

# Large Size 3 Port Solenoid Valve

## Series VP3145/3165/3185

### Rubber Seal



#### Large flow capacity, small exhaust resistance

(Refer to "Flow Characteristic" table.)

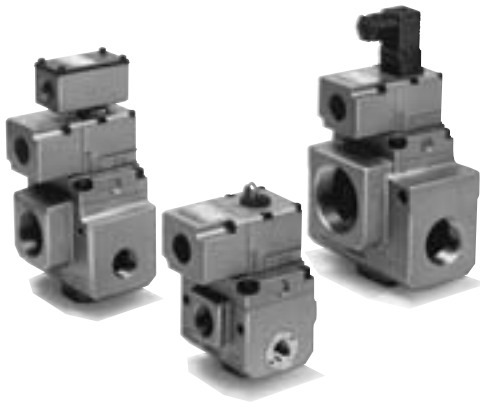
#### Easy conversion to N.C. or N.O.

Function plate makes it possible to use as a N.C. or N.O. valve with the port unchanged.

#### Possible to use in vacuum or under low pressures

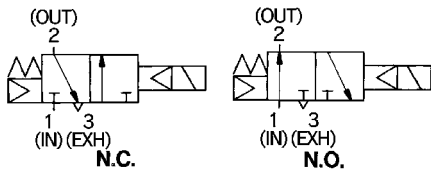
Vacuum: Up to 101.2 kPa  
Low pressure: 0 to 0.2 MPa

#### Free mounting orientation

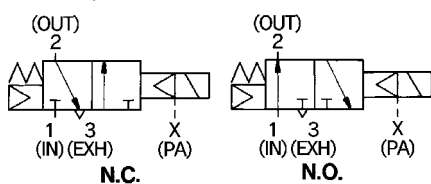


#### JIS Symbol

Internal pilot  
<Standard>



External pilot



Note) N.O. valve operates properly only when appropriate pressure is applied to the pilot.



**Made to Order**

(Refer to pages 1501 to 1503 for details.)

#### How to Order

**VP3 1 4 5 - 04 1 G A - - -**

Series VP 3 port solenoid valve

**Number of solenoids**

1	Single
---	--------

**Body size**

4	1/2
6	1
8	1 1/2

**Body type**

5	Body ported
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**Valve option**

Nil	For general
V	For vacuum/low pressure

**Port size (IN, OUT port)**

Symbol	Port size Rc (Nominal size)	VP3145	VP3165	VP3185
03	3/8 (10A)	●		
04	1/2 (15A)	●		
06	3/4 (20A)	●	●	
10	1 (25A)		●	
12	1 1/4 (32A)		●	●
14	1 1/2 (40A)			●
20	2 (50A)			●

**Coil rated voltage**

1	100 VAC, 50/60 Hz
2	200 VAC, 50/60 Hz
3*	110 VAC, 50/60 Hz
4*	220 VAC, 50/60 Hz
5	24 VDC
6*	12 VDC
7*	240 VAC, 50/60 Hz
9*	Other

\* Option

**CE-compliant**

Nil	—
Q	CE-compliant*

\* Electrical entry: D/DL/DS/DZ only

**Thread type**

Nil	Rc
F	G
N	NPT
T	NPTF

**Pilot option**

Nil	Standard (Internal pilot)
1	External pilot

**Type of actuation**

A	N.C. (Normally closed)
B	N.O. (Normally open)

**Electrical entry**

G	Grommet
T	Conduit terminal
D	DIN terminal
TL*	Conduit terminal with indicator light
TS*	Conduit terminal with surge voltage suppressor
TZ*	Conduit terminal with light/surge voltage suppressor
DL*	DIN terminal with indicator light
DS*	DIN terminal with surge voltage suppressor
DZ*	DIN terminal with light/surge voltage suppressor

\* Option

#### How to Order Pilot Valve Assembly

**VT3113 - 00 1 G - - -**

**Coil rated voltage**

1	100 VAC, 50/60 Hz
2	200 VAC, 50/60 Hz
3*	110 VAC, 50/60 Hz
4*	220 VAC, 50/60 Hz
5	24 VDC
6*	12 VDC
7*	240 VAC, 50/60 Hz
9*	Other

\* Option

**Electrical entry**

G	Grommet
T	Conduit terminal
D	DIN terminal
TL*	Conduit terminal with indicator light
TS*	Conduit terminal with surge voltage suppressor
TZ*	Conduit terminal with light/surge voltage suppressor
DL*	DIN terminal with indicator light
DS*	DIN terminal with surge voltage suppressor
DZ*	DIN terminal with light/surge voltage suppressor

\* Option

**CE-compliant**

Nil	—
Q	CE-compliant*

\* Electrical entry: D/DL/DS/DZ only

SYJ

VQZ

VP

VG

VP3□



# Series VP3145/3165/3185

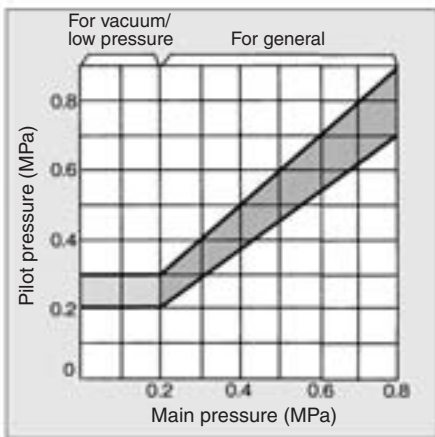
## External Pilot

Use external pilot model in the following cases.

- Vacuum or low pressure (0.2 MPa or less): Vacuum/Low pressure type
- Using the valve with supply port external throttle: General type
- Air pressure of supply port is slow: General type
- Resistance in outlet side is small in case of air blowing or filling an air tank: General type

Note 1) Keep external pilot pressure within the pressure range below.

Note 2) Conversion of internal pilot and external pilot can not be done.



## Specifications

<b>Fluid</b>		Air			
<b>Type of actuation</b>		N.C. or N.O. (Convertible)			
<b>Pilot type</b>		Internal pilot		External pilot	
		For general	For vacuum/low pressure	For general	
<b>Operating pressure range (MPa)</b>	<b>Main pressure</b>	0.2 to 0.8	-101.2 kPa to 0.2		0.2 to 0.8
	<b>Pilot pressure</b>		0.2 to 0.3		Refer to the graph left.
<b>Ambient and fluid temperature (°C)</b>		0 (No freezing) to 60			
<b>Response time (ms) <sup>(1)</sup> (at the pressure of 0.5 MPa)</b>		ON	AC	30 or less	OFF
			DC	40 or less	
<b>Max. operating frequency (Hz)</b>		3			
<b>Lubrication <sup>(2)</sup></b>		Required (Equivalent to turbine oil Class1 ISO VG32)			
<b>Manual override</b>		Yes (Non-locking)			
<b>Mounting orientation</b>		Unrestricted			
<b>Shock/Vibration resistance (m/s<sup>2</sup>) <sup>(3)</sup></b>		150/50			



Note 1) Based on dynamic performance test, JIS B 8374-1981. (Coil temperature: 20°C, at rated voltage, without surge voltage suppressor)

Note 2) This solenoid valve requires lubrication. Use turbine oil Class 1 (ISO VG32).

Note 3) Impact resistance: No malfunction occurred when it is tested with a drop tester 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)

Vibration resistance: No malfunction occurred in a one-sweep test between 45 and 1000 Hz. Test was performed at both energized and de-energized states in the axial direction and at the right angles to the main valve and armature. (Values at the initial period)

## Solenoid Specifications

<b>Electrical entry</b>	<b>Standard</b>	Grommet (G), Conduit terminal (T) DIN terminal (D)
	<b>Option</b>	Conduit terminal with indicator light (TL), Conduit terminal with surge voltage suppressor (TS), Conduit terminal with light/surge voltage suppressor (TZ), DIN terminal with indicator light (DL), DIN terminal with surge voltage suppressor (DS), DIN terminal with light/surge voltage suppressor (DZ)
<b>Coil rated voltage (V)</b>	<b>AC (50/60 Hz)</b>	100, 200, 110*, 220*, 240*
	<b>DC</b>	12*, 24
<b>Allowable voltage fluctuation</b>		-15 to +10% of rated voltage
<b>Apparent power <sup>Note)</sup></b>	<b>AC</b>	<b>Inrush</b>
		<b>Holding</b>
<b>Power consumption <sup>Note)</sup></b>	<b>AC</b>	73 VA (50 Hz), 58 VA (60 Hz)
	<b>DC</b>	28 VA (50 Hz), 17 VA (60 Hz)
		12 W



\* Option

Note) At rated voltage

## Flow Characteristics/Mass

Valve model	Port size		Flow characteristics						Mass* (kg)
			1 → 2 (IN → OUT)			2 → 3 (OUT → EXH)			
	1(IN), 2(OUT)	3(EXH)	C [dm <sup>3</sup> /(s·bar)]	b	Cv	C [dm <sup>3</sup> /(s·bar)]	b	Cv	Grommet
VP3145	3/8	3/4	19	0.43	5.5	18	0.47	5.4	1.5
	1/2		23	0.32	6.2	21	0.39	5.8	
	3/4		28	0.36	7.6	26	0.35	7.0	

Valve model	Port size		Effective area (mm <sup>2</sup> )		Mass* (kg)
	1 (IN), 2 (OUT)	3 (EXH)	1 → 2 (IN → OUT)	2 → 3 (OUT → EXH)	
VP3165	3/4	1 1/4	230	280	2.0
	1		280	310	
	1 1/4		310	330	
VP3185	1 1/4	2	570	650	2.8
	1 1/2		650	670	
	2		650	670	



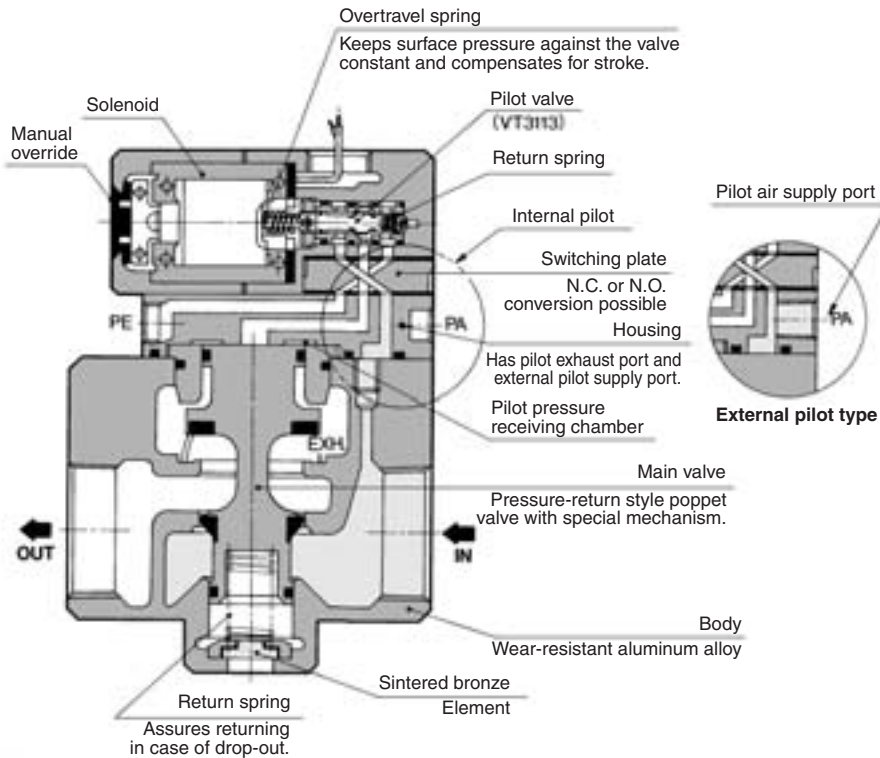
\* For grommet  
Conduit terminal... +0.2 kg

# Large Size 3 Port Solenoid Valve Series VP3145/3165/3185

## Construction/Internal Pilot

As in the figure below, this pilot-operated solenoid valve consists of a compact 3 port solenoid valve as the pilot valve and a large 3 port valve as the main valve.

The pilot valve controls opening and closing the main valve. N.C. or N.O. function conversion can be done by switching the pilot passage.



Note) Pilot valve and body are shown in a different direction from the actual product in order to show the construction and air passage.

### Piping (Vacuum Use)

1. Piping in general:

- |            |   |                  |
|------------|---|------------------|
| EXH port = | Vacuum pump/<br>Blower                                  | } (Suction side) |
| OUT port = | Tank/<br>Vacuum pad                                     |                  |
| IN port =  | Plug (2 port valve)<br>Air releasing<br>Air pressure-in | } (Load side)    |

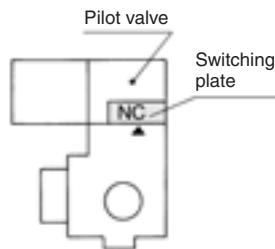
2. Following the above piping, vacuum passage is switched between OUT and EXH, therefore, N.C./N.O. indication on the function plate and switching of the vacuum passage are reversed; N.C. (Normally closed) in vacuum passage are reversed:

- "N.C." indicated on the plate  
→ N.O. in vacuum passage  
(Normally open)
- "N.O." indicated on the plate  
→ N.C. in vacuum passage  
(Normally closed)

### N.C./N.O. Conversion

To convert valve operation from N.C. to N.O. or N.O. to N.C., remove the pilot valve, move the function plate along the gasket, both top and bottom until the mark ► meets N.C. (N.O.)

Please note however, that the N.O. valve functions properly only when the appropriate pressure is applied to the valve.



SYJ

VQZ

VP

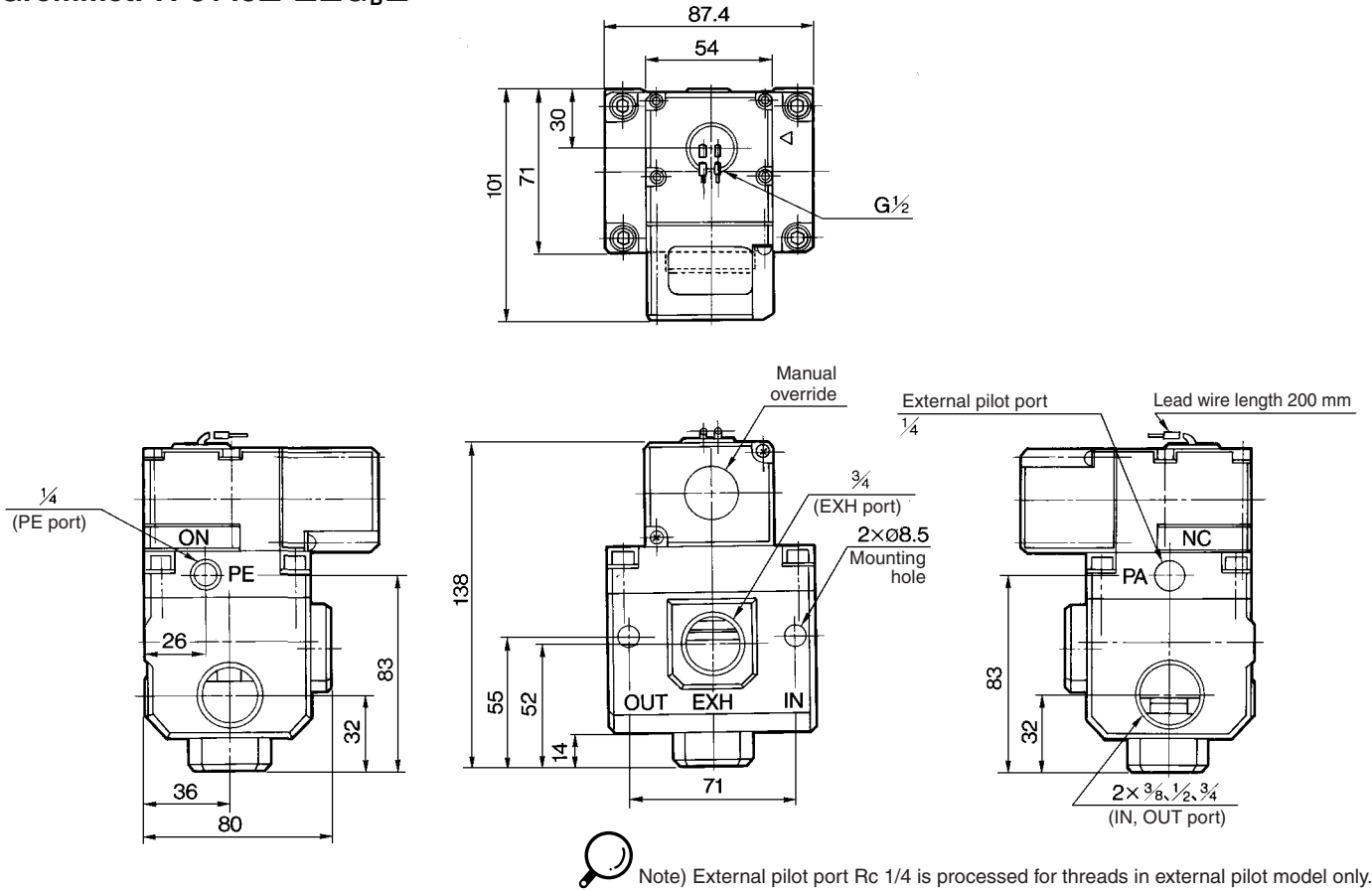
VG

VP3□

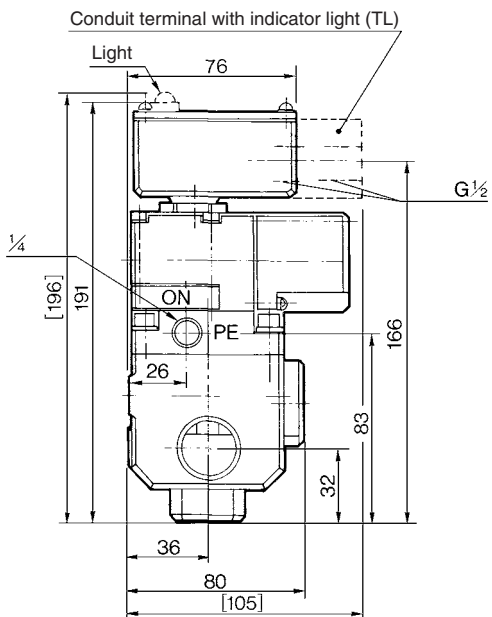
# Series VP3145

## Dimensions: VP3145

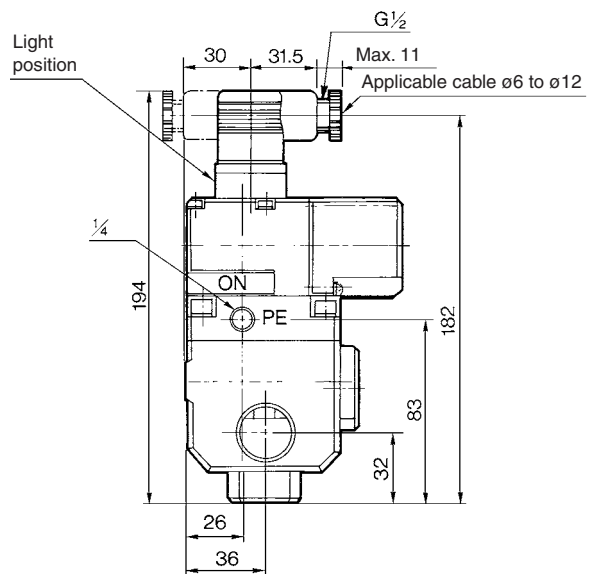
Grommet: VP3145□-□□G<sub>B</sub><sup>A</sup>□



Conduit terminal: VP3145□-□□T<sub>B</sub><sup>A</sup>□



DIN terminal: VP3145□-□□D<sub>B</sub><sup>A</sup>□

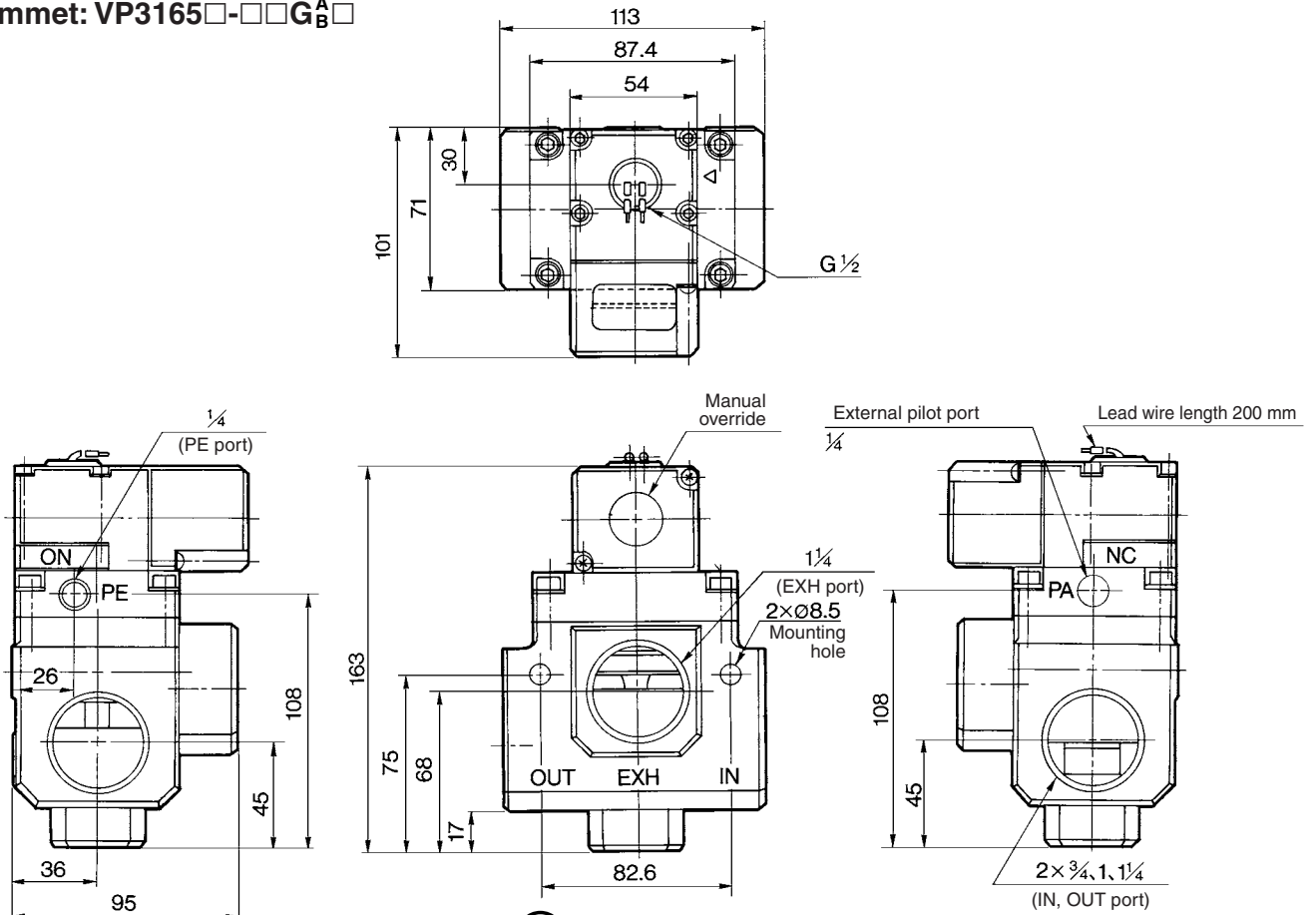


[ ]: With indicator light (TL)

# Large Size 3 Port Solenoid Valve Series VP3165

## Dimensions: VP3165

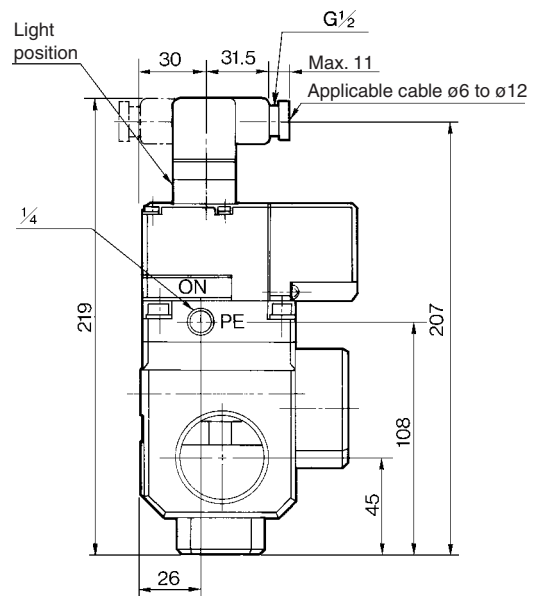
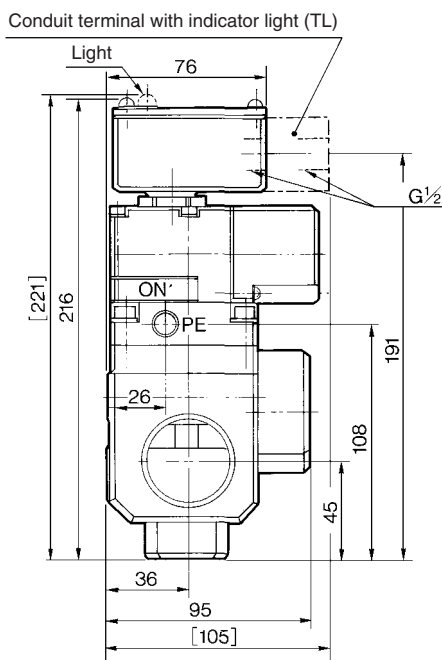
Grommet: VP3165□-□□G<sub>B</sub><sup>A</sup>□



Note) External pilot port Rc 1/4 is processed for threads in external pilot model only.

Conduit terminal: VP3165□-□□T<sub>B</sub><sup>A</sup>□

DIN terminal: VP3165□-□□D<sub>B</sub><sup>A</sup>□



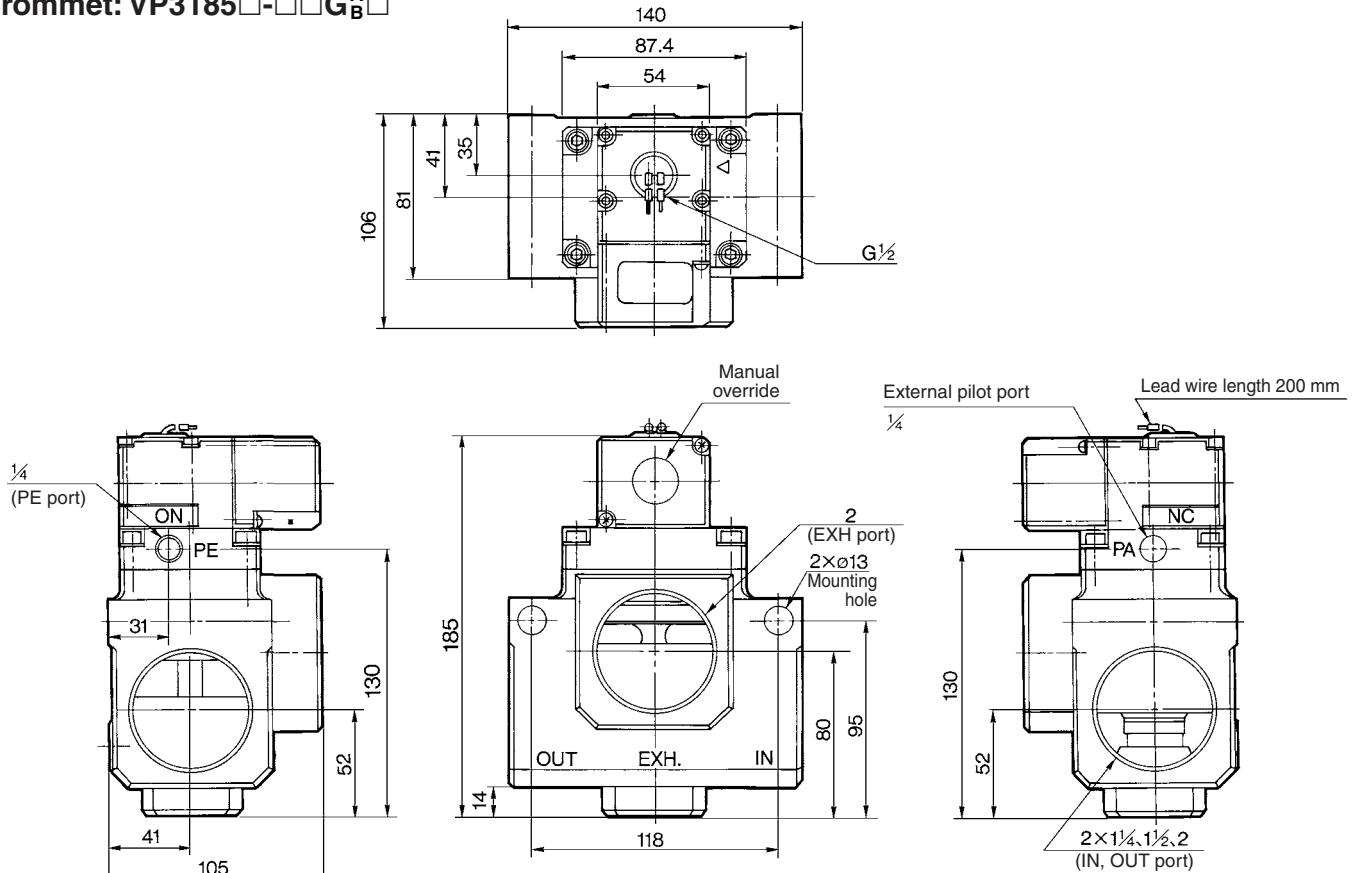
[L]: With indicator light (TL)

- SYJ
- VQZ
- VP
- VG
- VP3□

# Series VP3185

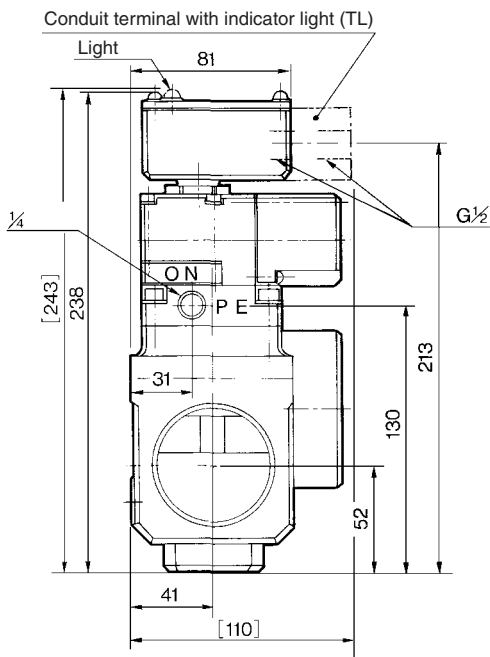
## Dimensions: VP3185

Grommet: VP3185□-□□G<sub>B</sub><sup>A</sup>□

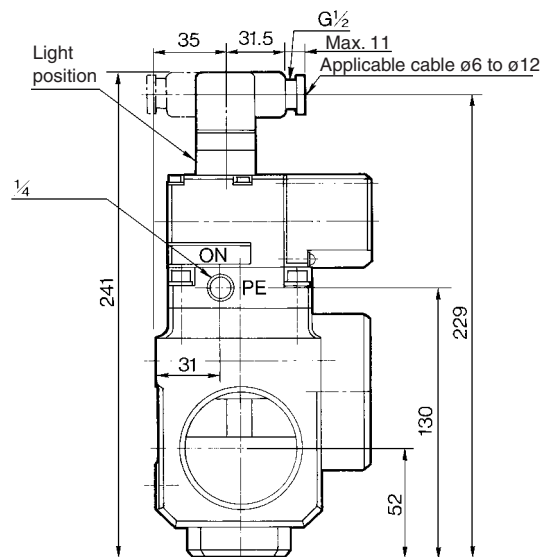


Note) External pilot port Rc 1/4 is processed for threads in external pilot model only.

Conduit terminal: VP3185□-□□T<sub>B</sub><sup>A</sup>□



DIN terminal: VP3185□-□□D<sub>B</sub><sup>A</sup>□



[ ]: With indicator light (TL)

# Made to Order:

## Series VP3145/3165/3185

### Main Valve Double Acting Type: -X80/X81



#### How to Order

**VP31 4 5-06 1 D Z A 1-N-X 81-**

**Body size**

4	1 1/2
6	1
8	1 1/2

**Thread type**

Nil	Rc
F	G
N	NPT
T	NPTF

**CE-compliant**

Nil	—
Q	CE-compliant*

\*Electrical entry: D/DO only

**Port size (IN, OUT port)**

Symbol	Port size	VP3145	VP3165	VP3185
03	3/8	●		
04	1/2	●		
06	3/4	●	●	
10	1		●	
12	1 1/4		●	●
14	1 1/2			●
20	2			●

**Passage, Type of actuation**

A	NC
B	NO

In the case of -X80, only N.C. is available.

**Type of actuation**

80	Double solenoid
81	Single solenoid

**Coil rated voltage**

1	100 VAC, 50/60 Hz
2	200 VAC, 50/60 Hz
3*	110 to 120 VAC, 50/60 Hz
4*	220 VAC, 50/60 Hz
5	24 VDC
6*	12 VDC
7*	240 VAC, 50/60 Hz
9*	Other

\* Option  
L, M plug connector is 220 VAC at the maximum.

**Electrical entry**

G	Grommet (Lead wire: 300 mm)	
H	Grommet (Lead wire: 600 mm)	
E	Grommet terminal	
T	Conduit terminal	
D	DIN terminal	With connector
DO		Without connector
L	L plug connector	With lead wire
LN		Without lead wire
LO	M plug connector	Without connector
M		With lead wire
MN	M plug connector	Without lead wire
MO		Without connector

**Light/Surge voltage suppressor**

Nil	None
Z	With light/surge voltage suppressor
S	With surge voltage suppressor

\* Indicator light is not available for grommet type. W/ surge voltage suppressor is available for grommet type only.

#### How to Order Pilot Valve Assembl

**VF3 40-**

**Type of actuation**

1	Single solenoid
2	Double solenoid

**Light/Surge voltage suppressor**

Nil	None
Z	With light/surge voltage suppressor
S	With surge voltage suppressor

\* Indicator light is not available for grommet type. W/ surge voltage suppressor is available for grommet type only.

**CE-compliant**

Nil	—
Q	CE-compliant*

\*Electrical entry: D/DO only

**Coil rated voltage**

1	100 VAC, 50/60 Hz
2	200 VAC, 50/60 Hz
3*	110 to 120 VAC, 50/60 Hz
4*	220 VAC, 50/60 Hz
5	24 VDC
6*	12 VDC
7*	240 VAC, 50/60 Hz
9*	Other

\* Option  
L, M plug connector is 220 VAC at the maximum.

**Electrical entry**

G	Grommet (Lead wire: 300 mm)	
H	Grommet (Lead wire: 600 mm)	
E	Grommet terminal	
T	Conduit terminal	
D	DIN terminal	With connector
DO		Without connector
L	L plug connector	With lead wire
LN		Without lead wire
LO	M plug connector	Without connector
M		With lead wire
MN	M plug connector	Without lead wire
MO		Without connector

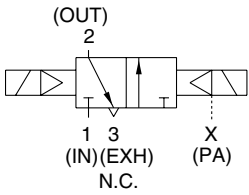
- SYJ
- VQZ
- VP
- VG
- VP3□



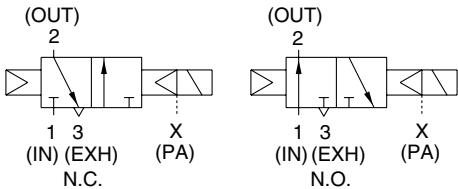


# Series VP3145/3165/3185

JIS Symbol  
-X80



-X81



## Specifications

Valve configuration	External pilot 3 port solenoid valve
Type of actuation	Double solenoid (-X80), Single solenoid (-X81)
Fluid	Air
Operating pressure range	-101.2 kPa to 0.8 MPa
Pilot pressure	85 to 115% of main pressure, Min. 0.2 MPa
Ambient and fluid temperature	0 to 50°C (No freezing)
Lubrication <sup>(1)</sup>	Required (Equivalent to turbine oil Class 1 ISO VG32)
Mounting orientation	Unrestricted
Impact/Vibration resistance <sup>(2)</sup>	150/50 m/s <sup>2</sup>



Note 1) This solenoid valve requires lubrication. Use turbine oil Class 1 (ISO VG32).

Note 2) Impact resistance: No malfunction occurred when it is tested with a drop tester 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)

Vibration resistance: No malfunction occurred in a one-sweep test between 45 and 1000 Hz. Test was performed at both energized and de-energized states in the axial direction and at the right angles to the main valve and armature. (Values at the initial period)

## Solenoid Specifications

Electrical entry	Grommet, Grommet terminal, Conduit terminal DIN terminal, L plug connector, M plug connector	
Coil rated voltage (V)	AC (50/60 Hz)	100, 200, 110*, 220*, 240*
	DC	24, 12*
Allowable voltage fluctuation	-15 to 10%	
Apparent power (AC) <sup>Note</sup>	Inrush	5.6 VA/50 Hz, 5.0 VA/60 Hz
	Holding	3.4 VA/50 Hz, 2.3 VA/60 Hz
Power consumption (DC) <sup>Note</sup>	W/o indicator light	1.8W
	W/ indicator light	2W



\* Option

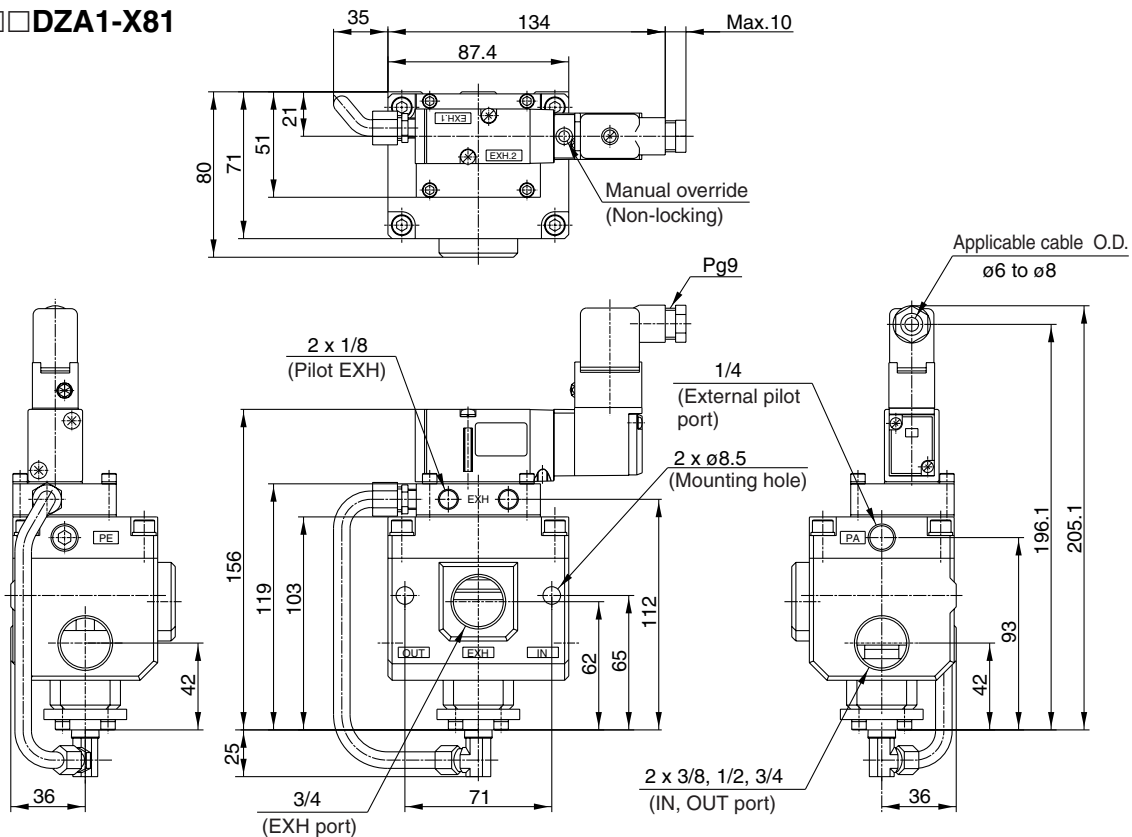
Note) At rated voltage

## Caution

Piping and other usage are the same as standard products.

## Dimensions

VP3145-□□DZA1-X81



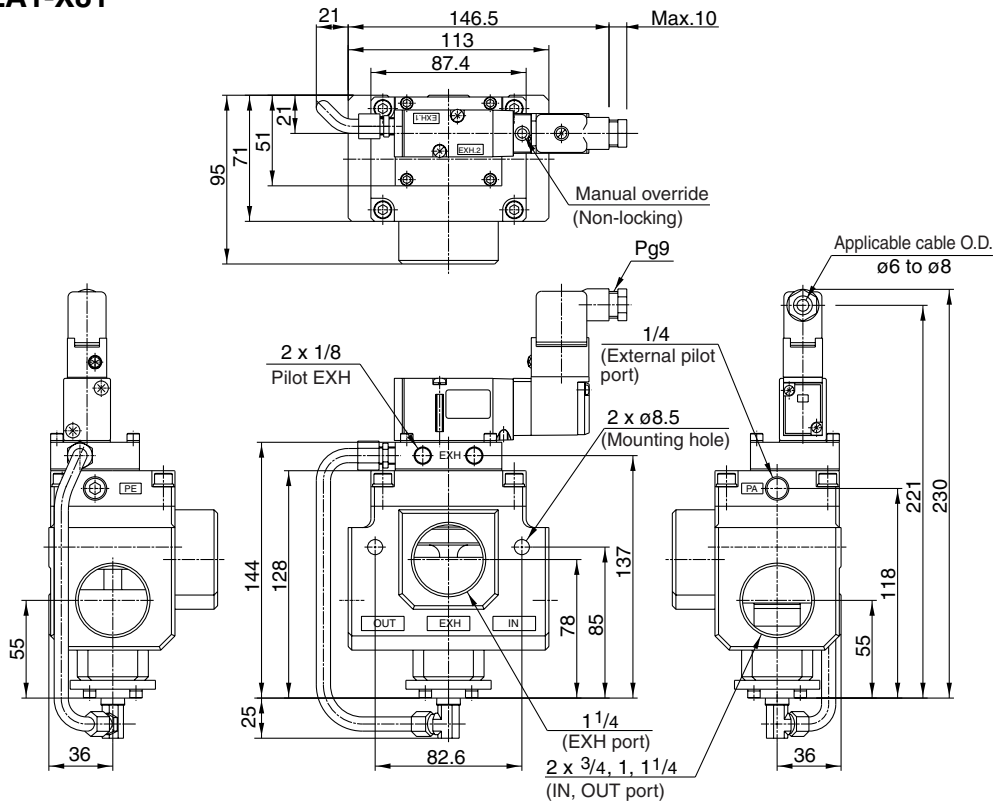
- When B spec. of -X81 (N.O. spec.), VF3140 solenoid has to be positioned at left, when looking at the EXH port in the front face.
- In the case of -X80, VF3240-□□□□ (Pilot valve) will be mounted.



# Large Size 3 Port Solenoid Valve Series VP3145/3165/3185

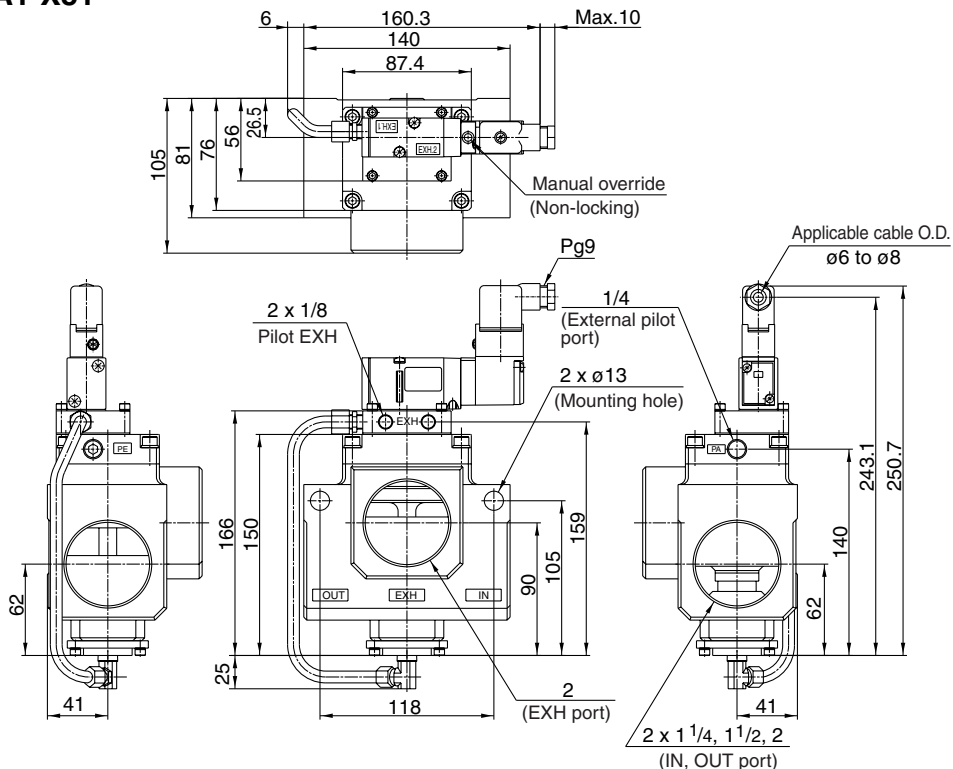
## Dimensions

### VP3165-□□DZA1-X81



- When B spec. of -X81 (N.O. spec.), VF3140 solenoid has to be positioned at left, when looking at the EXH port in the front face.
- In the case of -X80, VF3240-□□□ (Pilot valve) will be mounted.

### VP3185-□□DZA1-X81



- When B spec. of -X81 (N.O. spec.), VF3140 solenoid has to be positioned at left, when looking at the EXH port in the front face.
- In the case of -X80, VF3240-□□□ (Pilot valve) will be mounted.

SYJ  
VQZ  
VP  
VG  
VP3□



# Series VP3145/3165/3185 Specific Product Precautions

Be sure to read before handling.

Refer to front matters 58 and 59 for Safety Instructions and pages 3 to 7 for 3/4/5 Port Solenoid Valve Precautions.

## ⚠ Caution

### Piping

If supply port air pressure drops to less than 0.2 MPa, the valve may malfunction. In such a case, use external pilot type. (When throttling IN port, or operating with OUT port open to the atmosphere or in a similar operation.)

### Pressure balance among each port

This solenoid valve is pressure-unbalanced type. Operate it within this pressure range:  $IN \geq OUT \geq EXH$ . If not operated in the range, the valve will malfunction.

### Use as 2 port valve

1. Plug EXH port in case of pressure-in and plug IN port in case of vacuum use.
2. This valve has slight air leakage and can not be used for such purposes as holding air pressure (including vacuum) in the pressure container.

### Supply air

Install an air filter and a lubricator on the upstream side.

### Lubrication

This solenoid valve requires lubrication. Use turbine oil Class 1 (ISO VG32). Besides that, for brands of each manufacturer, refer to page 6.

### Environment

If using the valve in a dusty environment, install a silencer at EXH port and PE port to prevent dust from entering.

### N.C./N.O. conversion

When changing the direction of a switching plate to convert from N.C. to N.O. and vice versa, note that the equipment to be connected will act reversely.

### How to Calculate the Flow Rate

For obtaining the flow rate, refer to front matters 44 to 47.

## Light/Surge Voltage Suppressor

	Grommet (G)	Conduit terminal (T)	DIN terminal (D)	
With indicator light (L)	None		48 VDC or less 	100 VAC or more 
Surge voltage suppressor (S)				
With light/surge voltage suppressor (Z)	None		48 VDC or less 	100 VAC or more 

⦿ "Items that are marked "With indicator light," "With surge voltage suppressors," and "With light/surge voltage suppressor" are all non-polar types.

## How to Use DIN Terminal

### 1. Disassembly

- 1) After loosening the screw (1), then if the housing (4) is pulled in the direction of the screw, the connector will be removed from the body of equipment (solenoid, etc.).
- 2) Pull out the screw (1), then remove the gasket (2a) or (2b).
- 3) On the bottom part of the terminal block (3), there's a cut-off part (indication of an arrow) (3a). If a small flat head screwdriver is inserted between the opening in the bottom, terminal block (3) will be removed from the cover (4). (Refer to the figure below.)
- 4) Remove the cable gland (5) and plain washer (6) and rubber seal (7) .

### 2. Wiring

- 1) Pass them through the cable (8) in the order of cable ground (5), washer (6), rubber seal (7), and then insert into the housing (4).
- 2) Dimensions of the cable (8) are the figure as below. Skin the cable and crimp the crimped terminal (9) to the edges.
- 3) Remove the screw with washer (3e) from the bracket (3e). (Loosen in the case of Y-shape type terminal.) As shown in the below figure, mount a crimped terminal (9), and then again tighten the screw (3e).

Note) Tighten within the tightening torque of 0.5 N·m±15%.

Note: a It is possible to wire even in the state of bare wire. In that case, loosen the screw with washer (3e) and place a lead wire (3d) into the bracket, and then tighten it once again.

b Maximum size of crimped terminal (9) is up to 1.25 mm<sup>2</sup>—3.5 when O terminal. For Y terminal, it is up to 1.25 mm<sup>2</sup>—4.

c Cable (8) external: 6 to 12 mm ø

Note) For the one with the external dimension ranged between 9 to 12 mmø, remove the inside parts of the rubber seal (7) before using.

### 3. Assembly

- 1) Terminal block (3) connected with housing (4) should be reinstated. (Push it down until you hear the click sound.)
- 2) Putting rubber seal (7), plain washer (6), in this order into the cable introducing slit on the housing (4), then further tighten the cable gland (5) securely.
- 3) By inserting gasket (2a) or (2b) between the bottom part of the terminal block (3) and a plug on an equipment, screw in (1) on top of the housing (4) and tighten it.

Note) Tighten within the tightening torque of 0.5 N·m ±20%.

Note: The orientation of a connector can be changed arbitrarily, depending on the combination of a housing (4) and a terminal block (3).

