HORIBA
Semiconductor

Thermal Mass Flow Module

SEC-Z700S

New Concept PI Mass Flow Module

Contribute to Etching and Deposition Process at Atomic Level

In cutting-edge semiconductor processes where multi-patterning is increasing, the performance of mass flow modules greatly affects the performance of semiconductor manufacturing equipment. With the indispensable performance such as flow rate accuracy, reproducibility, and response performance, SEC-Z700S Series can meet various requirements in each process.

Expanded Upper Limit of Operating Temperature

15-60 °C
(Our conventional product 5-50 °C)

Powered by Response Time Adjustment Function

Tunable range
300 ms ≤ T ≤ 1000 ms

Valve Shutoff Performance*

Fluorocarbon Polymers (PFA) adopted (Bin#01-04)
Flow Rate at Fully Closed ≤ 0.1 %F.S.

Reduction of Performance Variation

Repeatability ≤ ±0.15 %S.P.
(Flow rate ≥ 5 %)
Flow response time 450±30 ms

* : It depends on the MR.MG number. Please check the specifications for details.

Applications

- Atomic Layer Deposition (ALD) / Atomic Layer Etching (ALE)
- Particle Sensitive Epitaxial process
- Halogen Gas (Cl_2, BCl_3 etc.)

STEC Fluid Control Technology

PI: Pressure Insensitive

Specification

Model		SEC-Z714SMG *1 / SEC-Z717SMG *2			SEC-Z724SMG *1 / SEC-Z727SMG *2
Full-scale flow rate (N_2 conversion flow rate)		MR.MG number #01 : 30 SCCM	MR.MG number #02 : 100 SCCM #03 : 300 SCCM #04 : 1 SLM #05 : 3 SLM	MR.MG number #06 : 10 SLM	MR.MG number #07 : 30 SLM #08 : 50 SLM
Flow rate accuracy *3 *4		≤ ±1.0 %S.P. (5 %F.S. ≤ Flow rate ≤ 100 %F.S.) ≤ ±0.05 %F.S. (0.5 %F.S. ≤ Flow rate < 5 %F.S.)			
Linearity *3		≤ ±0.5 %F.S.			
Repeatability *3 *5		≤ ±0.15 %S.P. (5 %F.S. ≤ Flow rate ≤ 100 %F.S.) ≤ ±0.0075 % F.S. (0.5 %F.S. ≤ Flow rate < 5 %F.S.)			
Zero point temperature effect *6		≤ ±0.01 %F.S./°C			
Span temperature effect *6		≤ ±0.05 %F.S./°C			
Zero point output stability *7		≤ ±0.3 %F.S./year			
Flow rate control range *8		0.5-100 %F.S. Auto close function : ≤ 0.25 %F.S.			
Step-up flow response time *9		450±30 ms (0 %F.S. → 5 %F.S. < Flow rate ≤ 100 %F.S.) ≤ 600 ms (0 %F.S. → 2 %F.S. ≤ Flow rate ≤ 5 %F.S.) ≤ 1 s (0 %F.S. → 0.5 %F.S. ≤ Flow rate < 2 %F.S.)			
Step down flow response time *9		450±30 ms (100 %F.S. → 10 %F.S. ≤ Flow rate ≤ 80 %F.S.) ≤ 2 s (100 %F.S. → 0.5 %F.S. ≤ Flow rate ≤ 10 %F.S.) ≤ 200 ms (100 %F.S. → 0 %F.S. (Valve closed))			
Flow response time adjustment (Tunable Response) *9 *10		Tunable range : 300 ms ≤ Time ≤ 1000 ms (0.3 s ≤ Time ≤ 1 s) Adjustment accuracy : User specified time ±50 ms (±0.05 s)			
Supply pressure condition		≤ 450 kPa (G)			
Operating differential pressure	max	400 kPa (D)			
	min	100 kPa (D) (Supply pressure < 150 kPa (A)) 50 kPa (D) (Supply pressure ≥ 150 kPa (A))		100 kPa (D)	200 kPa (D)
Proof pressure		1 MPa (G)			
Flow rate at fully closed control valve *11		≤ 0.1 %F.S.			(N.C.valve) ≤ 0.2 %F.S. (N.O.valve) ≤ 0.5 %F.S.
Pressure transient sensitivity *12		≤ ±(1.5 %F.S. + 1.5 %S.P.)	≤ ±1.0 %F.S.		
Pressure measurement accuracy		≤ ±3.5 kPa (Measurement range : 0-700 kPa (A))			
Operating temperature *13		15-60 °C			
Temperature measurement accuracy		≤ ±2 °C (Measurement range : 15-60 °C)			
Leak integrity		≤ 5×10^{-12} Pa・m^3/s (He)			
Valve type		Normally closed : N.C. Normally opend : N.O.			
Wetted materials		SUS316 L, Ni-alloy, PFA (Bin#01-#04)			
Fitting		1/4 inch VCR equivalent fitting-to-fitting dimension 124 mm 1.125 inch C-Seal Port-to-port dimension 92 mm 1.125 inch W-Seal Port-to-port dimension 92 mm			
Communication interface		M12 (5 pin) male connector DeviceNet™protocol *1 RJ45 connector × 2 EtherCAT®protocol *2			
Service communication port		ϕ2.5 port Dedicated RS-485 communication			
Power supply		M12 (5 pin) male connector 24 VDC, 7.5 VA (682mA at 11 V) *1 *14 M8 (5 pin) male connector 24 VDC ±4 V, 7.5 VA *2			
Weight		1.3 kg *1 1.1 kg *2			
Mounting orientation		Free			
Warm-up operation time		≥ 60 minutes			
Storage temperature		0-80 °C (Non condensing)			
Multi-gas, multi-range Function		Standard installation			

*1: DeviceNet™ communication model
*2: EtherCAT® communication model
*3: Value applicable to a calibration gas(N_2) or the gas types measured with our benchmark equipment.
*4: Flow rate accuracy with the ambient temperature at 23±2°C (in compliance with SEMI E56-0309).
*5: Complies with "repeatability" as defined by SEMI E56-0309.
*6: Temperature effect for the range of temperatures between 15°C and 60°C when 23°C constitutes the benchmark.
*7: Zero point output stability in compliance with SEMI E69-0298.
*8: If the full-scale value for the flow rate is changed with the multi-range function, 100% of the revised full-scale value will constitute the upper limit of the flow-rate control range.
*9: The response time is defined as the time that it takes for the product's flow rate output to reach 98% of the amount of the change set for the flow rate.
For any change in flow rate control to 0% F.S. (valve closed),the response time is defined as the time it takes for the product's flow rate output to reach 0.5% F.S.
*10: The value in our conditions as based on the use of a calibration gas (N_2). *11: Flow rate when the control valve is fully closed and a calibration gas (N_2) is supplied at 450 kPa (G).
*12: Flow rate variation amount where a 2psi pressure change (in compliance with SEMI F64-0701) occurs in a 1second period when flow rate control is applied between 5% F.S. and 100% F.S. in our conditions as based on the use of a calibration gas (N_2).
*13: The product's temperature output constitutes the benchmark. The product's temperature may rise higher than the environmental temperature if a source of heat exists in the vicinity of the product or if multiple units of the product have been installed in close proximity to each other.
*14: Use power supply and cable applicable for ODVA.

- In notation of pressure unit, (D) shows differential pressure, (G) shows gauge pressure, (A) shows absolute pressure.
- SCCM, SLM are symbols representing the gas flow rate (ml/min, l/min, at 0°C 101.3kPa).

Model		SEC-Z737SMG		SEC-Z747SMG
Full-scale flow rate (N_2 conversion flow rate)		MR.MG number #09 : 100 SLM	MR.MG number #9.5 : 100 SLM	MR.MG number #10 : 200 SLM
Flow rate accuracy *1 *2		≤ ±1.0 %S.P. (35 %F.S. ≤ Flow rate ≤ 100 %F.S.) ≤ ±0.35 %F.S. (2 %F.S. ≤ Flow rate < 35 %F.S.)		
Linearity *1		≤ ±0.5 %F.S.		
Repeatability *1 *3		≤ ±0.2 %F.S.		
Zero point temperature effect *4		≤ ±0.01 %F.S./°C		
Span temperature effect *4		≤ ±0.05 %F.S./°C		
Zero point output stability *5		≤ ±0.3 %F.S./year		
Flow rate control range *6		2-100 %F.S. Auto close function : ≤ 1.5 %F.S.		
Step-up flow response time *7		≤ 600 ms (0 %F.S. → 2 %F.S. ≤ Flow rate ≤ 100 %F.S.)		
Step down flow response time *7		≤ 600 ms (100 %F.S. → 10 %F.S. < Flow rate ≤ 80 %F.S.) ≤ 2 s (100 %F.S. → 2 %F.S. ≤ Flow rate ≤ 10 %F.S.) ≤ 200 ms (100 %F.S. → 0 %F.S. (Valve closed))		
Flow response time adjustment (Tunable Response)		No function		
Supply pressure condition		100-450 kPa (G) (Ambient temperature 15-50 °C) 150-450 kPa (G) (Ambient temperature 50-60 °C)	200-450 kPa (G) (Ambient temperature 15-50 °C) 250-450 kPa (G) (Ambient temperature 50-60 °C)	
Operating differential pressure	max	350 kPa (D)		
	min	100 kPa (D) (Ambient temperature 15-50 °C) 150 kPa (D) (Ambient temperature 50-60 °C)	200 kPa (D) (Ambient temperature 15-50 °C) 250 kPa (D) (Ambient temperature 50-60 °C)	
Proof pressure		1MPa (G)		
Flow rate at fully closed control valve *8		≤ 2 % of set full scale		
Pressure transient sensitivity *9		≤ ±(1.0 %F.S.+1.0 %S.P.)		
Pressure measurement accuracy		≤ ±3.5 kPa (Measurement range : 0-700 kPa(A))		
Operating temperature *10		15-60 °C		
Temperature measurement accuracy		≤ ±2 °C (Measurement range : 15-60 °C)		
Leak integrity		≤ 5×10^{-12} Pa・m^3/s (He)		
Valve type		Normally closed : N.C. Normally opend : N.O.		
Wetted materials		SUS316L, Ni-alloy		
Fitting		1/2 inch VCR equivalent fitting-to-fitting dimension 150.4 mm 1.5 inch C-Seal Port-to-port dimension 92mm		
Communication interface		RJ45 connector×2 EtherCAT®protocol		
Service communication port		ϕ2.5 port Dedicated RS-485 communication		
Power supply		M8 (5 pin) male connector 24 VDC ±4 V, 7.5 VA		
Weight		1.6 kg		
Mounting orientation		Free		
Warm-up operation time		≥ 60 minutes		
Storage temperature		0-80 °C (Non condensing)		
Multi-gas, multi-range Function		Standard installation	Standard installation *11	Standard installation

*1: Value applicable to a calibration gas(N_2) or the gas types measured with our benchmark equipment.
*2: Flow rate accuracy with the ambient temperature at 23±2°C (in compliance with SEMI E56-0309).
*3: Complies with "repeatability" as defined by SEMI E56-0309.
*4: Temperature effect for the range of temperatures between 15°C and 60°C when 23°C constitutes the benchmark.
*5: Zero point output stability in compliance with SEMI E69-0298.
*6: If the full-scale value for the flow rate is changed with the multi-range function, 100% of the revised full-scale value will constitute the upper limit of the flow-rate control range.
*7: The response time is defined as the time that it takes for the product's flow rate output to reach 98% of the amount of the change set for the flow rate.
For any change in flow rate control to 0% F.S. (valve closed),the response time is defined as the time it takes for the product's flow rate output to reach 0.5% F.S.
*8: Flow rate when the control valve is fully closed and a calibration gas (N_2) is supplied at 450 kPa (G).
*9: Flow rate variation amount where a 2psi pressure change (in compliance with SEMI F64-0701) occurs in a 1second period when flow rate control is applied between 5% F.S. and 100% F.S. in our conditions as based on the use of a calibration gas (N_2).
*10: The product's temperature output constitutes the benchmark. The product's temperature may rise higher than the environmental temperature if a source of heat exists in the vicinity of the product or if multiple units of the product have been installed in close proximity to each other.
*11: Contact us for more information about compatible gas types.

- In notation of pressure unit, (D) shows differential pressure, (G) shows gauge pressure, (A) shows absolute pressure.
- SCCM, SLM are symbols representing the gas flow rate (ml/min, l/min, at 0°C 101.3kPa).

IMS

The HORIBA Group adopts IMS (Integrated Management System) which integrates Quality Management System ISO9001, Environmental Management System ISO14001, and Occupational Health and Safety Management System ISO45001.
We have now integrated Business Continuity Management System ISO22301 in order to provide our products and services in a stable manner, even in emergencies.

RoHS COMPLIANT

Applying to the EU RoHS Directive : This products is compliant with the restriction of the designated 10 hazardous substances(*).
(*) lead , cadmium , mercury , hexavalent chromium , polybrominated biphenyls (PBB) , polybrominated diphenyl ethers (PBDE) , bis (2-ethylhexyl) phthalate (DEHP) , butyl benzyl phthalate (BBP) , dibutyl phthalate (DBP) and diisobutyl phthalate (DIBP)
Using lead-free soldering : Lead-free soldering is used for mounting components of printed circuit boards.
- Many countries consider the reinforcement of regulations concerning the risk caused by lead to human body and the environment

HORIBA STEC

HORIBA STEC, Co., Ltd. http://www.horiba.com/horiba-stec/

Please read the operation manual before using this product to ensure safe and proper handling of the product.

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