC	2.22 Ø on 24.13 Ø BC
G*	Conforms to 150 lb. Series ASA Flange Configuration except for MDV-015 which uses KF-40 (NW-40) Flanges Std.					

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