



KUNDINGER
FLUID POWER AUTOMATION CONTROLS



500/600 Series II

Mass Flow Meters and Controllers

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding



ENGINEERING YOUR SUCCESS.

500/600 Series II Mass Flow

The original 500/600 Series Digital Mass Flow Products introduced the Porter standard of versatility and cost effectiveness to digital MFC's. The new 500/600 SERIES II instruments take those concepts to a higher level. The instruments in the new SERIES II product line feature expanded flow ranges; from 0.014 - 0.7 cc/min up to 33 - 1670 l/min and are available with maximum operating pressures up to 5800 PSIA. SERIES II Mass Flow Products can be factory configured to include up to 8 gas type and flow range combinations with an effective turn down ratio of 150:1. In addition they can be configured with Porter's Flow Parameter Adjust (FPA) feature. FPA offers increased flexibility by providing user selection of both flow ranges and gas types while maintaining high accuracy and up to 150:1 effective turndown ranges for measurement and control.

A newly developed software tool and available connection hardware allows communication with the MFC through a Laptop USB port. With this package, the selection of different gas types and flow ranges is simple and intuitive. As a result, Original Equipment Manufacturers are able to significantly reduce the variety of spare instruments they keep in stock, thereby reducing the cost of ownership. Users of MFC's in pilot plants or laboratories can rescale their instruments on site, saving time and cost.



Available Models

MFM Model Number	MFC Model Number	Flow Range
510C	600CV	0.014 - 0.7 ml/min up to 0.18 - 9 ml/min
511B	601CV	0.16 - 8 ml/min up to 0.5 - 25 l/min
511AC	601AV	0.4 - 20 l/min up to 5 - 100 l/min
512AC	602AV	0.8 - 40 l/min up to 1.4-250 l/min
513AC	603AV	4 - 200 l/min up to 33 - 1670 l/min

Note: The flow ranges listed are the minimum and maximum nitrogen (N₂) flow ranges available for each given model. Intermediate flow ranges are available. For correct sizing when operating parameters are questionable, please consult the factory. All flow ranges are at standard conditions of 14.7 PSIA and 70°F (21.1°C)

Product Features

- Gas flow ranges from 0 - 0.7 ml/min up to 0 - 1670 l/min
- Operating pressures up to 5800 PSIA
- High accuracy and repeatability
- Storage of max. 8 calibration curves
- User configurable control characteristics
- Flow Parameter Adjust functionality up to 150 PSIA
- Effective rangeability <150:1
- Analog or digital: RS-232, DeviceNet™, Profibus-DP®, Modbus-RTU™

Specifications

Measurement / Control System

Accuracy (incl. linearity) (based on actual calibration)	Standard: $\pm 0.5\%$ Reading plus $\pm 0.1\%$ Full Scale ($\pm 1\%$ Full Scale for ranges 3-5 ml/min; $\pm 2\%$ Full Scale for ranges < 3 ml/min)
Turndown	1 : 50 (in digital mode up to 1 : 187.5)
Repeatability	$< 0.2\%$ Reading
Settling Time (Controller)	Standard: 1-2 seconds
Control Stability	$< \pm 0.1\%$ Full Scale (typical for 1 l/min N ₂)
Operating Temperature	-10°C to +70°C
Temperature Sensitivity	Zero: $< 0.05\%$ Full Scale/°C; span: $< 0.05\%$ Reading/°C
Pressure Sensitivity	0.1%/ATM typical N ₂ ; 0.01%/ATM typical H ₂
Leak Integrity, outboard	Tested $< 2 \times 10^{-9}$ mbar l/s He
Attitude Sensitivity	Max. error at 90° off horizontal 0.2% at 1 ATM, typical N ₂
Warm-Up Time	30 min. for optimum accuracy 2 min. for accuracy $\pm 2\%$ Full Scale

Mechanical Parts

Material (wetted parts)	Stainless steel 316L or comparable
Surface Quality (wetted parts)	Ra= 0.8µm typical
Process Connections	Compression or face seal fittings
Seals	Standard: Viton® (FKM) Options: EPDM, Kalrez® (FFKM)
Ingress Protection (housing)	IP40

Electrical Properties

Power Supply	+15-24 Vdc
Power Consumption	Meter: 70 mA; Controller: max. 320 mA; Add 50 mA for Profibus®, if applicable
Analog Output/Command	0-5 (10) Vdc or 0 (4)-20 mA – specify – (Sourcing output)
Digital Communication	Standard: RS-232 Options: Profibus-DP®, DeviceNet™, Modbus™

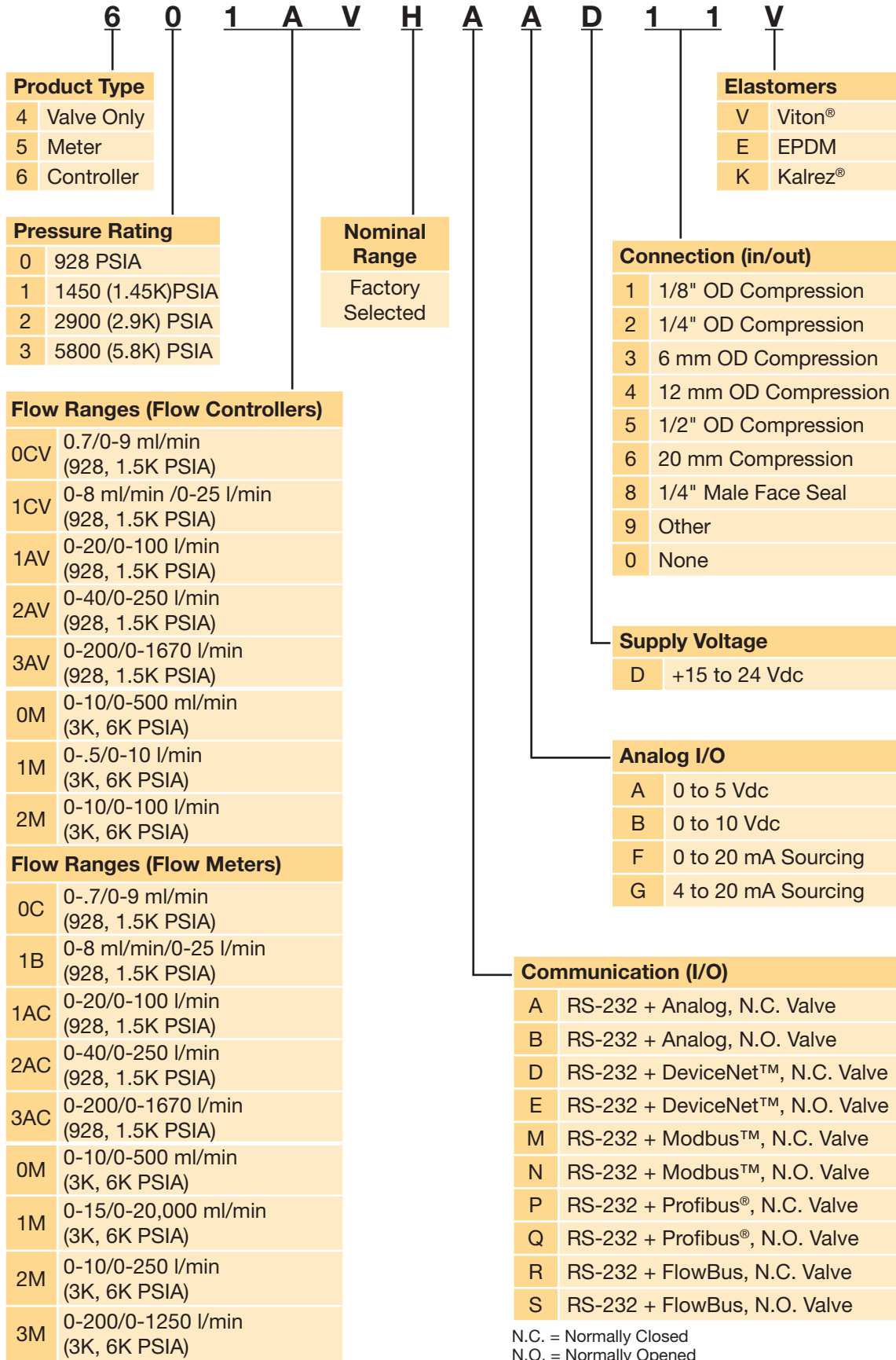
Electrical Connection

Analog/RS-232	9-pin D-connector (male)
Profibus-DP®	Bus: 9-pin D-connector (female) Power: 9-pin D-connector (male)
DeviceNet™	5-pin M12-connector (male)
Modbus-RTU™/FLOW-BUS	RJ45 modular jack

Technical specifications and dimensions subject to change without notice.

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Model Number and Description



Minimum / Maximum Flow Ranges for Typical Gases

(Valid for operating conditions from 12 to 150 PSIA and 0°C to 70°C)

Model Number	Min/Max Range	Ar	CH ₄	C ₂ H ₆	CO	CO ₂	
510C / 600CV	Min	0.02-1	0.012-0.6	0.008-0.4	0.014-0.7	0.012-0.6	ml / min
	Max	0.07-9.5	0.04-5.5	0.028-4	0.06-9	0.04-4.5	
511B / 601CV	Min	0.2-10	0.11-5.5	0.08-4	0.16-8	0.14-7	l / min
	Max	0.2-25	0.13-16	0.088-11	0.16-25	0.122-14	
511AC / 601AV	Min	0.54-27	0.32-16	0.22-11	0.4-20	0.3-15	l / min
	Max	0.9-100	0.5-60	0.4-45	0.6-100	0.5-50	
512AC / 602AV	Min	1.12-56	0.64-32	0.42-21	0.8-40	0.62-31	l / min
	Max	2-250	1.1-170	0.7-120	1.4-250	1-130	
513AC / 603AV	Min	5.4-270	3.2-160	2.2-110	4-200	3-150	l / min
	Max	11.2-1670	6.4-900	4.2-750	8-1500	6.2-850	

Model Number	Min/Max Range	H ₂	He	Air / N ₂	N ₂ O	O ₂	
510C / 600CV	Min	0.014-0.7	0.02-1	0.014-0.7	0.012-0.6	0.014-0.7	ml / min
	Max	0.06-7.2	0.07-10	0.06-9	0.04-4.5	0.06-9	
511B / 601CV	Min	0.144-7.2	0.2-10	0.16-8	0.12-6	0.16-8	l / min
	Max	0.168-25	0.24-30	0.16-25	0.12-14	0.16-25	
511AC / 601AV	Min	0.42-21	0.56-28	0.4-20	0.3-15	0.4-20	l / min
	Max	0.6-90	0.9-125	0.6-100	0.5-50	0.6-90	
512AC / 602AV	Min	0.84-42	1.12-56	0.8-40	0.6-30	0.8-40	l / min
	Max	1.4-200	2-300	1.4-250	1-130	1.4-250	
513AC / 603AV	Min	4.2-210	5.6-280	4-200	3-150	4-200	l / min
	Max	8.4-1350	11.2-1850	8-1670	6-840	8-1500	

Notes:

- Flow parameter adjust is optional on the Series II and must be requested at the point of ordering
- Extended rangeability for digital communication only; turndown 50:1 when using analog I/O options
- The selected orifice of the control valve may limit the rangeability
- Standard accuracy (based on actual calibration): +(0.5% RD + 0.1% FS); ranges from 0 - 5 to 0 - 10 ml/min: ±1% FS; ranges ≤ 0-5 ml/min: ±2% FS
- Series II factors for gas not in the above table are available from the factory

⚠WARNING – USER RESPONSIBILITY

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

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