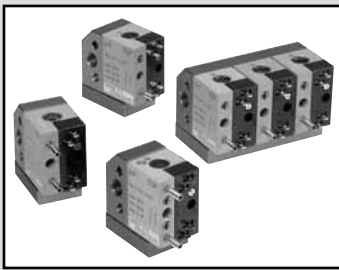


PEL system

# APA Series



- A pneumatic bridge circuit is adopted.
- Non-contact air detection system with a wide detection range.
- Not affected by the detection object material.
- Piping bore size:  $\phi 3$  to  $\phi 4$



## Specifications

Descriptions		APA
Working pressure	Use pressurized MPa	Standard: 0.14 ( $\approx 20$ psi, 1.4 bar) Practical range: 0.005 ( $\approx 0.73$ psi, 0.05 bar) to 0.3 ( $\approx 44$ psi, 3 bar)
	Use with vacuum pressure kPa	Standard: -81 ( $\approx -12$ psi, -0.81 bar) Practical range: -21 ( $\approx -3$ psi, -0.21 bar) to -96 ( $\approx -14$ psi, -0.96 bar)
Air consumption	$\ell/\text{min(ANR)}$	10 to 112 (This differs with the switching element nozzle shape combination. Refer to page 1200)
Output		Terminals 1 and 2 for 2 contact signal reed switches: NO contact Terminals 3 and 4: NC contact
Contact capacity	Max. voltage	50 V AC/DC
	Max. current	0.5 A
	Max. power consumption	5 W
	Rating	24 V AC/DC 0.2 A
Electrical service life		10 million times and over (at 24 V 0.2 A)
Mechanical durability		10 million times and over
Response time		Max. 20 Hz (gauging switch)
		Max. 50 Hz (differential pressure gauging switch)
Hysteresis		1.5 to 20 $\mu\text{m}$ (when used for gauging)
Reproducibility		0.2 to 4 $\mu\text{m}$ (when used for gauging)
Connection tube bore size	mm	$\phi 3$ to $\phi 4$
Ambient temperature	$^{\circ}\text{C}$	0 (32 $^{\circ}\text{F}$ ) to +60 (140 $^{\circ}\text{F}$ ) (no freezing)
Weight	g	138

## How to order

The PEL system uses the switching element and detection nozzle combined.



A Model

B Fixed orifice size

C Station No.

Code	Content				
<b>A Model</b>					
AA	General purpose				
AK	Vacuum				
AC	For dimension selection				
BL	Differential pressure switch				
<b>B Fixed orifice size</b>					
	Model	AA	AK	AC	BL
00	Without orifice	-	-	-	●
03	0.3 mm	●	-	-	-
05	0.5 mm	●	●	●	-
07	0.7 mm	●	●	-	-
10	1.0 mm	●	-	-	-
<b>C Station No.</b>					
Blank	Single unit				
2	2 stations				
3	3 stations				
4	4 stations				
5	5 stations				

### AA (general purpose/with needle)

● This is a general-purpose element with a wide working range that covers gauging (dimension sorting) and control (presence confirmation). This basic PEL element consists of one variable orifice and one detection nozzle connection port. This element is a pneumatic bridge circuit.

### AK (vacuum/without needle)

● This element does not have a variable orifice, which must be installed externally. AK is convenient when an application exceeds the AA element's variable orifice adjusting range or when the range is difficult to adjust.

### AC (dimension selection/for cascade connection)

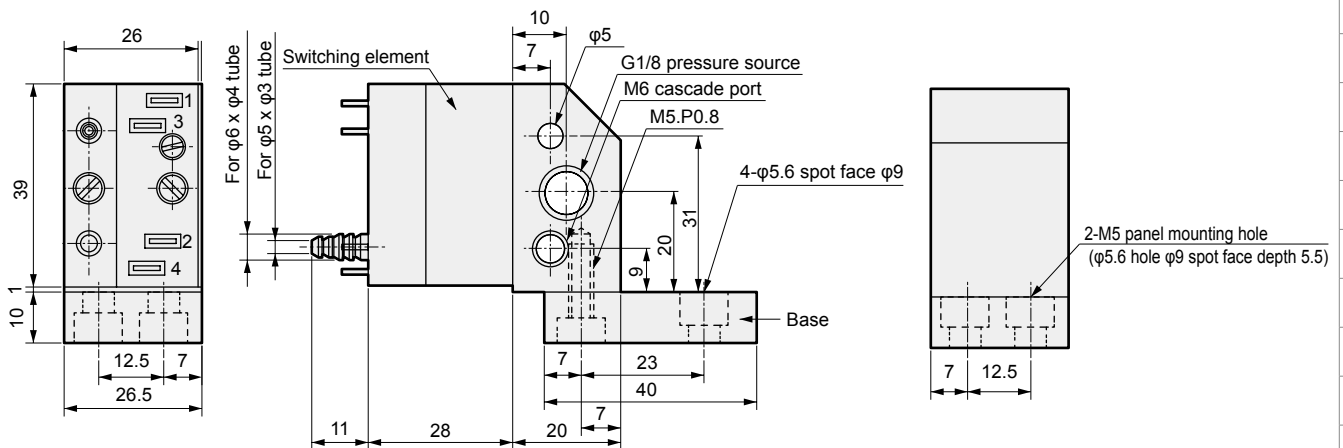
● Several AC elements are assembled in the manifold, and detection ports are centralized and connected to the detection nozzle with one pipe. Use this when there is more than one setting point, such as when confirming dimensions.

### BL (differential pressure switch/without needle, without orifice)

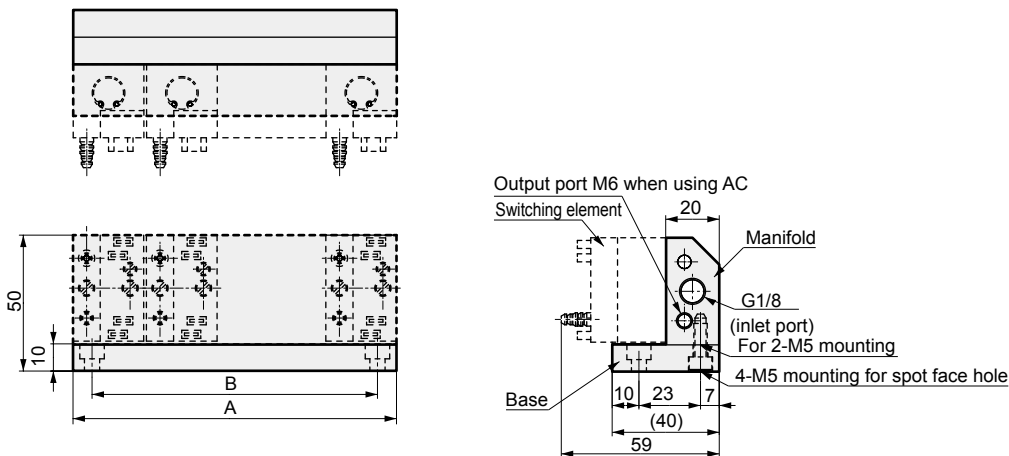
● This element does not have a fixed or variable orifice, so a pneumatic bridge circuit cannot be configured with the element itself. Extract ports from top and bottom of the magnet float, and use this element as a differential pressure switch.

### Dimensions

#### ● Switching element (APA1)



#### ● Manifold and base (APA3)



### Type and dimensions of manifold assembly components

No. of switching elements installed	Component (model No.)				Dimensions (mm)	
	Manifold	Weight (g)	Circuit board (base)	Weight (g)	A	B
2	APA3-AA2-20	88	APA3-B2	55	53	39
3	APA3-AA3-20	134	APA3-B3	84	80	66
4	APA3-AA4-20	181	APA3-B4	114	108	94
5	APA3-AA5-20	227	APA3-B5	141	133	119

- F.R.L
- F (Filtr)
- R (Reg)
- L (Lub)
- PresSW
- Shutoff
- SlowStart
- FimResistFR
- Oil-ProhR
- MedPresFR
- No Cu/ PTFE FRL
- Outdrs FR
- F.R.L (Related)
- CompFRL
- LgFRL
- PrecsR
- VacF/R
- Clean FR
- ElecPneuR
- AirBoost
- SpdContr
- Silncr
- CheckV/ other
- Jnt/tube
- AirUnt
- PrecsCompn
- Mech/ ElecPresSw
- ContactSW
- AirSens
- PresSW Cool
- AirFloSens/ Contr
- WaterRtSens
- TotAirSys (Total Air)
- TotAirSys (Gamma)
- RefrDry
- DesicDry
- HiPolymDry
- MainFiltr
- Dischrg etc
- Ending

## F.R.L Internal structure

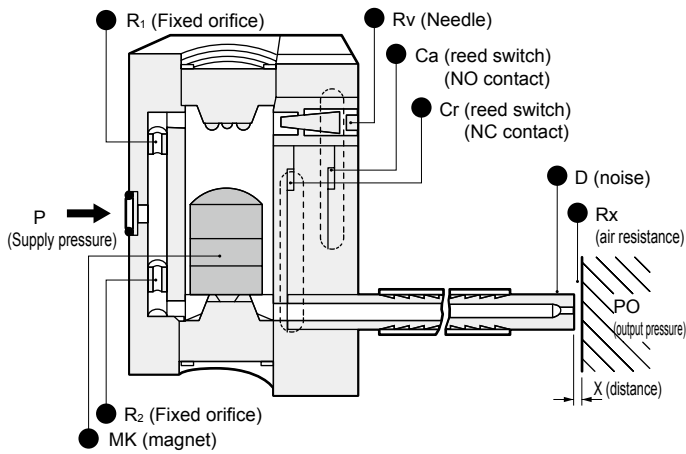


Fig. 1

## Operational principle

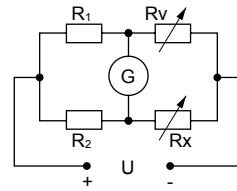


Fig. 2

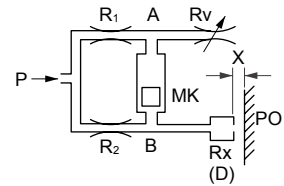
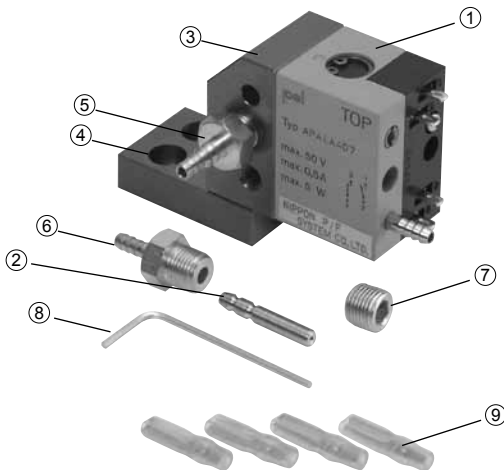


Fig. 3

- The PEL connects the electric circuit's Wheatstone bridge to the bridge circuit using air.
- This is shown in Fig. 1, 2 and 3. The electrical circuit's fixed resistance,  $R_1/R_2$ , is equivalent to the pneumatic circuit's fixed orifice,  $R_1/R_2$ . The electrical circuit's variable resistance,  $R_v/R_x$ , is equivalent to the pneumatic circuit's variable orifice,  $R_v$ , and to the pneumatic resistance  $R_x$  which is generated when distance  $X$  between the nozzle and specimen changes.
- When distance  $X$  changes and pneumatic resistance,  $R_x$ , changes, the nozzle's back pressure also changes, and differential pressure is generated between  $A$  and  $B$  in pneumatic pressure bridge circuits. This vertically displaces the float,  $MK$ , which has a permanent magnet, and changes the two reed switches (NO contact for  $Ca$ , NC contact for  $Cr$ ).
- The switch operates as a differential pressure switch at 0.15 kPa, and as a simple pressure switch at 0.5 kPa.

## Configuration of PEL



(Note) Nozzle (2) is a gauge nozzle. One APA-BA10 with a 1 mm bore is included as an accessory. All other nozzles are optional, and must be ordered separately. Types are shown on page 1193.

PEL consists of the following parts: (AA)

No	Part name	Part No.
①	Switching element	1
②	Nozzle	1
③	Manifold	1
④	Circuit board (base)	1
⑤	Hose nipple $\phi 4$	1
⑥	Hose nipple $\phi 3$	1
⑦	Plug Rc1/8	1
⑧	Hexagonal wrench 1.5HEX	1
⑨	Connector (bullet terminal)	4

### Detection nozzle

This nozzle is used with the switching element. Nozzle parts can be assembled separately or combined to match the application. This enables different types of detection sensor circuits to be configured.

### Operational principle

As shown in Fig. 1, the air flow injected from the nozzle drops, so back pressure,  $P_o$ , increases. The switching element is turned ON and OFF by this pressure,  $P_o$ , and the state is detected.

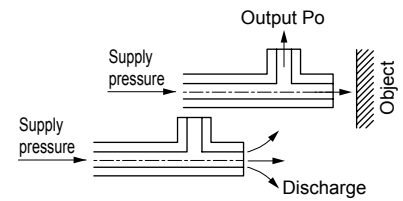


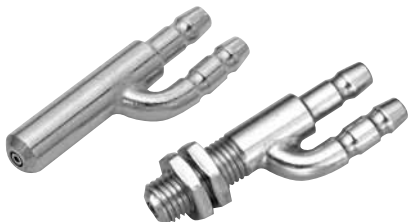
Fig. 1

● For gauge (BA)



Most nozzles for gauge applications are round. Due to the relationship to the flow area, the measurement distance is  $X \leq \frac{d}{4}$  ( $d$ : detection nozzle inner diameter;  $X$ : distance from detection object). This nozzle is used with a relatively short clearance. The ideal bore is 1 mm to 2 mm (APA4-BA10 or APA4-BA20).

● Back pressure (DA10)/(DA20)



With this type, another layer, B, of air flows on the outside of the gauge nozzle, A, making it more difficult for air inside to diffuse. The measurement distance is longer and accuracy is lower than for the gauge type.

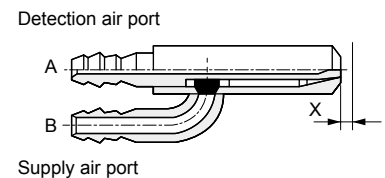


Fig. 2

● Reflection (VS)



Another air layer, B, is created on the outside, the same as for the back pressure, but this type is designed so that the air forms a vortex and is constrained. Air on the inside does not diffuse as easily as with the back pressure, so measurement is longer.

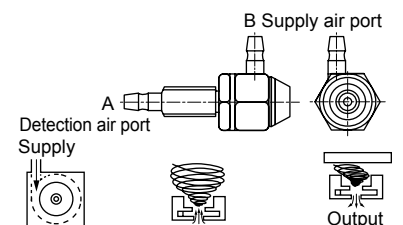


Fig. 3

● Detecting (GA)



This type of nozzle is mainly used to detect the presence of objects. Measurement is longer compared to the three types of nozzles explained above. This type is used facing the injection nozzle, B, against the other detection nozzle, A, and detecting the presence of objects by changes in pressure occurring when an object is between the two nozzles. Generally, with this type of nozzle, the detection nozzle bore is the same size or larger than the injection air nozzle bore.

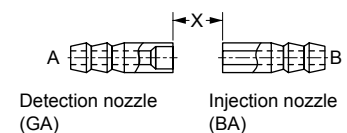


Fig. 4

● Turbulence

With respect to the opposing nozzles, by placing a 3rd nozzle "C" perpendicularly, this nozzle can detect unwanted objects between it and the other nozzles. The max. detection distance is 200 mm, longer than the detecting nozzle. This can also be used as a detection nozzle for fluidics or air micrometers, or as a detection nozzle of a jig with a hole opened in the detection section.

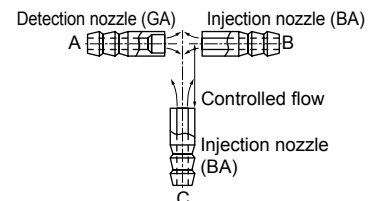


Fig. 5

F.R.L
F (Filtr)
R (Reg)
L (Lub)
PresSW
Shutoff
SlowStart
FimResistFR
Oil-ProhR
MedPresFR
No Cu/ PTFE FRL
Outdrs FR
F.R.L (Related)
CompFRL
LgFRL
PrecsR
VacF/R
Clean FR
ElecPneuR
AirBoost
SpdContr
Silncr
CheckV/ other
Jnt/tube
AirUnt
PrecsCompn
Mech/ ElecPresSw
ContactSW
<b>AirSens</b>
PresSW Cool
AirFloSens/ Contr
WaterRtSens
TotAirSys (Total Air)
TotAirSys (Gamma)
RefrDry
DesicDry
HiPolymDry
MainFiltr
Dischrg etc
Ending

F.R.L  
F (Filtr)  
R (Reg)  
L (Lub)  
PresSW  
Shutoff  
SlowStart  
FimResistFR  
Oil-ProhR  
MedPresFR  
No Cu/  
PTFE FRL  
Outdrs FR  
F.R.L  
(Related)  
CompFRL  
LgFRL  
PrecsR  
VacF/R  
Clean FR  
ElecPneuR  
AirBoost  
SpdContr  
Silncr  
CheckV/  
other  
Jnt/tube  
AirUnt  
PresCompn  
Mech/  
ElecPresSw  
ContactSW  
AirSens  
PresSW  
Cool  
AirFloSens/  
Contr  
WaterRtSens  
TotAirSys  
(Total Air)  
TotAirSys  
(Gamma)  
RefrDry  
DesicDry  
HiPolymDry  
MainFiltr  
Dischrg  
etc  
Ending

## How to order detection nozzle

**APA4 - BA 03**

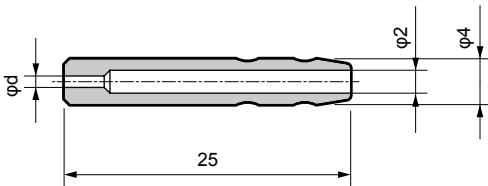
**A** Model

**B** Nozzle port size

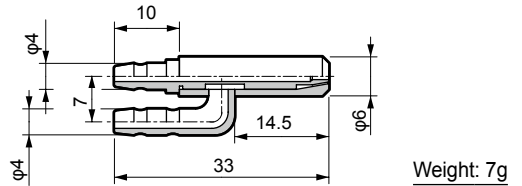
Code	Content				
<b>A Model</b>					
BA	For gauge				
DA	Back pressure				
VS	Reflection				
GA	Detecting				
<b>B Nozzle port size (mm)</b>					
Model	BA	DA	VS	GA	
03	0.3	●	-	-	-
05	0.5	●	-	-	-
07	0.7	●	-	-	-
10	1.0	●	●	●	●
20	2.0	●	●	-	●
32	3.2	-	-	-	●

## Dimensions

● APA4-BA\*\* (nozzle for gauge)

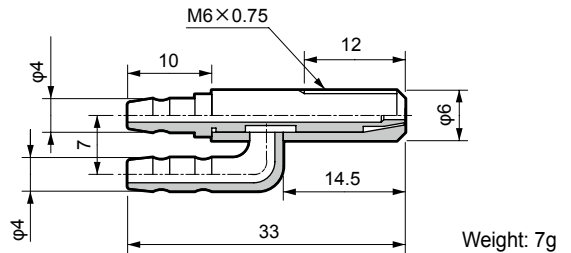


● APA4-DA10 (back pressure nozzle)



Weight: 7g

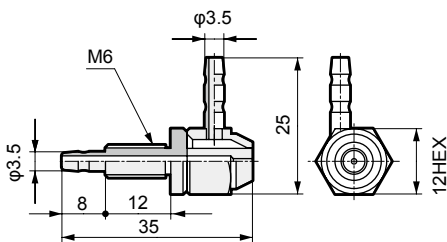
● APA4-DA20 (back pressure nozzle)



Weight: 7g

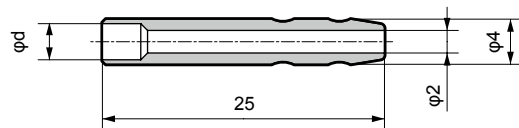
Model No.	φd	Weight g
APA4-BA03	0.3 mm	2
APA4-BA05	0.5 mm	2
APA4-BA07	0.7 mm	2
APA4-BA10	1.0 mm	2
APA4-BA20	2.0 mm	2

● APA4-VS10 (reflection nozzle)



Weight: 14g

● APA4-GA\*\* (detecting nozzle)



Model No.	φd	Weight g
APA4-GA10	1.0 mm	2
APA4-GA20	2.0 mm	2
APA4-GA32	3.2 mm	2

## Selecting the nozzle bore

Fig. 6 on the right shows the relationship between the clearance between the nozzle and specimen (nozzle clearance) and the output pressure that moves the switching element float.

The curve's rising edges are steeper for the APA1-AA03 than the APA1-AA07. This means that when the fixed orifice is small, output pressure changes more under the same fluctuation, a, of nozzle clearance, X. The APA1-AA03's output pressure fluctuation, b, is greater than the APA1-AA07 output pressure fluctuation, c.)

Therefore APA1-AA03 is capable of more accurate switching even with extremely small dimensions. The response time of the APA1-AA03, with its smaller fixed orifice, is slower than the larger APA1-AA07 because the flow rate drops when the fixed orifice is small. In other words, APA1-AA07 is used when detection nozzle pressure is high (discharge rate: large), and APA1-AA03 is used when nozzle pressure is low, such as with detecting nozzles.

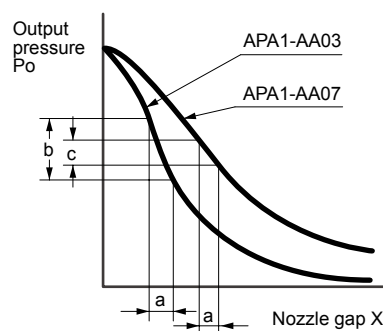


Fig. 6

## Standard nozzle and switching element combination

Detection nozzle		Switching element	
Type of nozzle	Model No.	Model No.	
Nozzle for gauge	APA4-BA10	APA1-AA07	
	APA4-BA20		
Back pressure nozzle	APA4-DA10, APA4-DA20	APA1-AA05	
Reflection nozzle	APA4-VS10	APA1-AA05	
Detecting nozzle	Injection side	Detection side	
	APA4-BA10	APA4-GA10	APA1-AA03
	APA4-BA10	APA4-GA20	APA1-AA03
	APA4-BA10	APA4-GA32	APA1-AA03

## Nozzle measurement distance

Model No.	Measurement distance (mm)	
	For measuring dimensions	For presence confirmation
APA4-BA03	0.03 to 0.075	0 to 0.05
APA4-BA05	0.03 to 0.06	0 to 0.2
APA4-BA07	0.03 to 0.1	0 to 0.3
APA4-BA10	0.03 to 0.25	0 to 0.4
APA4-BA20	0.03 to 0.25	0 to 0.7
APA4-DA10	0.1 to 3.5	
APA4-DA20	0.1 to 3.5	
APA4-GA10	0.1 to 30	
APA4-GA20	0.1 to 100	
APA4-GA32	0.1 to 150	
APA4-VS10	0.1 to 6.0	

\*1: Special nozzles are available as custom orders.

\*2: Gauge nozzle and detecting nozzles manufactured by the user can be used.

\*3: APA4-BA□ and APA4-GA□ are the same.

- F.R.L
- F (Filtr)
- R (Reg)
- L (Lub)
- PresSW
- Shutoff
- SlowStart
- FimResistFR
- Oil-ProhR
- MedPresFR
- No Cu/PTFE FRL
- Outdrs FR
- F.R.L (Related)
- CompFRL
- LgFRL
- PrescR
- VacF/R
- Clean FR
- ElecPneuR
- AirBoost
- SpdContr
- Silncr
- CheckV/other
- Jnt/tube
- AirUnt
- PresCompn
- Mech/ElecPresSw
- ContactSW
- AirSens
- PresSW Cool
- AirFloSens/Contr
- WaterRtSens
- TotAirSys (Total Air)
- TotAirSys (Gamma)
- RefrDry
- DesicDry
- HiPolymDry
- MainFiltr
- Dischrg etc
- Ending



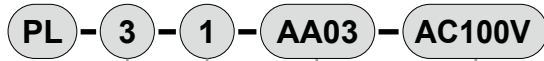
PL switch (PEL Series)

# PL Series

Combination of PEL switching element, electrical wiring connection terminal, pneumatic piping terminal, or power circuit in one box



## How to order



**A** Model

**B** Number of PEL switching element

**C** Switching element

**D** Voltage  
\*1

Code	Content	
<b>A Model</b>		
1	PEL, terminal box, With indicator lamp	
3	PEL, terminal box, lamp, relay, With transformer	
<b>B Number of PEL switching element</b>		
1	1	
2	2	
<b>C Switching element</b>		
<b>Blank</b>	APA1-AA07	Standard
<b>AA03</b>	APA1-AA03	Custom order
<b>AA05</b>	APA1-AA05	
<b>AA10</b>	APA1-AA10	
<b>AC05</b>	APA1-AC05	
<b>AK05</b>	APA1-AK05	
<b>AK07</b>	APA1-AK07	
<b>BL00</b>	APA1-BL00	
<b>D Voltage</b>		
<b>AC100V</b>	100 VAC 50/60 Hz	Standard
<b>AC200V</b>	200 VAC 50/60 Hz	Option
<b>DC24V</b>	24 VDC	

## ⚠ Precautions for model No. selection

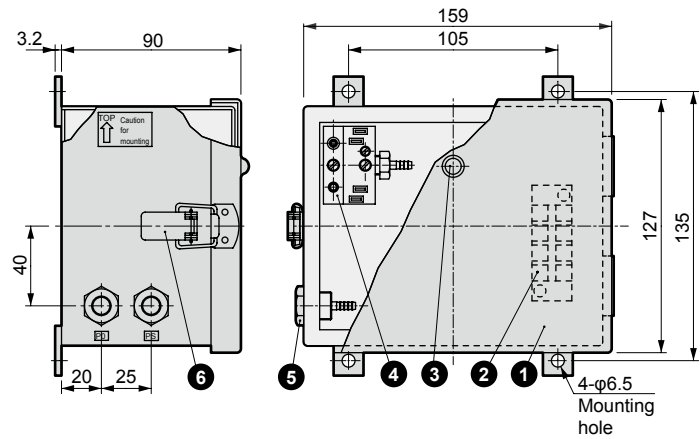
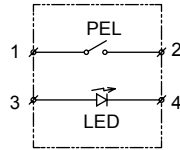
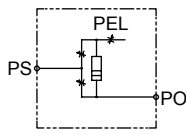
\*1: Indicate the voltage only for the PL-3.

## Weight table

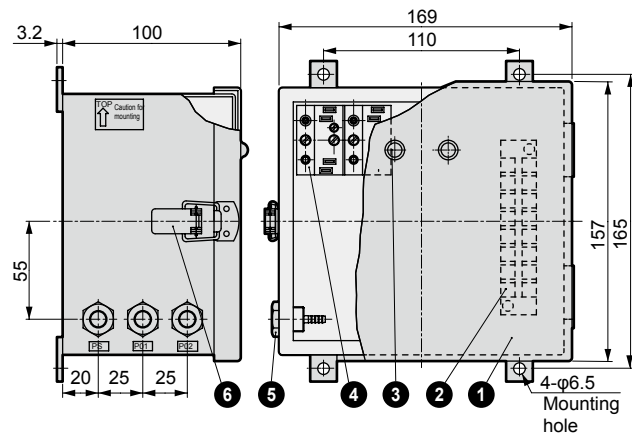
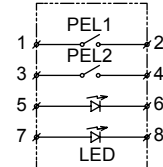
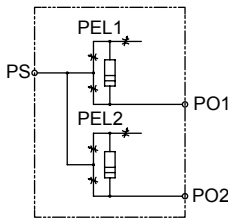
Model No.	Weight g	Model No.	Weight g
PL-1-1	1490	PL-3-1	2580
PL-1-2	1850	PL-3-2	3010

### Internal structure and dimensions

#### ● PL-1-1



#### ● PL-1-2



### Parts list (PL-1-1 to PL-1-2)

No.	Part name	Quantity	Remarks
1	Box	1	Paint (Munsell code N5)
2	Terminal block	1	
3	Lamp	1(PL-1-1) 2(PL-1-2)	
4	PEL	1(PL-1-1) 2(PL-1-2)	
5	Panel union	2(PL-1-1) 3(PL-1-2)	Rc1/8
6	Snap lock	1	

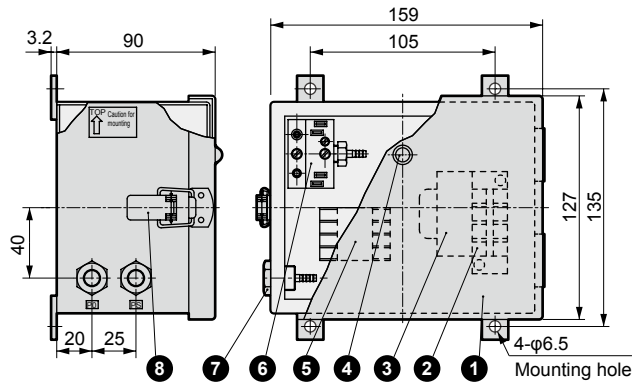
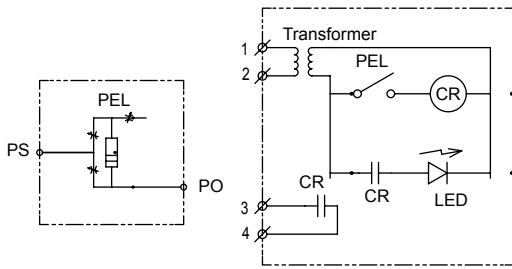
F.R.L
F (Filtr)
R (Reg)
L (Lub)
PresSW
Shutoff
SlowStart
FimResistFR
Oil-ProhR
MedPresFR
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Outdrs FR
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LgFRL
PrecsR
VacF/R
Clean FR
ElecPneuR
AirBoost
SpdContr
Silncr
CheckV/ other
Jnt/tube
AirUnt
PrecsCompn
Mech/ ElecPresSw
ContactSW
<b>AirSens</b>
<b>PresSW Cool</b>
AirFloSens/ Contr
WaterRtSens
TotAirSys (Total Air)
TotAirSys (Gamma)
RefrDry
DesicDry
HiPolymDry
MainFiltr
Dischrg etc
Ending



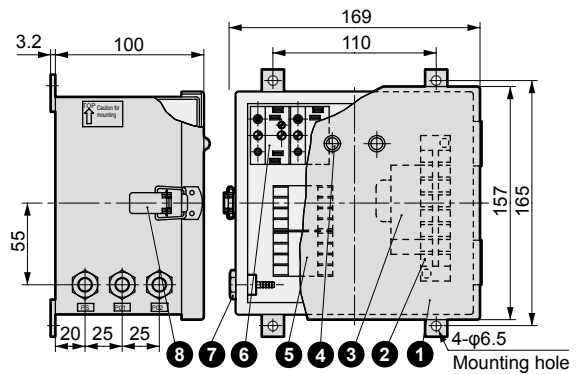
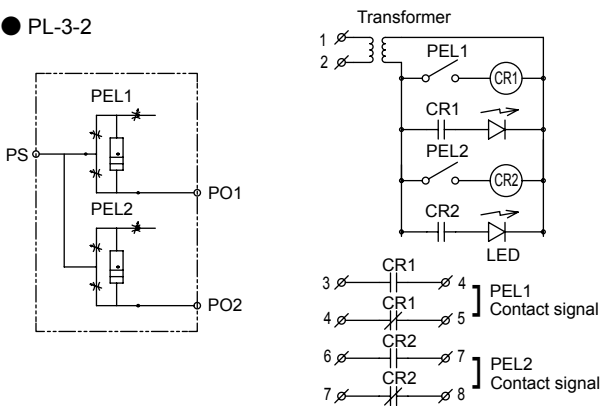
## F.R.L Internal structure and dimensions

- F (Filtr)
- R (Reg)
- L (Lub)
- PresSW
- Shutoff
- SlowStart
- FimResistFR
- Oil-ProhR
- MedPresFR
- No Cu/PTFE FRL
- Outdrs FR
- F.R.L (Related)
- CompFRL
- LgFRL
- PrecsR
- VacF/R
- Clean FR
- ElecPneuR
- AirBoost
- SpdContr
- Silncr
- CheckV/other
- Jnt/tube
- AirUnt
- PrecsCompn
- Mech/ElecPresSw
- ContactSW
- AirSens**
- PresSW Cool
- AirFloSens/Contr
- WaterRtSens
- TotAirSys (Total Air)
- TotAirSys (Gamma)
- RefrDry
- DesicDry
- HiPolymDry
- MainFiltr
- Dischrg etc
- Ending

### ● PL-3-1



### ● PL-3-2



### Parts list (PL-3-1 to PL-3-2)

No.	Part name	Quantity	Remarks
1	Box	1	Paint (Munsell code N5)
2	Terminal block	1	
3	Transformer	1	
4	Lamp	1(PL-3-1) 2(PL-3-2)	
5	relay	1(PL-3-1) 2(PL-3-2)	
6	PEL	1(PL-3-1) 2(PL-3-2)	
7	Panel union	2(PL-3-1) 3(PL-3-2)	Rc1/8
8	Snap lock	1	

---

# MEMO

---

F.R.L
F (Filtr)
R (Reg)
L (Lub)
PresSW
Shutoff
SlowStart
FimResistFR
Oil-ProhR
MedPresFR
No Cu/ PTFE FRL
Outdrs FR
F.R.L (Related)
CompFRL
LgFRL
PrecsR
VacF/R
Clean FR
ElecPneuR
AirBoost
SpdContr
Silncr
CheckV/ other
Jnt/tube
AirUnt
PrecsCompn
Mech/ ElecPresSw
ContactSW
<b>AirSens</b>
<b>PresSW Cool</b>
AirFloSens/ Contr
WaterRtSens
TotAirSys (Total Air)
TotAirSys (Gamma)
RefrDry
DesicDry
HiPolymDry
MainFiltr
Dischrg etc
Ending

# APA/PL Series

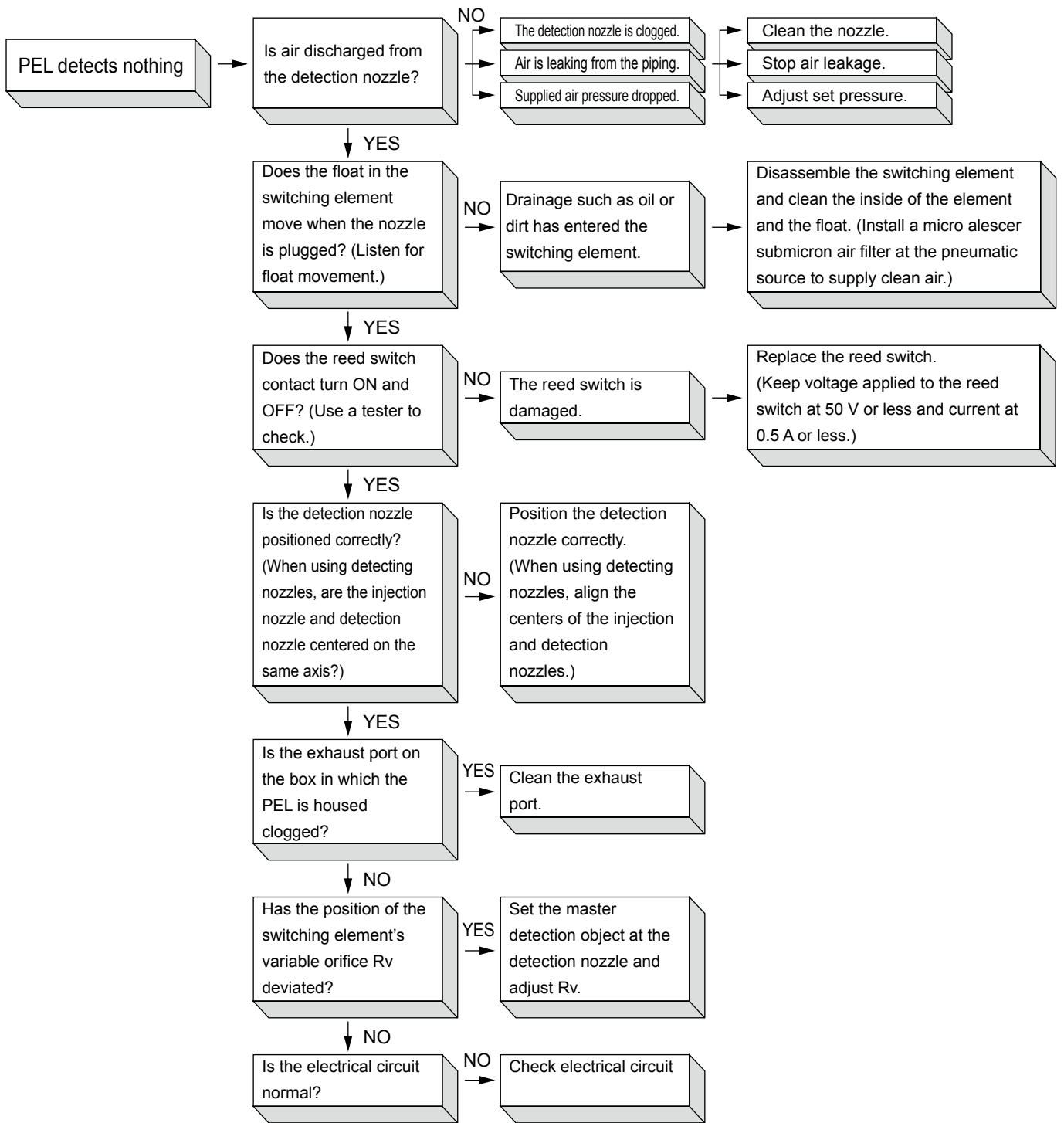
## ● PEL system characteristics

Type of nozzle		Nozzle for gauge			Reflection nozzle	Back press nozzle	Detecting nozzle
Measuring method		Gauging method	Inner/outer $\phi$ measuring	Sorting by dimension	Gauging method	Sorting by dimension	Drill fracture
Number of PEL		1	2	2 3 4 5	1	1	1
Circuits used							
Switching element	APA1	AA07	AC05	AA03	AA05	AA05	AA03
Nozzle	APA4	BA10(BA20)			VS10	DA10	BA10 and GA32
Detectable range (mm)	Dimension confirm	0.03 to 0.25(0.03 to 0.25)			0.1 to 4	0.1 to 2	
	Presence confirm	0 to 0.40(0 to 0.70)			0.1 to 6	0.1 to 3.5	0.1 to 150
	Rating	0.15(0 to 0.25)			3	1	25
Response time (sec)	Min	0.05	0.1	0.2	0.14	0.04	0.02
	Average	0.5	1	2	1	0.6	0.2
	Max	1.5	2	4	2	2	2
Accuracy (hysteresis (mm)) Sample feed speed 0.2 $\mu$ m/s		0.0015	0.002	0.004	0.4	0.03	-
Repeatability (reproducibility) (mm)		0.0002	0.001	0.002	0.05	0.01	-
			When X = 0.15		When X = 3	When X = 1	
Switching point fluctuation when primary pressure fluctuates from 0.13 MPa to 0.15 MPa			-0.001 When X = 0.15			-0.02 When X = 2	+10 X=100
Influence by surface finish (mm)		+0.002 when changed from $\nabla\nabla\nabla$ (6 $\mu$ ) finish to $\nabla\nabla$ (25 $\mu$ ) finish			-		-

- **Measuring** (1) The above data shows averages, and may differ slightly due to nozzle variation. (4) The response time is double the above data when PVC tubing is 5000 mm long.  
 conditions (2) The primary pressure must be 0.14 MPa. (5) The above data applies when the nozzle is moved in the direction of the emissions from the nozzle. However, the same characteristics are indicated even when the nozzle is moved at a right angle to the flow. The measurement distance may differ slightly.  
 (3) Response time measurement conditions apply when using  $\phi 3$  bore, 500 mm long PVC tubing.

Circuits used	Applications	Switching element	Nozzle	Air consumption rate $Q$ /min (ANR)				
				P.S=0.05 MPa	0.1	0.15	0.2	0.3
	Workpiece confirmation Contact confirmation Dimension measurement	APA1-AA07	APA4-BA10	10	16	23	33	52
			APA4-BA10 2 pcs.	11	17	26	35	54
	Workpiece confirmation Shape confirmation Position confirmation	APA1-AA05	APA4-DA10	20	34	52	69	112
			APA4-DA20					
	Drill fracture Edge control	APA1-AA03	APA4-VS10	20	34	52	69	108
			APA4-GA10 APA4-GA32	15	24	35	45	72

PEL system troubleshooting



- F.R.L
- F (Filtr)
- R (Reg)
- L (Lub)
- PresSW
- Shutoff
- SlowStart
- FimResistFR
- Oil-ProhR
- MedPresFR
- No Cu/ PTFE FRL
- Outdrs FR
- F.R.L (Related)
- CompFRL
- LgFRL
- PrecsR
- VacF/R
- Clean FR
- ElecPneuR
- AirBoost
- SpdContr
- Silncr
- CheckV/ other
- Jnt/tube
- AirUnt
- PrecsCompn
- Mech/ ElecPresSw
- ContactSW
- AirSens**
- PresSW Cool**
- AirFloSens/ Contr
- WaterRtSens
- TotAirSys (Total Air)
- TotAirSys (Gamma)
- RefrDry
- DesicDry
- HiPolymDry
- MainFiltr
- Dischrg etc
- Ending



SEPEL switch

# DPS Series

By integrating the micro differential pressure sensor into air bridge circuit,

- Suction confirmation from min. nozzle  $\phi 0.15$
- Suction check when there is a leakage in the workpiece
- Piping bore size:  $\phi 2.5$  to  $\phi 4$



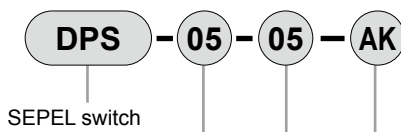
## Specifications

Descriptions	Specifications
Working fluid	Noncorrosive gas (Check for water)
Working pressure (PS supply port)	Negative pressure -20 ( $\approx$ -2.9 psi, -0.2 bar) to -101 kPa ( $\approx$ -15 psi, -1.01 bar)
Differential pressure	5 kPa ( $\approx$ 0.7 psi, 0.05 bar)
Max. differential pressure between A/B (Diff diaphragm chamber press betw A/B)	100 kPa ( $\approx$ 15 psi, 1 bar) (DPS-05)
Ambient temperature	0 (32°F) to 50°C (122°F) (no freezing)
Operation precision	$\pm 0.05$ kPa ( $\approx$ 0.008 psi, 0.0005 bar) (using 12 VDC) (*1)
Max. response time	5 msec (0.005 second) (*2) (Response time changes according to external piping/sensor nozzle)
Hysteresis	0.06 kPa ( $\approx$ 0.009 psi, 0.0006 bar) (*1)
Power supply voltage	12 to 25 VDC
Current consumption	30 mA max. (at 25 VDC)
Output style	NPN open collector
Output rating	30 VDC 60 mA
Vibration resistance	98 m/S <sup>2</sup>
Connection tube	Inner diameter $\phi 2.5$ to $\phi 4$
Lead wire	Shield wire 0.1 mm <sup>2</sup> 4-conductor (spare wire green) length 1 m
Temperature characteristics	$\pm 0.3\%$ F.S./°C in the temperature range of 0 (32°F) to 50°C (122°F)
Weight	Body: 100 g, mounting plate: 40 g

\*1: Using 12 VDC power supply voltage static measurement.

\*2: Response time only for 12 VDC power supply voltage sensor body. (Excluding delay caused by piping and sensor nozzle.)

## How to order



Code	Content
<b>A Differential pressure range</b>	
05	5 kPa
<b>B Detection method/inner orifice size</b>	
05	Pneumatic bridge/ $\phi 0.5$ mm
07	Pneumatic bridge/ $\phi 0.7$ mm
10	Pneumatic bridge/ $\phi 1.0$ mm
00	Micro diff. press/ $\phi 0.5$ mm (Note)
<b>C Adjustment needle</b>	
Blank	Integrated
LN	Integrated (with lock nut)
AK	None

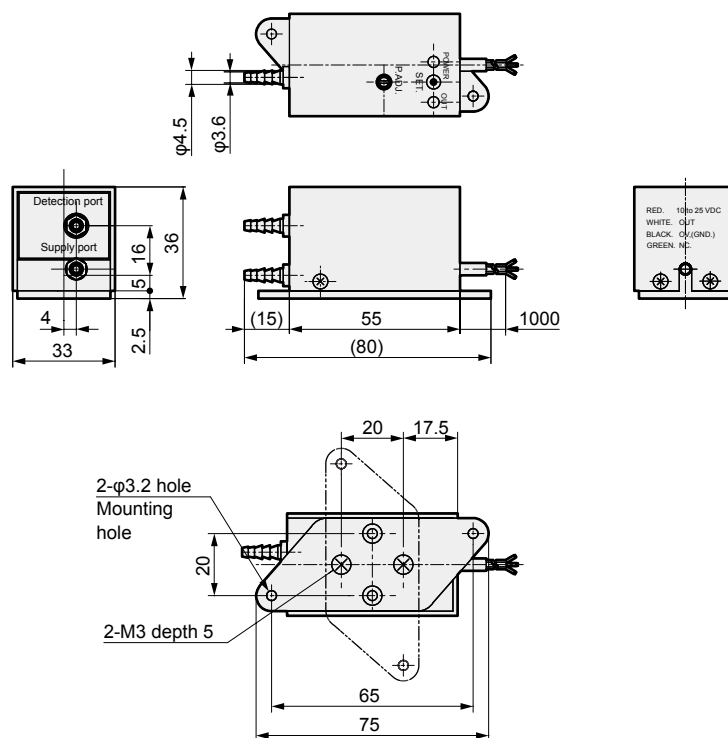
## Selection reference

Suction nozzle diameter	SEPEL Model
$\phi 0.15$ to $\phi 0.5$	DPS-05-05
$\phi 0.5$ to $\phi 1.0$	DPS-05-07
$\phi 0.7$ to $\phi 1.4$	DPS-05-10

Note: The adjustment needle is not available for a fine differential pressure.

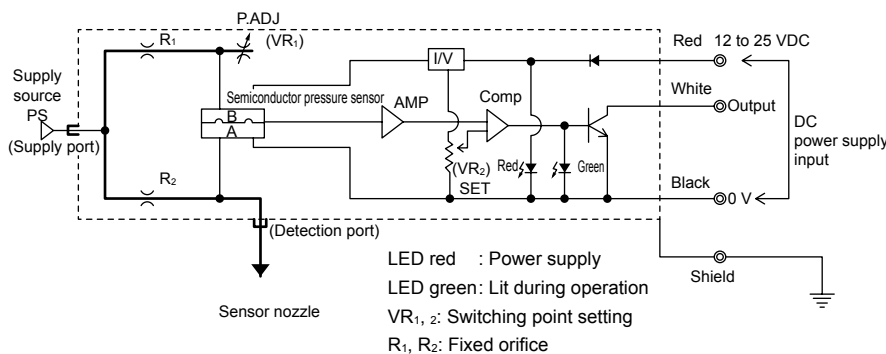
(Display © not required for model No.)

### Dimensions



### Operational principle

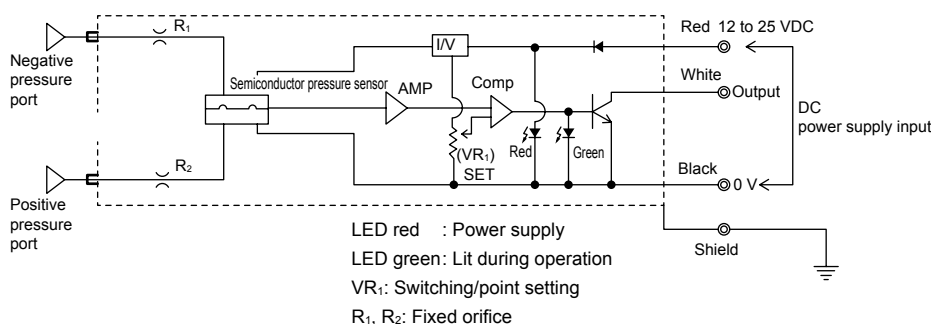
#### ● Pneumatic bridge



#### ● Operational explanation

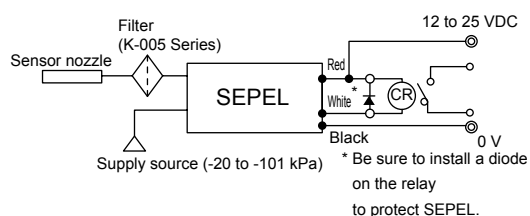
When confirming suction, downward pressure is applied to the semiconductor pressure sensor when the workpiece is picked up if the adjustment needle (VR1) is the same diameter as or smaller than the sensor nozzle. Upward pressure is applied when the workpiece is released. This pressure is converted and amplified into an electrical signal with the semiconductor pressure sensor. When the switching point is set with the electric comparison circuit, a suction confirmation signal is outputted.

#### ● Fine differential pressure

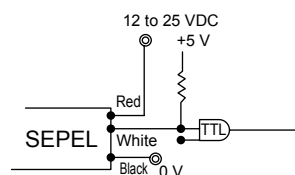


### Usage connection

#### ● Relay connection method



#### ● TTL connection method



F.R.L
F (Filtr)
R (Reg)
L (Lub)
PresSW
Shutoff
SlowStart
FimResistFR
Oil-ProhR
MedPresFR
No Cu/ PTFE FRL
Outdrs FR
F.R.L (Related)
CompFRL
LgFRL
PrecsR
VacF/R
Clean FR
ElecPneuR
AirBoost
SpdContr
Silncr
CheckV/ other
Jnt/tube
AirUnt
PrecsCompn
Mech/ ElecPresSw
ContactSW
<b>AirSens</b>
PresSW Cool
AirFloSens/ Contr
WaterRISens
TotAirSys (Total Air)
TotAirSys (Gamma)
RefrDry
DesicDry
HiPolymDry
MainFiltr
Dischrg etc
Ending

# Air sensor

F.R.L
F (Filtr)
R (Reg)
L (Lub)
PresSW
Shutoff
SlowStart
FimResistFR
Oil-ProhR
MedPresFR
No Cu/ PTFE FRL
Outdrs FR
F.R.L (Related)
CompFRL
LgFRL
PrecsR
VacF/R
Clean FR
ElecPneuR
AirBoost
SpdContr
Silncr
CheckV/ other
Jnt/tube
AirUnt
PrecsCompn
Mech/ ElecPresSw
ContactSW
<b>AirSens</b>
PresSW Cool
AirFloSens/ Contr
WaterRtSens
TotAirSys (Total Air)
TotAirSys (Gamma)
RefrDry
DesicDry
HiPolymDry
MainFiltr
Dischrg etc
Ending

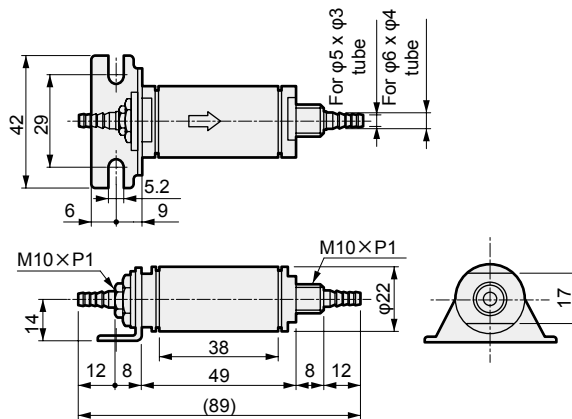
Filter



● Vacuum filter (filtration rating: 5 μm)  
Model No.: **K-005-1**



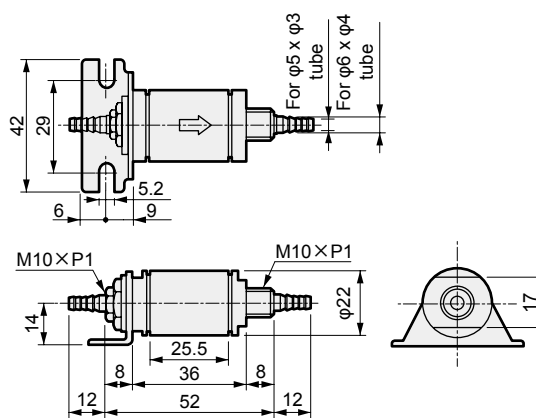
K-005 element model No.: 85-166  
Weight: 98 g



● Vacuum filter half size (filtration rating: 5 μm)  
Model No.: **K-005H-1**



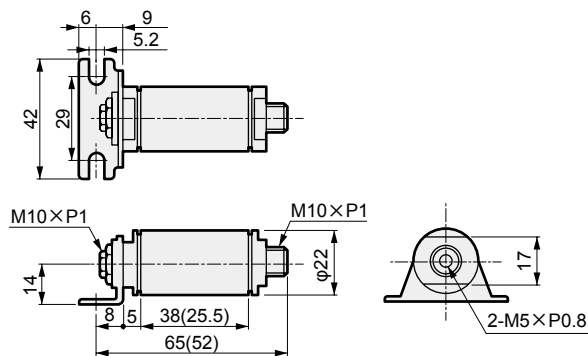
K-005H element model No.: 85-5160  
Weight: 88 g



● M5 thread attached  
Model No.: **K-005-M5, K-005H-M5**



Weight: 95 g, 85 g

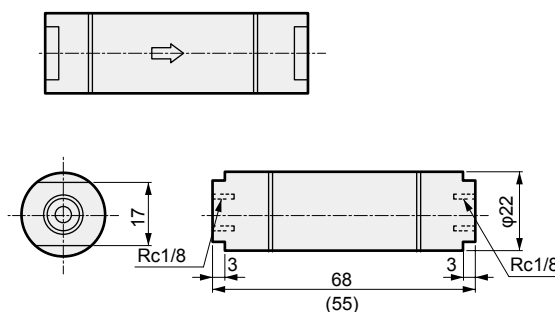


Dimensions shown in ( ) are for K-005H-M5.

● Female thread  
Model No.: **K-005-6, K-005H-6**  
Bore size: Rc1/8



Weight: 120 g, 110 g



Dimensions shown in ( ) are for K-005H-6.

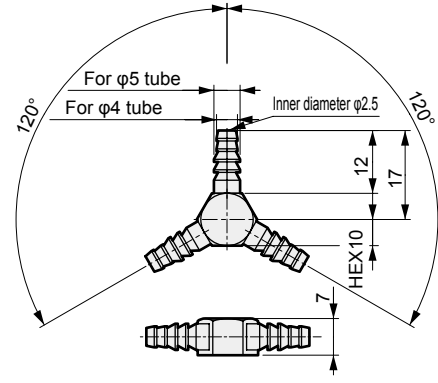
## Piping instrument



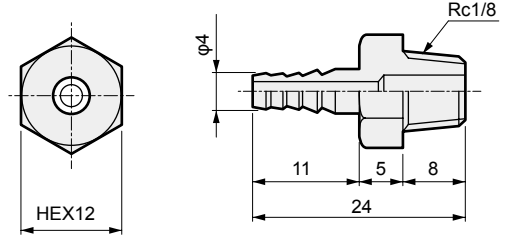
● 3-way fitting  
 Model No.: **APA6-3W-1**  
 Bore size:  $\phi 3$ ,  $\phi 4$



Weight: 8 g

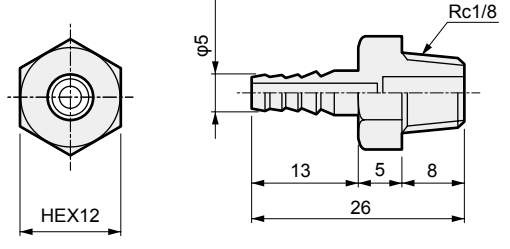


● Model No.: **APA6-TN03**



Weight: 10 g

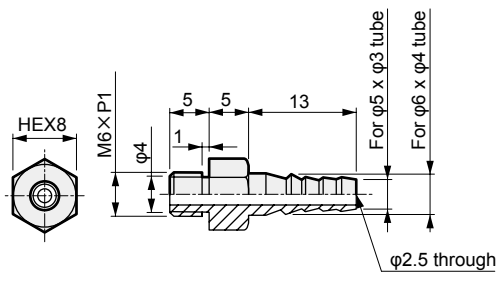
● Model No.: **APA6-TN04**



Weight: 10 g

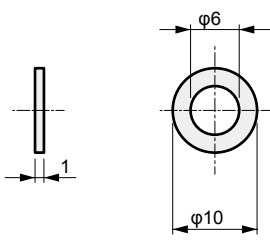
● Part for cascade  
 Model No.: **APA6-CS10**  
 (The following parts are in a set.)

(1) Nipple  
 (for M6- $\phi 3$ ,  $\phi 4$ ) 1 pc.



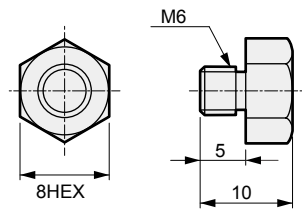
Weight: 7 g

(2) Packing 2 pcs.



Weight: 0.1 g

(3) Plug (for M6) 1 pc.



Weight: 3 g

F.R.L
F (Filtr)
R (Reg)
L (Lub)
PresSW
Shutoff
SlowStart
FimResistFR
Oil-ProhR
MedPresFR
No Cu/ PTFE FRL
Outdrs FR
F.R.L (Related)
CompFRL
LgFRL
PrecsR
VacF/R
Clean FR
ElecPneuR
AirBoost
SpdContr
Silncr
CheckV/ other
Jnt/tube
AirUnt
PrecsCompn
Mech/ ElecPresSw
ContactSW
<b>AirSens</b>
PresSW Cool
AirFloSens/ Contr
WaterRtSens
TotAirSys (Total Air)
TotAirSys (Gamma)
RefrDry
DesicDry
HiPolymDry
MainFiltr
Dischrg etc
Ending



# Air sensor

- F.R.L
- F (Filtr)
- R (Reg)
- L (Lub)
- PresSW
- Shutoff
- SlowStart
- FimResistFR
- Oil-ProhR
- MedPresFR
- No Cu/  
PTFE FRL
- Outdrs FR
- F.R.L  
(Related)
- CompFRL
- LgFRL
- PrecsR
- VacFR
- Clean FR
- ElecPneuR
- AirBoost
- SpdContr
- Silncr
- CheckV/  
other
- Jnt/tube
- AirUnt
- PrecsCompn
- Mech/  
ElecPresSw
- ContactSW
- AirSens**
- PresSW  
Cool
- AirFloSens/  
Contr
- WaterRtSens
- TotAirSys  
(Total Air)
- TotAirSys  
(Gamma)
- RefrDry
- DesicDry
- HiPolymDry
- MainFiltr
- Dischrg  
etc
- Ending

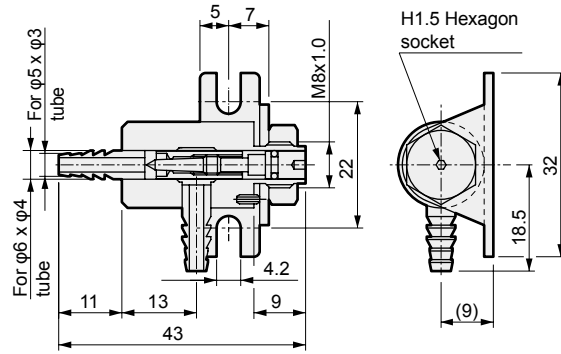
## Needle



● Adjustment needle  
Model No.: **APA6-FV10**



Weight: 39 g



## Urethane tube



● Urethane tube  
Model No.: **46011-5 (transparent)**  
I.D. x O.D.:  $\phi 3 \times \phi 5$   
Temperature range -5 to 60°C

