



Workpiece Drop Prevention Check Valve



For safety handling of several workpieces at the same time!

Enable using one CONVUM and several cups, in applications where some of the suction cups may not be in contact with the workpiece.

Maintain of suction even if no contact with workpiece!

O When the workpiece has been released from the cup, it closes the air flow path and prevent vacuum pressure drop.

Integrated filter.

O To prevent mixing with dust from suction port. Solving the dust trouble.



How to Order



—① Attachment Screw (fitting side)

Symbol	Size	Symbol	Size	Symbol	Size
M5	M5X0.8	R3	R3/8	N1	1/8-27 NPT
M6	M6X1.0	G1	G1/8	N2	1/4-18 NPT
R1	R1/8	G2	G1/4	N3	3/8-18 NPT
R2	R1/4	G3	G3/8		

Applicable Cup and Setting Screw

Madal number	Applicable cup						
Model number	Cup	Setting screw					
FPV-M5	PAG-10 ~ 20A PAG-10 ~ 20B PBG-20 PCG-15 ~ 20	PDG-4 ~ 20 PFG-10 ~ 20 PJG-10 ~ 25	TN-PF-15-M5 TN-PF-20-M5 TN-PC-10-M5 TN-PS-10-M5				
FPV-M6	PAG-10 ~ 20A PAG-10 ~ 20B PBG-20 PCG-15 ~ 20	PDG-4 ~ 20 PFG-10 ~ 20 PJG-10 ~ 25	TN-PF-25-M6 TN-PF-50-M6 TN-PC-30-M6 TN-PA-30-M6				
FPV-R1	PFG-15 ~ 50 PJG-15 ~ 50	_	_				
FPV-R2	_	-	-				
FPV-R3	_	_	_				

Specifications

Descript Model nu	ion ∖ ımber	Unit	FPV-M5	FPV-M6	FPV-R1/G1/N1	FPV-R2/G2/N2	FPV-R3/G3/N3			
Fluid	k		Air , non-corrosive gas, non-flammable gas							
Ambient temper	rature range	°C	0~60(No freezing)							
Operating pres	ssure range		-100kPa~0.6MPa							
Min. operating vacuum (air) flow Note1		L/min(ANR)	10 15							
Filtration		μm	25							
Filtration	area	mm ²	14	20	50	1	2			
Attachment	Cup side		M5 M6		Rc1/8	Rc1/4	Rc3/8			
screw Note2	Fitting side		M5	M6	R1/8	R1/4	R3/8			
Weight		g	6.5	7	12	16	24			

Note 1) Minimum operating vacuum (air) flow is the value required at CONVUM side (vacuum source).

Note 2) Check screw details at drawing section.

Symbol



FPV Workpiece Drop Prevention Check Valve

Operating principle



Construction

FPV-M5/M6 FPV-R/G/N1 CONVUM side Spring Seal washer Body 1 Valve CONVUM side Body A 0 ring O ring Body 2 Valve ð Spring Filter Filter Cup side Cup side Body B

FPV-R/G/N2·3



Component Parts

· · ·	
Parts name	Material
Body	Aluminium
Valve	Aluminium
Spring	Stainless
Filter	Stainless
O ring	NBR
Seal washer	NBR

FPV Workpiece Drop Prevention Check Valve



FPV-G3



FPV Workpiece Drop Prevention Check Valve

Dimensions



03 VF VFL VFL-M5 FPV MS

Other Equipments Workpiece Drop Prevention for Vacuum Check Valve

CH-01

FPV-R3/N3



Precautions



① In the case of porous workpiece handling, it may not be possible to handle the workpiece if there is not enough vacuum (air) flow or if there is important leakage.

2 The quantity of FPV that may not have contact with the workpiece changes depending on using conditions. Please select suitable quantity after checking CONVUM, vacuum pump specifications (vacuum flow, vacuum pressure characteristics)

③ FPV check valve is not a vacuum maintaining product. Do not use it in this way.

- ④ Please test FPV valves in real condition on the equipment in the case that you need to check the suction with a signal by using a vacuum sensor set up between the FPV and the suction cup. As there is only few pressure variation, the vacuum degree may not be high enough to get the desired signal.
- ⑤ Please test FPV valves in real condition on the equipment in the case that you need to use 1 CONVUM with several FPV valves
- ⑥ Attachment of FPV: please attach male screw to CONVUM side (vacuum source).

Selection of FPV

○ Vacuum Source : CV CONVUM (P.107)

The below table shows the vacuum (air) flow and vacuum pressure characteristics needed in case of using one CONVUM with several FPV check valves.

Table 1 FPV Performance Table

EBV model number	FPV						
FFV model number	M5	M6	R1	R2	R3		
Min. operating vacuum (air) flow[L/min(ANR)]	10	10	15	15	15		
Vacuum drop rate when no contact[kPa]	3	3	8	8	14		

% Above table is in the case of using CV-15HS CONVUM. Values shown are per FPV valve.

※ Piping resistance and CONVUM characteristics have an effect on the vacuum degree decreasing values. Please use this data as reference.
※ Please calculate the exact vacuum drop from CONVUM or vacuum pump vacuum (air) flow and vacuum pressure performance graph.

Table 2 CV CONVUM Performance Table

	CV									
CONVUM model number	10		15		20		25		30A	
	HS	LS								
Maximum vacuum pressure [kPa]	-92	-57	-92	-57	-92	-57	-92	-57	-92	-57
Vacuum (air) flow [L/min(ANR)]	27	36	63	95	110	165	160	250	225	350

Table 3 CV CONVUM Suction Flow-Vacuum Pressure Characteristics



Selection in Case of Using One CONVUM

$(\ensuremath{\mathbbm l})$ We check the possible quantity of FPV without contact with workpiece

CONVUM vacuum (air) flow÷FPV valve min. operating vacuum (air) flow = quantity of FPV valve

< Calculation >

 $\begin{array}{ll} \mbox{CV-15HS} & \mbox{vacuum (air) flow is 63L/min (ANR), FPV-M5.} \\ \mbox{operating vacuum (air) flow is 10L/min (ANR)} \\ \mbox{63L/min (ANR)} \div 10L/min (ANR) = 6.3 \\ \mbox{The possible quantity of FPV valve is 6 pieces.} \end{array}$

2 We check the maximum vacuum pressure

We check the vacuum drop rate per FPV check valve from table1.

Vacuum drop rate when no contact x FPV quantity = total vacuum drop rate.

We check the maximum vacuum pressure of CONVUM from table 2.

Maximum vacuum pressure - Total vacuum drop rate = Maximum vacuum pressure when using FPV check valve.

< Calculation >

FPV-M5 vacuum drop rate is 3 kPa per check valve. In this case, total vacuum drop rate is $3kPa \times 6 = 18kPa$ CV-15HS maximum vacuum pressure is -92kPa(-92 + 18) = -74kPaThe maximum vacuum pressure is -74kPa when 6 pieces FPV are not in contact.

In the case of using 10 suction cups, all attached with FPV-M5, it means that if 6 of the 10 suctions cups are not in contact with workpiece, suction force of remaining 4 suctions cups is -74 kPa: handling is possible.

Table 4 Estimation of suction cup without contact with workpiece when using CV-15HS

EDV/ model number	FPV							
FPV model number	M5	M6	R1	R2	R3			
Quantity of FPV without contact	6	6	4	4	2			
Vacuum pressure (kPa)	-74	-74	-60	-60	-64			

Note) This means the number of the cup to which FPV valves are attached with when there is no contact between the suction cup and the workpiece.

VFL

MS

CH-01

VFL-M5