

# Air Catch Sensor

## Non-Contact Sensor for Workpiece Placement Verification

### Series ISA2



## Stable detection of **0.01 to 0.5 mm** clearance

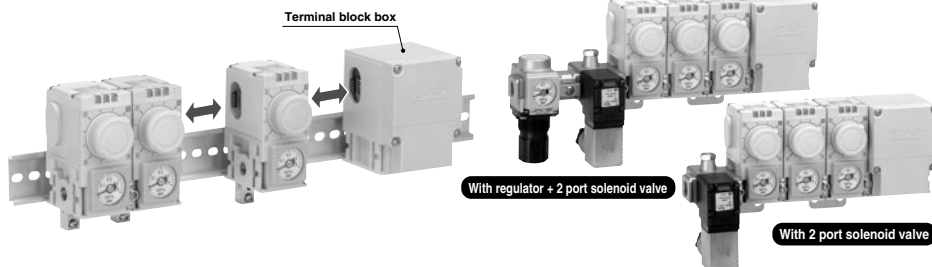
Due to the pneumatic bridge circuit and semiconductor pressure sensor, the non-contact type sensor is hardly affected by fluctuations in the supply pressure.

#### ● Plug connectors (Centralized wiring)

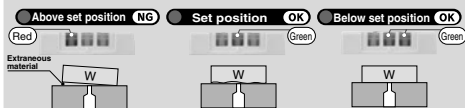
Requires less man hours to wire.  
Easy to add and remove manifold stations.

#### ● Modular construction

Requires less man hours to wire.

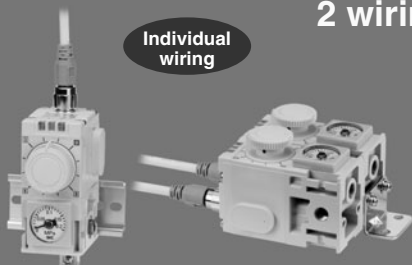


#### Check optimum position at a glance. LED level meter



## 2 wiring methods

#### Individual wiring



#### Centralized Wiring



#### ● Minimum operating pressure **30 kPa (ISA2-G)**

Energy consumption can be reduced compared with the conventional models (Conventional models: 50 kPa)

#### ● Position of supply port: Either right side or left side is available.

# Air Catch Sensor Series ISA2



## How to Order

### Manifold

Without control unit

IISA2 N PL - 3 B

With control unit

IISA2 C SL - 3 B 1 D E2

#### Control unit

C	With regulator + 2 port solenoid valve
V	With 2 port solenoid valve

#### Electrical entry and supply port position

SR	Centralized wiring with supply port on the right
SL	Centralized wiring with supply port on the left
PR	Individual wiring with supply port on the right
PL	Individual wiring with supply port on the left

Note) The supply port position is the one when the switch is viewed from the front.

#### Stations

1	1 station
2	2 stations
3	3 stations
4	4 stations
5	5 stations
6	6 stations

#### Option

Nil	Without bracket
B	With bracket
D	With mounting bracket for DIN rail

Note) DIN rail must be ordered separately. (Refer to page 104.)

#### Voltage of 2 port solenoid valve

1	100 VAC
2	200 VAC
3	110 VAC
4	220 VAC
5	24 VDC
6	12 VDC
36	230 VAC

#### Pressure gauge of regulator Note 1)

A*	Without pressure gauge Note 2)	
E2	MPa single notation	0.2
Z2	psi single notation	MPa
E4	MPa single notation	0.4
Z4	psi single notation	MPa
G2	MPa single notation	0.2
P2	MPa-psi double notation	MPa
G4	MPa single notation	0.4
P4	MPa-psi double notation	MPa

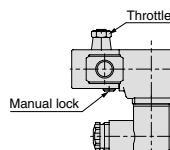
Note 1) Due to new Japanese weight and measurement legislation, psi notation type cannot be sold or used in Japan.

Note 2) The pressure gauge port is Rc 1/8.

\* Produced upon receipt of order

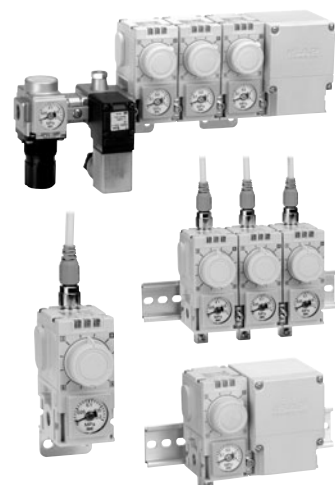
#### Throttle/Manual lock of 2 port solenoid valve

Nil	Without throttle, without manual lock
C	With throttle, without manual lock
W	Without throttle, with manual lock
M	With throttle, with manual lock



#### Electrical entry of 2 port solenoid valve

D : DIN connector DL: DIN connector (With indicator light)	D0: DIN connector (Without connector)	T : Conduit terminal TL: Conduit terminal (With indicator light)



## How to Order

For single and double notation type and additional stations

### Air catch sensor

**ISA2 - G E2 1**

**Detection distance**

<b>G</b>	0.01 to 0.25 mm
<b>H</b>	0.03 to 0.5 mm

**Piping specifications**

<b>Nil</b>	Rc 1/8
<b>N</b>	NPT 1/8
<b>F*</b>	G 1/8

\* Produced upon receipt of order

**Output specifications**

<b>1</b>	NPN output
<b>5</b>	PNP output

**Electrical entry**

Individual wiring	<b>Nil</b>	Straight
	<b>L*</b>	Right angle
	<b>N</b>	Without lead wire
Centralized wiring	<b>P</b>	Terminal block box

\* Produced upon receipt of order

**Pressure gauge** (Note 1)

<b>A*</b>	Without pressure gauge (Note 2)
<b>E2</b>	MPa single notation
<b>Z2*</b>	psi single notation
<b>E4</b>	MPa single notation
<b>Z4*</b>	psi single notation
<b>G2</b>	MPa single notation
<b>P2</b>	MPa-psi double notation
<b>G4</b>	MPa single notation
<b>P4</b>	MPa-psi double notation

Note 1) Due to new Japanese weight and measurement legislation, psi notation type cannot be sold or used in Japan.

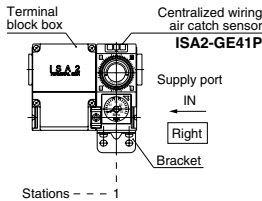
Note 2) The pressure gauge port is Rc 1/8.

\* Produced upon receipt of order

## Ordering Example

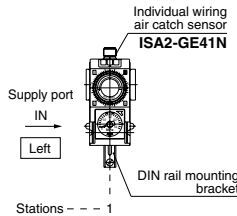
### Without control unit

#### Centralized wiring



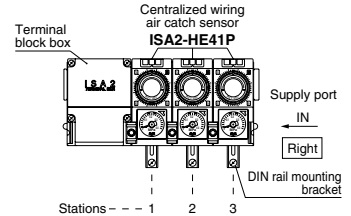
IISA2NSR-1B...1 set (1 station manifold part number)  
 ISA2-GE41P...1 set (Air catch sensor part number)  
 Prefix the part number of the air catch sensor with an asterisk (\*).

#### Individual wiring



IISA2NPL-1D...1 set (1 station manifold part number)  
 ISA2-GE41N...1 set (Air catch sensor part number)  
 Prefix the part number of the air catch sensor with an asterisk (\*).

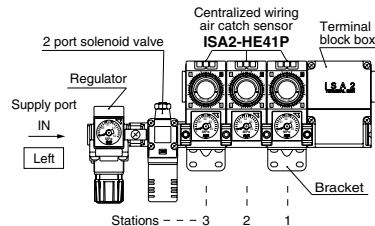
#### Centralized wiring/Supply port right



IISA2NSR-3D...1 set (3 stations manifold part number)  
 ISA2-HE41P...3 sets (Air catch sensor part number)  
 Prefix the part number of the air catch sensor with an asterisk (\*).

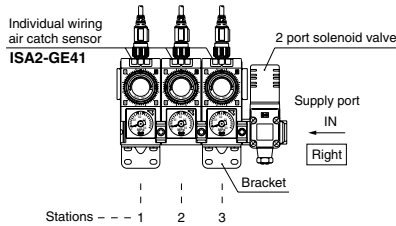
### With control unit

#### Centralized wiring/Supply port left



IISA2CSL-3B5DLCE2...1 set (3 stations manifold part number)  
 ISA2-HE41P...3 sets (Air catch sensor part number)  
 Prefix the part number of the air catch sensor with an asterisk (\*).

#### Individual wiring/Supply port right



IISA2VPR-3B5DLC...1 set (3 stations manifold part number)  
 ISA2-GE41...3 sets (Air catch sensor part number)  
 Prefix the part number of the air catch sensor with an asterisk (\*).

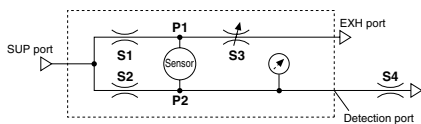
## Specifications

Model			ISA2-G□□□1□	ISA2-G□□□5□	ISA2-H□□□1□	ISA2-H□□□5□
Detection distance			0.01 to 0.25 mm		0.03 to 0.50 mm	
Fluid			Dry air (filtered to 5 μm)			
Operating pressure range			30 to 200 kPa		50 to 200 kPa	
Recommended detection nozzle			ø1.5		ø2.0	
Consumption flow rate L/min (ANR)	Supply pressure	50 kPa	5 or less		10 or less	
		100 kPa	8 or less		15 or less	
		200 kPa	12 or less		22 or less	
Power supply voltage			12 to 24 VDC ±10%, Ripple (p-p) 10% or less (With power supply polarity protection)			
Current consumption			15 mA or less			
Switch output			NPN open collector: 1 output	PNP open collector: 1 output	NPN open collector: 1 output	PNP open collector: 1 output
			Maximum load current			
			80 mA			
			Maximum load voltage			
			30 VDC (at NPN output)			
Residual voltage			1.5 V or less (at 80 mA)			
Output protection			Yes			
Repeatability (including temperature characteristics)			0.01 mm or less (Detection distance range 0.01 to 0.15 mm, supply pressure 100 to 200 kPa)		0.01 mm or less (Detection distance range 0.03 to 0.15 mm, supply pressure 100 to 200 kPa)	
Hysteresis <small>Note 1)</small>			0.01 mm or less (Detection distance range 0.01 to 0.15 mm)		0.01 mm or less (Detection distance range 0.03 to 0.15 mm)	
Indicator light			LED level meter <small>Note 2)</small> with 1 red, 2 green (Set value < detection distance: red, Set value = detection distance: green 1, Set value > detection distance: green 1 + green 2)			
Environment	Enclosure	IP66: with pressure gauge IP40: without pressure gauge				
	Operating temperature range	Operating: 0 to 60°C, Stored: -20 to 70°C (No condensation or freezing)				
	Operating humidity range	Operating/stored: 35 to 85%RH (No condensation)				
	Withstand voltage	1000 VAC (in 50/60 Hz) for 1 minute between terminals and housing				
	Insulation resistance	2 MΩ or more (500 VDC measured via megohmmeter) between terminals and housing				
	Vibration resistance	1.5 mm amplitude in 10 to 500Hz or acceleration of 98 m/s <sup>2</sup> without control unit and bracket mounted, Others 30 m/s <sup>2</sup> , whichever is smaller for 2 hours in X, Y, Z direction each (De-energized)				
Impact resistance		Without control unit and bracket mounted: 980 m/s <sup>2</sup> , Others: 150 m/s <sup>2</sup> in X, Y and Z direction, 3 times each (De-energized)				
Port size			Nil: Rc 1/8, N type: NPT 1/8, F type: G 1/8			
Lead wire (Individual wiring type)			4 cores, oil-resistant cable (ø6, 5m) with M12 4-pin pre-wired connector, Conductor O.D.: 0.90 mm, Insulator O.D.: 1.72 mm			
Terminal block box (Centralized wiring type)			Front wiring (Electrical entry ø21)			
Weight			Individual wiring type (body only): 253 g, common wiring type (body only): 250 g, Terminal block box: 205 g, lead wire: 278 g, connecting bracket with sealing for additional station: 4 g			
Standards			Compliant with CE marking			

Note 1) Refer to "Relation between Nozzle Diameter and Detection Distance" (page 94) for hysteresis.

Note 2) Refer to "Setting Procedure" (page 97) for LED level meter.

## Working Principle



S1, S2: Fix orifice

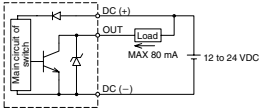
S3: Variable orifice (adjusted by setting dial)

S4: Detection nozzle

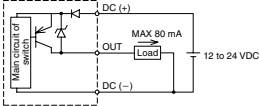
In a bridge circuit as in the left figure, a detection gap is applied to the detection nozzle (S4) while the setting gap S3 is adjusted to balance the pressure applied to the pressure sensor (P1 = P2). The pressure sensor detects the differential pressure generated when the detection nozzle (S4) is released. When the work piece comes close to the detection nozzle, the back pressure P2 increases until it is larger than P1 (P2 ≥ P1). Then the switch output turns on to notify that the pressure is below the detection gap.

## Internal Circuit and Wiring

### NPN open collector output

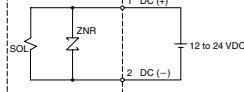


### PNP open collector output

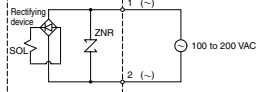


### Circuit and Wiring for 2 Port Solenoid Valve

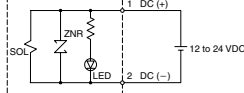
#### Without indicator light DC circuit



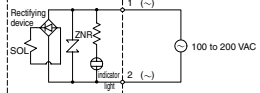
#### Without indicator light AC Circuit



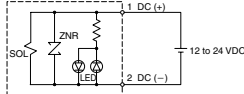
#### Conduit terminal With indicator light DC circuit



#### Conduit terminal DIN type connector With indicator light AC Circuit



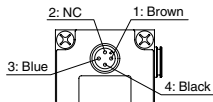
#### DIN type connector With indicator light DC circuit



For wiring, refer to the catalog and the operation manual of the VCA series. Pay attention to the power supply voltage. Use of incorrect power supply will cause damage to equipment.

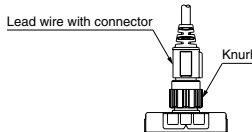
## Wiring

### Individual wiring



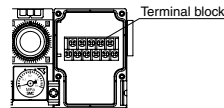
1	Brown	DC (+)
2	—	NC
3	Blue	DC (-)
4	Black	OUT

1. Insert the connector of the lead wire with its key groove at the proper position.
2. Hold the knurl with 2 fingers and rotate it clockwise. Do not use tools.



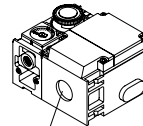
3. Connect the colored wires coming from the cable terminal. Refer to the circuit diagram and table above to avoid mistakes.

### Centralized wiring



OUT 1	OUT 2	OUT 3	OUT 4	OUT 5
⊗	DC (-)	DC (+)	NC	OUT 6

1. Mount the seal conduit on the terminal block box. For mounting procedure, refer to the catalog and operation manual provided by the manufacturer of the seal conduit.
2. Thread the cable through the seal conduit and arrange wiring according to the polarity of the terminal block illustrated above.
3. Fasten the seal conduit with a tightening torque not greater than 5 N·m. Do not hold the terminal block box or the switch.



Seal conduit entry (ø21)

**Relation between Nozzle Diameter and Detection Distance**

The data in the following charts are characteristics of hysteresis at the detection distance.

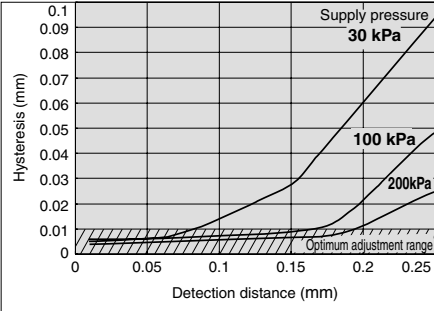
In case accuracy is required by the settings, the design should be made so that the hysteresis will stay within the optimum adjustment range not larger than 0.01 mm.

The smaller the hysteresis, the better the sensitivity. In cases where the hysteresis exceeds 0.01 mm, the air catch sensor should be used to check the presence of the workpiece.

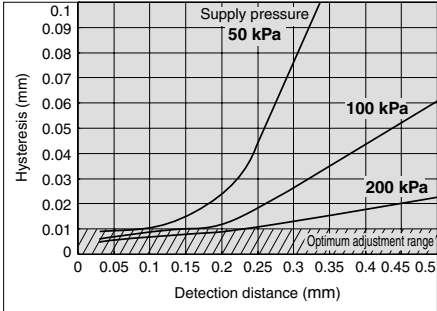
ISA2-G□□□□□

ISA2-H□□□□□

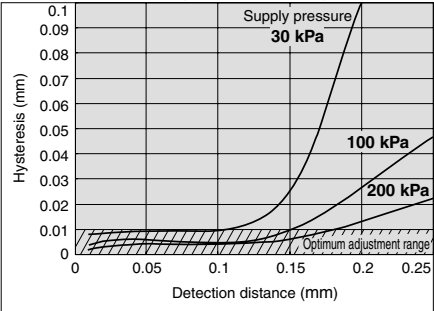
**Detection nozzle:  $\phi 1.0$**   
**Detection side piping:  $\phi 6 \times \phi 4$  tubing 5 m**



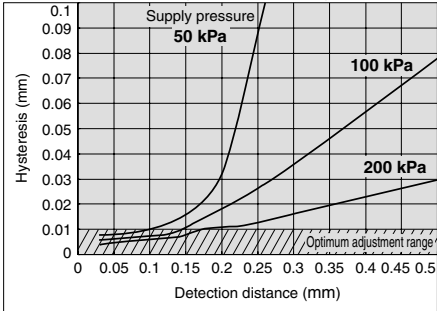
**Detection nozzle:  $\phi 1.0$**   
**Detection side piping:  $\phi 6 \times \phi 4$  tubing 5 m**



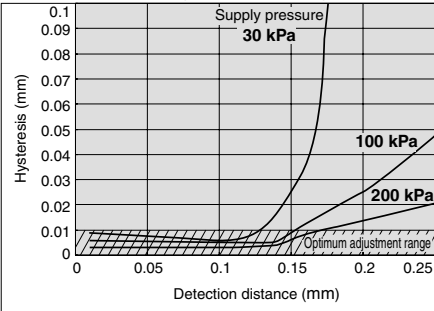
**Detection nozzle:  $\phi 1.5$**   
**Detection side piping:  $\phi 6 \times \phi 4$  tubing 5 m**



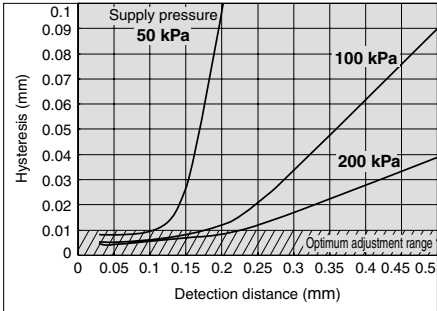
**Detection nozzle:  $\phi 1.5$**   
**Detection side piping:  $\phi 6 \times \phi 4$  tubing 5 m**



**Detection nozzle:  $\phi 2.0$**   
**Detection side piping:  $\phi 6 \times \phi 4$  tubing 5 m**



**Detection nozzle:  $\phi 2.0$**   
**Detection side piping:  $\phi 6 \times \phi 4$  tubing 5 m**



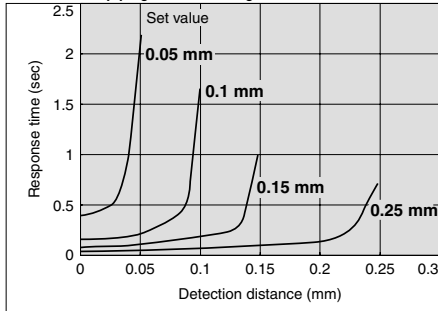
## Response Time

Response time changes with detection distance and piping length.

While all graphs assume a fixed set distance with changes in the detection distance, the upper charts show responses at various set values and the lower charts show responses at various piping lengths. If the detection distance is equal to the set value, the response becomes quicker as the set value becomes bigger or the piping length becomes shorter.

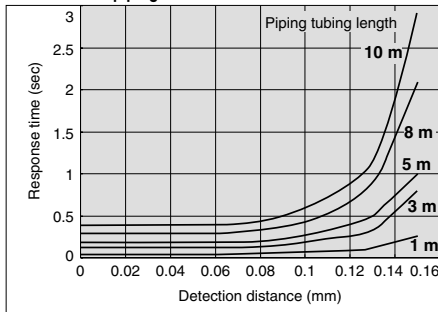
### ISA2-G□□□□□

Detection nozzle:  $\phi 1.5$  Supply pressure: 100 kPa  
Detection side piping:  $\phi 6 \times \phi 4$  tubing 5 m



Detection distance – Response time characteristics

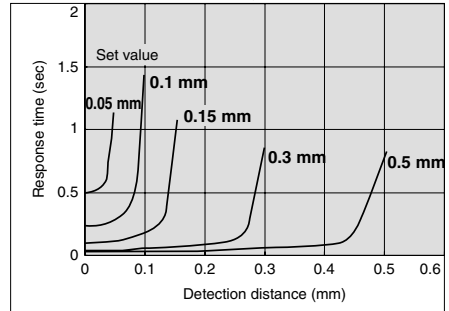
Detection nozzle:  $\phi 1.5$  Supply pressure: 100 kPa  
Detection side piping:  $\phi 6 \times \phi 4$  Set distance: 0.15 mm



Piping tubing length – Response time

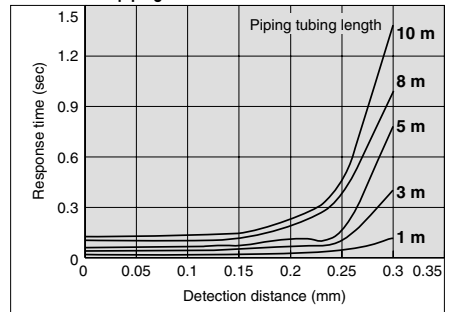
### ISA2-H□□□□□

Detection nozzle:  $\phi 2.0$  Supply pressure: 100 kPa  
Detection side piping:  $\phi 6 \times \phi 4$  tubing 5 m



Detection distance – Response time characteristics

Detection nozzle:  $\phi 2.0$  Supply pressure: 100 kPa  
Detection side piping:  $\phi 6 \times \phi 4$  Set distance: 0.3 mm



Piping tubing length – Response time

## Nozzle Shape

Please keep the nozzle shape as illustrated below.

Take every caution against chamfer on the detection surface and/or nozzle hole, which could affect the characteristics as illustrated in Figure (1).

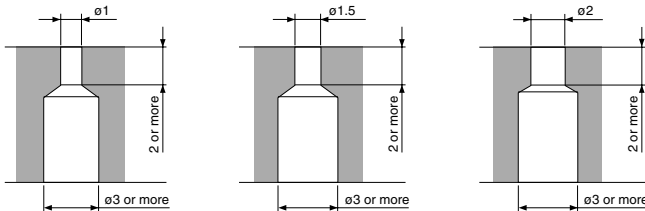
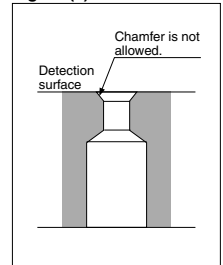


Figure (1)

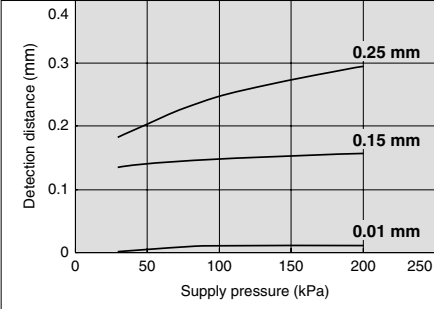


**Supply Pressure Dependence**

The charts show changes in the detection distance with fluctuations in the supply pressure.

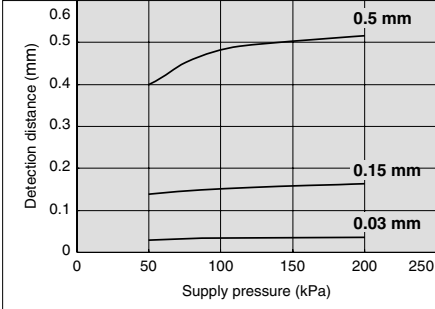
**ISA2-G**□□□□□

**Detection nozzle: ø1.0**  
**Detection side piping: ø6 x ø4 tubing 5 m**

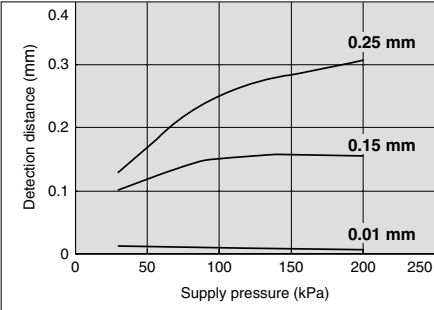


**ISA2-H**□□□□□

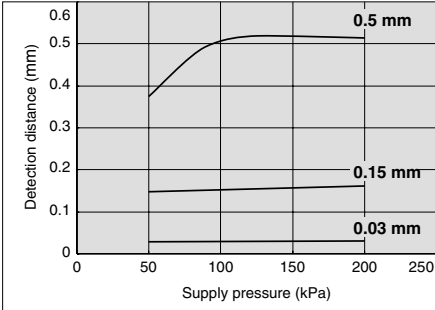
**Detection nozzle: ø1.0**  
**Detection side piping: ø6 x ø4 tubing 5 m**



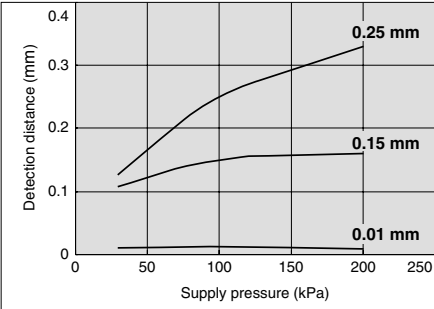
**Detection nozzle: ø1.5**  
**Detection side piping: ø6 x ø4 tubing 5 m**



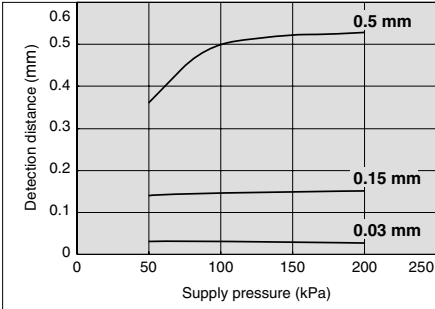
**Detection nozzle: ø1.5**  
**Detection side piping: ø6 x ø4 tubing 5 m**



**Detection nozzle: ø2.0**  
**Detection side piping: ø6 x ø4 tubing 5 m**



**Detection nozzle: ø2.0**  
**Detection side piping: ø6 x ø4 tubing 5 m**

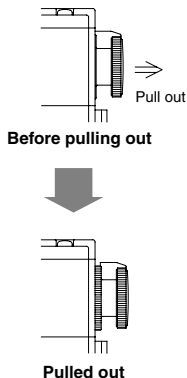




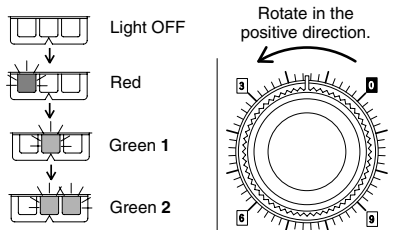
## Setting Procedure

The detection distance is set with the LED level meter and setting dial.

Keep the setting dial pulled out while in use. If released, it will return to its original position and become unable to rotate.



1. For accuracy in setting, apply a clearance gauge to the detection nozzle to replicate the set condition in advance.
2. Confirm that the set pressure is applied. If the setting dial is fully open, the LED level meter appears as (Light OFF).
3. Pull the setting dial and rotate it in the positive direction. The lights will turn on in the order shown below.



4. The sensor output comes on when the lights on the LED level meter turn on as . Complete the setting when this condition is observed.
5. Apply the clearance gauge again to confirm that the lights turn on as .

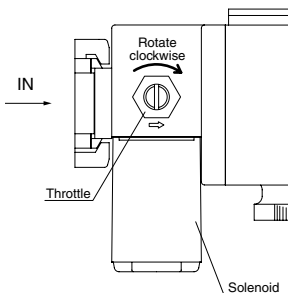
## Handling and setting of 2 port solenoid valve

Throttle setting for blowing to prevent water and cutting oil from entering the nozzle.

(Clockwise: Close throttle; Counterclockwise: Open throttle)

\* The setting is not applicable to valves without throttle.

1. Power off the valve.
2. Rotate the throttle clockwise for adjustment so that the detection nozzle will not suck up water or cutting oil.

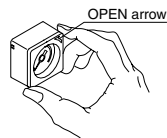


3. Power on the valve, then off again.  
Confirm that the detection nozzle does not suck up water or cutting oil.  
Note) Do not rotate the throttle more than 5 turns or it will fall out.

## Handling and setting of limit gauge indicator

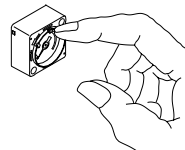
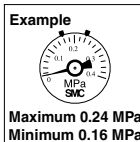
### 1. Removal of cover

Hook the finger on the front cover ridge and rotate it in the direction of the OPEN arrow until it stops (15°). Then pull out and remove the cover.



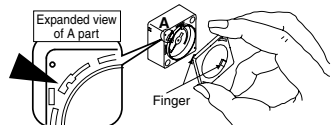
### 2. Setting the installation needle

The installation needle should be moved by the fingertip. Set the 2 green installation needles at the maximum and minimum limits of pressure.



### 3. Installation of cover

After setting the installation needles, locate the OPEN arrow at the top right position and insert the claws on the cover into the grooves on the case (indicated by ▼ in the expanded view of A part). Rotate the cover clockwise until it stops. Confirm that the cover is firmly secured.



Relation between Dial Scale and Detection Distance

Test procedure and conditions

Dial scales when the detection nozzle is under the following conditions;  
Supplied pressure: 100 kPa  
Piping: ø6 x ø4 tubing, 5 m in length.

Results of measurement <sup>Note 1)</sup>

● Relation between the detection distance and set dial scales <sup>Note 2)</sup> (Scale numbers)

ISA2-G□

Detection distance	Detection nozzle diameter		
	ø1.0	ø1.5	ø2.0
0.05 mm	0.7 to 1.1	0.9 to 1.4	1.5 to 1.8
0.10 mm	1.5 to 1.9	2.3 to 2.8	3.5 to 4.0
0.15 mm	1.9 to 2.3	3.4 to 4.1	5.1 to 6.0
0.20 mm	2.5 to 3.0	4.4 to 5.5	6.4 to 8.1
0.25 mm	3.0 to 3.5	5.2 to 7.0	6.6 to 10.7

ISA2-H□

Detection distance	Detection nozzle diameter		
	ø1.0	ø1.5	ø2.0
0.1 mm	1.1 to 1.5	2.4 to 2.8	3.3 to 4.1
0.2 mm	2.4 to 2.9	4.5 to 5.1	6.2 to 7.2
0.3 mm	3.0 to 3.5	5.5 to 6.3	7.7 to 9.0
0.4 mm	3.3 to 3.8	6.0 to 7.0	8.4 to 10.0
0.5 mm	3.5 to 4.0	6.5 to 7.5	8.6 to 10.7

● Average variation per scale (Detection distance [mm])

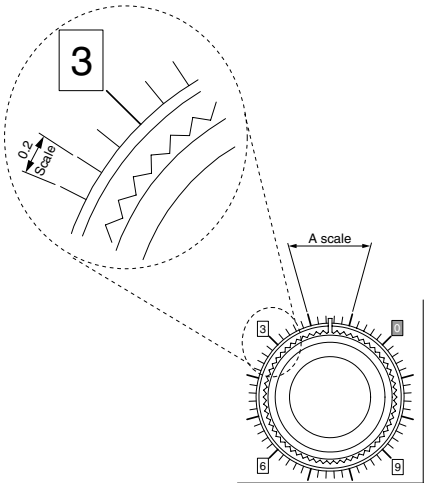
ISA2-G□

Detection distance	Detection nozzle diameter		
	ø1.0	ø1.5	ø2.0
0.05 mm	0.007	0.003	0.002
0.10 mm	0.007	0.004	0.003
0.15 mm	0.010	0.005	0.004
0.20 mm	0.022	0.005	0.003
0.25 mm	0.044	0.007	0.003

ISA2-H□

Detection distance	Detection nozzle diameter		
	ø1.0	ø1.5	ø2.0
0.1 mm	0.008	0.004	0.003
0.2 mm	0.008	0.005	0.004
0.3 mm	0.025	0.011	0.007
0.4 mm	0.046	0.019	0.015
0.5 mm	0.050	0.028	0.032

Note 1) This data provides reference values as a guide only, this should not be viewed as a guarantee of our products performance.  
Note 2) Set dial scales are as follows;

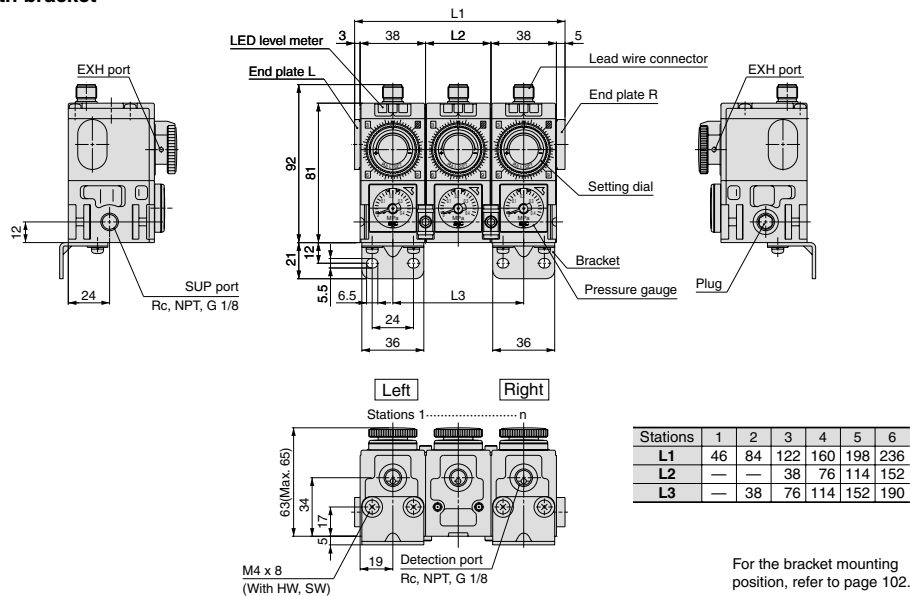


Between each major scales, it is sub divided into ten smaller settings (for example, between 2.0 to 3.0—2.1, 2.2, 2.3, etc.), settings are possible at 0.1 scale.

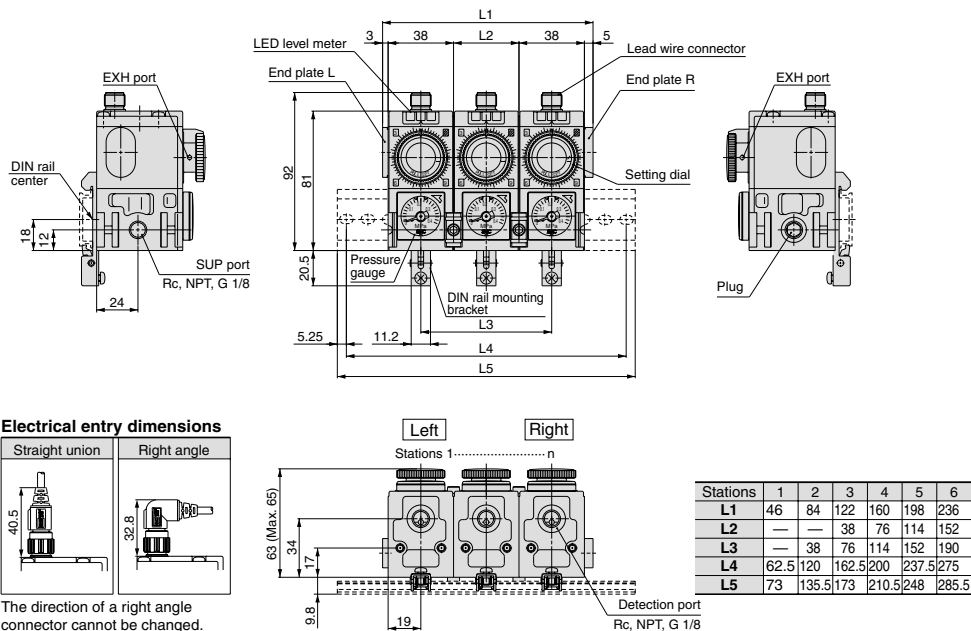


Dimensions: Individual Wiring Type

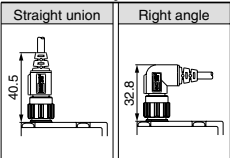
With bracket



With DIN rail



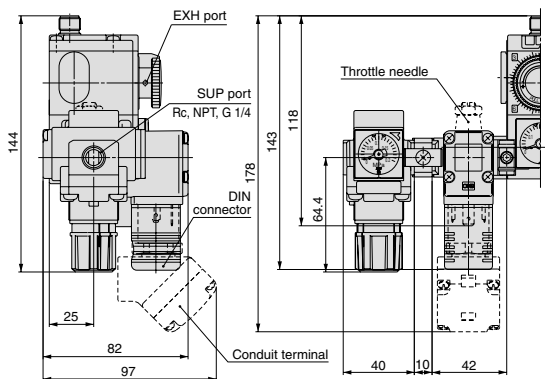
Electrical entry dimensions



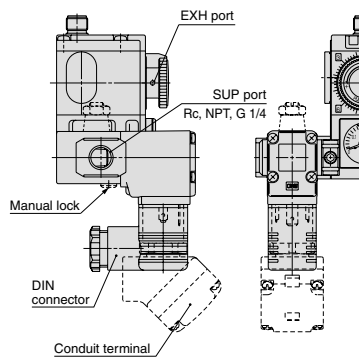
The direction of a right angle connector cannot be changed.  
100

## Dimensions: With Control Unit

### SUP port on the left

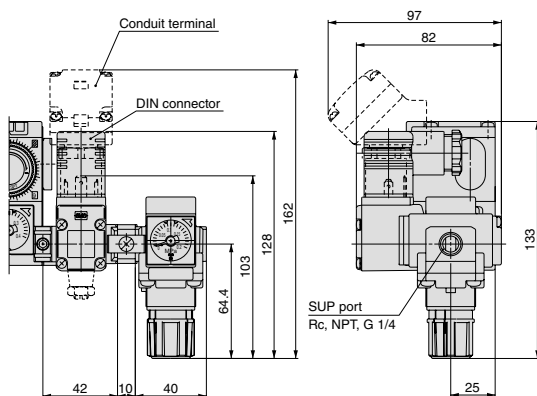


With regulator + 2 port solenoid valve

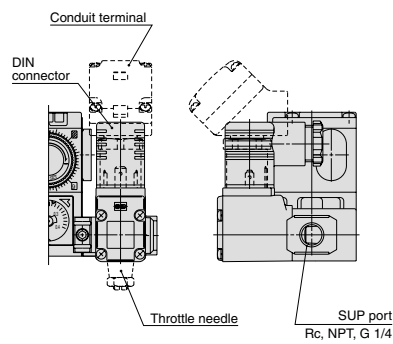


With 2 port solenoid valve

### SUP port on the right



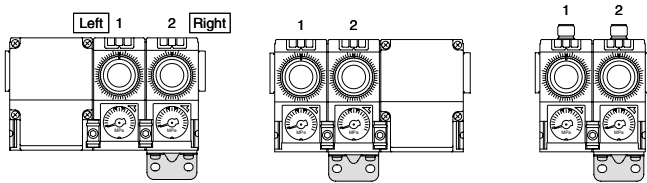
With regulator + 2 port solenoid valve



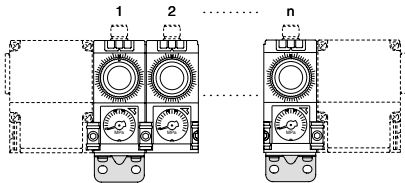
With 2 port solenoid valve

## Bracket Mounting Position

With 2 stations, the bracket is mounted on the second sensor from the left.

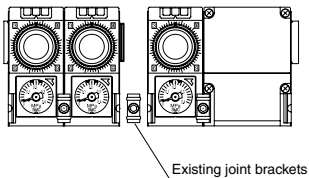


With n stations, the bracket is mounted on the first and “n” th sensor from the left.



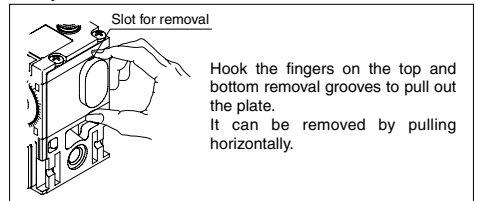
## Addition of Manifold Stations

### 1. Disassembly

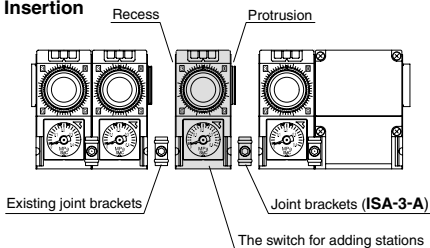


1. Loosen the screws and remove the 2 mounting brackets on the front and back side.
2. Disassemble the switch carefully so that the O-ring on the SUP port will not be detached.

### End plate removal

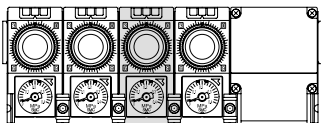


### 2. Insertion



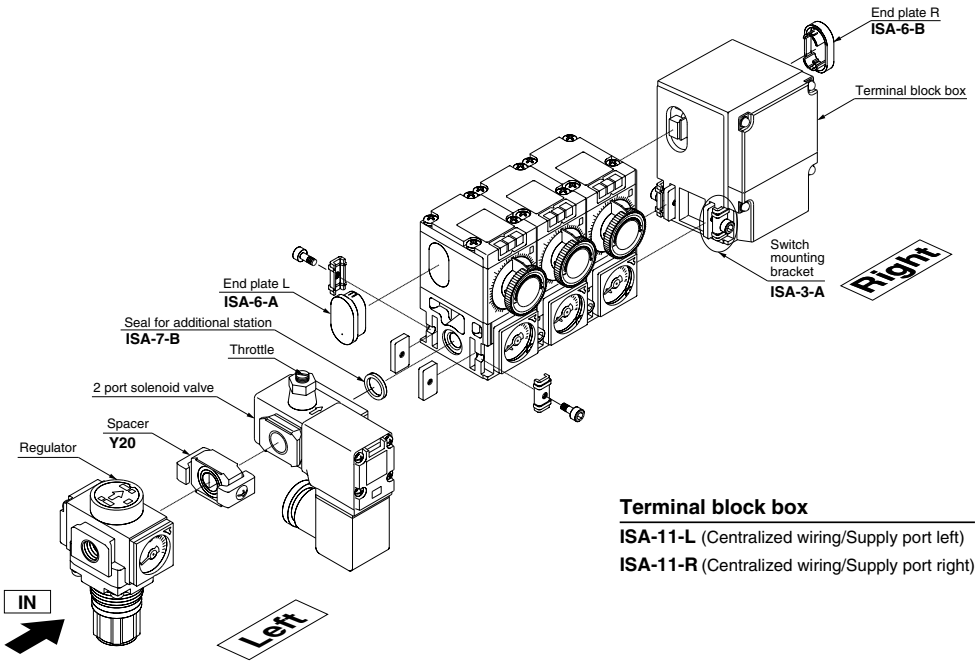
1. Fit seal for additional station (**ISA-7-B**) to the recess of the SUP port of the additional switch.
2. Fit the protrusion of the additional switch into the existing switch.
3. Mount joint brackets (**ISA-3-A**) at 2 positions.  
Note) Perform temporary tightening of screws.
4. Confirm that the recess of the SUP port of the existing switch has seal for additional station attached.
5. Fit the protrusion of the existing switch into the recess of the additional switch.
6. Mount the existing joint bracket.  
Note) Perform temporary tightening of screws.

### 3. Assembly



1. Tighten the joint brackets with the prescribed tightening torque of 1.2 N·m.
2. Arrange pneumatic piping and confirm that there is no air leakage from new joints.

## Parts List



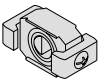
### Terminal block box

ISA-11-L (Centralized wiring/Supply port left)

ISA-11-R (Centralized wiring/Supply port right)

### Spacer

Y20



### Seal for additional station

ISA-7-B

When 2 air catch sensors are connected or when a 2 port solenoid valve is connected to the left:



ISA-7-A

When a 2 port solenoid valve is connected to the right:



### End plate L

ISA-6-A



### End plate R

ISA-6-B



### Joint bracket

ISA-3-A

A pair consists 1 set.



### Lead wire with connector (Individual wiring type)

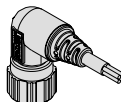
ISA-8-A

Straight, 5 m



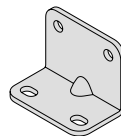
ISA-8-B

Right angle, 5 m



### Bracket

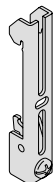
ISA-4-A



With mounting screw 2 pcs.

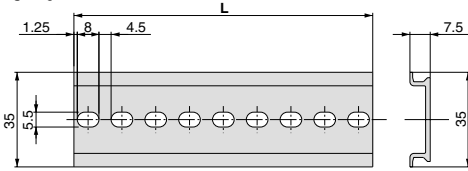
### DIN rail mounting bracket

ISA-9-A



## DIN Rail

### ISA-5-□



Part no.	L	Applicable models	
		Individual wiring type	Centralized wiring type
ISA-5-1	73.0	IISA2□P□-1	—
ISA-5-2	135.5	IISA2□P□-2	IISA2□S□-1
ISA-5-3	173.0	IISA2□P□-3	IISA2□S□-2
ISA-5-4	210.5	IISA2□P□-4	IISA2□S□-3
ISA-5-5	248.0	IISA2□P□-5	IISA2□S□-4
ISA-5-6	285.5	IISA2□P□-6	IISA2□S□-5
ISA-5-7	323.0	—	IISA2□S□-6

## Pressure Gauge for Air Catch Sensor

### Square embedded pressure gauge

GC3-□	4	AS
-------	---	----

**Notation specifications**

NII	MPa single notation
P	psi single notation

**Maximum pressure indication**

2	0.2 MPa
4	0.4 MPa



### Round pressure gauge

G36-□	4	01
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**Notation specifications**

NII	MPa single notation
P (Note)	MPa-psi double notation

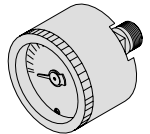
**Maximum pressure indication**

2	0.2 MPa
4	0.4 MPa

Note) For double notation of MPa and psi, add "X30" at the end of part number.  
Example) G36-P4-01-X30

### Connection thread

NII	R 1/8
P	NPT 1/8



## Regulator

AR 20-□ 02 E-1 □

### Thread type

NII	Rc
N	NPT
F	G

### Option (The shape of pressure gauge) (Note 2)

NII	None
E	Square embedded pressure gauge (With limit indicator)
G (Note 1)	Round pressure gauge (With limit indicator)

Note 1) The pressure gauge port is 1/8. The pressure gauge is included in the package (not assembled).

Note 2) Order individually when 0.4 MPa gauge is required.

### Option specification

NII	None
N	Non-relieving
R	Flow direction: Right to left
Z (Note 1)	Unit representations on the label and pressure gauge are psi and °F

When specifying more than one option, enter symbols first in numerical, then in alphabetical orders.

Note 1) Compatible with thread type NPT. Under the New Measurement Law, this type is only sold outside Japan. (The SI unit is used inside Japan.)  
In all cases, with the exception of NPT, add "X2025" at the end of the order number. Example) AR20-02-E-1-X2025

## Standard Specifications

Model	AR20
Port size	1/4
Fluid	Air
Proof pressure	1.5 MPa
Maximum operating pressure	1.0 MPa
Set pressure range	0.02 to 0.2 MPa
Gauge port size (Note 1)	1/8
Relief pressure	Set pressure + 0.05 MPa (at relief flow of 0.1 L/min(ANR))
Ambient and fluid temperature	-5 to 60°C (No freezing)
Construction	Relieving type
Weight (kg)	0.29
Pressure gauge	0.2 MPa Round (Note 2) Square embedded (Note 3)

Note 1) The type with square embedded pressure gauge does not have connection.

Note 2) The "□" in the part number of the round pressure gauge indicates the type of connection threads, no symbol for R and N for NPT. Contact SMC for supply of the connection thread type NPT and the pressure gauge of psi unit representation.

Note 3) With an O-ring (1 pc.) and mounting screws (2 pcs.).

## 2 Port Solenoid Valve

VCA27A-5 DL S-4-02-Q

### Voltage

1	100 VAC
2	200 VAC
3	110 VAC
4	220 VAC
5	24 VDC
6	12 VDC
36	230 VAC

### Port size

02	Rc 1/4
02N	NPT 1/4
02F	G 1/4

### CE compliant

### Throttle

NII	Without throttle and manual lock
S	With throttle
B	With manual lock
K	With manual lock and throttle

### Electrical entry

D	DIN connector
DL	DIN connector (With light)
D0	DIN connector (Without connector)
T	Conduit terminal
TL	Conduit terminal (With light)

## Standard Specifications

Valve specifications	Valve type	Direct operation poppet
	Fluid	Air, Inert gas
	Withstand pressure MPa	2.0
	Body material	Al
	Seal material	HNBR
	Ambient temperature °C	-20 to 60
	Fluid temperature °C	-10 to 60 (No freezing)
	Enclosure	Dustproof and jetproof (Equivalent to IP65)
	Atmosphere	Environment with no corrosive or explosive gas
	Valve leakage cm <sup>3</sup> /min (ANR)	0.2 or less
Coil specifications	Mounting orientation	Free
	Vibration resistance/Impact resistance ms <sup>2</sup> (Note 2)	30/150 or less
	Rated voltage	24/12 VDC, 100/110/200/220 VAC (50/60 Hz)
	Allowable voltage fluctuation	±10% rated voltage
	Type of coil insulation	B type
	Power consumption DC	VCA2: 6.5 W
	Apparent power (Note 1) AC	50 Hz 60 Hz
		VCA2: 7.5 VA

Note 1) Since the AC specifications include a rectifying device, there is no difference between the apparent power required for starting and holding.

Note 2) Vibration resistance: No malfunction resulted in a one-sweep test in a 10 to 300 Hz range in the axial and right angle directions of the main valve and armature, for both energized and de-energized states.

Shock resistance: No malfunction resulted in an impact test using a drop impact tester. The test was performed in the axial and right angle directions of the main valve and armature, for both energized and de-energized states.





# Series ISA2 Specific Product Precautions 1

Be sure to read before handling. Refer to back page 1 for Safety Instructions and  
“Handling Precautions for SMC Products” (M-E03-3) for Pressure Switch Precautions.

## Air Catch Sensor Series ISA2

### Operating Environment

#### ⚠ Warning

1. Do not use in an environment where flammable gas, explosive gas or corrosive gas exists. Usage may cause a fire or explosion. This air catch sensor do not have an explosion proof construction.

#### ⚠ Caution

1. Do not use in a place subject to heavy vibration and/or shock. Use a bracket in an environment with vibration exceeding 30 m/s<sup>2</sup>.
2. The enclosure of the switch conforms to IP66 and that for the solenoid valve to IP65. The pressure gauge and the regulator have IP40. Employ suitable protective measures in locations where there is contact with water droplets, oil or welding spatter, etc.
3. Piping materials without flexibility such as steel tube piping, are prone to be effected by excess moment load and vibration from the piping side. Use flexible tubing in between to avoid such an effect.
4. Although CE marked, this air catch sensor is not equipped with surge protection against lightning. Necessary countermeasures for possible lightning surge should be fitted to system components as required.
5. When an air catch sensor is contained in a box, provide an air outlet to constantly keep the atmospheric pressure inside the box.  
Internal pressure rises will hinder normal air discharge and may lead to possible malfunction.
6. The air outlet is provided on the setting dial section of the air catch sensor. Do not turn off air supply to the switch if water or cutting oil splashes around the setting dial.

### Mounting

#### ⚠ Caution

1. If the detection nozzle is exposed to splashes of water or cutting oil, do not allow backflow from the detection nozzle to the switch body. Install the switch body at a position higher than the detection nozzle wherever possible.

### Piping

#### ⚠ Caution

1. **Piping equipment**  
In the piping between the switch body and the detection nozzle, do not use equipment or fittings that can possibly cause leakage or serve as resistance.  
Do not use One-touch fittings in an environment where the air catch sensor is exposed to water or other liquid.

## Pressure Source

#### ⚠ Caution

##### 1. Supply air

Since the orifice of the air catch sensor is small, prevent foreign matter from entering the equipment. For this purpose, use supply air that is dry and filtered 5 μm or better.

##### 2. Operating pressure

Since the product adopts a semiconductor pressure sensor, keep the operating pressure not larger than 0.2 MPa.

## 2 Port Solenoid Valve Series VCA

### Precautions on Design

#### ⚠ Warning

##### 1. Energized continuously

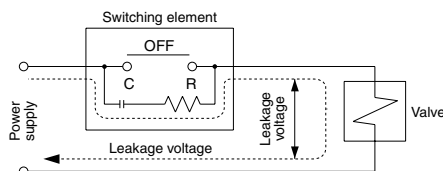
Please consult with SMC if the product is to be energized continuously for long periods of time.

### Selection

#### ⚠ Caution

##### 1. Leakage voltage

Take special precautions if a resistor is used in parallel with the switching element or a C-R element (for surge voltage protection) is used for protection of the switching element. The valve may fail to turn off due to leakage current flowing through the resistor or C-R element.



**AC coil**  
10% or less rated voltage

**DC coil**  
2% or less rated voltage

### Mounting

#### ⚠ Warning

1. Do not use the air catch sensor if the leakage amount increases or the equipment does not operate properly.  
After installation, connect compressed air and electricity and conduct an appropriate functionality inspection to confirm that the air catch sensor is installed properly.
2. Do not apply external force to the coil.  
Apply a wrench to the exterior surface of the piping joint at the time of tightening.
3. Do not use heat insulators, etc. to keep the temperature at the coil assembly.  
Do not use a tape heater for freeze prevention except on the piping and body. If may cause the coil to burn.



# Series ISA2 Specific Product Precautions 2

Be sure to read before handling. Refer to back page 1 for Safety Instructions and “Handling Precautions for SMC Products” (M-E03-3) for Pressure Switch Precautions.

## 2 Port Solenoid Valve Series VCA

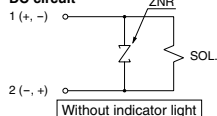
### Electric Circuit

#### ⚠ Caution

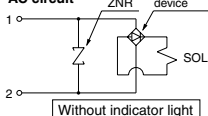
##### In case of series VC (B type coil)

##### Conduit terminal, DIN type connector

###### DC circuit

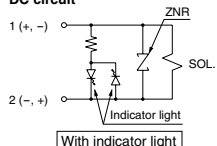


###### AC circuit

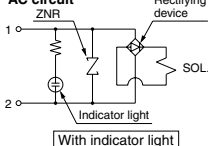


##### Conduit terminal, DIN type connector

###### DC circuit



###### AC circuit



### Maintenance

#### ⚠ Warning

##### 1. Low-frequency operation

Perform valve switching at least every 30 days to prevent malfunction. Also, conduct a periodic inspection at intervals of approximately 6 months to use the product in its best condition.

### Manual Operation

#### ⚠ Warning

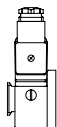
##### How to operate manually

##### Locking type (tool required)

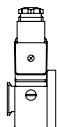
To open valve: Rotate to the right by 90° using a flat head screwdriver. It will still hold open even when the driver removed.

To close valve: Rotate to the left by 90° to achieve the former closed position.

Electrical operations should be undertaken when the valve is closed.



Valve closed (vertical slit)



Valve open (horizontal slit)

## Regulator Series AR

### Mounting and Adjustment

#### ⚠ Warning

1. The adjustment knob must be handled manually. Use of tools may cause damage to the product.
2. Check the inlet and outlet pressure indications on the pressure gauge while setting. If the knob is turned to excess, it may cause internal parts to fracture.
3. Since products for 0.02 to 0.2 MPa settings come with a pressure gauge for 0.2 MPa, do not apply pressure exceeding 0.2 MPa. It may cause damage to the pressure gauge.

#### ⚠ Caution

1. Unlock the knob before pressure adjustment and lock it again when the adjustment is over.  
Incorrect procedure may cause damage to the knob or lead to the outlet pressure fluctuation.
  - Pull the adjustment knob to release the lock. An orange colored line is provided at the bottom of the adjustment handle for visual checking.
  - Push the pressure regulation knob to engage the lock. If it does not lock easily, turn the knob slightly clockwise or counterclockwise until the orange colored line goes out of sight.
2. When the product is installed, leave a space of 60 mm on the side of the valve guide (opposite to the knob) for maintenance and inspection.



# Series ISA2 Specific Product Precautions 3

Be sure to read before handling. Refer to back page 1 for Safety Instructions and  
“Handling Precautions for SMC Products” (M-E03-3) for Pressure Switch Precautions.

## 2 Port Solenoid Valve Series VCA

### Disassembly and Assembly

#### ⚠ Caution

• Before the product is disassembled, shut off the power and pressure supply and exhaust the residual pressure.

#### • Disassembly procedure

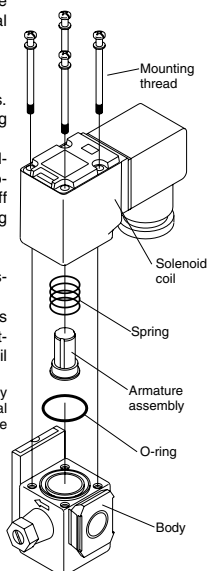
1. Remove the top mounting threads.
2. Remove the solenoid coil, spring and armature assembly.
3. If there is any foreign matter adhering on the surface, take appropriate measures to clear it off such as an air blow or washing with neutral detergent.

#### • Assembly procedure

Reverse the above procedure to assemble the product.

In case the electrical entry is changed, also change the mounting orientation of the solenoid coil before assembly.

Note 1) Tighten the 4 mounting threads by each pair of corners on a diagonal line at the proper tightening torque shown below.



#### Proper Tightening Torque $N \cdot m$

VCA27	0.4 to 0.5
-------	------------

### Wiring

#### ⚠ Caution

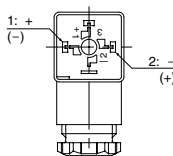
1. Use electrical wires with a conductive sectional area of 0.5 to 1.25 mm<sup>2</sup>. Make sure that no excessive force is applied to the wires.
2. Adopt an electrical circuit which will not cause chattering at the contact.
3. The voltage variation must stay within the -10% to +10% range of the rated voltage. In case importance is attached to response characteristics due to use of a DC power supply, keep the variation within the -5% to +5% range. The voltage drop is the value at the lead wire to which the coil is connected.

### Wiring

#### ⚠ Caution

#### DIN connector (B type only)

The internal wiring of the DIN connector is illustrated below. Connect each terminal to the power supply.

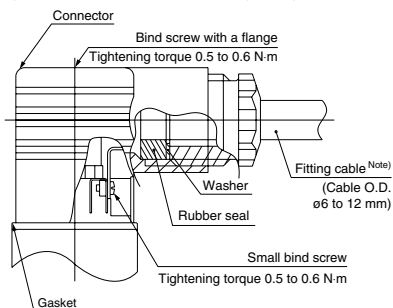


Terminal no.	1	2
DIN terminal	+ (-)	- (+)

\* No polarity.

• A catbire cable with an O.D.  $\phi 6$  to 12 mm is applicable.

• Tighten each part with an appropriate tightening torque shown below.

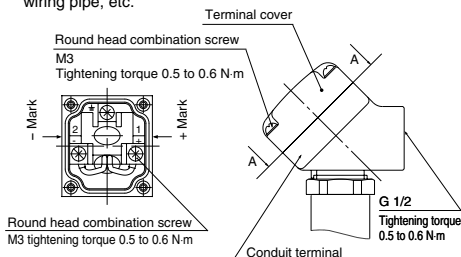


Note) With a cable O.D.  $\phi 9$  to 12 mm, hollow the rubber sealing before use.

#### Conduit terminal

In case of a conduit terminal, refer to the marks below for wiring.

- Tighten each part with an appropriate tightening torque shown below.
- Seal the piping part (G 1/2) securely with a dedicated electric wiring pipe, etc.



View A-A  
(Internal connection diagram)