

Air Catch Sensor for Work Piece Detection

Air Catch Sensor

Detection distance

0.01 to 0.5mm

Repetition accuracy

0.01mm or less

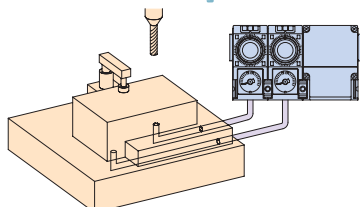


Model	Detection distance	Detection accuracy <small>Note)</small>
ISA2-G	0.01 to 0.25mm	±0.01mm or less
ISA2-H	0.03 to 0.5mm	

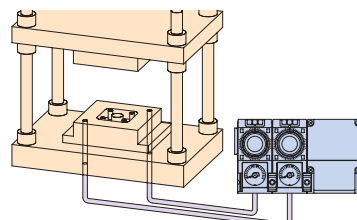
Note) Detection distance: 0.01 to 0.15mm (ISA2-G), 0.03 to 0.15mm (ISA2-H)
 Supply pressure : At supply pressure 100 to 200kPa

2 Port Solenoid Valve with Manual Lock is newly added.

To check the work piece position
on the reference plane



Position check of metal mold



Series ISA2

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

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

Plug connectors (Centralised wiring)

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



Modular construction

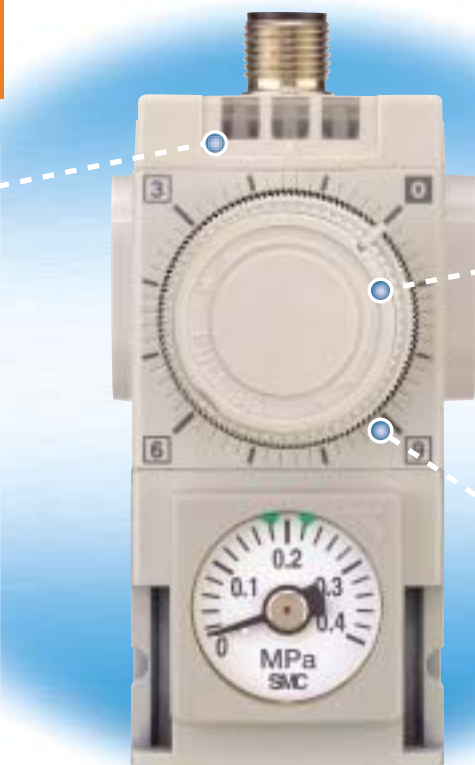
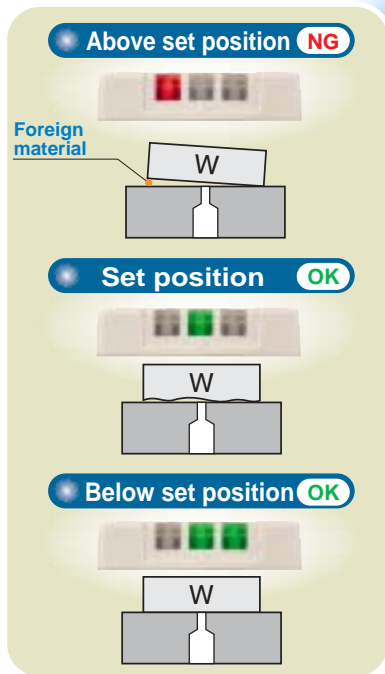
Requires less man hours to wire.



Air catch sensor *Series ISA2*

Optimum position is known at a glance.

LED level meter



Easy-to-operate **large dial**

Scale provides guidelines for set position.

Minimum operating pressure 30kPa (ISA2-G)

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

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

2 wiring methods



Variations

Model	ISA2-G	ISA2-H
Operating pressure range	30 to 200kPa	50 to 200kPa
Detection distance	0.01 to 0.25mm	0.03 to 0.5mm
Output type	NPN open connector, PNP open collector	
Electrical entry	Lead wire with connector (Individual wiring) Terminal box (Centralised wiring)	
Mounting	DIN rail, Bracket	
Number of manifold stations	1 to 6 stations	
Port size	Rc, NPT, G 1/8	
Enclosure	IP66 (IP65 for solenoid valve. Regulator and pressure gauge are open type.)	

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	Centralised wiring with supply port on the right
SL	Centralised 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

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

Note) DIN-rail must be ordered separately. (Refer to the page 15.)

Voltage of 2 port solenoid valve

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

Pressure gauge of regulator Note 1)

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

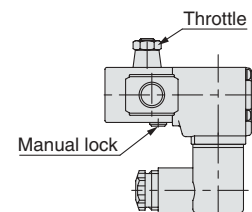
Note 1) Due to new Japanese weight and measurement legislation, PSI notation type cannot be sold or used in Japan.

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

* Manufactured upon receipt of order.

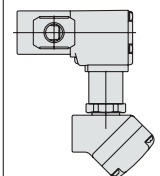
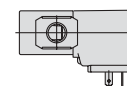
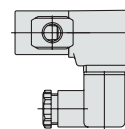
Throttle/Manual lock of 2 port solenoid valve

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

G	0.01 to 0.25mm
H	0.03 to 0.5mm

Piping specifications

-	Rc 1/8
N	NPT 1/8
F*	G 1/8

* Made to order

Pressure gauge Note 1)

A*	Without pressure gauge Note 2)		
E2	MPa single notation	0.2	Square embedded pressure gauge
Z2*	PSI single notation	MPa	
E4	MPa single notation	0.4	Round pressure gauge
Z4*	PSI single notation	MPa	
G2	MPa single notation	0.2	Round pressure gauge
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.

* Manufactured upon receipt of order.

Output specifications

1	NPN Output
5	PNP Output

Electrical entry

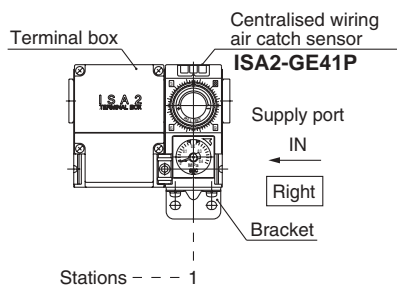
Individual wiring	-	Straight
	L*	Right angle
	N	Without lead wire
Centralised wiring	P	Terminal block box

* Manufactured upon receipt of order.

Example

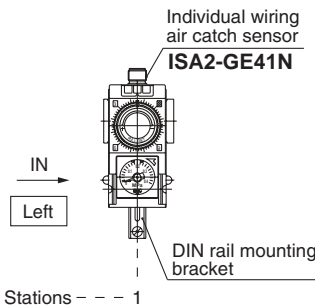
Without control unit

Centralised wiring



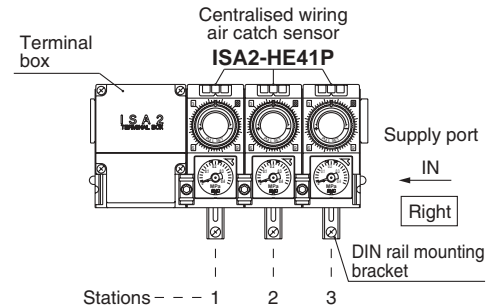
IISA2NSR-1B ··· 1 set (1 station manifold part number)
***ISA2-GE41P** ··· 1 set (Air catch sensor part number)
↳ Prefix the part number of the air catch sensor with an asterisk (*).

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 (*).

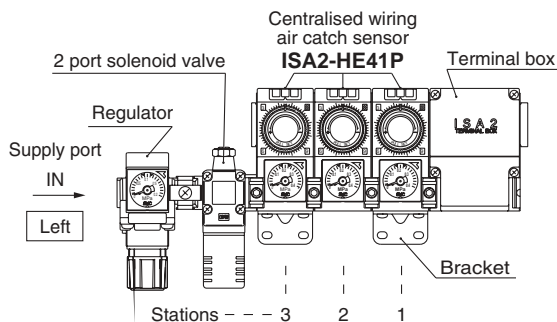
Centralised wiring/Supply port right



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 (*).

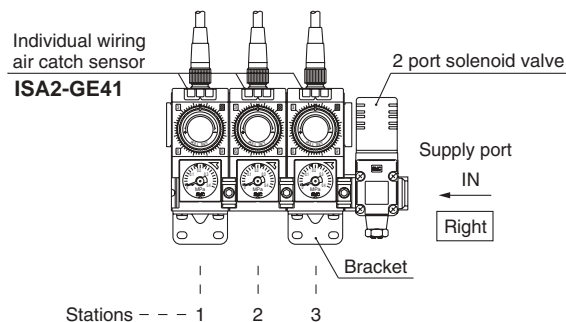
With control unit

Centralised wiring/Supply port left



IISA2CSL-3B5DLC2 ··· 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 (*).

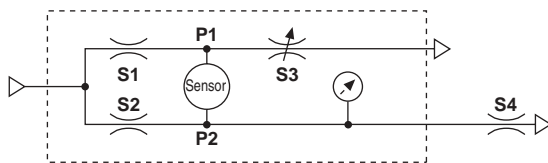
Specifications

Model	ISA2-G□□□1□	ISA2-G□□□5□	ISA2-H□□□1□	ISA2-H□□□5□
Detection distance	0.01 to 0.25mm		0.03 to 0.50mm	
Fluid	Dry air (filtered to 5μm)			
Operating pressure range	30 to 200kPa		50 to 200kPa	
Recommended detection nozzle	ø1.5		ø2.0	
Consumption flow rate ℓ/min (ANR)	Supply pressure	50kPa	5 or less	
		100kPa	8 or less	
		200kPa	12 or less	
Power supply voltage	12 to 24VDC, Ripple (p-p) 10% or less (with power polarity protection)			
Current consumption	15mA or less			
Switch Output	NPN open collector: one output		PNP open collector: one output	
	Maximum load current			
	Maximum load voltage			
	Residual voltage			
	Output protection			
Repeatability (Including temperature characteristics)	0.01mm or less (Detection distance range 0.01 to 0.15mm, supply pressure 100 to 200kPa)		0.01mm or less (Detection distance range 0.03 to 0.15mm, supply pressure 100 to 200kPa)	
Hysteresis ^{Note 1)}	0.01mm or less (Detection distance range 0.01 to 0.15mm)		0.01mm or less (Detection distance range 0.03 to 0.15mm)	
Indicator light	LED level meter ^{Note 2)} with 1 red, 2 green (Set value < detection distance: red, Set value = detection distance: green 1, Set value > detection distance: green 1 + green 2)			
Environmental Resistance	Enclosure	IP66		
	Operating temperature range	Operating: 0 to 60°C, Stored: -20 to 70°C (with no condensation and no freezing)		
	Operating humidity range	Operating/stored: 35 to 85%RH (with no condensation)		
	Withstand voltage	1000 VAC in 50/60Hz for 1 minute between external terminal and case		
	Insulation voltage	2 MΩ or more between external terminal and case (measured with 500 VDC megaohm meter)		
	Vibration resistance	1.5 mm amplitude in 10 to 500Hz or acceleration of 98 m/s ² without control unit and bracket mounted, Others 30m/s ² , whichever is smaller for 2 hours in X, Y, Z direction each (de-energised)		
	Impact resistance	Without control unit and bracket mounted: 980m/s ² , Others: 150m/s ² in X, Y and Z direction, 3 times each (de-energised)		
Port size	Nil: Rc 1/8, N type: NPT 1/8, F type: G 1/8			
Lead wire (individual wiring type)	4 core, oil resistant, cable (0.64mm ²) with M12, 4 pin pre-wired connector			
Terminal block box (centralised wiring type)	Front wiring (Electrical entry ø21)			
Weight	Individual wiring type (body only): 253g, common wiring type (body only): 250g, Terminal box: 205g, lead wire: 278g, connecting bracket with sealing for additional station: 4g			

Note 1) Refer to "Relation between the nozzle diameter and detection distance" (page 5) for hysteresis.

Note 2) Refer to "Setting procedure" (page 8) for LED level meter.

Working principle

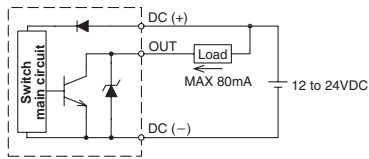


- S1, S2: Fix orifice
- S3: Variable orifice (adjusted by setting dial)
- S4: Detection nozzle

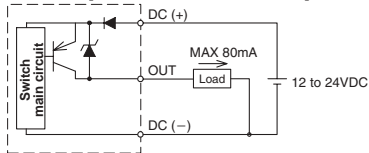
In a bridge circuit as in the left figure, a detection gap is applied to the detection nozzle (S4) while the setting dial S3 is adjusted to balance the pressure applied to the pressure sensor (P1=P2). The pressure sensor detects the differential pressure generated when the detection nozzle (S4) is released. 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 display light DC circuit

Conduit terminal With display light DC circuit

DIN type connector With display light DC circuit

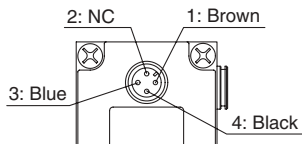
Without display light AC Circuit

Conduit terminal DIN type connector With indicator light AC Circuit

Refer to catalogue and instruction manual of Series VCA for wiring.
Pay attention to the power supply voltage.
Use of incorrect power supply will cause damage to equipment.

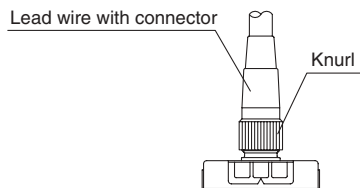
Wiring

Individual wiring



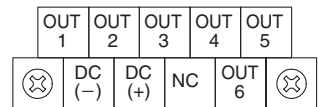
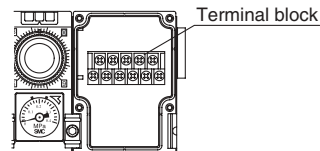
1	Brown	DC (+)
2	—	NC
3	Blue	DC (-)
4	Black	OUT

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 until finger tight.

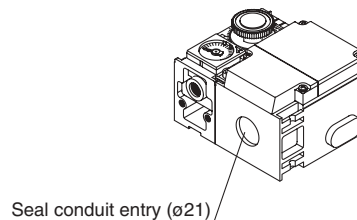


3. Connect the coloured wires coming from the cable terminal.
Refer to the circuit diagram and table above to avoid mistakes.

Centralised wiring



1. Mount the seal conduit on the terminal box. For mounting procedure, refer to the catalogue and instruction 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 box or the switch.



Relation between Nozzle Diameter and Detection Distance

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

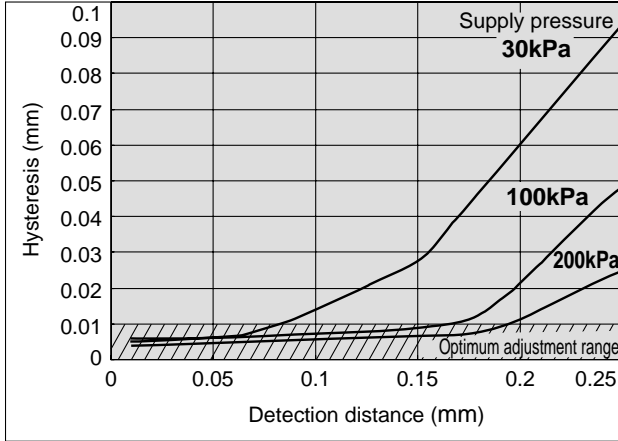
In case accuracy is required by the settings, the design should be made so that the hysteresis will stay within the optimum adjustment range not larger than 0.01 mm.

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 work piece.

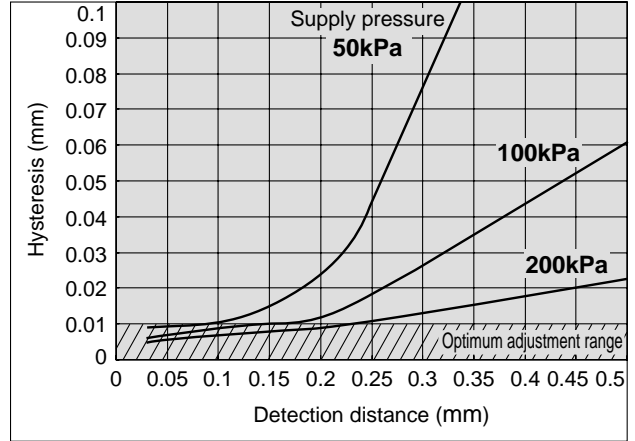
ISA2-G

ISA2-H

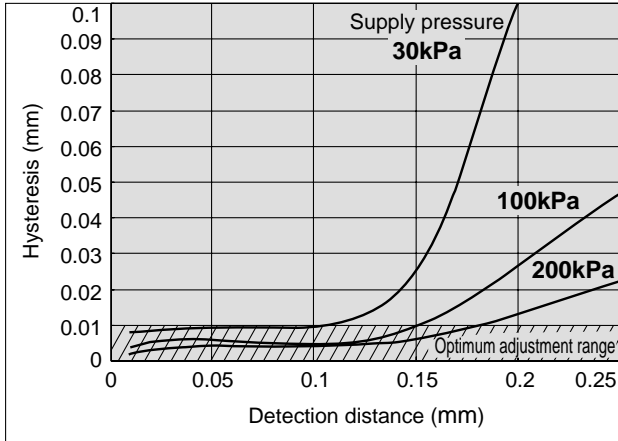
**Detection nozzle: $\varnothing 1.0$
Detection side piping: $\varnothing 6 \times \varnothing 4$ tubing 5m**



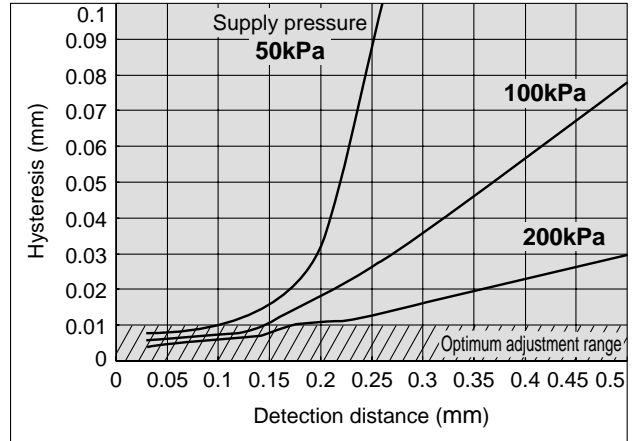
**Detection nozzle: $\varnothing 1.0$
Detection side piping: $\varnothing 6 \times \varnothing 4$ tubing 5m**



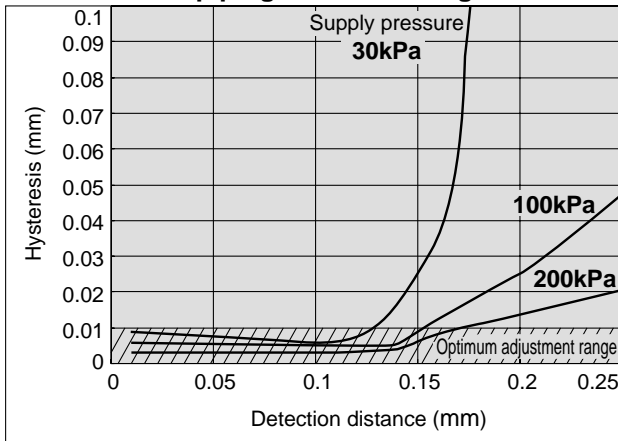
**Detection nozzle: $\varnothing 1.5$
Detection side piping: $\varnothing 6 \times \varnothing 4$ tubing 5m**



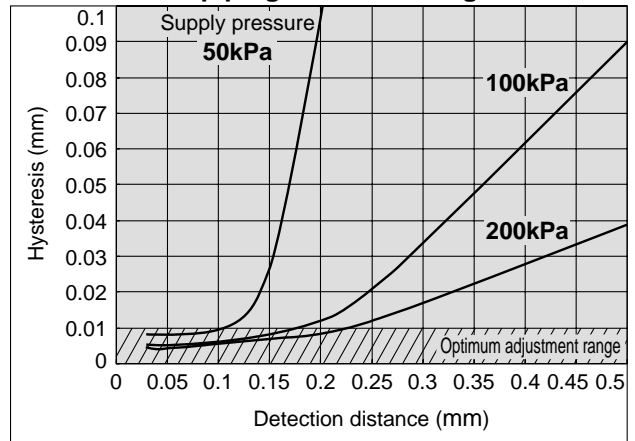
**Detection nozzle: $\varnothing 1.5$
Detection side piping: $\varnothing 6 \times \varnothing 4$ tubing 5m**



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



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



Response Time

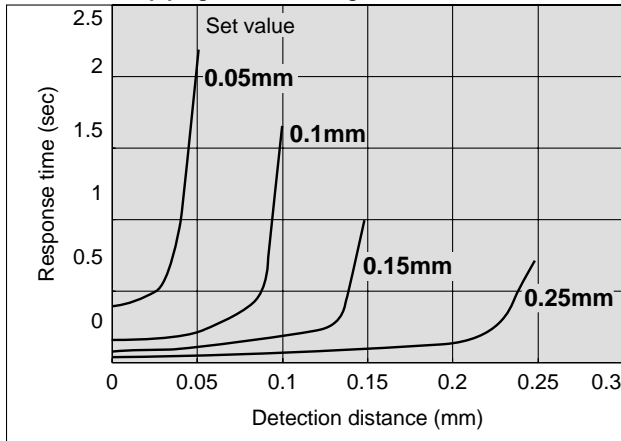
Response time changes with detection distance and piping length. It is hardly influenced by the supply pressure and nozzle diameter ($\phi 1.0$ to $\phi 2.0$).

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 set distance is equal to the set value, the response becomes quicker as the set value becomes smaller or the piping length becomes shorter.

ISA2-G

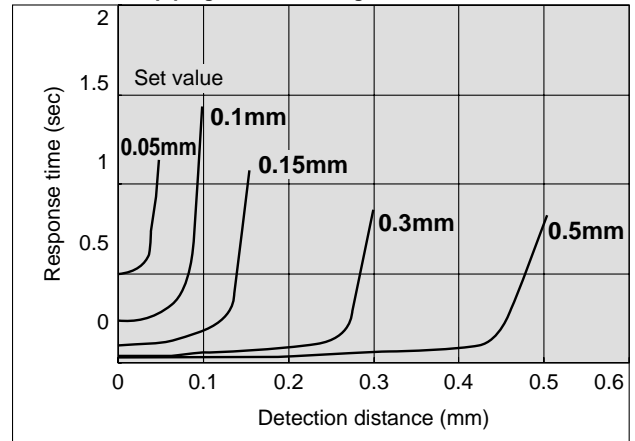
ISA2-H

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



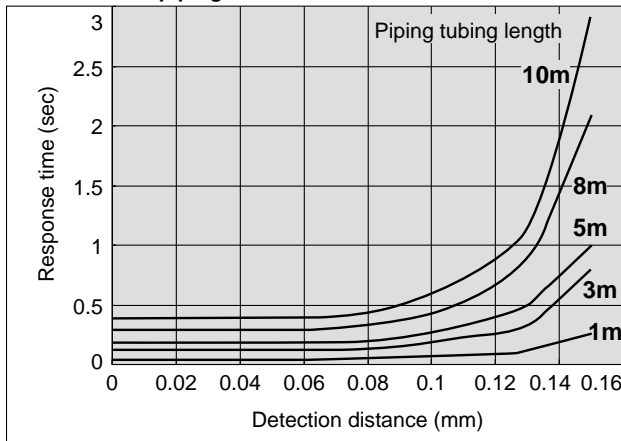
Detection distance–Response time characteristics

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



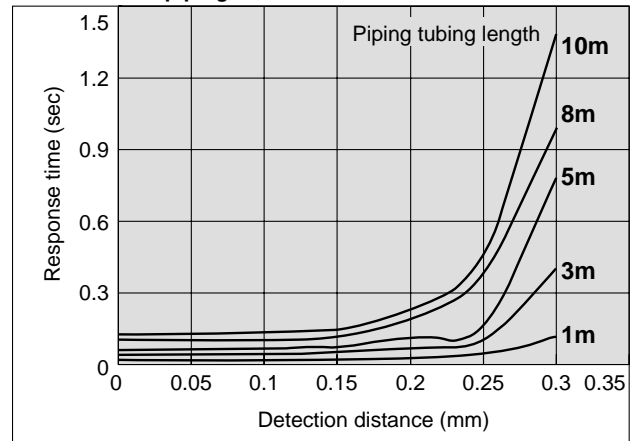
Detection distance–Response time characteristics

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



Piping tubing length–Response time

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



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.

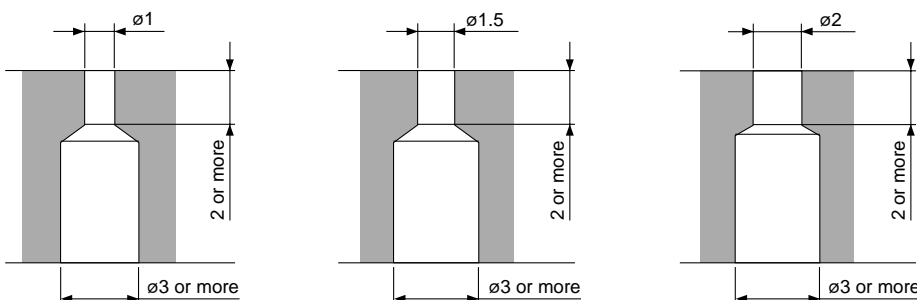
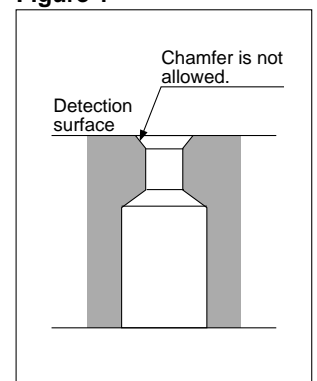


Figure 1



Series ISA2

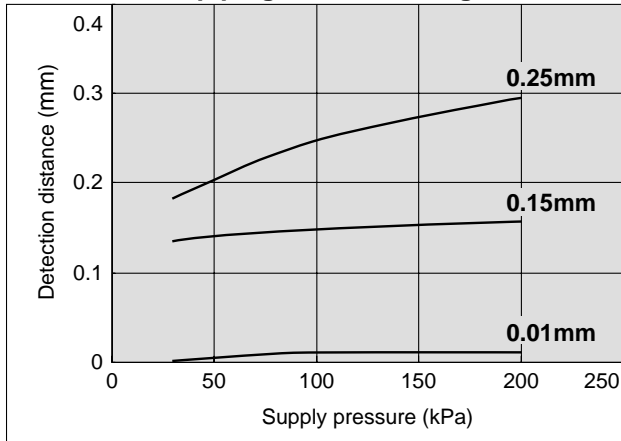
Supply Pressure Dependence

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

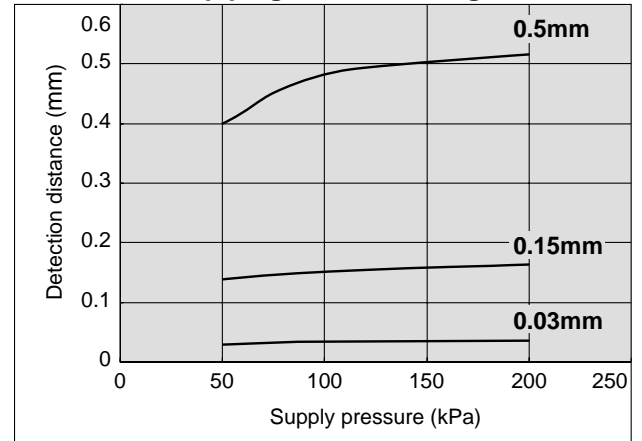
ISA2-G

ISA2-H

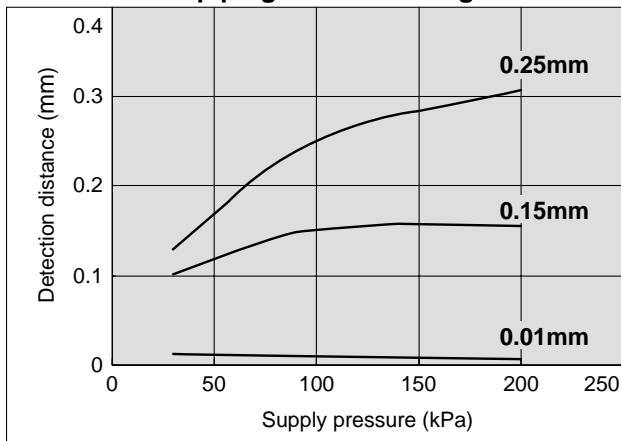
Detection nozzle: $\varnothing 1.0$
Detection side piping: $\varnothing 6 \times \varnothing 4$ tubing 5m



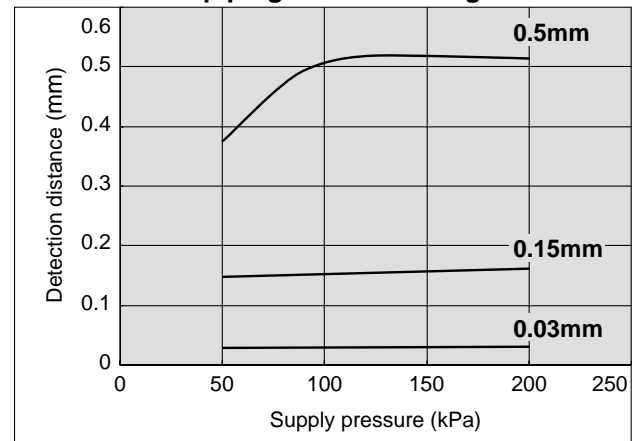
Detection nozzle: $\varnothing 1.0$
Detection side piping: $\varnothing 6 \times \varnothing 4$ tubing 5m



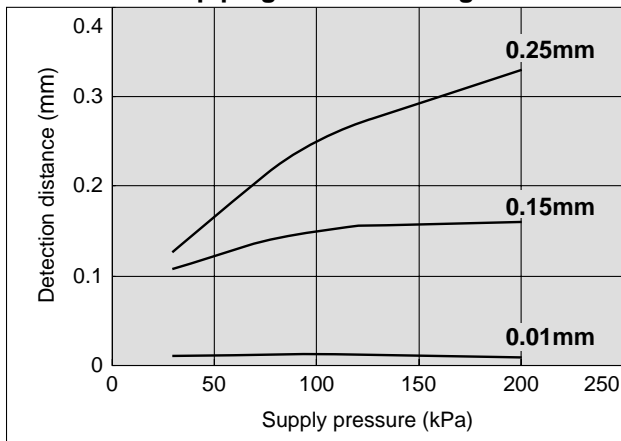
Detection nozzle: $\varnothing 1.5$
Detection side piping: $\varnothing 6 \times \varnothing 4$ tubing 5m



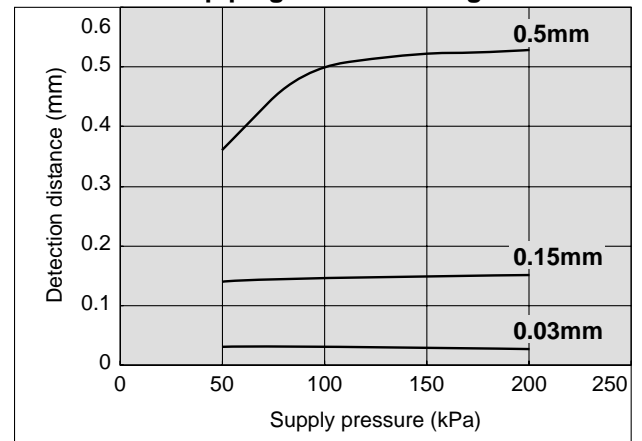
Detection nozzle: $\varnothing 1.5$
Detection side piping: $\varnothing 6 \times \varnothing 4$ tubing 5m



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



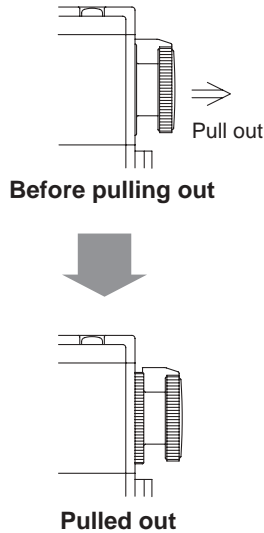
Detection nozzle: $\varnothing 2.0$
Detection side piping: $\varnothing 6 \times \varnothing 4$ tubing 5m



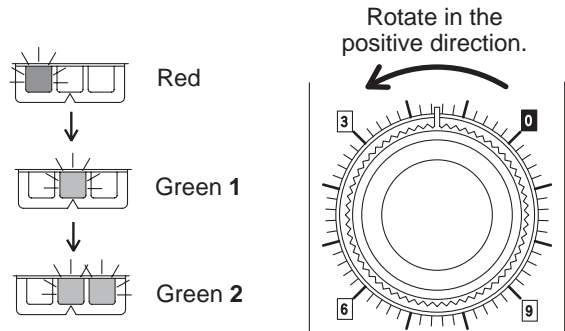
Setting Procedure

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 .
3. Pull the setting dial and rotate it in the positive direction. The lights will turn on in the order shown below.



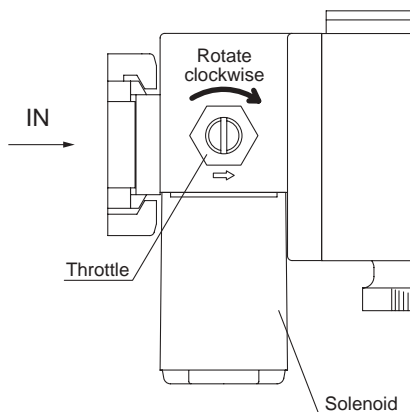
4. The sensor output comes on when the lights on the LED level meter turn on as . Complete the setting when this condition is observed.
5. Apply the clearance gauge again to confirm that the lights turn on as .

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, Counter-clockwise: 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.

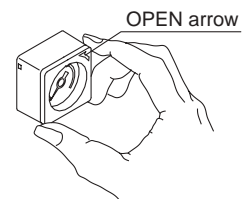


3. Power on the valve, then off again.
Confirm that the detection nozzle does not suck up water or cutting oil.
Note) Do not rotate the throttle more than 4 turns or it will fall out.

Handling and setting of limit gauge indicator

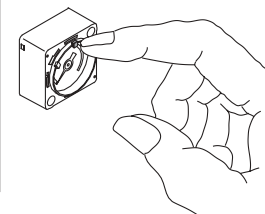
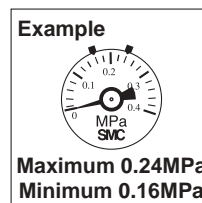
1. Removal of cover

Grip fingers 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.



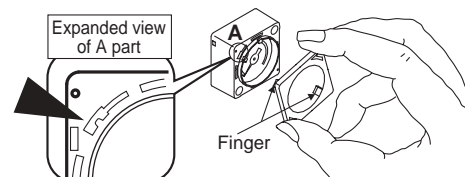
2. Setting the installation needle

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: 100kPa

Piping: $\phi 6 \times \phi 4$ tubing, 5m in length.

Results of measurement ^{Note 1)}

●Relation between the detection distance and set dial scales ^{Note 2)} (scale numbers)

ISA2-G

Detection distance	Detection nozzle diameter		
	$\phi 1.0$	$\phi 1.5$	$\phi 2.0$
0.05mm	0.3 to 0.7	0.9 to 1.4	0.3 to 0.7
0.10mm	1.1 to 1.5	2.3 to 2.8	2.0 to 2.5
0.15mm	1.9 to 2.3	3.4 to 4.1	3.7 to 4.6
0.20mm	2.5 to 3.0	4.4 to 5.5	5.3 to 7.0
0.25mm	3.0 to 3.5	5.2 to 7.0	6.6 to 10.7

ISA2-H

Detection distance	Detection nozzle diameter		
	$\phi 1.0$	$\phi 1.5$	$\phi 2.0$
0.1mm	1.1 to 1.5	2.4 to 2.8	2.6 to 3.4
0.2mm	2.4 to 2.9	4.5 to 5.1	5.4 to 6.4
0.3mm	3.0 to 3.5	5.5 to 6.3	7.0 to 8.3
0.4mm	3.3 to 3.8	6.0 to 7.0	7.9 to 9.6
0.5mm	3.5 to 4.0	6.5 to 7.5	8.6 to 10.7

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

ISA2-G

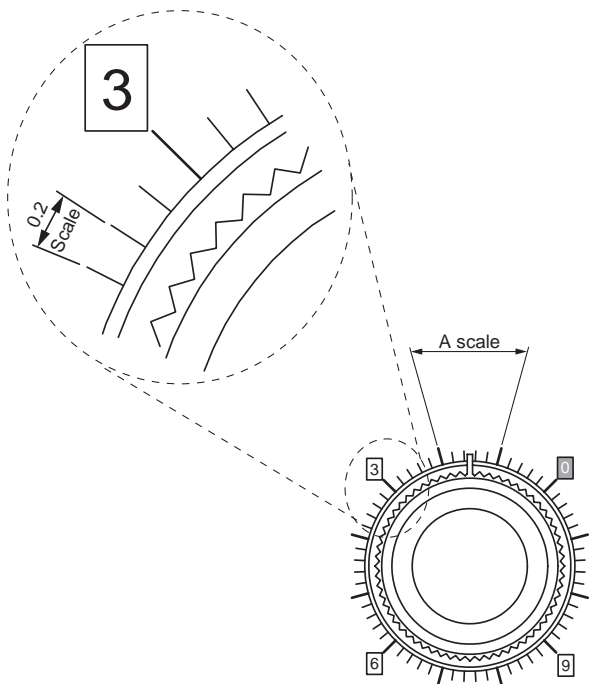
Detection distance	Detection nozzle diameter		
	$\phi 1.0$	$\phi 1.5$	$\phi 2.0$
0.05mm	0.010	0.005	0.006
0.10mm	0.007	0.004	0.003
0.15mm	0.010	0.005	0.004
0.20mm	0.010	0.005	0.003
0.25mm	0.010	0.007	0.003

ISA2-H

Detection distance	Detection nozzle diameter		
	$\phi 1.0$	$\phi 1.5$	$\phi 2.0$
0.1mm	0.008	0.004	0.003
0.2mm	0.008	0.005	0.004
0.3mm	0.025	0.011	0.007
0.4mm	0.046	0.019	0.011
0.5mm	0.050	0.021	0.012

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;

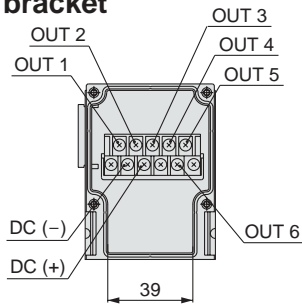


Between each major scales, it is sub divided into ten smaller settings (for example, between 2.0 to 3.0 – 2.1, 2.2, 2.3 etc), settings are possible at each increment.

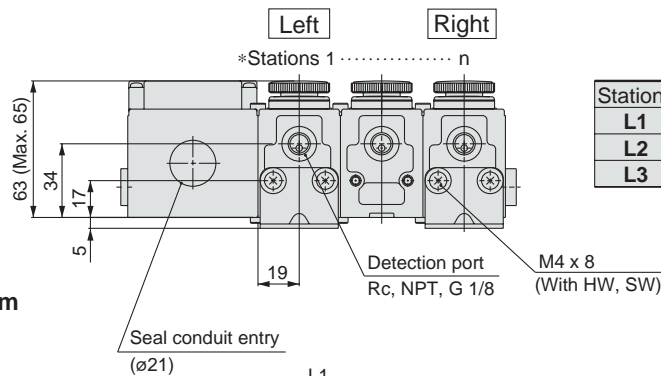
Dimensions/Centralised Wiring Type

* When the SUP port is on the left, the stations are sequentially numbered from the side of the terminal block box.

With bracket

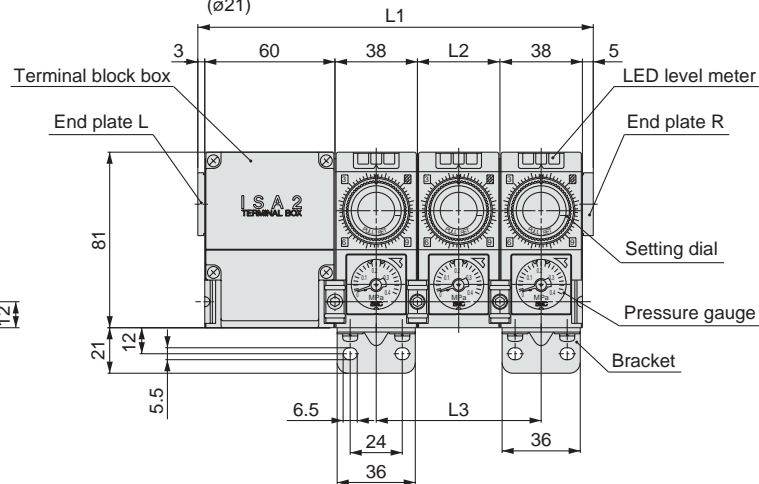
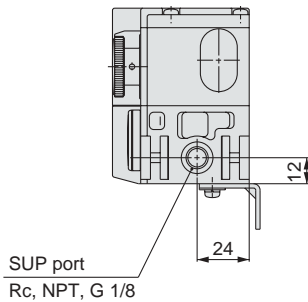


Terminal block box wiring diagram

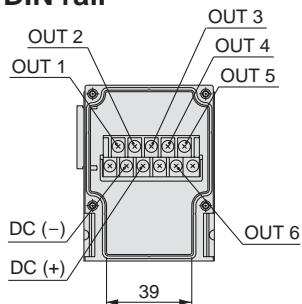


Stations	1	2	3	4	5	6
L1	106	144	182	220	258	296
L2	—	—	38	76	114	152
L3	—	38	76	114	152	190

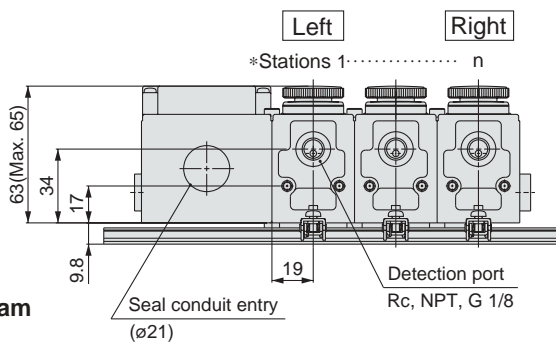
For the bracket attachment position, refer to page 13.



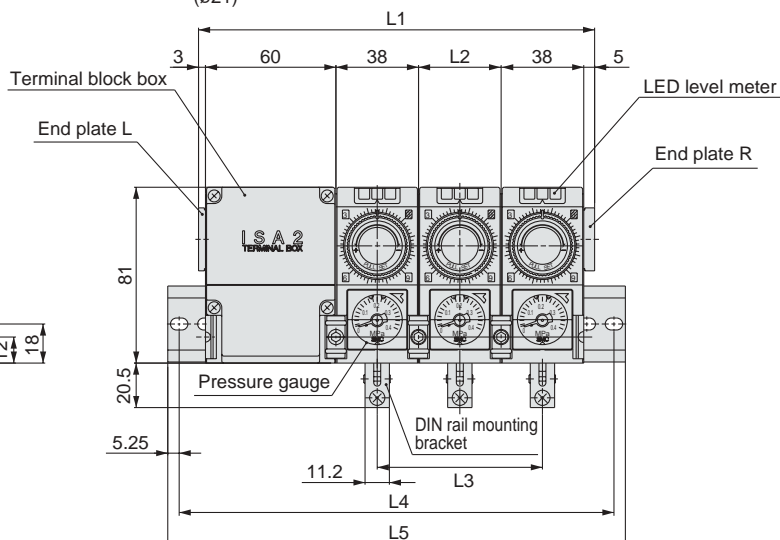
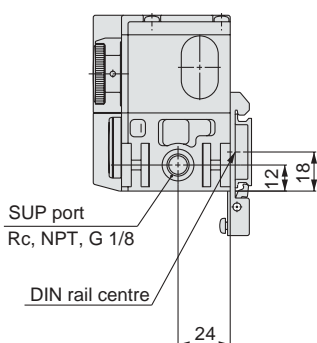
With DIN rail



Terminal block box wiring diagram



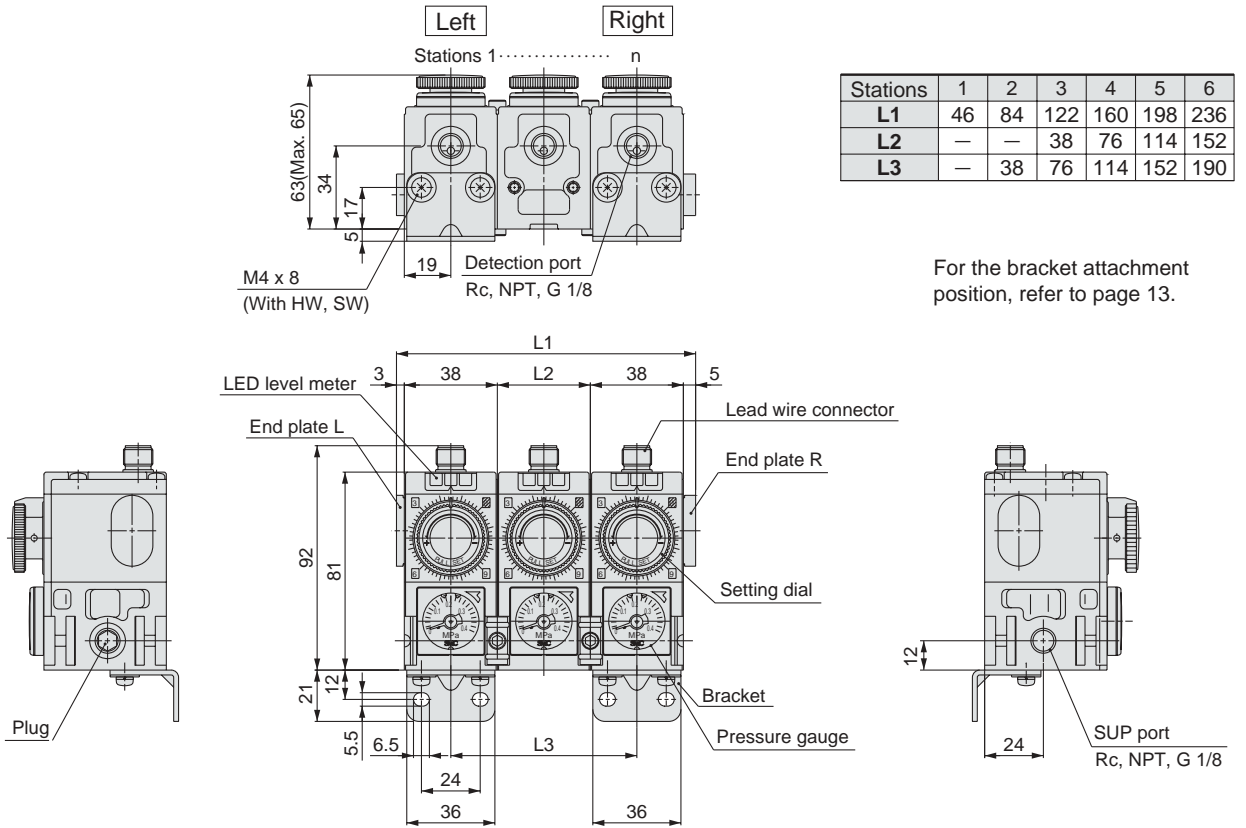
Stations	1	2	3	4	5	6
L1	106	144	182	220	258	296
L2	—	—	38	76	114	152
L3	—	38	76	114	152	190
L4	120	162.5	200	237.5	275	312.5
L5	135.5	173	210.5	248	285.5	323



Series ISA2

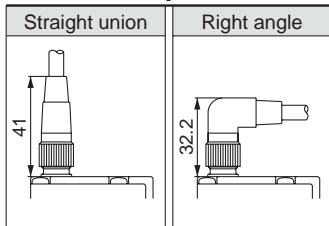
Dimensions/Individual Wiring Type

With bracket

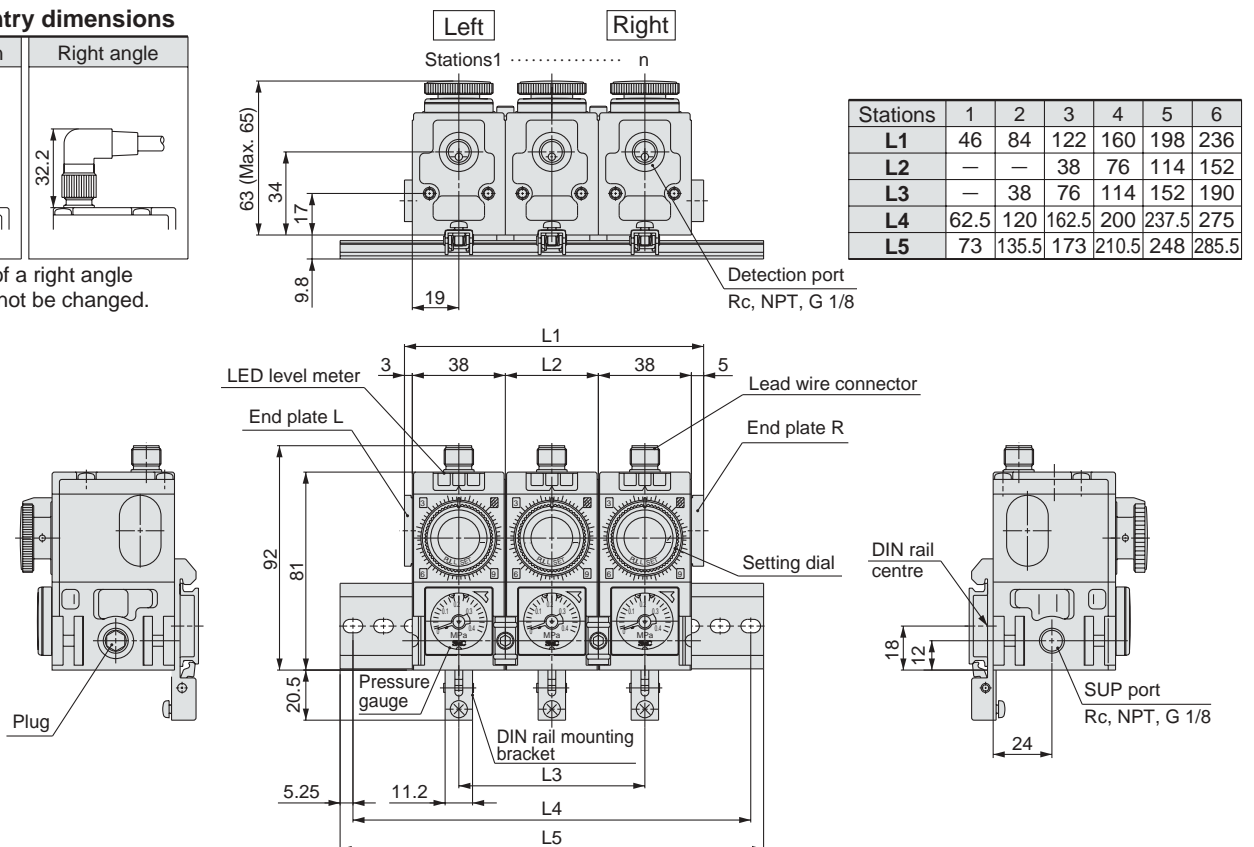


With DIN rail

Electrical entry dimensions

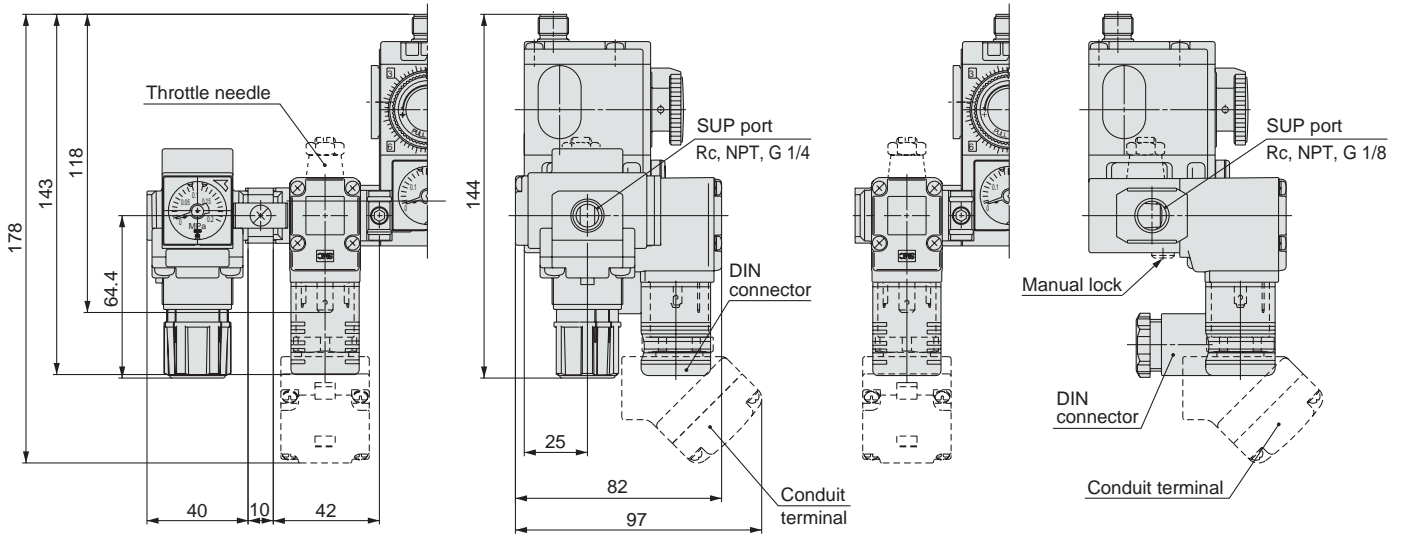


The direction of a right angle connector cannot be changed.



Dimensions/With control unit

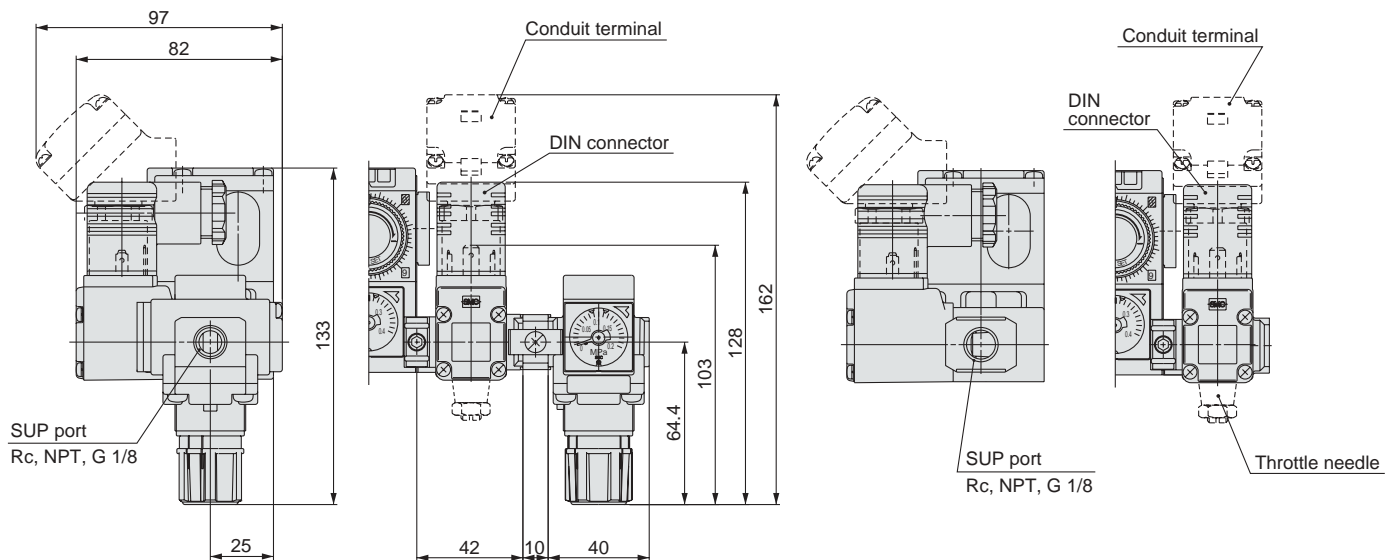
SUP port on the left



With regulator + 2 port solenoid valve

With 2 port solenoid valve

SUP port on the right



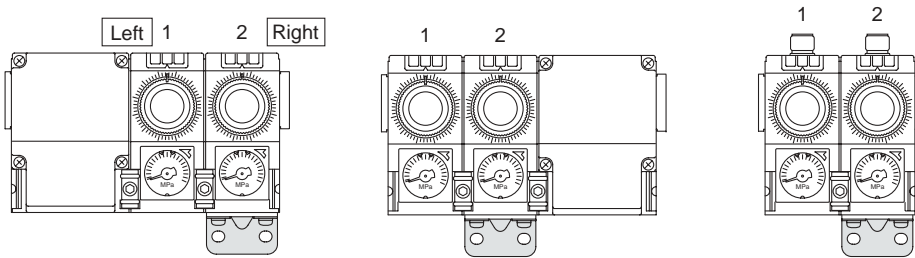
With regulator + 2 port solenoid valve

With 2 port solenoid valve

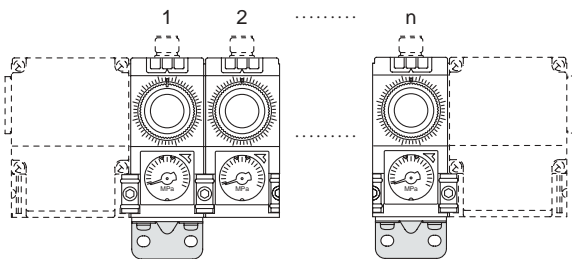
Series ISA2

Bracket Mounting Position

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

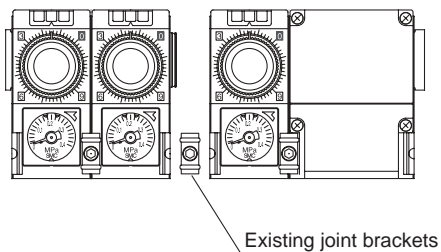


With n stations, the bracket is mounted on the first and "n" th sensor from the left.



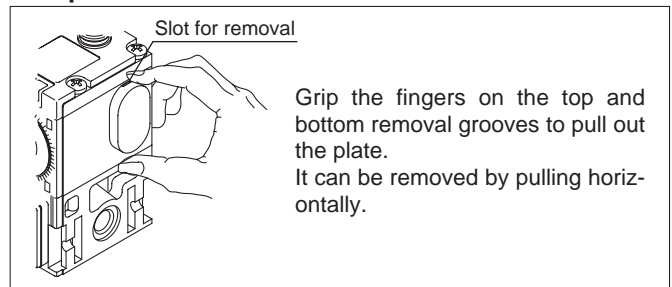
Addition of Manifold Stations

1. Disassembly

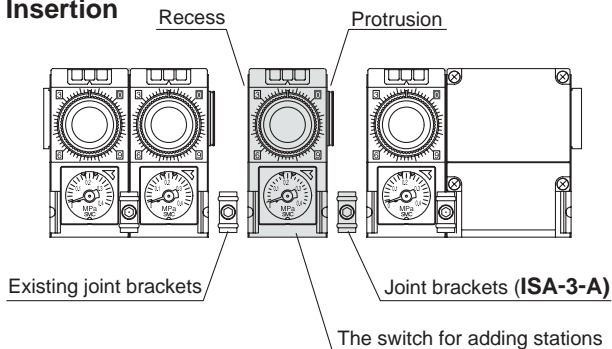


1. Loosen the screws and remove the 2 mounting brackets on the front and back side.
2. Disassemble the switch carefully so that the O-ring on the SUP port will not be detached.

End plate removal

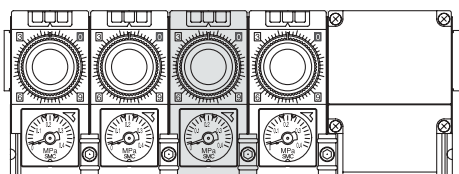


2. Insertion



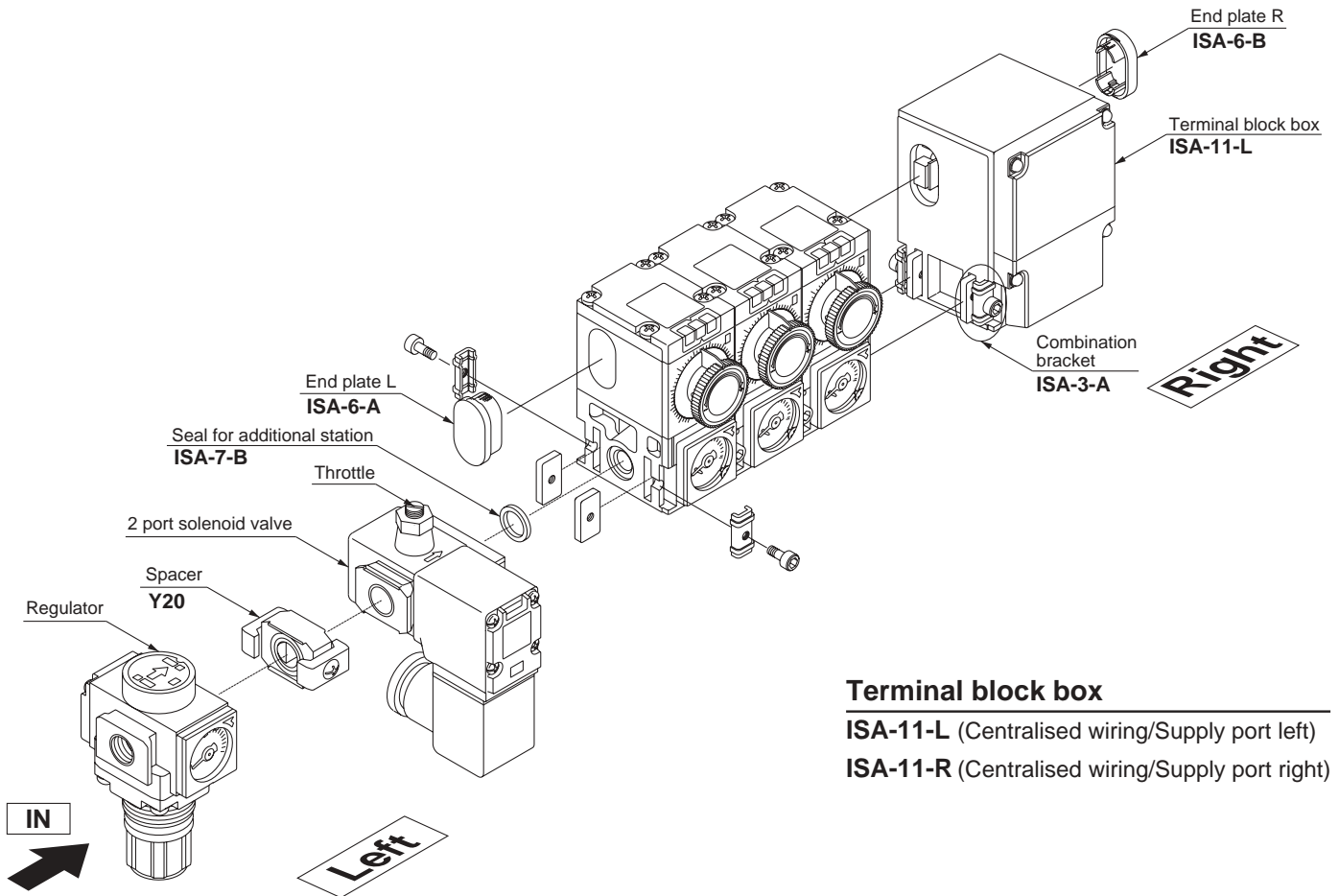
1. Fit seal for additional station (**ISA-7-B**) to the recess of the SUP port of the additional switch.
2. Fit the protrusion of the additional switch into the existing switch.
3. Mount joint brackets (**ISA-3-A**) at 2 positions.
Note) Perform temporary tightening of screws.
4. Confirm that the recess 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 1.2N·m.
2. Arrange pneumatic piping and confirm that there is no air leakage from new joints.

Parts List

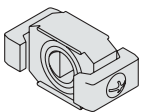


Terminal block box

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

ISA-11-R (Centralised 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

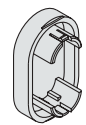
When a 2 port solenoid valve is connected to the right:



End plate L ISA-6-A



End plate R ISA-6-B



Joint bracket ISA-3-A

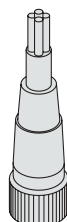
A pair consists 1 set.



Lead wire with connector (Individual wiring type)

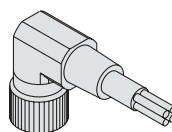
ISA-8-A

Straight, 5m

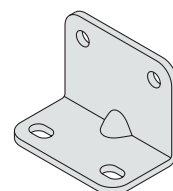


ISA-8-B

Right angle, 5m

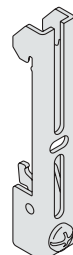


Bracket ISA-4-A



With mounting screw 2 pcs.

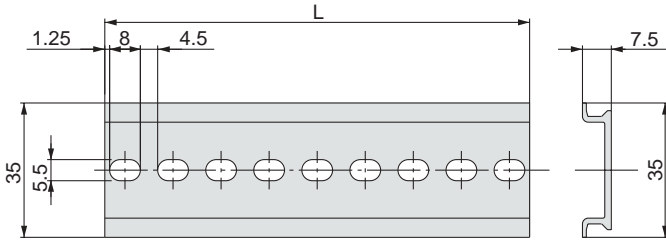
DIN rail mounting bracket ISA-9-A



Series ISA2

DIN Rail

ISA-5-□



Part no.	L	Applicable models	
		Individual wiring type	Centralised 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

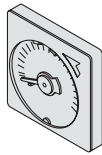
GC3-□-4-AS

Notation specification

-	MPa single notation
P	PSI single notation

Maximum pressure indication

2	0.2MPa
4	0.4MPa



Round pressure gauge

G36-□-4-01

Notation specification

-	MPa single notation
P ^{Note)}	MPa-PSI double notation

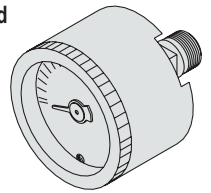
Maximum pressure indication

2	0.2MPa
4	0.4MPa

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

Connection thread

-	R 1/8
N	NPT 1/8



Regulator

AR 20-□-02 E-1 □

Thread type

-	Rc
N	NPT
F	G

Option (The shape of pressure gauge) ^{Note 2)}

-	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 Rc 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

-	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) AR20-02E-1-X2025

Standard specifications

Model	AR20	
Port size	1/4	
Fluid	Air	
Proof pressure	1.5MPa	
Maximum operating pressure	1.0MPa	
Set pressure range	0.02 to 0.2MPa	
Gauge port size ^{Note 1)}	1/8	
Relief pressure	Set pressure + 0.05MPa {at relief flow of 0.1l/min(ANR)}	
Ambient and fluid temperature	-5 to 60°C (with no condensation)	
Construction	Relieving type	
Weight (kg)	0.29	
Pressure gauge	Round ^{Note 2)}	G36-2-□01
	Square embedded ^{Note 3)}	GC3-2AS

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

Port size

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

CE marked

Throttle

-	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)
DO	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 (with no freezing)
Enclosure		Dustproof and jetproof (Equivalent to IP65)
Atmosphere		Environment with no corrosive or explosive gas
Valve leakage cm ³ /min (ANR)		0.2 or less
Mounting orientation		Free
Vibration resistance/Impact resistance m/s ² ^{Note 2)}		30/150 or less
Rated voltage		24/12VDC, 100/110/200/220/230VAC (50/60Hz)
Allowable voltage fluctuation		±10% rated voltage
Type of coil insulation		B type
Power consumption	DC	VCA2: 6.5W
Apparent power	^{Note 1)} AC	VCA2: 7.5VA
	50Hz	
	60Hz	

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 300Hz range in the axial and right angle directions of the main valve and armature, for both energised and de-energised 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 energised and de-energised states.



Series ISA2

Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by a label of "**Caution**", "**Warning**" or "**Danger**". To ensure safety, be sure to observe ISO 4414 Note 1), JIS B 8370 Note 2) and other safety practices.

⚠ Caution : Operator error could result in injury or equipment damage.

⚠ Warning : Operator error could result in serious injury or loss of life.

⚠ Danger : In extreme conditions, there is a possible result of serious injury or loss of life.

Note 1) ISO 4414: Pneumatic fluid power – General rules relating to systems

Note 2) JIS B 8370: General Rules for Pneumatic Equipment

⚠ Warning

1. The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.

Since the products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your specific requirements. The expected performance and safety assurance will be the responsibility of the person who has determined the compatibility of the system. This person should continuously review the suitability of all items specified. Referring to the latest catalogue information with a view to giving due consideration to any possibility of equipment failure when configuring a system.

2. Only trained personnel should operate pneumatically operated machinery and equipment.

Compressed air can be dangerous if an operator is unfamiliar with it. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.

3. Do not service machinery/equipment or attempt to remove components until safety is confirmed.

1. Inspection and maintenance of machinery/equipment should only be performed once measures to prevent falling or runaway of the driven object have been confirmed.
2. When equipment is to be removed, confirm the safety process as mentioned above. Cut the supply pressure for this equipment and exhaust all residual compressed air in the system.
3. Before machinery/equipment is restarted, take measures to prevent shooting-out of cylinder piston rod, etc.

4. Contact SMC if the product is to be used in any of the following conditions:

1. Conditions and environments beyond the given specifications, or if product is used outdoors.
2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, clutch and brake circuit in press applications, or safety equipment.
3. An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.



Series ISA2 Common Precautions 1

Be sure to read before handling.

Design and Selection

Warning

1. Operate the switch only within the specified voltage.

Use of the switch outside the range of the specified voltage can cause not only malfunction and damage to the switch but also electric shocks and fire.

2. Never apply a load above the maximum load capacity.

It can damage the air catch sensor or shorten the life time.

3. Do not use a load that generates surge voltage.

Although the output circuit of the air catch sensor is equipped for surge protection, repeated application of surges can damage the air catch sensor.

When a load, such as a relay or solenoid, which generates surge is directly driven, use a type of switch having a built-in surge absorbing element.

4. Be sure to observe the set pressure range and maximum operating pressure.

Use of the air catch sensor outside the range of the specified pressure can cause failure. Use at a pressure exceeding the maximum operating pressure may damage the air catch sensor.

5. Be aware of internal voltage drops of the air catch sensor.

When the air catch sensor is used below the specified voltage, even if the air catch sensor operates normally, the load may fail to operate. Confirm the operating voltage of the load and adjust it to satisfy the formula below.

$$\text{Power supply voltage} - \text{Internal voltage drop of air catch sensor} > \text{Load operating voltage}$$

6. Quality of operating air

1. Use clean air.

Do not use compressed air which includes chemicals, synthetic oils containing organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction.

2. Install air filters.

Install air filters at the upstream side of valves. The filtration degree should be 5μm or finer.

3. Install an after cooler, air dryer or water separator, etc.

Air that includes excessive drainage may cause malfunction of valves and other pneumatic equipment. To prevent this, install an after cooler, air dryer or water separator, etc.

Mounting

Warning

1. Do not use the switch unless it operates normally.

After installation, repair or reform, connect air and electricity and conduct appropriate function and leakage tests to confirm proper installation.

2. Observe the prescribed tightening torque in installation.

If screws are tightened with a force beyond the tightening torque range, it can cause damage to the mounting screws, mounting brackets and switches. If the force is below the tightening torque range, the fixing screws can come loose during operation.

connection thread :1/8, 1/4

Nominal size	Proper tightening torque N-m
M5	1/6 rotation after manual tightening
1/8	7 to 9
1/4	12 to 14

3. Detection port

Do not insert wire, etc. into pressure port. It will damage the pressure sensor and cause malfunction.

Maintenance

Warning

1. Removal of the product

1. Shut off the fluid supply and release the fluid pressure inside the system.
2. Shut off the power supply.
3. Remove the product.

2. Perform periodic inspections to confirm proper operation.

Unexpected malfunctions or incorrect operation can cause possible danger.

3. Be careful when using the air catch sensor in an interlocking circuit.

When using the air catch sensor in an interlocking circuit, build a multiple interlocking system to prevent trouble or malfunction. At the same time, perform periodic inspections to confirm proper operation.

Caution

1. When the body becomes dirty.

Wipe off dirt with soft cloth. In case of heavy dirt, soak the cloth in neutral detergent diluted with water, wring the water out, wipe off the dirt with the cloth and finish with dry cloth.



Series ISA2 Common Precautions 2

Be sure to read before handling.

Wiring

⚠ Warning

1. Confirm the colours and terminal numbers of the wires when connecting.

Incorrect wiring can lead to damage, failure and malfunction. Confirm colours and terminal numbers in the operation manual when wiring.

2. Avoid repeatedly bending or stretching lead wires.

Broken wires will result from applying repeated bending stress or stretching force to the lead wires. Replace any lead wire that is damaged and can possibly cause malfunction.

3. Confirm proper insulation of wiring.

Be certain that there is no faulty wiring insulation (contact with other circuits, ground fault, improper insulation between terminals, etc.) Damage may occur due to excess current flow into an air catch sensor.

4. Do not run wiring near power lines or high voltage lines.

Wire separately from power lines or high voltage lines, avoiding parallel wiring or wiring in the same conduit with these lines. Control circuits containing auto switches may malfunction due to noise from these other lines.

5. Do not allow short circuit of loads.

Take special care to avoid reverse wiring with the power supply line (brown) and the output line (black).

Operating Environment

⚠ Warning

1. Never use in an atmosphere of explosive gases.

The construction of air catch sensor is not intended to prevent explosion. Never use in an atmosphere with an explosive gas since this may cause a serious explosion.

2. Do not use in an atmosphere of corrosive gases, chemicals, sea water, water, or vapor or in an environment where such a substance adheres.

3. Do not use in environment where vibration or impact occurs.

4. Do not operate in a location near a heat source or where radiated heat will be received.

5. Take proper protection measures in an environment where water splashes, oil or spatters from welding may adhere to the product.

6. Do not use in locations where surge is generated.

If there is equipment generating a large surge (such as a solenoid lifter, high frequency induction furnace or motor) around the air catch sensor, it can deteriorate or damage the circuit elements inside the air catch sensor. Apply surge protection measures to the source of the surge and keep the lines apart from each other.

Pressure Source

⚠ Warning

1. Use the air catch sensor within the specified fluid and ambient temperature range.

The fluid and ambient temperature are 0 to 60°C. Take measures to prevent freezing, since moisture in circuits may be frozen at or below 5°C, which can cause damage the O-ring and lead to malfunction. Installation of an air dryer is recommended to remove drain and moisture. Do not use the air catch sensor in an environment with sudden temperature changes even if the ambient temperature range is compliant with the specifications.

Piping

⚠ Caution

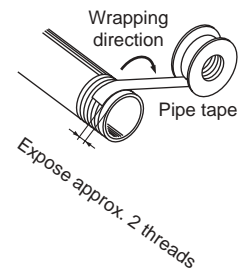
1. Preparation before piping

Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.

Do not allow tensile, contracting or bending forces by piping to be applied to the valve body.

2. Wrapping of pipe tape

When screwing together pipes and fittings, etc., be certain that chips from the pipe threads and sealing material do not get inside the piping. Also, when pipe tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.





Series ISA2 Specific Product Precautions 1

Be sure to read before handling.

Air Catch Sensor Series ISA2

Operating Environment

Warning

1. Do not use in an environment where vibration or impact occurs. Use a bracket in an environment with vibration exceeding 30 m/s².
2. The enclosure of the switch conforms to IP66 and that for the solenoid valve to IP65. The pressure gauge and the regulator have open constructions. Take proper protection measures in an environment where water splashes, oil or spatters from welding may adhere to the product.
3. Since steel piping lacking flexibility is easily affected by moment loads or propagation of vibration, employ flexible tubing, etc., to prevent interactions of such factors.
4. Although CE accredited, this air catch sensor is not equipped with surge protection against lightning. Necessary counter-measures for possible lightning surge should be fitted to system components as required.
5. Do not operate in locations having an atmosphere of flammable, explosive or corrosive gases, which can result in fire, explosion or corrosion. The air catch sensor does not have an explosion proof rating.

Caution

1. 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.
2. 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 5µm 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. Energised continuously

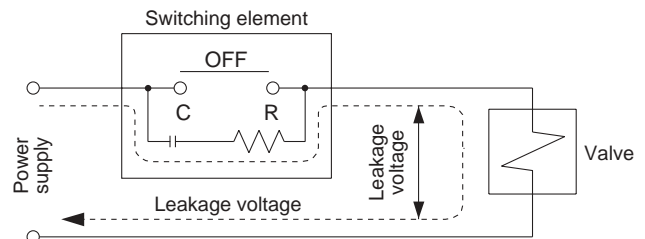
Consult SMC if the product is to be energised continuously for long periods of time.

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. It may cause the coil to burn.



Series ISA2 Specific Product Precautions 2

Be sure to read before handling.

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

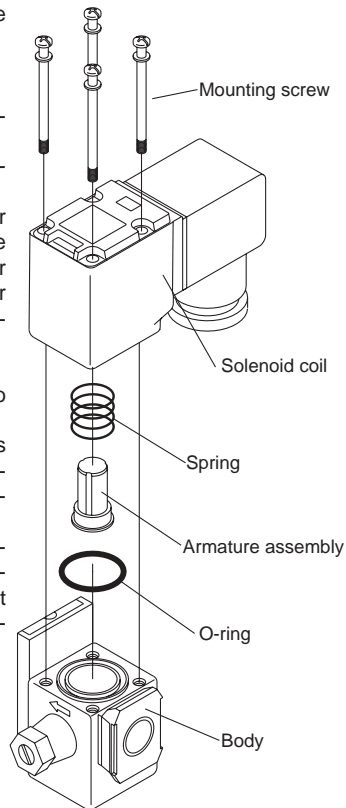
1. Remove the top mounting screws.
2. Remove the solenoid coil, spring and armature assembly.
3. If there is any foreign matter adhering on the surface, take appropriate measures to clear it off such as an air blow or washing with neutral detergent.

· 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 screws by each pair of corners on a diagonal line at the proper tightening torque shown below.



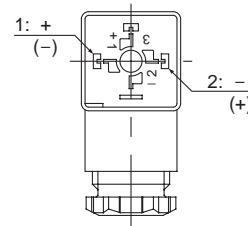
Proper tightening torque N·m	
VCA27	0.4 to 0.5

Wiring

⚠ Caution

DIN connector (B type only)

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

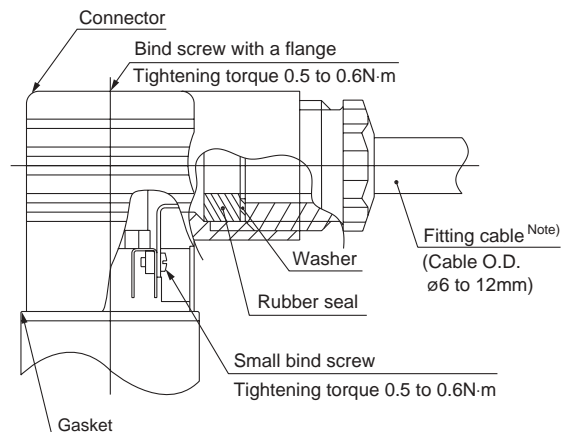


Terminal No.	1	2
DIN terminal	+ (-)	- (+)

*No polarity.

· A compatible heavy duty 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.

Wiring

⚠ Caution

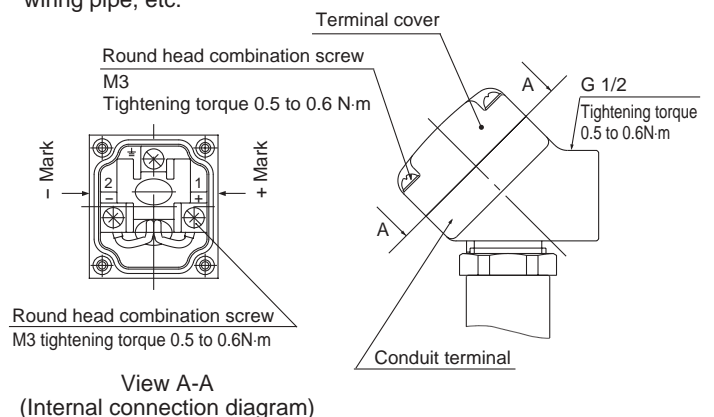
1. Use electrical wires with a conductive sectional area of 0.5 to 1.25 mm². Make sure that no excessive force is applied to the wires.
2. Adopt an electrical circuit which will not cause chattering at the contact.
3. The voltage variation must stay within the -10% to +10% range of the rated voltage. In case importance is attached to response characteristics due to use of a DC power source, 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.

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.





Series ISA2 Specific Product Precautions 3

Be sure to read before handling.

2 Port Solenoid Valve Series VCA

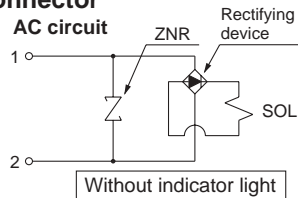
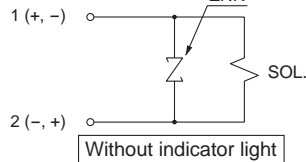
Electric Circuit

⚠ Caution

In case of series VC (B type coil)

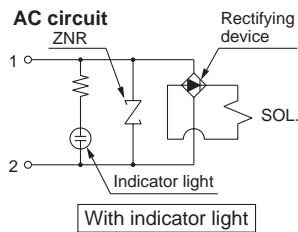
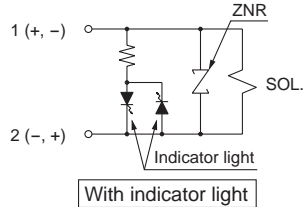
Conduit terminal, DIN type connector

DC circuit



Conduit terminal, DIN type connector

DC 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

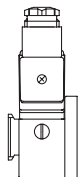
How to operate manually

Locking type (tool required)

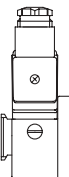
To open valve: Rotate to the right by 90° using a flat head screwdriver. It will still hold open even when the driver removed.

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 coloured 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 coloured 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.

SMC Corporation

1-16-4 Shimbashi, Minato-ku, Tokyo 105-0004, JAPAN
Tel: 03-3502-2740 Fax: 03-3508-2480
URL <http://www.smcworld.com>
© 2003 SMC CORPORATION All Rights Reserved

European Marketing Centre (EMC)

Zuazobidea 14, 01015 Vitoria
Tel: +34 945-184 100 Fax: +34 945-184 124
URL <http://www.smceu.com>