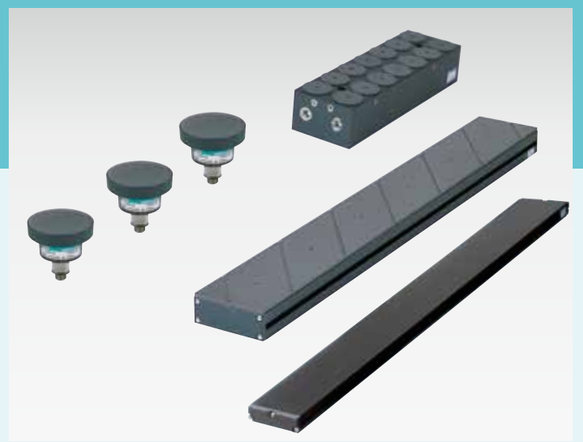
Float Star®
GFM

■ Precision Components

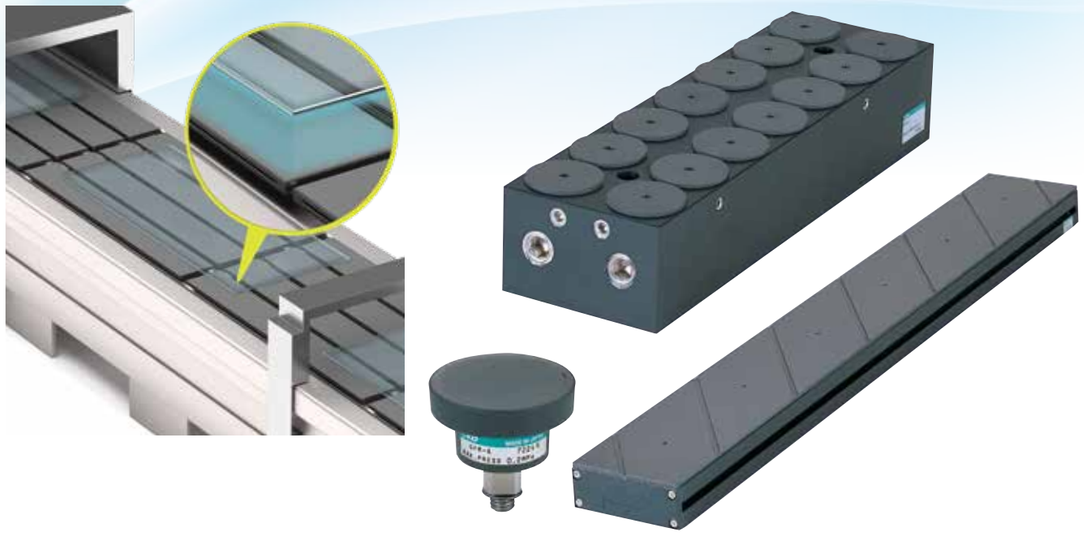


CONTENTS

GFM Series

High-precision/High-quality Floating System

Enables non-contact/clean/damage-less transport
even for delicate workpieces such as glass substrates



Stable, high-precision floating without contact

Adoption of carbon porous material realizes stable, high-precision floating without contact.

Significant reduction in air consumption

Adopts optimal air efficiency for glass floating, significantly reducing air consumption. Greatly contributes to factory energy saving.

Achieves Class 10 level *

Carbon porous material suppresses particles in floating air.

*Based on CKD tests for the GFM series, equivalent to Class 4 of JIS B 9920; measured values also include particle sizes of 0.5 µm or more. (Excluding GFM-T)

Prevents workpiece charging

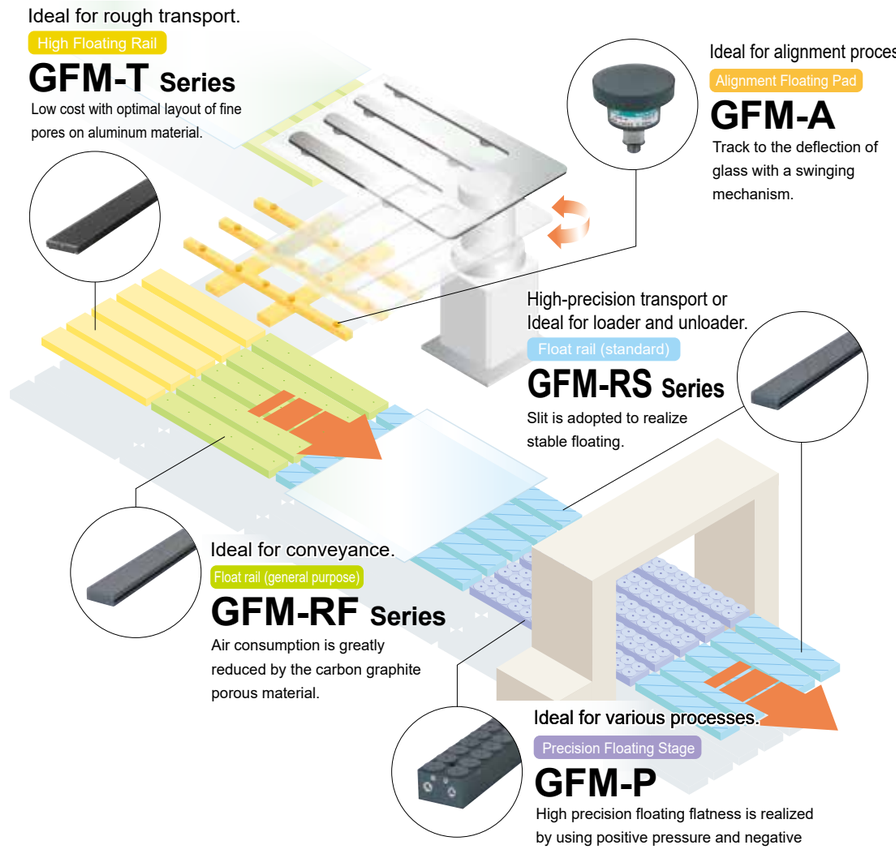
Conductive porous material suppresses static electricity. (Excluding GFM-T)

Ideal for high-sensitivity inspection

Adoption of a black body eliminates diffuse reflection and improves workpiece visibility.

Variations in diverse shapes/functions

Supports optimal systems for all processes, from transport to various processes and inspections



GFM Series variation

Model variations	Applications	Float [µm]	Air consumption L/min (at 0.1MPa) *1	Material	Page
GFM-A	Positioning	10 µm or more*2	10 or less	Contains carbon fiber PPS porous material	18
GFM-T Series	Rough transport	250 µm or more*2	100 or less	Aluminum alloy (Micropore processing)	24
GFM-RF Series	Transport	250 µm or more*2	24 or less	Carbon graphite Porous Material	28
GFM-RS Series	Loader/ Unloader	150 µm or more*2	24 or less	Carbon graphite Porous Material	28
GFM-P	Various processes	30 µm*3	3 or less	Carbon graphite Porous Material	38

*1 Take this as a guideline for air consumption. *2 Take this as a guide for float.
*3 The numerical values change according to the combination of positive pressure and negative pressure flow rate.

Floating System/Float Star

Alignment Floating Pad **GFM-A**

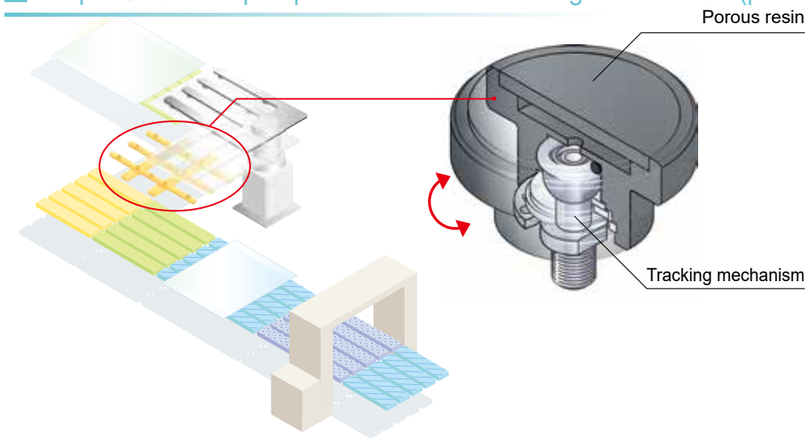
Swivel-type freely adaptable to deflection.

● Estimated float: 10 μm or more ● Main applications: Alignment

RoHS

Adoption of new material resin porous body and unique copying mechanism enables alignment adaptable to deflection.

Adopts CKD's unique "porous resin and tracking mechanism" (patented).



Less air consumption

Adoption of porous material reduced air consumption by 1/2.*

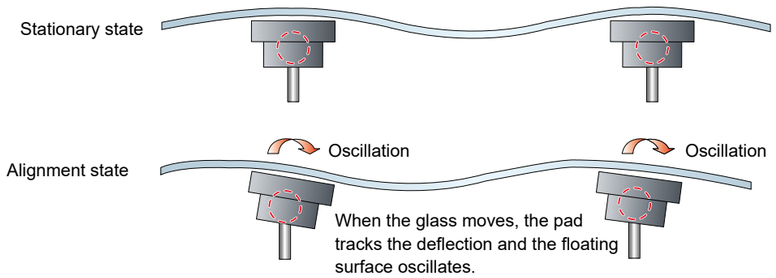
*Based on CKD tests for GFM-A

Antistatic

It is possible to suppress static electricity with antistatic resin porous material.

Supports sag freely

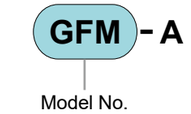
Non-contact floating is possible by following the deflection of large glass substrates, etc. (Image Diagram)



Suction holding

Suction fixing is possible after alignment.

Model No. Notation

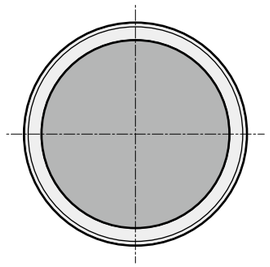


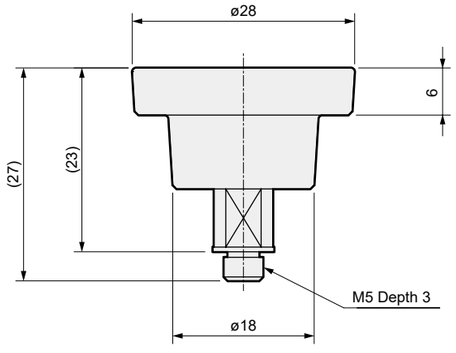
Specifications

Item		GFM-A
Operating Fluid		Compressed Clean Air [Class 1.1.1 to 1.6.2]
Operating Pressure	During Floating MPa	0.08 to 0.2
	During Suction kPa	-90 to -60
Operating Ambient Temperature °C		5 to 40
Storage Ambient Temperature °C		-10 to 60 (However, no freezing)
Mounting Orientation		Limited to state with porous surface facing up
Applied load	*1 N	1 to 5
Air consumption	*1 L/min	10 or less
Floating height	*2: μm	10 or more
Suction Holding Force	N	5 or less (Direction perpendicular to suction surface)
Connection Port Size		M5
Weight	g	15

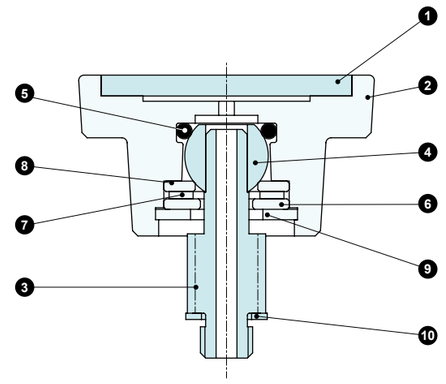
*1: Indicates air consumption when 0.1 MPa is supplied. Air consumption varies depending on the workpiece state and required floating amount. Consider this a guideline for flow rate calculation.
*2: When 0.1 MPa is supplied. Value when floating a load of 5 N. Consider this a guideline for floating height.

External Dimension Drawings



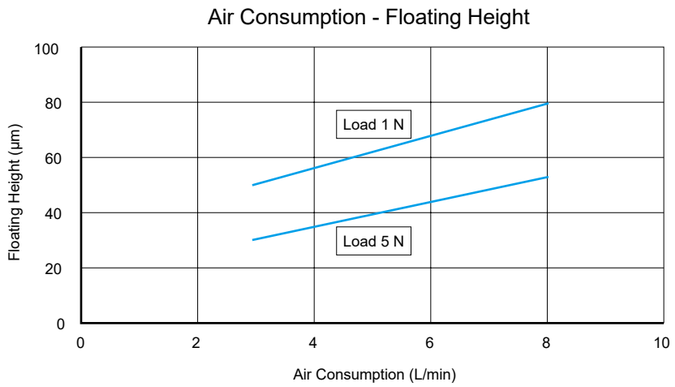


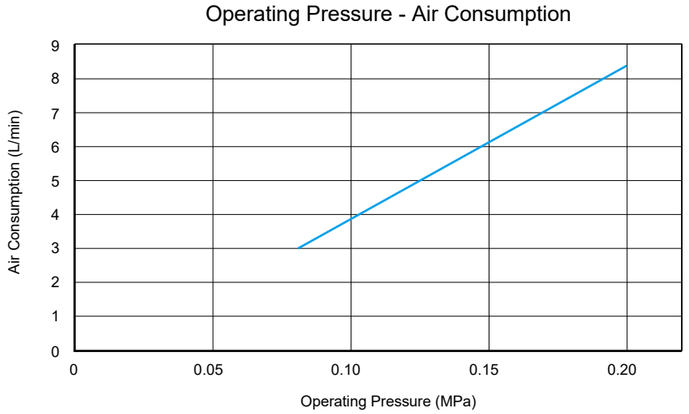
Internal Structure Diagram/Materials



Part No.	Part Name	Material	Remarks
1	Porous Material	Polyphenylene sulfide	Contains carbon fiber
2	Body	Polyphenylene sulfide	Contains carbon fiber
3	Shaft	Stainless steel	
4	Steel ball	Stainless steel	
5	O-ring	Nitrile rubber	
6	Metal Washer	Stainless steel	
7	Wave Washer	Stainless steel	
8	Metal Washer	Steel	Electroless nickel plating
9	C-type retaining ring for hole	Stainless steel	
10	Gasket	Nitrile rubber/Steel	

1 Floating Height (Reference Data)



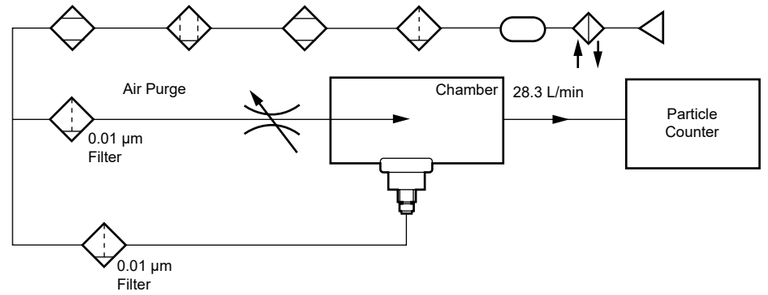


2 Particle Generation Amount (Reference Data)

[Measurement Method]

①Place the test sample in the chamber.
②Supply air.
③Measure the number of particles generated when air continues to flow.

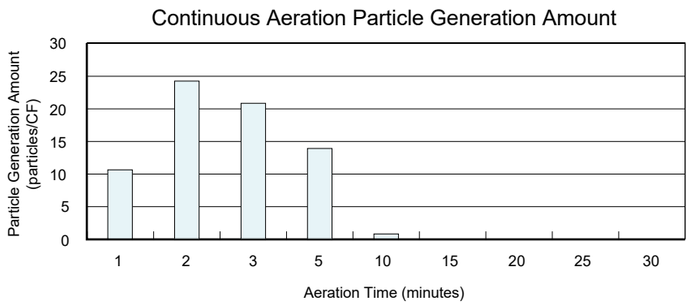
[Test Circuit]



[Measuring Instrument]

Particle Counter: Laser Dust Monitor
Minimum Measurable Particle Size: 0.1 μm
Suction Amount: 28.3 L/min

[Results]



* Particle generation amount also includes particle sizes of 0.5 μm or more.

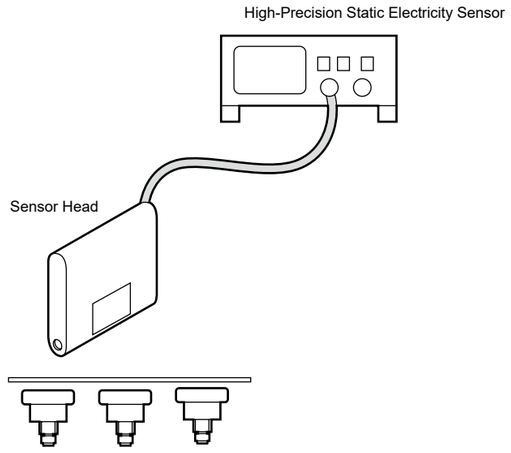
3 Static Electricity Change Amount (Reference Data)

MEMO

[Measurement Method]

①Place the sensor head at the center of the glass.
②Measure the amount of static electricity(voltage) when air is supplied.

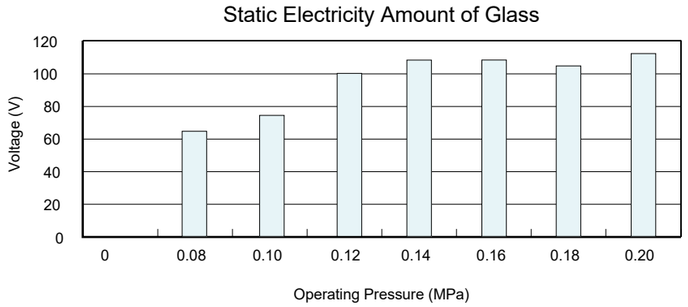
[Test Circuit]



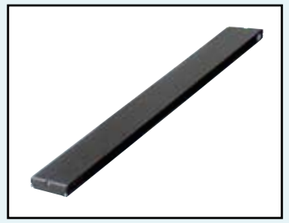
[Measuring Instrument]

Static Electricity Measurement: High-Precision Static Electricity Measuring Instrument (Non-contact type)

[Results]



Precision Components
LBC
GFM
PVP
FBU2
AFB-RB
Ending



Floating System/Float Star

High Floating Rail **GFM-T Series**

●Float: 250 μm or more ●Main applications: High Floating Transport

RoHS

Unique design utilizing know-how from years of pneumatic technology enables non-contact transport with a high floating amount.

CKD's Unique Design

Applies fluid technology cultivated at CKD over many years.
Achieved high floating amount with low consumption flow rate.

Easy Installation

Bracketless direct piping and direct mounting structure saves installation effort.
Contributes to reducing installation man-hours on long transport distance lines.

■ Black Body
Black alumite suppresses diffuse reflection

■ Floating Surface
Optimal placement of micro-holes realizes higher floating amount and lower consumption flow rate

■ Hollow Extruded Material
Uniform wall thickness and hollow structure realize increased rigidity and weight reduction

Model No. Notation

GFM - T - 500

Model No.

❶ Product Length

❶ Product Length

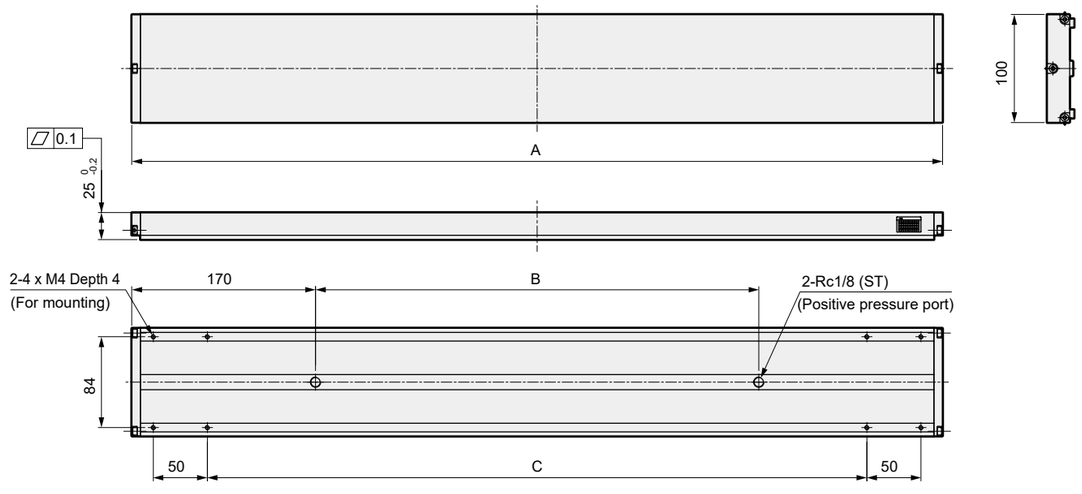
Code	Content
500	500
750	750
1,000	1,000

Specifications

Item	GFM-T-500	GFM-T-750	GFM-T-1000
Product Size (LxWxH) mm	500x100x25	750x100x25	1000x100x25
Operating Fluid	Compressed Clean Air [Class 1.6.2]		
Operating Ambient Temperature °C	5 to 40		
Storage Ambient Temperature °C	-10 to 60 (However, no freezing)		
Operating Pressure (Positive Pressure) MPa	0 to 0.2		
Air Consumption *1 L/min	50 or less	80 or less	100 or less
Floating Height *2 μm	250 or more		
Weight kg	1.7	2.5	3.3

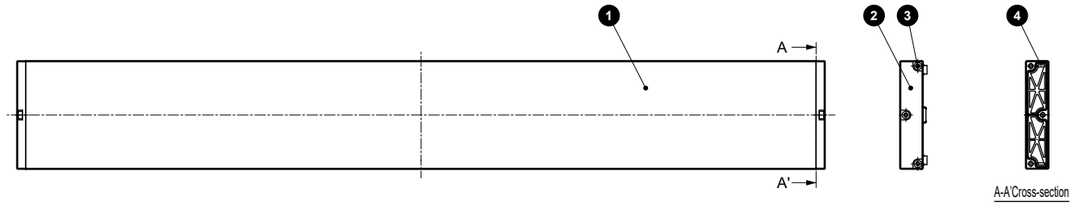
*1: Indicates air consumption when 0.1 MPa is supplied. Air consumption varies depending on the workpiece state and required floating amount. Consider this a guideline for flow rate calculation.
*2: When 0.1 MPa supplied. Value when floating glass with 0.7 mm thickness. Consider this a guideline for floating height.

External Dimension Drawings



Model No.	A	B	C
GFM-T-500	500	160	360
GFM-T-750	750	410	610
GFM-T-1000	1,000	660	860

Appearance/Material



Part No.	Part Name	Material	Remarks
1	Body	Aluminum alloy	Black Alumite Treatment *
2	Lid	Glass fiber filled polyamide	
3	Hexagon Socket Head Cap Screw	Stainless steel	
4	Gasket	Nitrile rubber	

*White streaks may be visible on the product exterior, but this occurs during the manufacturing process and does not affect product performance.

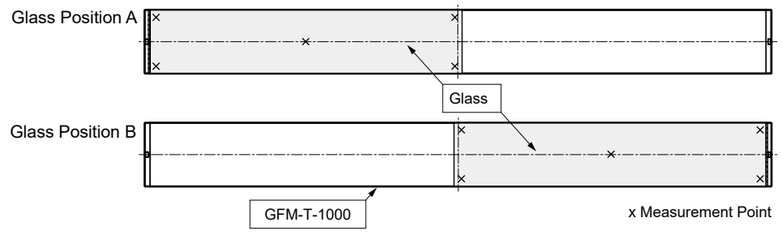
Technical Data

1 Floating Height (Reference Data)

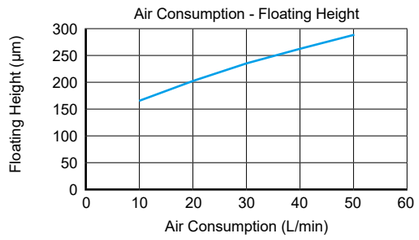
[Measurement Method]

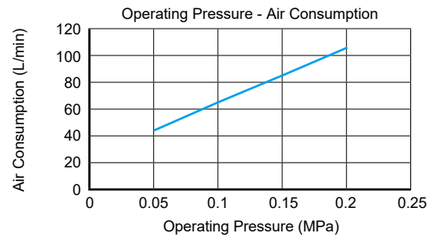
①Set the glass surface at zero supply air pressure as the reference point(zero point).
②Supply air, float the glass, and measure the displacement amount.
③Measure 5 points in the state of glass position A.
④Measure 5 points in the state of glass position B.

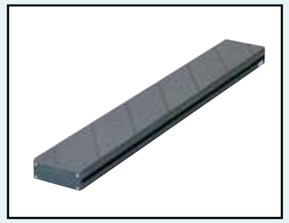
Floating Height: Smallest value among the displacement amounts of the 10 measurement points
Glass Size: t0.7x100x500



[Results]







Floating System/Float Star

Floating Rail GFM-R$^{F}_{S}$ Series

●Float: 150 μm or more ●Main applications: Transport

RoHS

New material carbon graphite porous body and unique design enable highly reliable floating transport.

CKD's Unique Design(Patent Acquired)

Applies fluid technology cultivated at CKD over many years.
Realized a floating surface shape that ensures reliable floating.

Antistatic

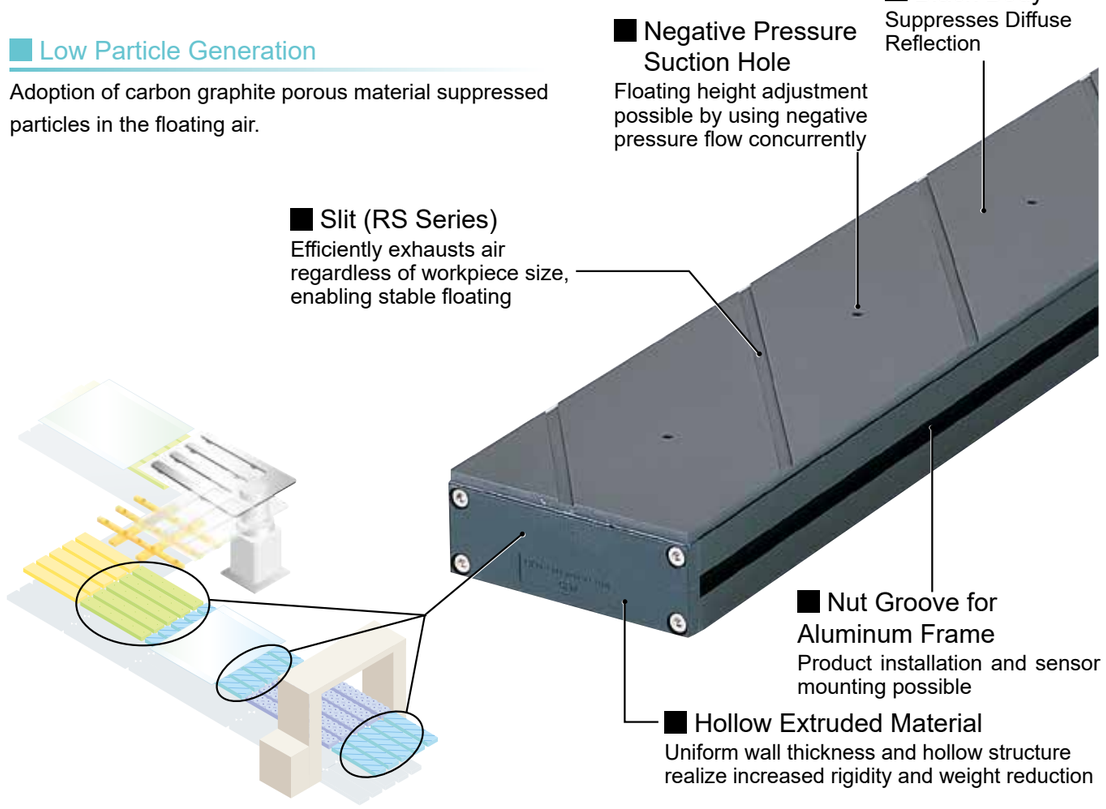
Achieved antistatic properties by adopting carbon graphite for the porous material. Floating air passing through the porous material has a slower flow velocity, and there is no charging of the workpiece.

Stable Floating

Adoption of porous material and optimal placement of air passages enable stable floating over a wide area.

Low Particle Generation

Adoption of carbon graphite porous material suppressed particles in the floating air.



Model No. Notation

GFM – RS – 500

- GFM: Model No.
- RS: ❶ Surface Shape
- 500: ❷ Floating Surface Length

❶ Surface Shape

Code	Content	
RS	With Slit	
RF	Without Slit	

❷ Floating Surface Length

Code	Content
500	500 mm
750	750 mm
1,000	1000 mm

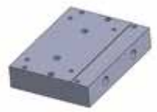
Bracket Kit Single Item Model No.

GFM – R – B

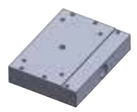
- GFM: Model No.

*For details of the bracket kit see P. 31.

Positive Pressure Side



Negative Pressure Side



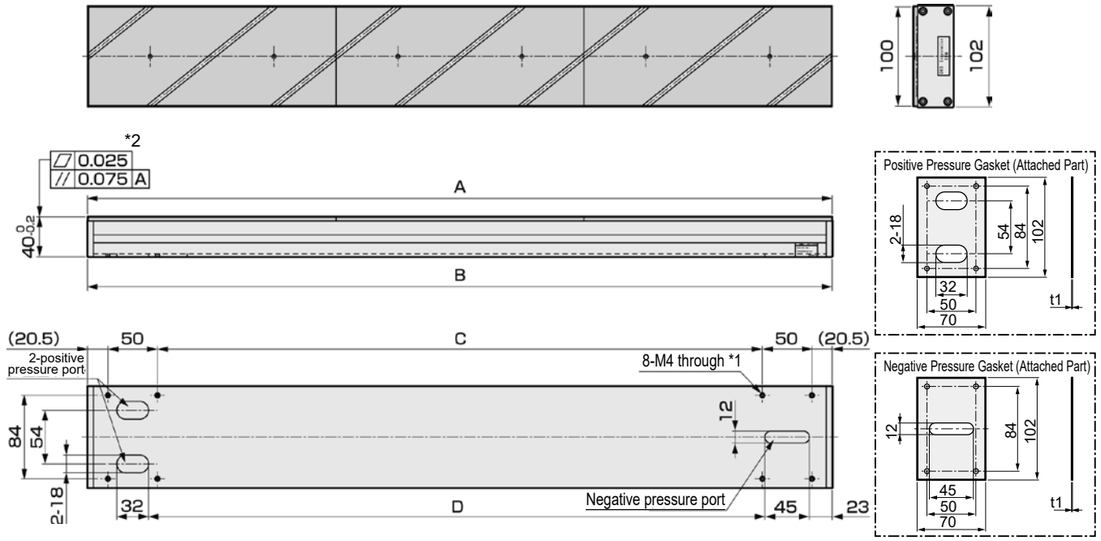
Specifications

Item		GFM-RS-500 GFM-RF-500	GFM-RS-750 GFM-RF-750	GFM-RS-1000 GFM-RF-1000
Product Size (LxWxH) mm		501x102x40	751x102x40	1001x102x40
Floating Surface Size (LxW) mm		500x100	750x100	1000x100
Operating Fluid		Compressed Clean Air [Class 1.1.1 to 1.6.2]		
Operating Ambient Temperature °C		5 to 40		
Storage Ambient Temperature °C		-10 to 60 (However, no freezing)		
Operating Pressure	Positive Pressure MPa	0 to 0.2		
	Negative Pressure kPa	-50 to 0		
Air consumption *1 L/min		Approx. 12	Approx. 18	Approx. 24
Floating height *2 μm		Approx. 150 (GFM-RS) / Approx. 250 (GFM-RF)		
Weight kg		1.8	2.7	3.6

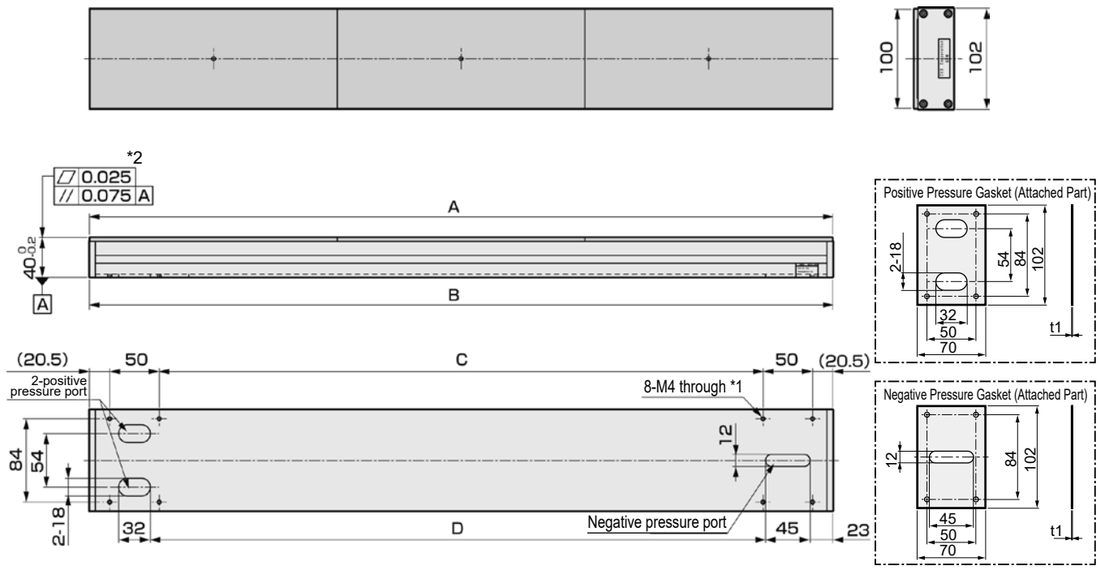
*1: Indicates air consumption when positive pressure 0.1 MPa and negative pressure 0 kPa are supplied. Air consumption varies depending on the workpiece state and required floating amount. Consider this a guideline for flow rate calculation.
*2: When positive pressure 0.1 MPa and negative pressure 0 kPa supplied. Value when floating glass with 0.7 mm thickness. Consider this a guideline for floating height.

External Dimension Drawings

● With Slit GFM-RS



● Without Slit GFM-RF



*1: Penetrates to the positive pressure port.
*2: Measurement value in a constant temperature room at 25°C. Accuracy changes in atmospheres deviating from 25°C. GFM-R□-1000 has flatness 0.05 mm and parallelism 0.1 mm.

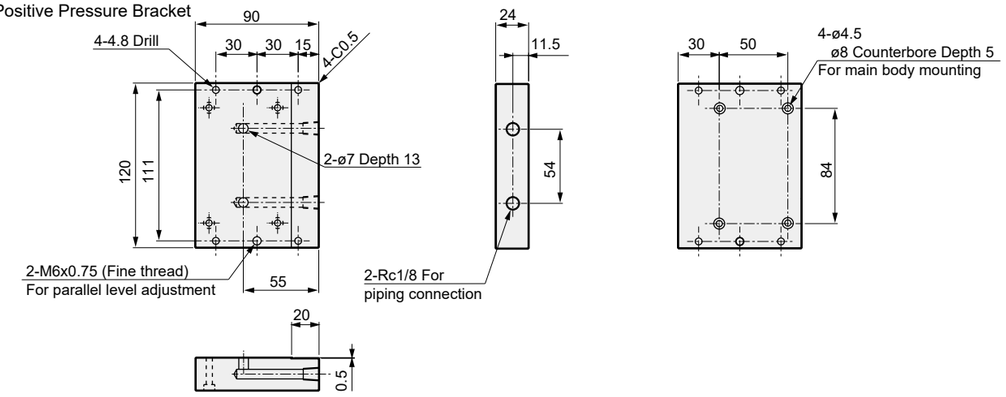
Model No.	A	B	C	D
GFM-R□-500	500	501	360	371.5
GFM-R□-750	750	751	610	621.5
GFM-R□-1000	1,000	1001	860	871.5

External Dimension Drawing (Bracket Kit)

● Model No.: GFM-R-B

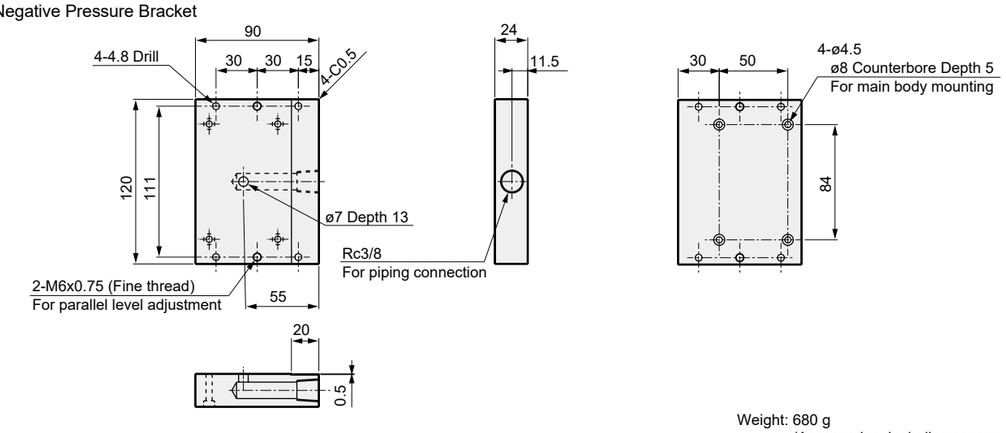
(Kit Contents: Positive pressure bracket, negative pressure bracket, 8 hexagon socket head cap screws, 8 screw gaskets)

• Positive Pressure Bracket



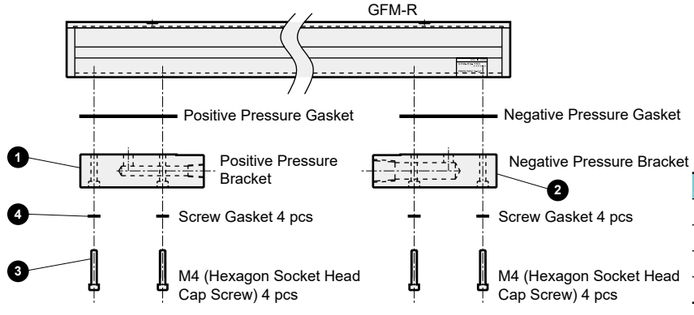
Weight: 680 g
(Accessories: Including approx. 20 g)

• Negative Pressure Bracket



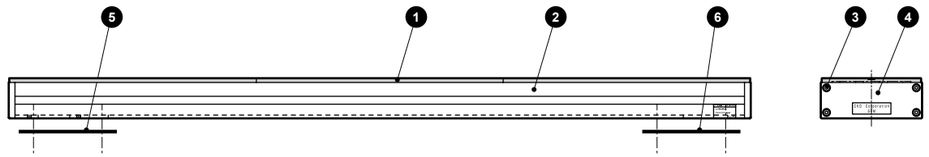
Weight: 680 g
(Accessories: Including approx. 20 g)

• Bracket Kit Mounting Example



Part No.	Part Name	Material	Remarks
1	Positive Pressure Bracket	Aluminum alloy	White Alumite Treatment
2	Negative Pressure Bracket	Aluminum alloy	White Alumite Treatment
3	Hexagon Socket Head Cap Screw	Stainless steel	
4	Screw Gasket	Nitrile rubber/Steel	

Appearance/Material



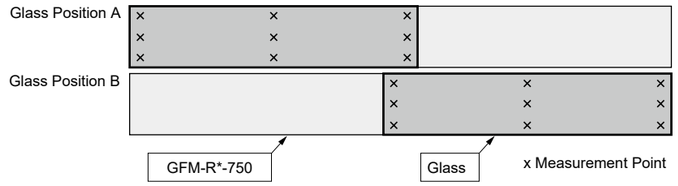
Part No.	Part Name	Material	Remarks
1	Porous Material	Carbon Graphite *1	
2	Base	Aluminum alloy	Black Alumite Treatment *2
3	Hexagon Socket Head Cap Screw	Stainless steel	
4	Lid	ABS Resin	
5	Positive Pressure Gasket	Nitrile rubber	Attached Parts
6	Negative Pressure Gasket	Nitrile rubber	Attached Parts

*1: Minor chipping on the porous material end face or gaps between porous materials may occur.
*2: White streaks may appear on the product exterior. This occurs during the manufacturing process and does not affect product performance.

1 Floating Height (Reference Data)

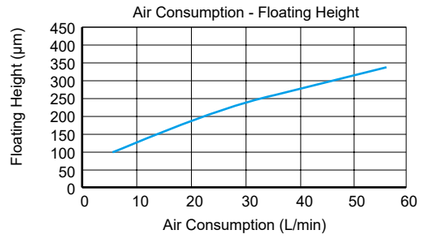
[Measurement Method]
①Set the glass surface at zero supply air pressure as the reference point(zero point).
②Float the glass and measure the displacement amount.
③Measure 9 points in the state of glass position A.
④Measure 9 points in the state of glass position B.

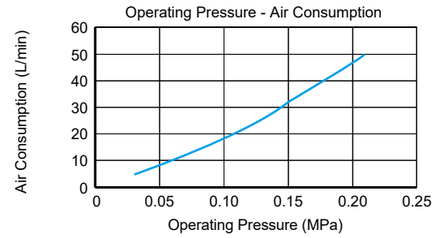
Floating Height: Smallest value among the displacement amounts of the 18 measurement points
Glass Size: t0.7x100x400



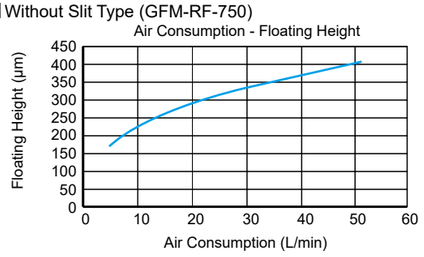
[Results]
Negative Pressure Condition: 0 kPa

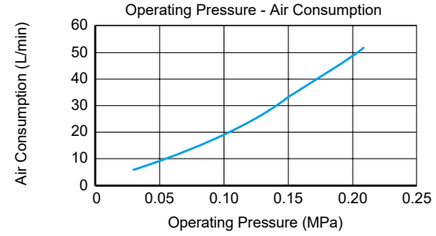
■ With Slit Type (GFM-RS-750)





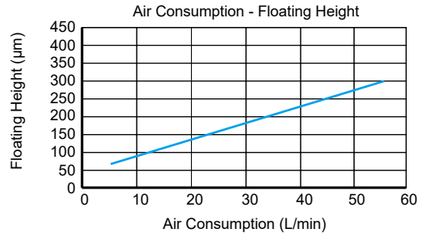
■ Without Slit Type (GFM-RF-750)

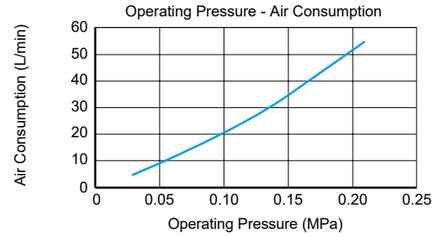




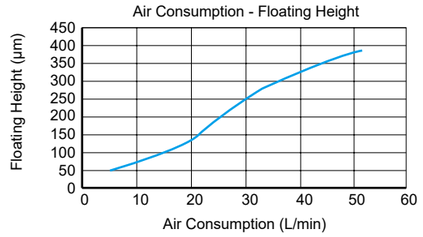
Negative Pressure Condition: -0.8 kPa

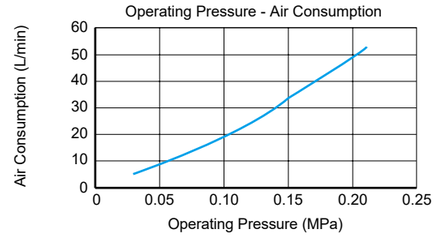
■ With Slit Type (GFM-RS-750)





■ Without Slit Type (GFM-RF-750)





2 Floating Flatness (Reference Data)

[Measurement Method]

①Set the glass surface at zero supply air pressure as the reference point(zero point).
②Float the glass and measure the displacement amount.
③Measure 9 points in the state of glass position A.
④Measure 9 points in the state of glass position B.

Floating Flatness: (max - min) value of the displacement amounts of the 18 measurement points

Glass Size: t0.7-100x400

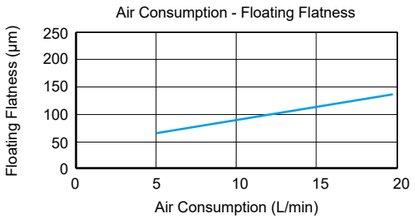
[Measuring Instrument]

Laser Displacement Meter: Specular reflection type (For transparent object measurement)

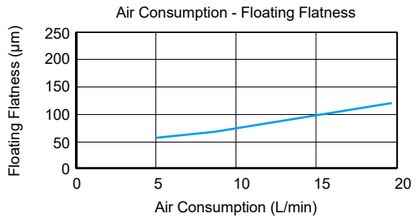
[Results]

■ With Slit Type (GFM-RS-750)

Negative Pressure Condition: 0 kPa

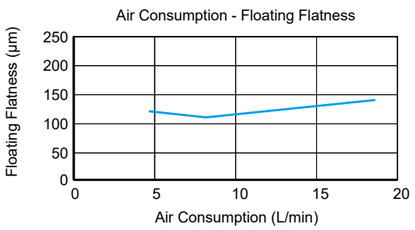


Negative Pressure Condition: -0.8 kPa

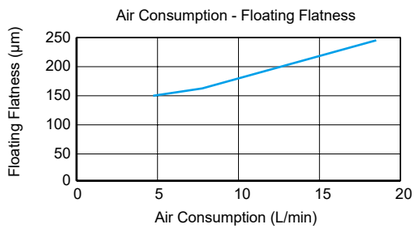


■ Without Slit Type (GFM-RF-750)

Negative Pressure Condition: 0 kPa



Negative Pressure Condition: -0.8 kPa

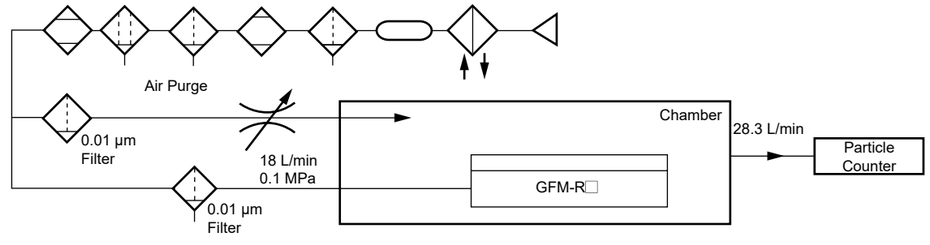


3 Particle Generation Amount (Reference Data)

[Measurement Method]

①Place the test sample inside the acrylic chamber.
②Supply 0.1 MPa (18 to 20 L/min) of air.
③Measure the number of particles generated when air continues to flow.

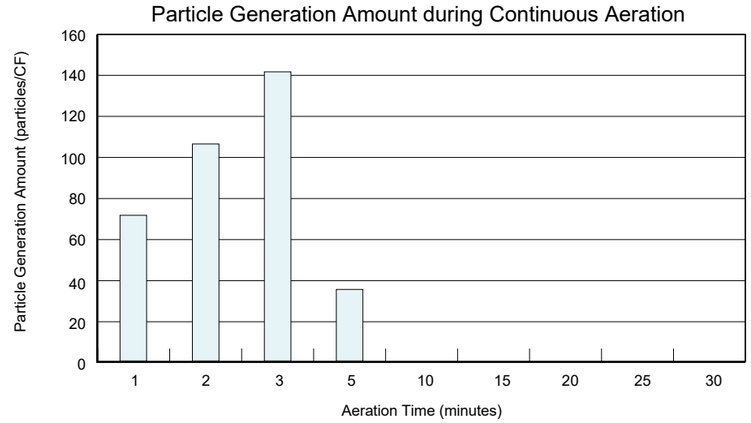
[Test Circuit]



[Measuring Instrument]

Particle Counter: Laser Dust Monitor
Minimum Measurable Particle Size: 0.1 μm
Suction Amount: 28.3 L/min

[Results]



* Particle generation amount also includes particle sizes of 0.5 μm or more.

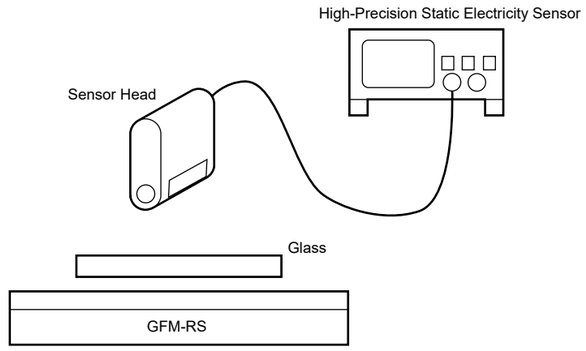
4 Static Electricity Change Amount (With Slit Type)(Reference Data)

[Measurement Method]

①Place the sensor head above the center of the glass.

②Measure the value indicated for the amount of static electricity (voltage) when air is supplied.

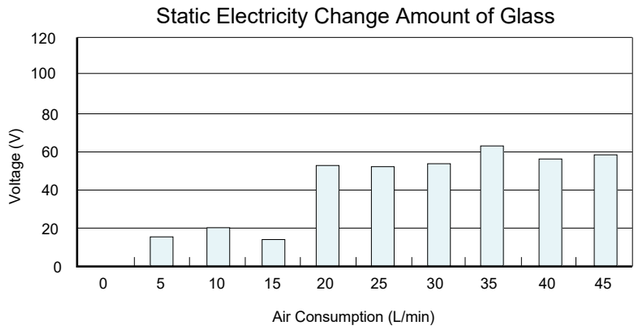
[Test Circuit]



[Measuring Instrument]

Static Electricity Measurement: High-Precision Static Electricity Measuring Instrument (Non-contact type)

[Results]



MEMO

Precision Components
LBC
GFM
PVP
FBU2
AFB-RB
Ending

Floating System/Float Star

Precision Floating Stage **GFM-P**

- Float: 30±6 μm
- Main applications: Various inspection processes, process steps

RoHS

New material carbon graphite porous body and unique design enable extremely high-precision floating.

CKD's unique design(patented)

Applies fluid technology cultivated at CKD over many years.
Realized a floating surface shape capable of high-precision floating.

High precision

Achieved high flatness and parallelism with ultra-precision machining.

High floating accuracy

Concurrent use of positive and negative pressure flows enables high-precision floating.

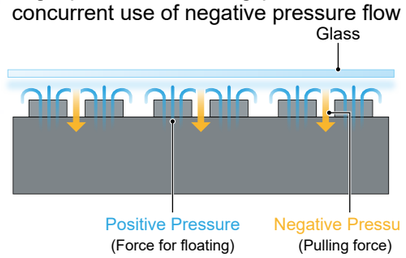
Antistatic

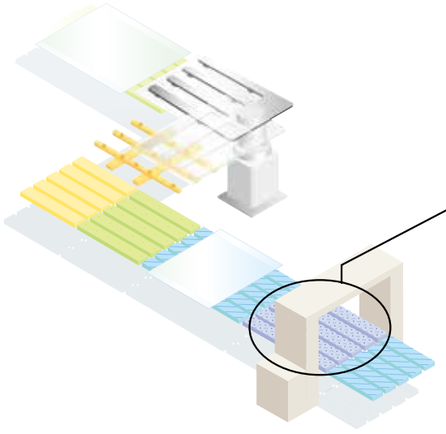
Achieved antistatic properties by adopting carbon graphite.
Floating air passing through the porous material has a slower flow velocity, and there is no charging of the workpiece.

Low Particle Generation

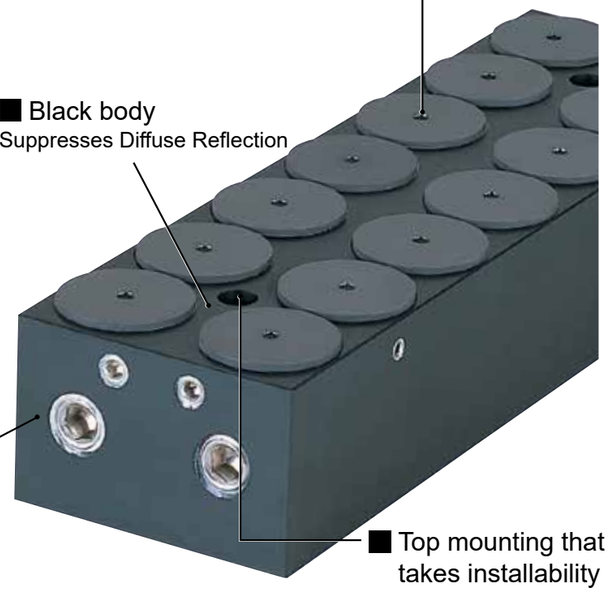
Adoption of carbon graphite porous material suppressed particles in the floating air.

■ Negative pressure vacuum hole
High-precision floating possible with concurrent use of negative pressure flow





■ Black body
Suppresses Diffuse Reflection



■ Top mounting that takes installability into consideration

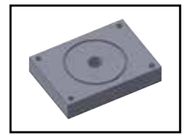
Model No. Notation

GFM – P
Model No.

Bracket Kit Single Item Model No.

GFM – P – B
Model No.

*For details of the bracket kit P. 40.

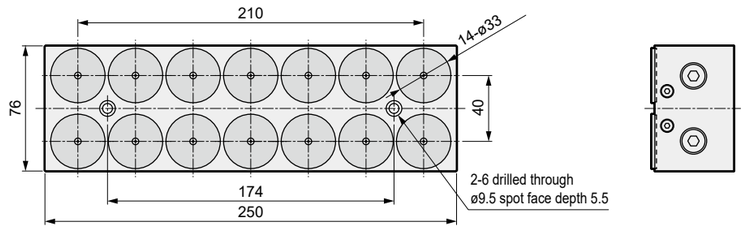


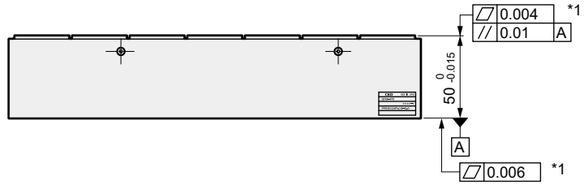
Specifications

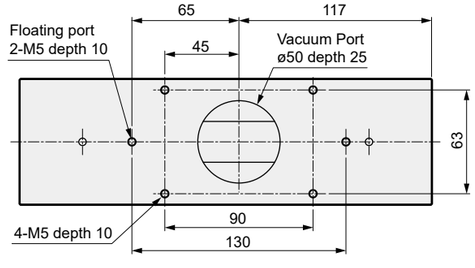
Item		GFM-P
Product Size (LxWxH) mm		250x76x50
Floating Surface Size (LxW) mm		250x76
Operating Fluid		Compressed Clean Air [Class 1.1.1 to 1.6.2]
Operating Ambient Temperature °C		5 to 40
Storage Ambient Temperature °C		-10 to 60 (However, no freezing)
Operating Pressure	Positive Pressure MPa	0 to 0.2
	Negative Pressure kPa	-50 to 0
Floating Flatness *1 μm		12 μm or less (when floating 30 μm)
Air Consumption *2 L/min		Approx. 2 to 3
Floating height *3: μm		Approx. 100
Weight kg		2.2

*1: Represents the MAX-MIN difference of the floating surface. Supply flow rate conditions vary depending on the workpiece state and customer's operating conditions. Consider this a guideline for floating flatness.
*2: Indicates air consumption when positive pressure 0.1 MPa is supplied. Air consumption varies depending on the workpiece state and required floating amount. Consider this a guideline for flow rate calculation.
*3: When positive pressure 0.1 MPa and negative pressure 0 kPa supplied. Value when floating glass with 0.7 mm thickness. Consider this a guideline for floating height.

External Dimension Drawings



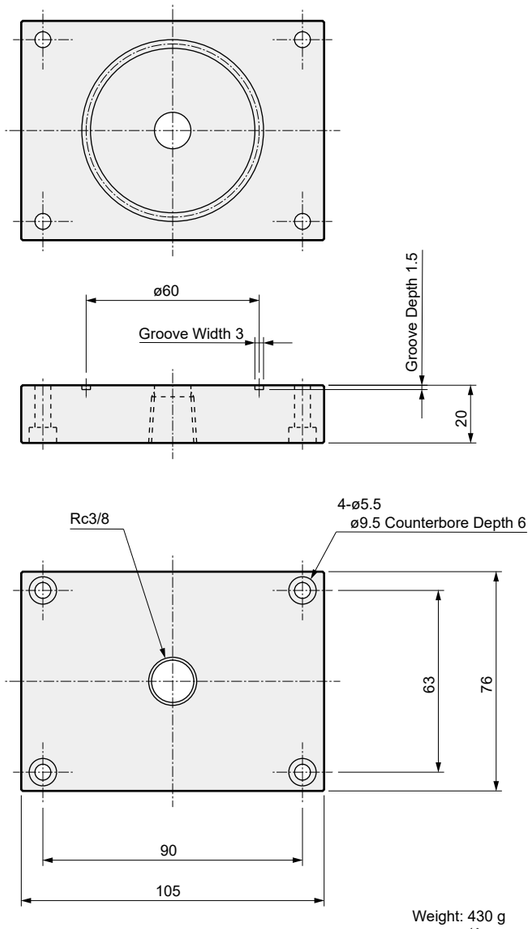




*1: Measurement value in a constant temperature room at 25°C. Accuracy may vary in atmospheres other than 25°C.

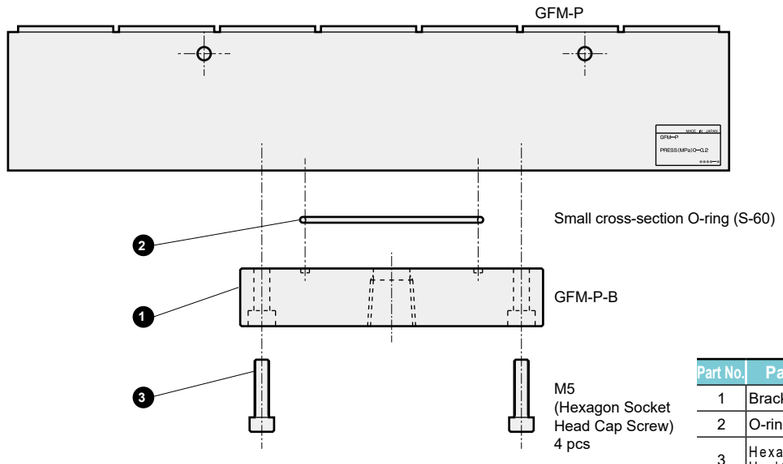
External Dimension Drawing (Bracket Kit)

● Model No.: GFM-P-B
(Kit Contents: Bracket, 1 O-ring, 4 hexagon socket head cap screws)



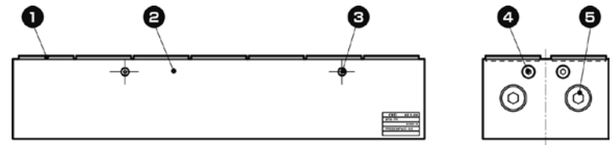
Weight: 430 g
(Accessories: Including approx. 20 g)

● Bracket Kit Mounting Example



Part No.	Part Name	Material	Remarks
1	Bracket	Aluminum alloy	White Alumite Treatment
2	O-ring	Nitrile rubber	
3	Hexagon Socket Head Cap Screw	Stainless steel	

Appearance/Material



Part No.	Part Name	Material	Remarks
1	Porous Material	Carbon Graphite *1	
2	Base	Aluminum alloy	Black Alumite Treatment *2
3	Hexagon Socket Set Screw	Stainless steel	
4	Hexagon Socket Set Screw	Stainless steel	
5	Hexagon Socket Set Screw	Stainless steel	

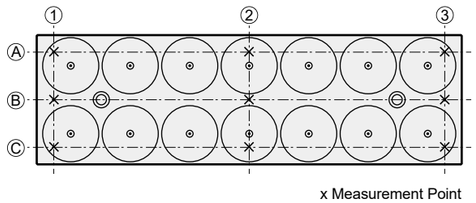
*1: Minor chipping may occur on the porous material end face.
*2: White streaks may appear on the product exterior. This occurs during the manufacturing process and does not affect product performance.

1 Floating Height/Floating Flatness 1 (Reference Data)

[Measurement Method]

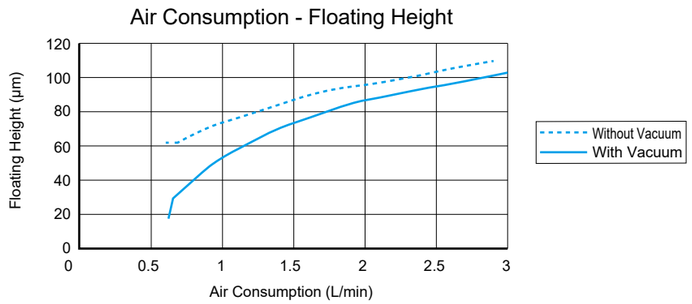
①Set the glass surface at zero supply air pressure as the reference point (zero point).
②Float the glass and measure the displacement amount.

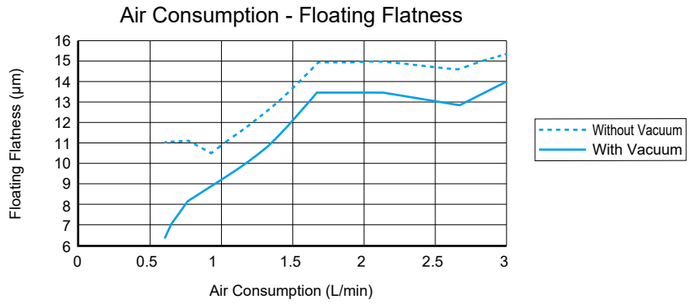
Floating Height: Average value of the displacement amounts of the 9 measurement points
Floating Flatness 1: (max-min) value of the displacement amounts of the 9 measurement points
Glass Size: t0.7x76x250

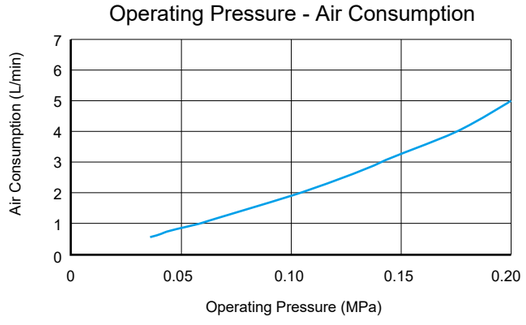


x Measurement Point

[Results]







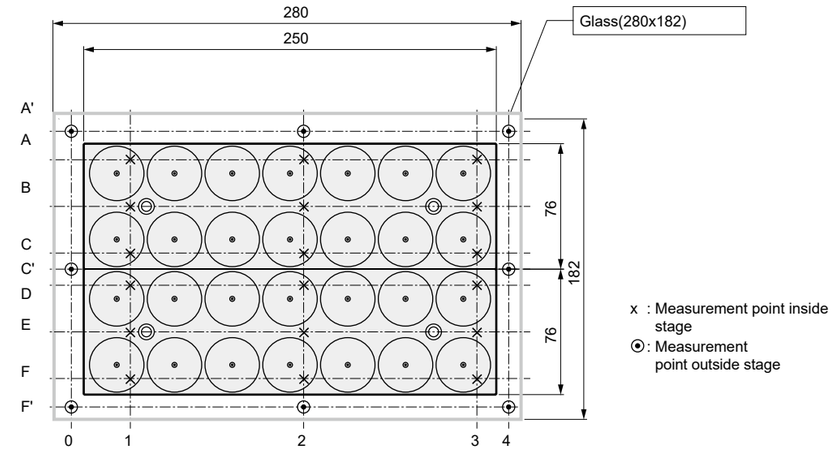
2 Floating Flatness 2 (Reference Data)

[Measurement Method]

①Set the glass surface at zero supply air pressure as the reference point(zero point).
②Float the glass and measure the displacement amount.

Condition 1: State where glass is 15 mm larger than the precision floating stage

Floating Flatness 2: (max-min) value of the displacement amounts of the 18 measurement points inside the stage
Glass Size: t0.7x280x182
Floating Stage Arrangement State: No gap between stages



[Results]

	0	1	2	3	4
A'	18.0		26.5		23.0
A		25.5	25.9	22.1	
B		25.0	27.2	24.8	
C		25.8	27.9	26.2	
C'	21.8				25.0
D		26.1	24.9	27.9	
E		23.8	25.6	23.6	
F		20.4	24.7	20.0	
F'	9.7		20.0		13.9

(Unit: μm)

Target Floating Height	(μm)	20
Positive Pressure	(MPa)	0.05
Positive Pressure Flow Rate	(L/min)	1.6
Negative Pressure Flow Rate	(L/min)	6.5
Floating Height MAX	(μm)	27.9
Floating Height MIN	(μm)	20.0
Average Floating Height	(μm)	24.9
Floating Flatness	(μm)	7.9

*Data for measurement points outside the floating stage is omitted.

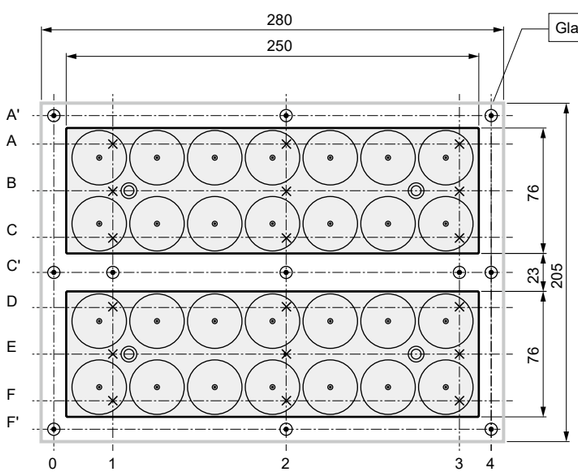
3 Floating Flatness 3 (Reference Data)

[Measurement Method]

①Set the glass surface at zero supply air pressure as the reference point (zero point).
②Float the glass and measure the displacement amount.

Condition 2: State where a 23 mm gap is made between floating stages under Condition 1

Floating Flatness 3: (max-min) value of the displacement amounts of the 18 measurement points inside the stage
Glass Size: t0.7x280x205
Floating Stage Arrangement State: Stage Interval 23 mm



x : Measurement point inside stage

⊙: Measurement point outside stage

[Results]

	0	1	2	3	4
A'	18.1		22.7		18.9
A		26.8	26.9	23.5	
B		26.0	27.2	25.0	
C		25.6	27.0	26.8	
C'	21.8	23.9	26.0	25.8	24.3
D		25.4	28.4	27.7	
E		23.7	25.3	25.0	
F		22.3	23.0	22.7	
F'	14.8		18.3		12.8

(Unit: μm)

Target Floating Height	(μm)	20
Positive Pressure	(MPa)	0.05
Positive Pressure Flow Rate	(L/min)	1.6
Negative Pressure Flow Rate	(L/min)	6.3
Floating Height MAX	(μm)	28.4
Floating Height MIN	(μm)	22.3
Average Floating Height	(μm)	25.5
Floating Flatness	(μm)	6.1

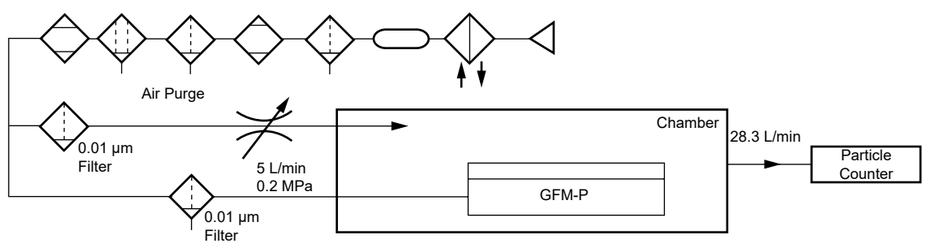
*Data for measurement points outside the floating stage is omitted.

4 Particle Generation Amount (Reference Data)

[Measurement Method]

①Place the test sample inside the acrylic chamber.
②Supply 0.2 MPa (approx. 5 L/min) of air.
③Measure the number of particles generated when air continues to flow.

[Test Circuit]

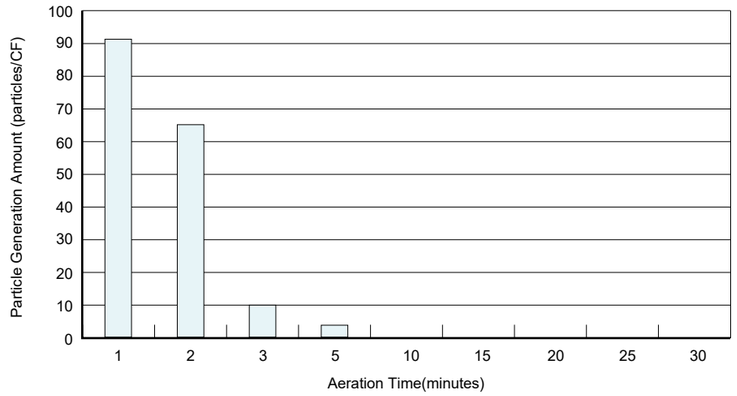


[Measuring Instrument]

Particle Counter: Laser Dust Monitor
Minimum Measurable Particle Size: 0.1 μm
Suction Amount: 28.3 L/min

[Results]

Particle Generation Amount during Continuous Aeration



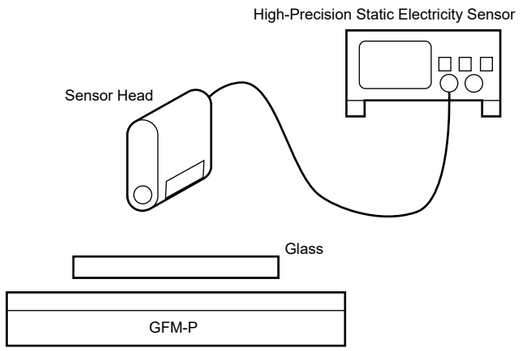
* Particle generation amount also includes particle sizes of 0.5 μm or more.

5 Static Electricity Change Amount (Reference Data)

[Measurement Method]

①Place the sensor head above the center of the glass.
②Measure the value indicated for the amount of static electricity (voltage) when air is supplied.

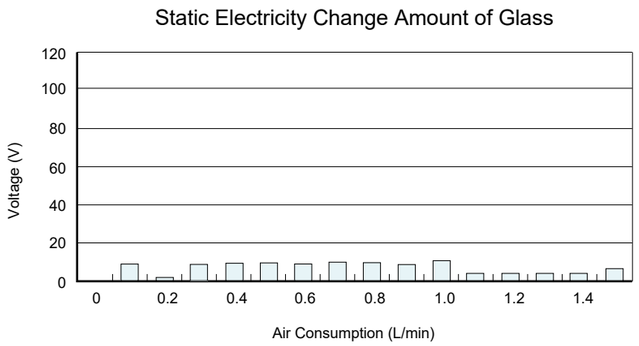
[Test Circuit]



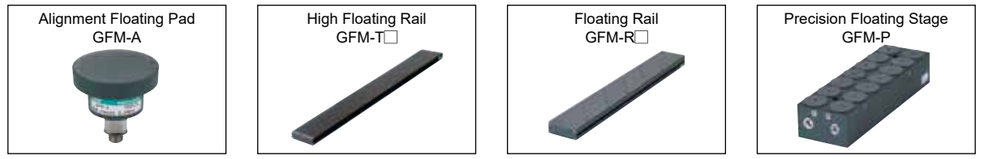
[Measuring Instrument]

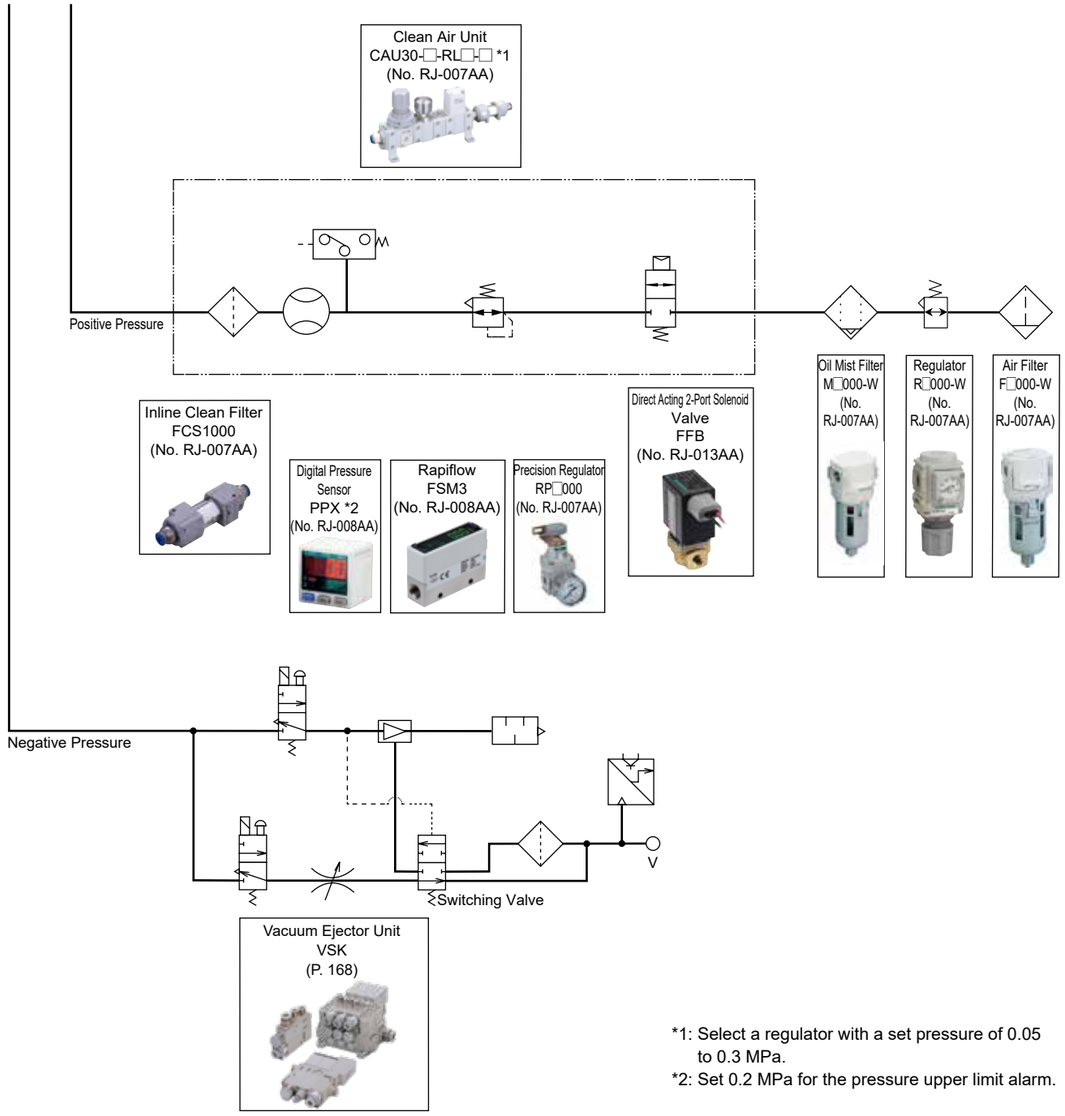
Static Electricity Measurement: High-Precision Static Electricity Measuring Instrument (Non-contact type)

[Results]



Floating System Related Products





*1: Select a regulator with a set pressure of 0.05 to 0.3 MPa.
*2: Set 0.2 MPa for the pressure upper limit alarm.

For Ensuring Safety

To Use This Product Safely

Be sure to read this before use.
For general pneumatic components precautions, Intro P. 15 for details.

Individual Precautions: Float Star GFM Series

Design / Selection

1. Common

Warning

■During transport/storage, keep the environment temperature within the range of the storage ambient temperature (-10°C to 60°C).
Transport/storage outside this range will cause product damage, abnormalities, or degradation of performance/durability. For optimal use of the product, transport/storage near 25°C is best.

■Always use within the product specifications.
Use outside the specification range can cause damage to the porous material or deterioration of the porous surface; do not use.

■Avoid using outdoors in areas with high levels of dust or direct sunlight.
Do not use in locations with corrosive or flammable gases. Also, never allow them to be inhaled.

■This product is used for compressed air. Do not use other fluids.

■Never modify or additionally machine this product. Processing distortion, etc., may lead to accuracy or strength degradation.

■The floating workpiece can be moved with minimal force.
To prevent injury to personnel and damage to workpieces/equipment/devices due to workpiece movement or overrun, appropriately incorporate workpiece support/holding/fixing and stoppers, etc.

■Consider the possibility that the pressure may be decreased by the electrical power failure or breakdown of the power source.
If insufficient floating could cause injury to personnel or damage to workpieces/equipment/devices, incorporate safety devices for that purpose. If insufficient suction force could cause injury to personnel or damage to workpieces/equipment/devices, incorporate safety devices for that purpose.

■Consider the behavior at emergency stop.
If safety devices activate during emergency stop or system abnormality, causing the power source, machinery, etc., to stop, design so as not to cause injury to personnel or damage to workpieces/equipment/devices.

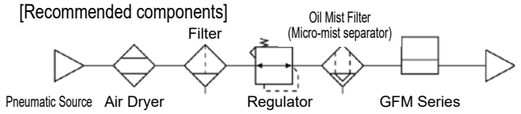
■Consider the behavior when restarting after emergency or abnormal stops.
Design so that restarting does not cause injury to personnel or damage to workpieces/equipment/devices.

■Perform piping with a sufficient effective cross-sectional area.
Piping design commensurate with air consumption is necessary. Ensure the effective area of tubes, fittings, valves, etc., is sufficiently large to minimize pressure drop. Insufficient floating or suction force can lead to injury to personnel and damage to workpieces/equipment/devices.

■Do not use spiral piping.
Avoid spiral piping on both the supply and vacuum sides; perform piping using the shortest possible straight distance to minimize pressure drop. Insufficient floating or suction force can lead to injury to personnel and damage to workpieces/equipment/devices.

Caution

■Use dry, clean compressed air [Class 1.1.1 to 1.6.2] (20,000 pcs./m^3 or less of solid particles 0.1 to 0.5 µm, pressure dew point +10°C or less, oil concentration 0.1mg/m^3 or less).
(Class is based on compressed air quality classes according to ISO-8573-1: 2010.)
[It is recommended to use the CKD Super dryer SD Series or CKD inline filter FCS.]
[Recommended components]



■When using this product in a cold climate, take the necessary measures to prevent freezing.
Foreign matter or oil in compressed air can clog the porous material, causing failure/malfunction.

■When there is a heat source in the surroundings, insulate the product.
Radiant heat may cause the product temperature to rise above the operating ambient temperature; shield with a cover, etc.

■Avoid using this product where vibration and impact are present.
Causes failure/malfunction.

■Wiping the floating surface of the product with cloth/paper, touching with a hand or contacting with glass will cause black adhesion(color transfer). This phenomenon means that applying physical load/stress to the porous material causes the porous surface layer to peel or be abraded, leading to particle generation; please be careful. (Excluding GFM-T)

2. SwiveL-type GFM-A

Warning

■Take care when swiveling operation is performed with a pad fixed with thread.
Rotation may cause screw loosening, risking trouble.

■When performing suction transport, consider the acceleration, impact and wind pressure.
There is a risk of the suctioned object detaching during movement.

Caution

■For the normal oscillating operation, set the applied load to 1 to 5 N.
Setting the quantity and installation layout is important. If the load capacity is 1 N or less, air may blow out from the body side or bottom surface. If 5 N or more, the copying mechanism may not function.

3. Rail-type GFM-R□/ Precision Type GFM-P

Caution

■Separately prepare brackets for piping connection that meet the mounting dimensions of your equipment.
Separate bracket kits are available. Please consult us.

■Because the threaded part of the mounting section of this product penetrates the air path, air leakage may occur from the threaded part.
[GFM-R Series Only]
This can be prevented by using screw gaskets.

For precautions regarding mounting, installation, adjustment, operation, and maintenance, please refer to the CKD Equipment Product Site (https: //www.ckd.co.jp/kiki/en/) → 'model No.' → Instruction Manual