Safety Standard ISO 13849-1 Compliant (Corresponding to Categories 3 and 4)

Safety Exhaust Valve Modular Connection Type

 The type without a pressure gauge and with digital pressure switch specification are UL certified. Refer to page 7 for details.







Safety Exhaust Valve/Modular Connection Type VPX400 series



Series variations

Max. PL AC size VPX406-A3 AC30 25.0 (AC30 connection) Safety exhaust VPX406-A4 $2 \Rightarrow 3$ 31.0 3, 4 PL e AC40 (AC40 connection) $(A \Rightarrow R)$ valve 1 **VPX400** VPX406-A6 AC50/ 35.8 (AC50/60 connection) 8 60 ·** Residual pressure release valve a a 8.3 AC30 VP546 $2 \Rightarrow 3$ 3.4 PL e $(A \Rightarrow R)$ Residual pressure release valve AC40 12.3 **VP746**

High flow rate: Approx. 3.0 times (AC30 connection) / Approx. 2.5 times (AC40 connection)

System protection through "Safety Exhaust" function

- Valves return to de-energised position via spring force in the case of power loss.
- If one of the residual pressure release valves fails to operate, the other one releases the residual pressure.
- Built in pressure sensor monitors valve operations.



Display of monitoring status: Fault can be checked visually as well as by signal.



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SOL.1/SOL.2/SEN.E/SEN.2 input/output signal diagram

Sensor Output Chart

This valve is dual channel safety exhaust valve. The valve can be monitored via built-in pressure sensors, allowing the safety controller to diagnose main valve faults or normal operation. The table below shows the energizing status of the respective valve, sensor waveform, and port 2 pressure waveform.

- SOL.1 (Valve 1) : 1st residual pressure release valve
- SOL.2 (Valve 2) : 2nd residual pressure release valve

Sensor E (SEN.E): Sensor to monitor the error status between two valves (SOL.1/SOL.2)

Sensor 2 (SEN.2): Sensor to monitor pressure in output port (Port 2) of valve

sor outp SEN.E SEN.2 Actuation SOL.1 SOL.2 ERR.LED Port 2 pressure OFF OFF ON ON OFF Normal OFF operation ON ON ON OFF OFF ON OFF Main valve ON OFF ON ON OFF error OFF ON OFF ON ON OFF



*1 This assumes that SOL.1 (valve 1) does not OFF.

*2 In SEN.E and SEN.2, relation of pressure and output are inverted. When pressure is detected in SEN.E or SEN.2 their output signal is 0 V

With soft start-up function & pilot flow path check valve

A function to gradually increase the initial pressure of the pneumatic system has been added.



Output Pressure (P2) vs Time Graph



Built-in check valve to the pilot flow path prevents the pilot pressure drop. (to prevent malfunction due to inlet pressure fluctuation)

Standards and Enclosure



*2 It is IP40 depending on the type of pressure gauge. For details, refer to the valve specifications.





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CONTENTS

Safety Exhaust Valve/Modular Connection Type VPX400 Series



How to Order	p. 7
Assembly Example	p. 8
Valve Specifications	p. 9
Flow Rate Characteristics	p. 9
Symbols	p. 9
Dimensions	p. 10
Valve Wiring Diagrams, Optional Accessories	·····p. 14

Safety Exhaust Valve/ **Modular Connection Type** VPX400 Series

How to Order





Pressure specifications

High pressure (0.25 to 1.0 MPa) κ

2 Coil specifications

With power-saving circuit т

4 Electrical entry

ко	M12 connector, Without connector cable
Κ	With M12 connector, Cable length: 3000 mm

When option "K" (With M12 connector cable) is selected, 2 cables are included.

5 Light/surge voltage suppressor

and common specification

With light/surge voltage suppressor NZ Negative common

3 Rated voltage 5

24 VDC

6 Pressure sensor wiring specifications

D	Double common
N1	Negative common, Wiring type 1
N2	Negative common, Wiring type 2

* They are not wiring specifications of pressure gauge type and digital pressure switch. Refer to page 14: Valve wiring Diagrams and M12 connector pin assignment for pressure sensor (SEN.)

Press	V Pressure gauge type			
Nil*1		Without pressure gauge	0	
G *2	Pressure	Round type pressure gauge (with limit indicator)	-	
M *2	gauge	Round type pressure gauge (with color zone)	—	
E		Square embedded type pressure gauge (with limit indicator)	—	
E1		Output: NPN output, Electrical entry: Wiring bottom entry	0	
E2	Digital	Output: NPN output, Electrical entry: Wiring top entry	0	
E3	switch	Output: PNP output, Electrical entry: Wiring bottom entry	0	
E4		Output: PNP output, Electrical entry: Wiring top entry	0	

*1 Without pressure gauge, pressure gauge connection thread is fitted with a plug.

*2 Pressure gauge type G, M is included with pressure gauge.

		Pressure gauge type			
8 Pre	essure gauge unit	Nil/M	G/E	E1 to E4	
Nil	Pressure gauge in SI units: MPa	0	0	0	
Z *1	Pressure gauge: MPa/psi dual scale	—	0	0	
ZA *2	Digital pressure switch: With unit selection function	_	—	0	

*1 This product is for overseas use only according to the New Measurement Act. (The SI unit is provided for use in Japan.)

The digital pressure switch will be equipped with the unit selection function, setting to psi initially. *2 This product is for overseas use only according to the New Measurement Act. (The SI unit is

provided for use in Japan.)

9 Connected AC size

Symbol Connected AC size		Flow rate characteristics $(2 \Rightarrow 3)$		Port size	
	1/2 0011	C [dm³/(s⋅bar)]	b	10110	
A3	AC30	25.0	0.20		
A4	AC40	31.0	0.15	G1"	
A6	AC50/60	35.8	0.10		

Thread type [Pressure gauge connection thread (1/8")]*1

Symbol	Pressure gauge type Thread type	Nil/ G/M	E/E1 to E4
Nil	Rc	∆*2	0
N	NPT	O*2	-
F	G	∆*2	-

*1 The thread is cut only when pressure gauge type "Nil," "G," or "M" is selected. *2 When "G" is selected for the pressure gauge type, and "Z" is

selected for the pressure gauge unit, only "N" (NPT) is supported. * Port (exhaust port) is only G thread regardless of thread type.



Assembly Example



- *1 No connection thread in safety exhaust valve Order a piping adapter separately.
- *2 Refer to page 15 for details on the spacer with bracket, piping adapter, and silencer.
- * Combination with lubricator cannot be used.
- * Between the air combination and the safety exhaust valve, and between the safety exhaust valve and piping adapter, we recommend installing a spacer with bracket to consider the effect of moments, vibration, and impact.

Products do not come assembled. They should be ordered separately and assembled by the customer.

Please contact your local sales representative for more details.

-Assembly Example -

①Air combination AC40B-04E-D ······· 1 pc.
② Spacer with bracket Y400T-D ······2 pcs.
③Safety exhaust valve
VPX406KT-5KONZ-DG-A4 ······1 pc.
④ Piping adapter E400-04-D ······· 1 pc.
⑤ Silencer INA-25-100 ······· 1 pc.

Applicable Combinations/Attachment Part Nos.

Safety	Air com	Air combination		Piping	Silonoor	
exhaust valve	Model	Component	bracket	adapter	Sileillei	
		AF30-D		E300-🗆		
VPX400-A3		AR30-D	13001-D	□-D		
VPX406-A4	AC40□-D	AF40-D	Y400T-D	E400-🗆	INA-25- 100	
		AR40-D		□-D		
		AF50-D				
VPX406-A6	AC30L-D	AR50-D		E600-🗆		
	AC60□-D	AF60-D		□-D		
		AR60-D				

Valve Specifications

	Fluid		А	ir		
	Type of actuation		N.C. (Sprir	ng return)*1		
	Operating pressure	range	0.25 to 1.0 MPa			
	Proof pressure		1.5 MPa*2			
	Ambient and fluid te	emperatures	0 to 50°C (No freezing)			
	Humidity range		Operating/Stored: 35 to 8	5%RH (No condensation)		
	Max. operating frequency*3		1	Hz		
	Manual override		No			
	Pilot exhaust		Individual exhaust			
Value	Lubrication		Not possible			
valve	Mounting orientatio	n	Unres	tricted		
specifications	Impact/Vibration res	sistance ^{*4}	150/3	0 m/s ²		
	Enclosure	Pressure gauge type: Nil, G, M, E	IP	65		
	LICIOSULE	Pressure gauge type: E1, E2, E3, E4	IP	40		
	Operating environm	ent	Inde	pors		
	Electrical wiring		M12 connec	ctor x 2 pcs.		
	Indicator light	SOL.1/SOL.2/SEN.PWR.*5	LED (Green)		
	ERR.*6		LED (Red)			
	Surge voltage suppressor		Diode			
	Polarity protection circuit		Yes			
	B10D		1,083,893 cycles			
F	Rated voltage		24 \	/DC		
Coil	Allowable voltage fluctuation		Rated voltage	+10%		
specifications				-8%		
(SOL.)	Power	Inrush	0.45	W x 2		
	consumption	Holding	0.2 V	V x 2		
	Pressure sensor	Sensor E	For fault detection			
		Sensor 2	For port 2 output detection			
	Rated voltage		24 VDC			
Egult detection	Allowable voltage fl	uctuation	$\pm 10\%$ of the rated voltage with 10% voltage ripple or less			
specifications	Power consumption	1	0.3 W x 2			
(SEN.)	Output type		PNP open collector output			
	Output mode		Hysteresis mode			
	Max. load current		80 mA			
	Internal voltage dro	p	1 V or less (at load current of 80 mA)			
	Short circuit protec	tion	No			
Digital	Display/Smallest se	ttable increment	0.01	MPa		
pressure	Rated voltage		24 VDC			
switch	Allowable voltage fluctuation		±10% of the rated voltage with 10% voltage ripple or less			
(Pressure	Output type		NPN or PNP open collector output			
gauge type: E1/E2/E3/E4	Repeatability		±1% F.S.			
selected)*7	Display accuracy		±1% F.S. ±1 digit (at 25°C ±3°C)			
	Electrical wiring		M12 connector			

*1 Soft-start valve is air return type.

*2 Proof pressure is the maximum applied pressure with no damage, do not apply a pressure more than operating pressure range. Malfunction or air leakage may result.

*3 Duty ratio: 50%, With no load

*4 Impact resistance: No malfunction occurred when it is tested in the axial direction and at the right angles to the main valve and armature in both energized and de-energized states every once for each condition. (Values at the initial period)

*5 SEN.PWR. lights up when 2 pressure sensors are energized simultaneously.

*6 ERR.LED lights up when spools are in different states.

*7 For other specifications, refer to the ISE35 series operation manual.

* This valve is a large flow rate pilot-operated solenoid valve. If the operating pressure falls below 0.25 MPa due to a pressure drop caused by insufficient air supply, it may not be able to switch properly.

Flow Rate Characteristics

	Flow rate characteristics				
Model	1→2		2 → 3	Weight [kg]	
	C [dm ³ /(s·bar)]	b	C [dm ³ /(s·bar)]	b	
VPX406-A3	16.2	0.40	25.0	0.20	1 71
VPX406-A4	20.0	0.30	31.0	0.15	1.71
VPX406-A6	22.6	0.25	35.8	0.10	1.81

 Weight is when there is no M12 connector cable (V100-200-5-30). M12 connector cable weight (2 pcs.) = 0.4 kg

Symbols



в 9



Safety Exhaust Valve/Modular Connection Type VPX400 Series

Dimensions









VPX406KT-5KO□-□^G_M□-A3 Round type pressure gauge







Dimensions





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43.8

(100.5)

Digital pressure switch/ Electrical entry: Bottom entry

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VPX406KT-5KOD-DGMD-A4 Round type pressure gauge



Without pressure gauge



Digital pressure switch/ **Electrical entry: Top entry**



Dimensions VPX406KT-5KOD-DED-A6 With M12 connector cable Square embedded type pressure gauge <u>QYO</u> 43.8 22.8 40) 2 (100. Refer to page 14 for the cable wiring diagram. 40 45 4. 山中 Port 1 Port 2 Throttle 19:20 4 2 **VPX406KT-5KO**□-□**E**¹₃□-A6 Digital pressure switch/ 10.8 , , 0 **Electrical entry: Bottom entry** 8 135.2 Ø 28 27.8 41.2 ľ Ħ 55.4 51 ω 2 80 Port 3 Ĥ Α LED (Green) LED (Red) G1 5.5 Τ F 85 61.5 (40) 6 M12 connector (Refer to page 14.) Cable length: 300 VPX406KT-5KO□-□₽2□-A6 Digital pressure switch/ Round type pressure gauge Without pressure gauge **Electrical entry: Top entry** M12 connector (Refer to page 14.) Cable length: 300 (55.1) 0 55. ø42.5 α 2 Ó Ø đ



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82.5

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27.8

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61.5

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Dimensions

Assembly drawing of VP406 and AC



Model	а	b	С	d	е	f	Note
VPX406KT-5□□-□□□-A3□	55.1	57.2	74.2	215.6	100.5	142.2	AC30B-03-D Y300T-D E300-03-D
VPX406KT-5□□-□□□-A4□	72.6	75.2	77.1	257.3	100.5	142.2	AC40B-04-D Y400T-D E400-04-D
VPX406KT-5□□-□□-A6□	93.1	96.2	86.2	317.6	107.5	135.2	AC50B-10-D Y600T-D E600-10-D
	98.1	101.2	86.2	327.6	107.5	135.2	AC60B-10-D Y600T-D E600-10-D

VPX400 Series Valve Wiring Diagrams, Optional Accessories

For details on optional accessories, refer to the Web Catalog.

Valve Wiring Diagrams



M12 Connector Cable (For SOL., SEN., and Pressure switch)

For SOL. and SEN.





Part no.	Lead wire length (L		
V100-200-5-10	1000 mm		
V100-200-5-30	3000 mm		
V100-200-5-50	5000 mm		

The cable wiring numbers correspond to the wiring numbers in the valve wiring diagram above. Refer to the valve wiring diagram for wiring.

Sheath O.D.	ø6.5 mm		
Cover diameter	ø1.8 mm		
Conductor cross section	n 0.5 mm ²		



Sheath O.D.	ø3.4 mm		
Cover diameter	ø1.16 mm		
Conductor cross section	0.2 mm ²		



Spacer with Bracket



Spacer with bracket (Y□T-D)

 Symbol 	Connected AC size
300	A3 (AC30)
400	A4 (AC40)
600	A6 (AC50/60)



* For specifications and dimensions, refer to the AC series catalog.

Silencer

INA-25-100

Specifications

-			
Fluid	Air		
Max. operating pressure*1	1.0 MPa		
Noise reduction	24 dB(A)*2		
Ambient and fluid temperatures	0 to 50°C (No freezing)		

*1 It indicates the inlet pressure of the valve.

*2 The value may vary depending on the pneumatic circuit or pressure that is exhausted from the valve.

Performance

Effective area	Sonic conductance C	Weight
[mm ²]	[dm ³ /(s·bar)]	[g]
180	36	150

	3	End plate (Resin) Case (Resin) Sound absorbing material (Resin sintered body)				
	- 11		Dimensi	Dimensions		
			Port size	Α	В	С
		Rectification plate	G1	148.1	ø52	136.6
	(Stainless steel) Port size		* Refer to the AN series for precautions such as mounting.			

Piping Adapter: 1/4, 3/8, 1/2, 3/4, 1, 1 1/4, 1 1/2

 \cdot Using on the inlet side or the outlet side of the valve makes it easier to perform maintenance, as the component can be installed/removed without removing the piping.



* For specifications and dimensions, refer to the AC series catalog.

▲ Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of **"Caution," "Warning"** or **"Danger."** They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)^{*1}, and other safety regulations.

Danger : Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
 Warning: Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

Caution: Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

AWarning

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

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

- 3. Do not service or attempt to remove product and machinery/ equipment until safety is confirmed.
 - The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
 - 2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
 - 3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Our products cannot be used beyond their specifications. Our products are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not covered.

- Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
- 2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, fuel equipment, entertainment equipment, emergency shut-off circuits*2, press clutches, brake circuits*2, safety equipment*2, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
- 3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.

*2) Except for machinery safety in factory automation applications

*1) ISO 4414: Pneumatic fluid power - General rules and safety requirements for systems and their components ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1:Robots etc.

We develop, design, and manufacture our products to be used for automatic control equipment, and provide them for peaceful use in manufacturing industries.

Use in non-manufacturing industries is not covered.

Products we manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act. The new Measurement Act prohibits use of any unit other than SI units in Japan.

Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements".

Read and accept them before using the product.

Limited warranty and Disclaimer

- The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.^{*3} Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
- 2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided. This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
- 3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

*3) Vacuum pads are excluded from this 1 year warranty. A vacuum pad is a consumable part, so it is warranted for a year after it is delivered. Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

- 1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
- 2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

A Safety Instructions Be sure to read the "Handling Precautions for SMC Products" (M-E03-3) and "Operation Manual" before use.

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