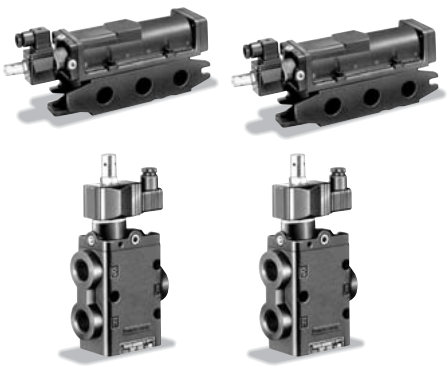
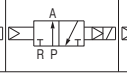
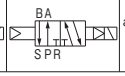
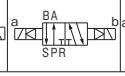
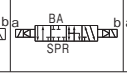
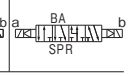
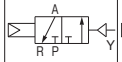
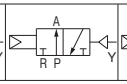
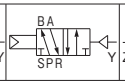
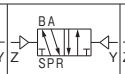
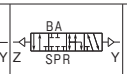
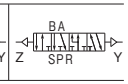
Heavy duty style SH solenoid valve

- The seal of port P has a poppet structure, which prevents damage to the seal caused by foreign particles.
- Even at the switching position of a detent type valve and at the neutral position of a 4-position valve, holding force is constantly applied to the spool by air pressure to prevent malfunctions due to vibration.

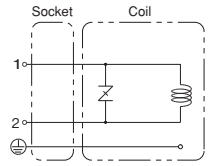
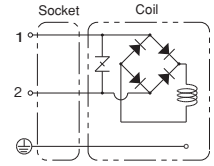
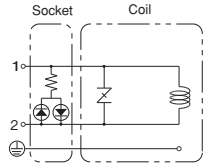
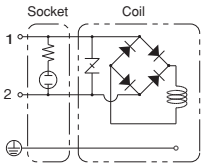


Valve Specifications

Item \ Model			3-port		5-port			
			2-position		2-position		4-position	
			Normal closed	Normal open	Return	Detent	Closed center	Exhaust center
Model number	Direct type		3HC−20E 3HC−25E	3HP−20E 3HP−25E	—	—	—	—
	Sub-plate type		—	—	5HR−20S 5HR−25S	5HD−20S 5HD−25S	5HC−20S 5HC−25S	5HE−20S 5HE−25S
	Valve for manifold		—	—	5HR−20M	5HD−20M	5HC−20M	5HE−20M
	Valve with stack manifold		—	—	5HR−20N 5HR−25N	5HD−20N 5HD−25N	5HC−20N 5HC−25N	5HE−20N 5HE−25N
JIS symbol	General-purpose type							
		Operation type	Pilot normal open type					
	Master valve							
		Pilot operation type	Normal closed control				Normal open control	
Port size	Direct	P•A•B•R•S	G3/4・G1		—			
	Sub-plate	P•A•B•R•S	—		G3/4・G1			
Note 3) Effective sectional area			G3/4: 160mm²・G1: 190mm²		G3/4: 160mm²・G1: 180mm²			
Working fluid			Air					
Lubrication			Unnecessary (Use additive-free turbine oil Class 1 ISO VG32 or its equivalent.)					
Working pressure range			0.15 to 1.0 MPa					
Pilot pressure range			Over working pressure to 1.0 MPa (for master valve)					
Proof test pressure			1.6 MPa					
Note 1) Response time in ON/OFF state			35/30 ms or less		55/35 ms or less	35 ms or less	50/60 ms or less	
Working temperature range			+5 to +50℃ (ambient temperature and fluid temperature)					
Manual type			Pushing					
Installing direction			Free					

Note 1) Values at an air pressure of 0.5 MPa. Values from the opposite positions in the case of 2-position valves or from the valve neutral positions in the case of 4-position valves
Note 2) The JIS symbol of 4-position valve □■□□ indicates the non-energized state of the solenoids on both sides, and □□■□ indicates the energized state of the solenoids on both sides.
Note 3) The parenthesized values apply to the sub-plate type valves and stack manifold valves.

Specifications for General-purpose Solenoid Valves (HR08 coil)

Rated voltage			24 V DC	100 V AC（100 V DC）	200 V AC
Allowable voltage range			Rated voltage±10%		
Starting current		50/60Hz	—	165mA（—）	80mA
Holding current		50/60Hz	710mA	165mA（190mA）	80mA
Power consumption		50/60Hz	17W	16.5VA（19W）	16VA
Allowable circuit leakage current value			71 mA or less	21 mA or less	10 mA or less
Insulation class			Class B		
Wiring part protective structure			Equivalent to IP65 (in the case of DIN socket)		
Wiring type			Lead wire (2000mm), terminal, DIN socke		
Lead wire color			White/black	Blue	Red
Electric circuit	Circuit type		With protective circuit		
	Wiring type		Lead wire, terminal, DIN socket		
	Type of voltage		For DC	For AC	
	Circuit diagram				
	Circuit type		With indicating lamp and protective circuit		
	Wiring type		Terminal, DIN socket		
	Type of voltage		For DC	For AC	
	Note 1) Indicating lamp		LED: Lights when sensing	Neon lamp: Lights when sensing	
	Circuit diagram				

Note 1) Two kinds of lamps, orange and green lamps, are available.

Manifold Specifications

Name		Stack manifold	
Model number		P4020−∗∗5HR	P4025−∗∗5HR
Max. number of stations		8 stations	
Number of stations		2・3・4・5・6・7・8	
Exhaust type		Common exhaust	
Port size	P・R・S	G1 1/2	
	A・B	G3/4	G1
Piping specification		Rear piping	
Applicable valve		5HR−20N 5HD−20N 5HC−20N 5HE−20N	5HR−25N 5HD−25N 5HC−25N 5HE−25N

Valve Weight

Unit: kg

Item \ Model			3-port		5-port			
			2-position		2-position		4-position	
			Normal closed	Normal open	Return	Detent	Closed center	Exhaust center
Model number	Direct type		3HC−20E 3HC−25E	3HP−20E 3HP−25E	—	—	—	—
	Sub-plate type		—	—	5HR−20S 5HR−25S	5HD−20S 5HD−25S	5HC−20S 5HC−25S	5HE−20S 5HE−25S
	Valve for manifold		—	—	5HR−20M	5HD−20M	5HC−20M	5HE−20M
	Valve with stack manifold		—	—	5HR−20N 5HR−25N	5HD−20N 5HD−25N	5HC−20N 5HC−25N	5HE−20N 5HE−25N
Weight	General-purpose type	Direct	2.48	2.47	—	—	—	—
		Sub-plate	—	—	5.30	5.64	5.96	5.82
		Manifold	—	—	3.48	3.82	4.14	4.00
	Master valve	Direct	2.30	2.30	—	—	—	—
		Sub-plate	—	—	5.25	5.25	5.55	5.55
		Manifold	—	—	3.43	3.43	3.73	3.73

Manifold Weight

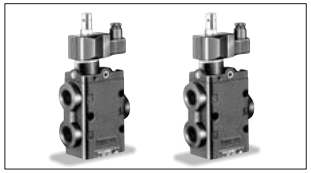
Unit: kg

Type	Model number	Number of stations						
		2 stations	3 stations	4 stations	5 stations	6 stations	7 stations	8 stations
Stack manifold	P4020−∗∗5HR	5.25	7.05	8.85	10.64	12.44	14.23	16.03
	P4025−∗∗5HR	5.18	6.95	8.71	10.47	12.23	13.99	15.75

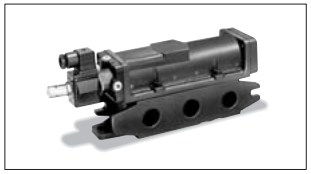
- The manifold weight includes the weight of plate, bolts, nuts and joints.
- Add the valve weight to the manifold weight.

How to Order Valve Only

3-port valve (port size: G3/4 and G1)



5-port valve (port size: G3/4 and G1)

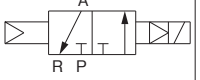
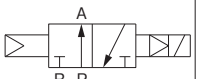
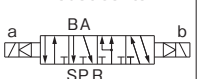


3H C - 20 E - 10 S4 - F

5H R - 20 S - 10 S4 - G

Option
Wiring type
Voltage/operation type

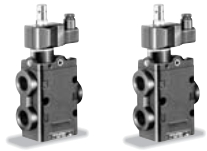
Switching type

No. of ports	Symbol	Switching type
3-port	C	Normal closed 
	P	Normal open 
5-port	R	Return 
	D	Detent 
	C	Closed center 
	E	Exhaust center 

Port size

Symbol	Ports A and B
20	G3/4
25	G1

Mounting type

Symbol	Mounting type
E	Direct type (Note 1) 
S	Sub-plate type (Note 2) 

Note 1) Only 3-port valves are available.
Note 2) Only 5-port valves are available.

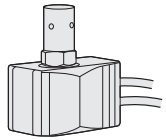
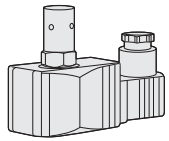
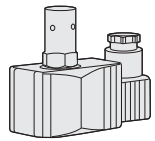
Note) The JIS symbols indicate the types for solenoid valves.

Option
Wiring type
Voltage/operation type

Voltage/operation type

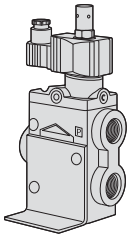
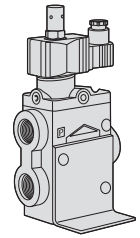
Symbol	Voltage/operation type
24	24V DC
10	100 V AC 50/60Hz 100 V DC
20	200 V AC 50/60Hz
11	110 V AC 50/60Hz 110 V DC
22	220 V AC 50/60Hz
P	Master valve

Wiring type

Symbol	Wiring type
L1	Lead wire/2000mm 
S4	DIN socket/wiring port: G1/2 
SO	DIN socket/wiring port: Pg11(Note 1) With orange lamp (Note 2)
SG	DIN socket/wiring port: Pg11(Note 1) With green lamp (Note 2)
T1	Terminal 
TO	Terminal/with orange lamp(Note 2)
TG	Terminal/with green lamp(Note 2)

Note 1) Wiring port: Pg11 is a screw size according to DIN40430.
Note 2) No entry for master valves

Option

Symbol	Option
None	None
F	With left mounting plate 
H	With right mounting plate 
G	External pilot type

Notes) ● These options cannot be attached to 5-port valves.
● To order an external pilot type valve with a mounting plate, specify FG or HG.

● Model number of stack manifold

P40 20 - 06 5HR

• Port size

Symbol	Port size
20	G3/4
25	G1

• Number of stations

Symbol	Number of stations
02	2 stations
03	3 stations
04	4 stations
05	5 stations
06	6 stations
07	7 stations
08	8 stations

Note) ● This model number indicates the plates on both ends, O-ring, and bolt and nut for connection.

● Model number of valve for manifold

5-port valve

5H R - 20 N-10 S4

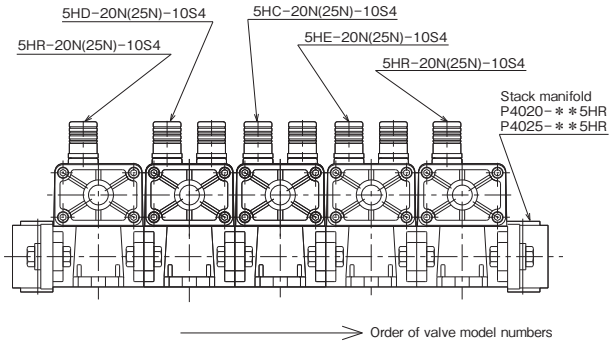
• Port size

Symbol	Port size
20	G3/4
25	G1

Notes) ● For details, see "How to Order Valve Only".
● For P4025, select the port size symbol 25.

How to Order

● Stack manifold



Model number of manifold	Qty.
P4020−055HR	1

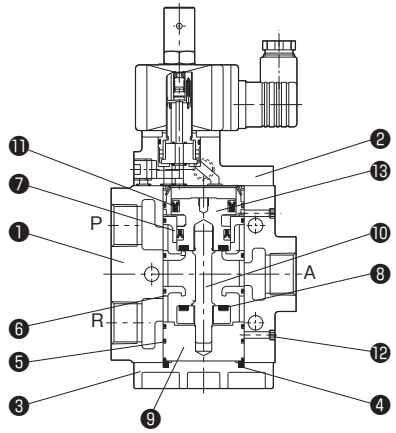
Model number of valve	Qty.
5HR−20N−10S4	1
5HD−20N−10S4	1
5HC−20N−10S4	1
5HE−20N−10S4	1
5HR−20N−10S4	1

SH Valve 3H∗/5H∗

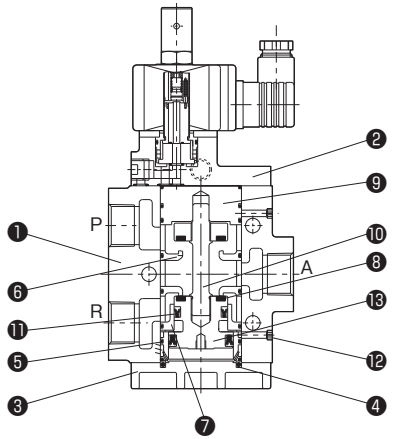
Sectional Drawings

3-port valve
Direct type

3HC-20E/3HC-25E(normal closed)



3HP-20E/3HP-25E(normal open)

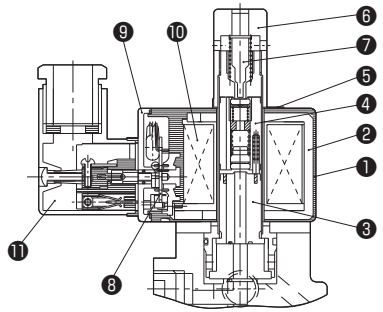


Note) Master valves have different internal structures.

Parts List

No.	Name	Material
❶	Body	Aluminum alloy
❷	Pilot valve	—
❸	Plate	Aluminum alloy
❹	Seal	Nitrile rubber
❺	O-ring	Nitrile rubber
❻	Ring	Stainless steel
❼	Ring	Stainless steel
❽	Seal	Nitrile rubber
❾	Disk	Aluminum alloy
❿	Spindle	Stainless steel
⓫	Lip seal	Nitrile rubber
⓬	Disk	Sintered metal
⓭	Piston	Copper alloy

General-purpose pilot valves



Parts List

No.	Name	Material	Qty.
❶	Molded part	Heat-curing plastic	1
❷	Yoke	Magnetic material	1
❸	Fixed iron core	Magnetic material	1
❹	Plunger	Magnetic material	1
❺	Claw washer	Steel sheet	1
❻	Mounting cap	Copper alloy	1
❼	Manual override	Synthetic resin	1
❽	PCB assembly	—	1
❾	Body cover	Synthetic resin	1
❿	Winding	Class B	1
⓫	DIN socket	—	1

Maintenance Parts

●How to order coil only

Note) ●The mounting cap and manual override are not included.

HR08 – 10 S4

• Voltage

Symbol	Voltage
24	24 V DC
10	100 V AC 50/60Hz 100 V DC
20	200 V AC 50/60Hz
11	110 V AC 50/60Hz 110 V DC
22	220 V AC 50/60Hz
P	Master valve

• Wiring type

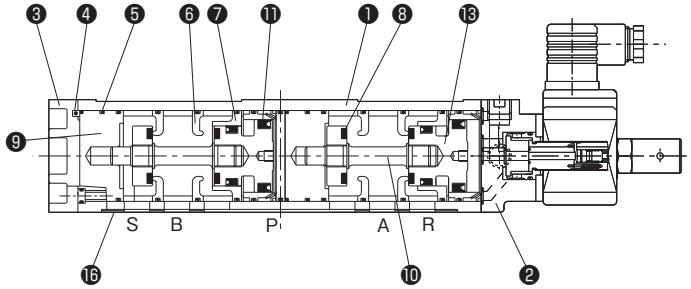
Symbol	Wiring type
L1	Lead wire (2000mm)
S4	DIN socket (wiring port: G1/2)
SO	DIN socket/wiring port: Pg11/with orange lamp
SG	DIN socket/wiring port: Pg11/with green lamp
T1	Terminal
TO	Terminal/with orange lamp
TG	Terminal/with green lamp

Note) Wiring port: Pg11 is a screw size according to DIN40430.

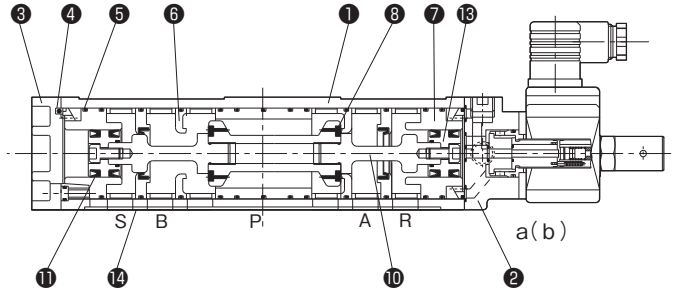
Sectional Drawings

Sub-plate type/For manifold/With stack manifold

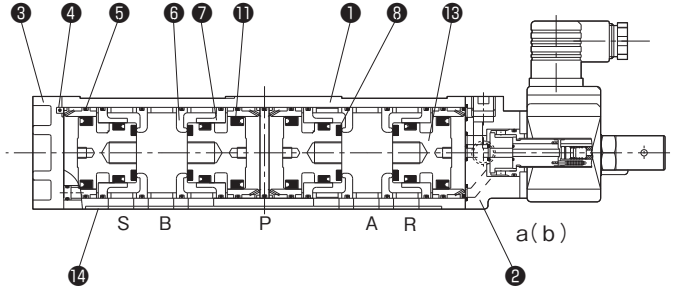
5HR-20S/M/N
(return)



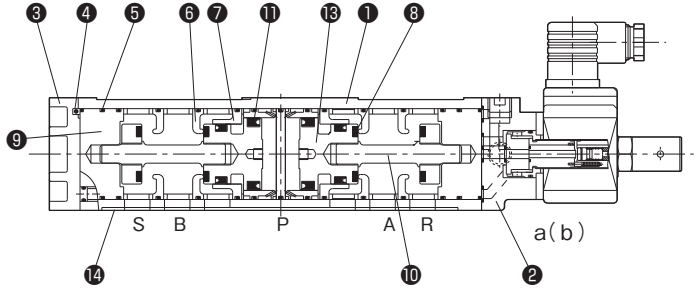
5HD-20S/M/N
(detent)



5HC-20S/M/N
(closed center)



5HE-20S/M/N
(exhaust center)



Notes) ● The parenthesized solenoid symbols indicate the solenoids on the rear side.
● These drawings show the internal structure of the valve body.

Parts List

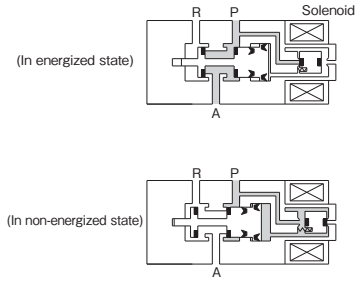
No.	Name	Material
❶	Body	Aluminum alloy
❷	Pilot valve	—
❸	Plate	Aluminum alloy
❹	Seal	Nitrile rubber
❺	O-ring	Nitrile rubber
❻	Ring	Stainless steel
❼	Ring	Stainless steel
❽	Seal	Nitrile rubber
❾	Disk	Aluminum alloy
❿	Spindle	Stainless steel
⓫	Lip seal	Nitrile rubber
⓬	Disk	Sintered metal
⓭	Piston	Copper alloy
⓮	Seal	Nitrile rubber

Note) For the sectional structure of the pilot valve, see VC115.

Principle of Operation

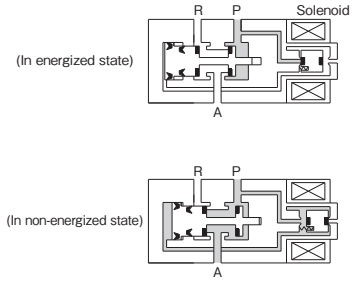
3-port valve

3HC-20E(normal closed)
3HC-25E



When the solenoid is energized, the pilot pressure is discharged, the spool is moved to the right, and air flows from P to A. When it is de-energized, the spool is moved to the left, and pressure P is closed.
When power failure occurs or the electric circuit is shutdown, the spool returns to the position at which it is set in the non-energized state.

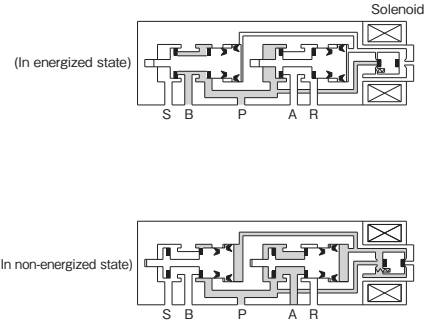
3HP-20E(normal open)
3HP-25E



When the solenoid is energized, the pilot pressure is discharged, the spool is moved to the left, and pressure P is closed. When it is de-energized, the spool is moved to the right, and air flows from P to A.
When power failure occurs or the electric circuit is shutdown, the spool returns to the position at which it is set in the non-energized state.

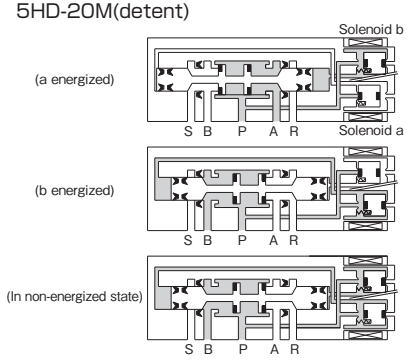
5-port valve

5HR-20M(return)



When the solenoid is energized, the pilot pressure is discharged, the right and left spools are moved to the right, and air flows from P to B. When it is de-energized, the pilot pressure is supplied, the right and left spools are moved to the left, and the air flow is shift to P to A.
When power failure occurs or the electric circuit is shutdown, the spool returns to the position at which it is set in the non-energized state.

5HD-20M(detent)

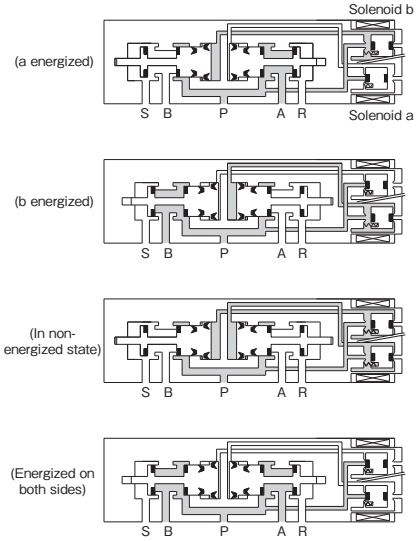


When the solenoid a is energized, the pilot pressure is discharged, the spool is moved to the left, and air flows from P to A. When the solenoid b is energized, the air flow is shift to P to B.
When power failure occurs or the electric circuit is shutdown, the valve is retained at the position.
Note) If pressure is applied suddenly after pressure P is discharged in the non-energized state, the pressure balance will be disturbed, and the valve may operate in the reverse direction (P→A) to the direction in the non-energized state (P →B). Apply pressure gradually.

Principle of Operation

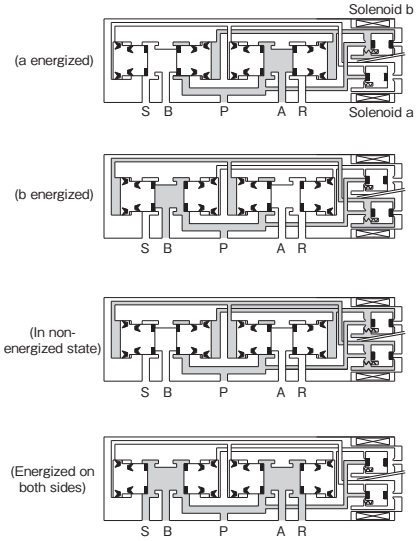
5-port valve

5HE-20M(exhaust center)



When the solenoid a is energized, the pilot pressure is discharged, and the right spool is moved to the left, and air flows from P to A.
When the solenoid b is energized, the air flow is shift to P to B.
When the solenoids are de-energized, the spools on both sides are moved to the outside, and the ports A and B are exhausted. When the solenoids on both sides are energized, pressure is applied to the ports A and B.

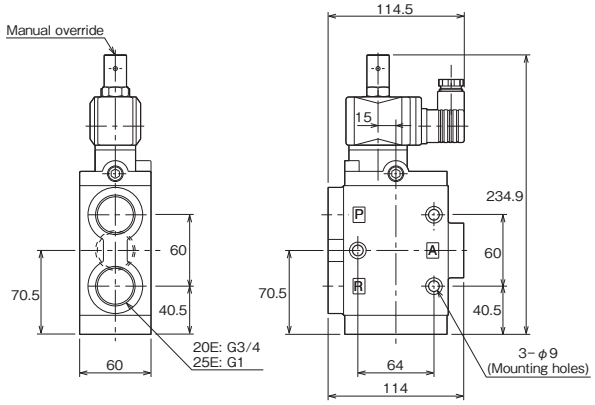
5HC-20M(closed center)



When the solenoid a is energized, the pilot pressure is discharged, the two pistons are moved to the left, and the paths from P to A and from B to S are opened. When the solenoid b is energized, the air flow is shift to P to B.
When the solenoids are de-energized, the pilot pressure is applied to all pistons, and the ports A and B are closed. When the solenoids on both sides are energized, the pilot pressure is discharged from all pistons, and the pressure supplied from the port P is applied to the ports A, B, R and S.

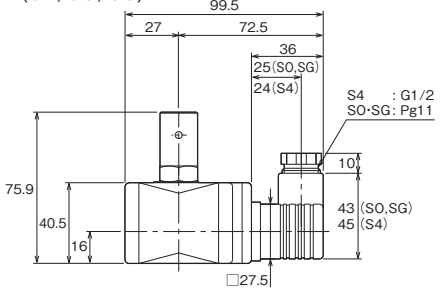
General-purpose Solenoid Valves

3-port valve/Direct type
3HC-20E/3HC-25E(normal closed)
3HP-20E/3HP-25E(normal open)

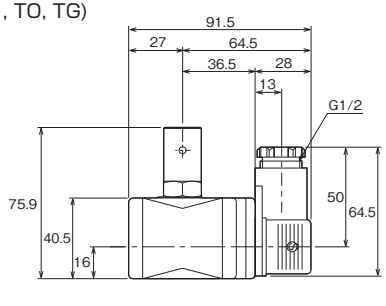


Wiring Block

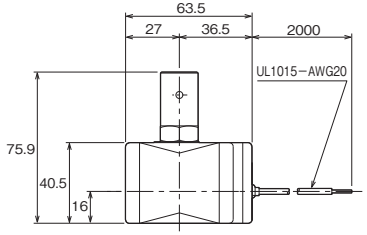
DIN socket type
(S4, SO, SG)



Terminal type
(T1, TO, TG)



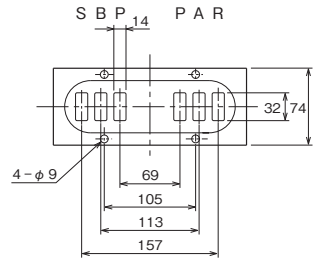
Lead wire type(L1)

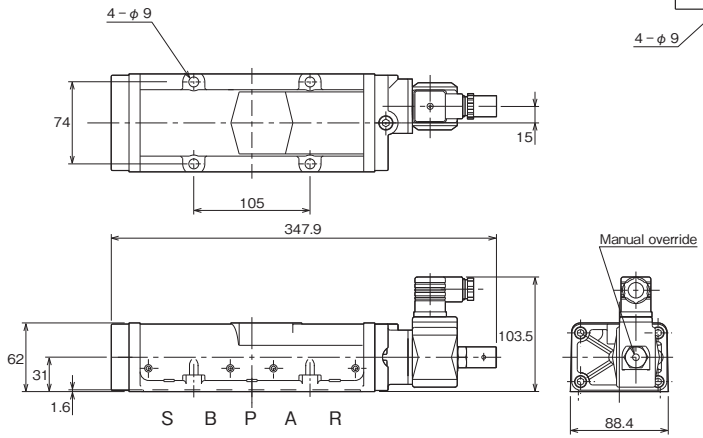


General-purpose Solenoid Valves

5-port valve/For manifold
5HR-20M(return)

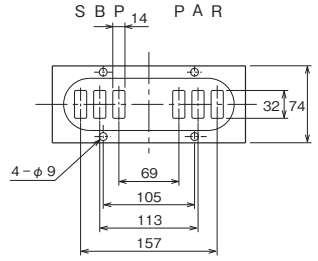
Dimensions of valve bottom

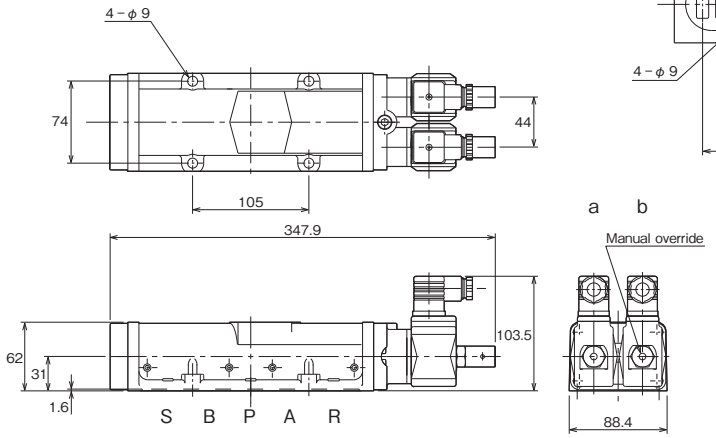




5HD-20M(detent)
5HC-20M(closed center)
5HE-20M(exhaust center)

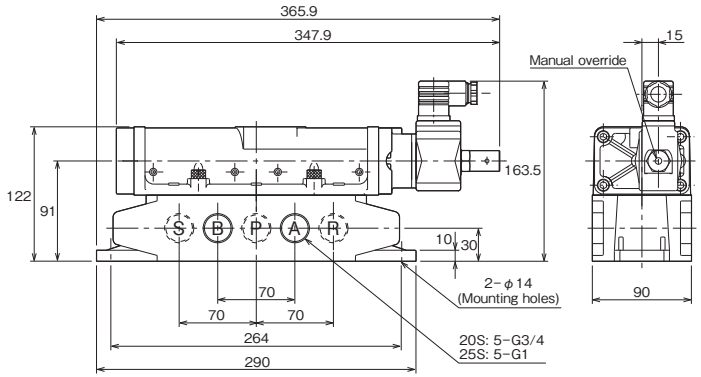
Dimensions of valve bottom



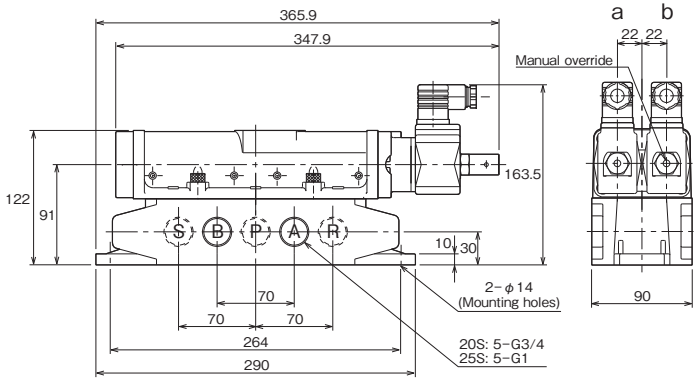


General-purpose Solenoid Valves

5-port valve/Sub-plate type/With stack manifold
5HR-∗∗S(N)(return)

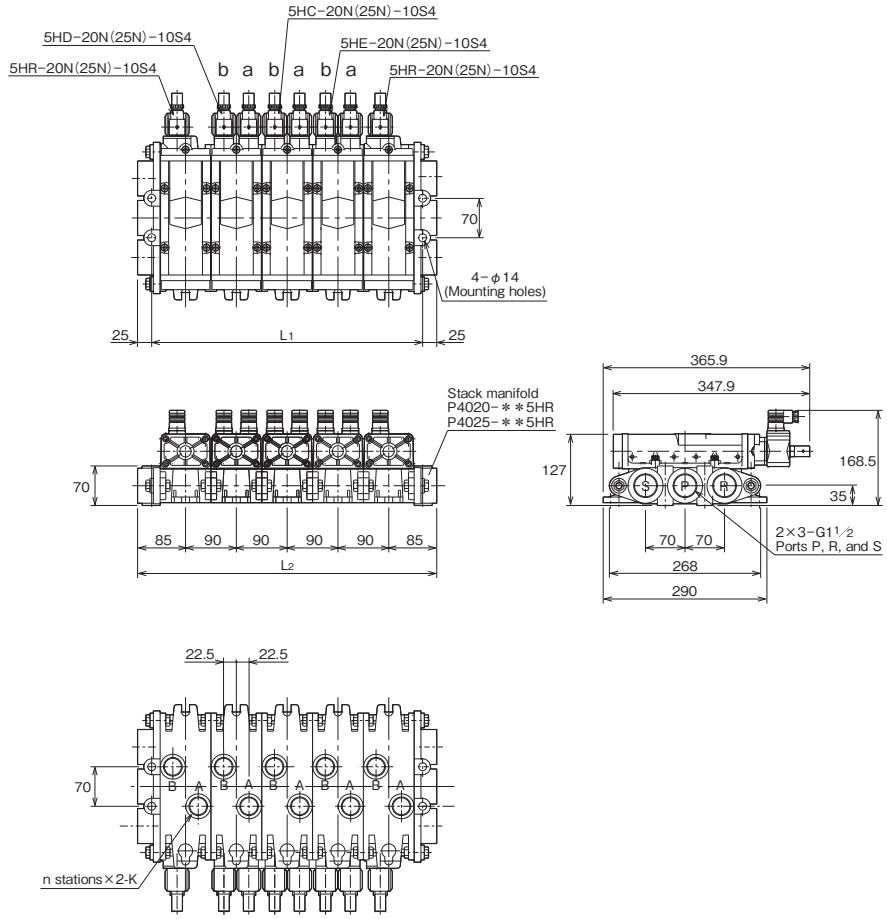


5HD-∗∗S(N)(detent)
5HC-∗∗S(N)(closed center)
5HE-∗∗S(N)(exhaust center)



General-purpose Solenoid Valves

Stack manifold/P4020(25)-∗ ∗5HR
5-port valve
5HR-20(25)N/5HD-20(25)N/5HC-20(25)N/5HE-20(25)N



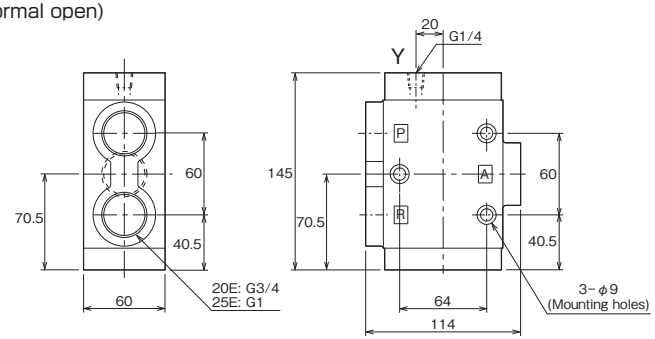
Dimensional Table

Model number of stack manifold \ Symbol	K
P4020−∗ ∗5HR	G3/4
P4025−∗ ∗5HR	G1

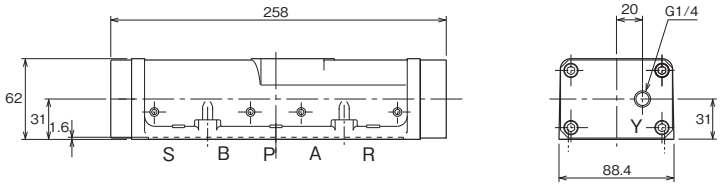
Model number of stack manifold	Number of stations n / Symbol of number of stations	2	3	4	5	6	7	8
	Dimension symbol	02	03	04	05	06	07	08
P4020−∗ ∗5HR	L1	210	300	390	480	570	660	750
P4025−∗ ∗5HR	L2	260	350	440	530	620	710	800

Master Valves

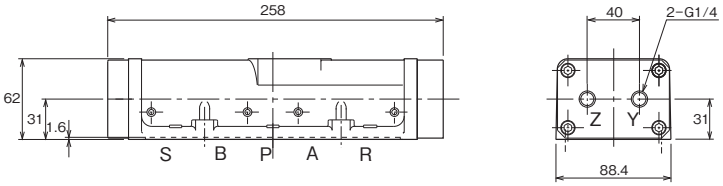
3-port valve/Direct type
3HC-∗∗E-P(normal closed)
3HP-∗∗E-P(normal open)



5-port valve/For manifold
5HR-20M-P(return)



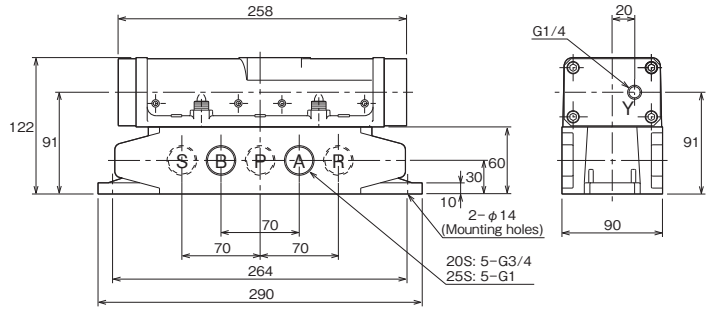
5HD-20M-P(detent)
5HC-20M-P(closed center)
5HE-20M-P(exhaust center)



●For the dimensions of the manifold, see the drawing of general-purpose solenoid valve.

Master Valves

5-port valve/Sub-plate type/With stack manifold
5HR-∗∗S(N)-P(return)



5HD-∗∗S(N)-P(detent)
5HC-∗∗S(N)-P(closed center)
5HE-∗∗S(N)-P(exhaust center)