SANDSUN

山田順精機股份有限公司

使 用 說 明 書
OPERATION MANUAL

超 負 荷 保 護 裝 置
OVERLOAD PROTECTOR
MODEL:VA08H (Air Pressure Type)

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OVERLOAD PROTECTOR

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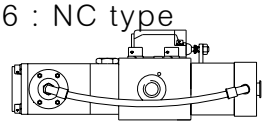
1. Introduction :

Overload protector is installed on press in order to check the overload hydraulic pressure of cylinder inside the slide. The hydraulic pressure of cylinder will be released immediately within 3/1000 seconds when overload occurs. And press will stop working urgently as soon as receiving the signal from limit switch, in order to protect the die and press.

After overload occurred, will quickly compensate oil of cylinder to reach normal working pressure by air driven hydraulic pump, in order to operate the press normally. Furthermore, overload protector to have pressure control valve, which can prevent effects of excessive rising of hydraulic pressure caused by raised temperature when press is operating.

2. Selection of Model : V A 0 8 H- [1] [2] [3] (Suitable for press 200 tons & down)

[1] Setting range of overload hydraulic pressure (Kgf/cm^2)	[2] Type of limit switch	[3] Volume of oil tank (Liter)
7 : x 70 times 9 : x 90 times	2 : NO type 6 : NC type 	0 : None 1 : 1.2 3 : 4.0 5 : 8.0

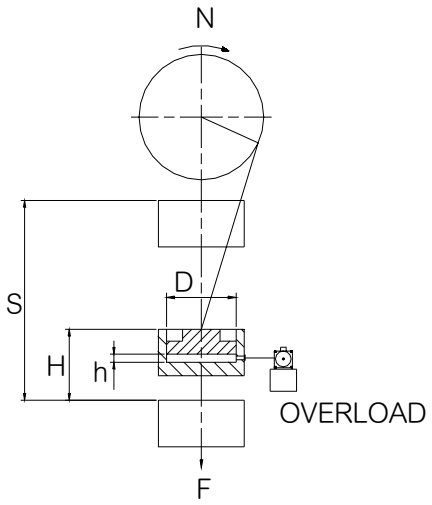
3. Specification :

Model		VA08H-7□0	VA08H-9□0
Releasing flow rate	cm^3/sec	13000	11500
Area of orifice	cm^2	0.5	0.4
Method of setting pressure		Air pressure x 70 times	Air pressure x 90 times
Range of setting pressure	kgf/cm^2	250 ~ 350	270 ~ 450
Air supply	kgf/cm^2	3 ~ 5	
Capacity of press		200 ton & down	
Air consumption	Nℓ/min	220	
Maxi. noise	dB	77	
Discharging pressure of pump	kgf/cm^2	Air pressure x 42 times	
Hydraulic oil		ISO-VG-32 or equivalent	

4. Basis of Selection：

4.1 Specification & parameter of press

F：capacity of press (tons)
S：stroke length of slide (mm)
N：strokes per minute (spm)
H：rated tonnage point (mm)
D：diameter of cylinder inside slide (cm)
n：number of cylinder inside slide (pc)
h：stroke length of cylinder inside slide (cm)
Pa: air pressure (kgf/cm^2)
m : times of air pressure



4.2 Calculation formulas for model selection

- Total area of cylinder inside slide $A=(\pi D^2 / 4) \times n$ (cm^2)
- Setting hydraulic pressure of overload protector $P = F \times 1000 \times 1.1 / A$ (kgf/cm^2)
- Setting air pressure of overload protector $Pa = P / m$ (kgf/cm^2)
- Drop speed of slide $V = N\sqrt{SH-H^2} / 87.5$ (cm/sec)
- Releasing flow rate of cylinder inside slide when overload occurs $Q = A \times V$ (cm^3/sec)
- Volume of oil tank $L \geqq 4 \times A \times h$ (cm^3)

4.3 Determination of model no.

- Please choose a suitable model from below table according to releasing flow rate of cylinder inside slide (Q)
- Releasing flow rate of overload protector which you choose has to be more than of cylinder inside slide when overload occurs. (Please consider use two sets of overload protector if releasing flow rate is not enough. It's equal to 2 times of releasing flow rate)

5. Attention Points for Piping:

5.1 Air piping:

a. Inside diameter of air piping has to be more than 6 mm.
b. Air supply has to remove steam and keep dry, in order to avoid generate furring. The function of pump and other parts will be affected or damaged by furring.
c. Please choose normal close type (NC) of air solenoid valve either 2-way or 3-way to use.

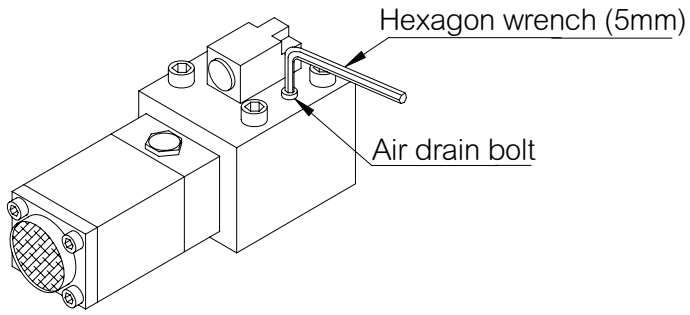
5.2 Hydraulic piping:

a. 1 In order to prevent normal function of overload protector or damage to inside parts from dust or chips, Hydraulic piping & fitting has to be cleared completely and keep clean.
b. Size of piping for reference:

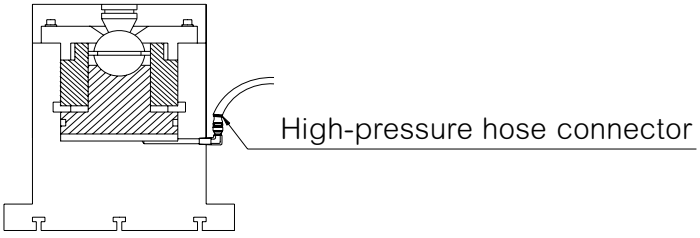
Size (I.D. / O.D.)	12 / 18 mm	13 / 18 mm	14 / 18 mm
Work pressure (max.)	400 kgf/cm^2	320 kgf/cm^2	250 kgf/cm^2

6. Caution in Use:
   - 6.1 Please check before use if wire connection is correct & air-piping connection is correct & hydraulic oil in tank is enough & kind of hydraulic oil is suitable.
   - 6.2 When press is normally operated, air supply should not be turned off absolutely.
   - 6.3 Check the oil tank regularly to see if there still has enough hydraulic oil. If lower than mid position of the oil level gauge, please add oil immediately.
   - 6.4 The hydraulic oil should be changed every year.

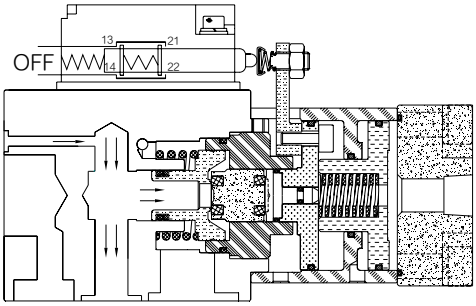
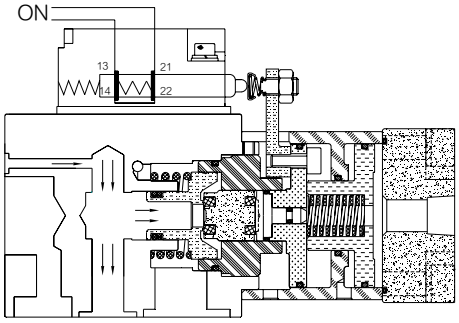
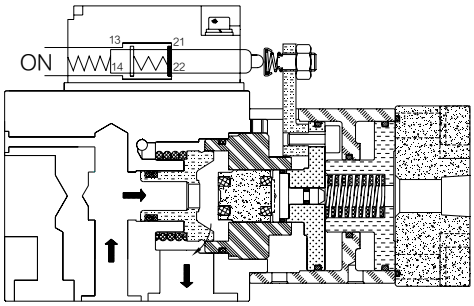
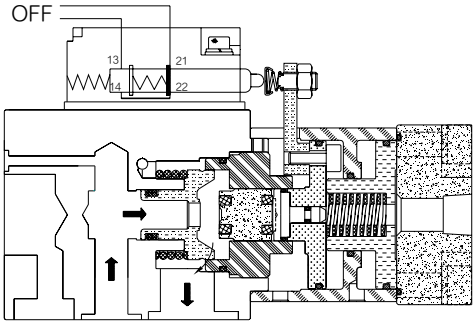
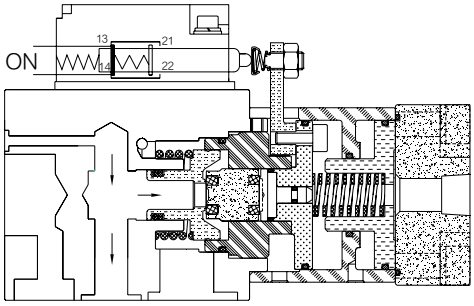
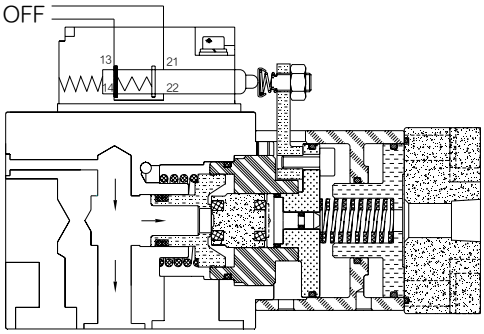
7. Method of Air Drain: (when you use overload protector at first time or re-supply oil)
   - 7.1 At air drain bolt：
     - 7.1.1 Adjust air regulator to 2 ~ 3 kgf/cm^2.
     - 7.1.2 Turn the air drain bolt anti-clockwise around 1/4 ~ 1/2 circle, then pump starts working.
     - 7.1.3 Wait for around 20 seconds in order to exhaust air completely.
     - 7.1.4 Turn the air drain bolt clockwise to fasten it, and then pump stops working (hydraulic pressure is raising).
     - 7.1.5 If the pump still working. It means the air didn't exhaust completely, please repeat step 7.1.2 ~ 7.1.4. till air is exhausted completely.
     - 7.1.6 Adjust air regulator to required pressure.



   - 7.2 At connector between high-pressure hose and cylinder of the slide：
     - 7.2.1 Adjust air regulator to 2 ~ 3 kgf/cm^2.
     - 7.2.2 Loosen the connector of high-pressure hose from slide, then pump starts working.
     - 7.2.3 Check the oil is which flowed out of high-pressure hose, till the oil didn't bubbles completely, then fasten the connector.
     - 7.2.4 After fasten the connector of high-pressure hose, pump stops working (hydraulic pressure is raising).
     - 7.2.5 Adjust air regulator to required pressure.



8. Working Principle：

Circuit of Limit Switch	NO type(AT11-1-Ⅰ)	NC type(AT11-2-Ⅰ) common
Press is normally operate		
When overload protector is releasing		
After overload protector was released (or hydraulic pressure isn't enough)		

8.1 Press is normally operate:

When the press is normally operate, inner to have pressure control valve of overload protector, which has the function of auto adjust hydraulic pressure. It can prevent effects of excessive rising of hydraulic pressure caused by raised temperature when press is operating.

8.2 When overload protector is releasing:

When overload occurs, overload protector will work to release excessive pressure immediately. Meanwhile, it will out put electric signal to stop press immediately, and the air solenoid valve, which is used by overload protector, will be "OFF" (cut off the power supply).

8.3 After overload protector was released. (or hydraulic pressure isn't enough):

After overload occurred, you have to eliminate the overload situation or to reset the press; Meanwhile, the air solenoid valve is "ON" (electrify) to supplement oil of cylinder to reach normal working pressure. Press will return to normal operation.

9. Setting Method of Limit Switch:

9.1 Installation method:

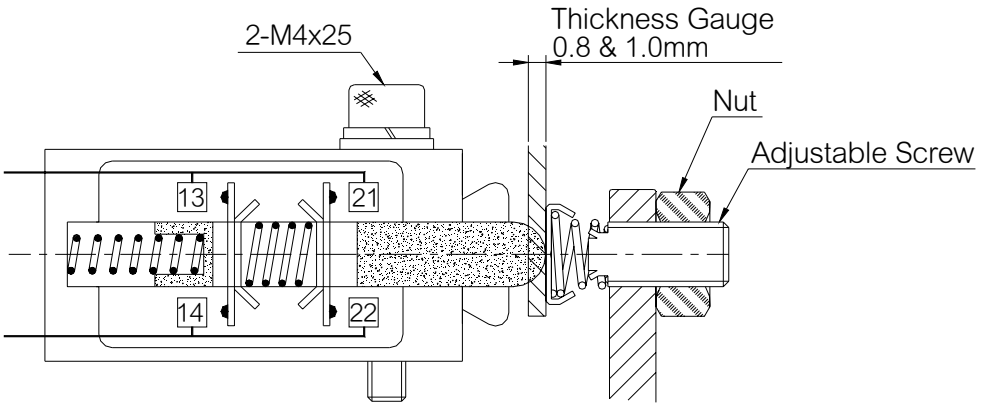
Use 3 mm hexagon wrench to fasten 2 pc of M4x25 hexagon socket head bolts, which is thread locking on the end 2 ~ 3 threads of bolts to prevent loose of limit switch. Before fasten the bolts.

9.2 Adjust method:

Limit switch has to be adjusted on the normal use condition of overload protector. (It means hydraulic pressures of cylinder inside the slide is charged completely then pump stops working). Under this condition, Insert the thickness gauge of 0.8 & 1.0 mm each between adjustable screw and head of limit switch to adjust limit switch. After adjustable screw, please fasten the nut and then insert the thickness gauge to re-confirm if electric signal is correct.

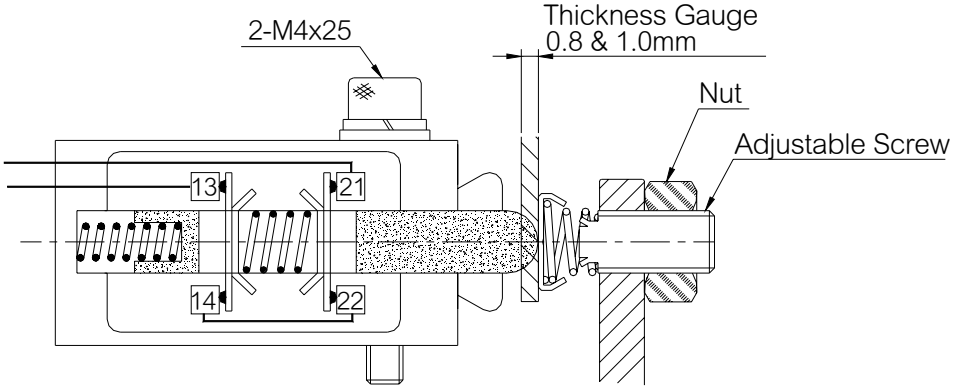
9.2.1 NO type(AT11-1-Ⅰ) :

Contact point 13 & 14 of limit switch has to be “ON” when insert 1.0 mm thickness gauge. And to be “OFF” when insert 0.8 mm thickness gauge.



9.2.2 NC type(AT11-2-Ⅰ) :

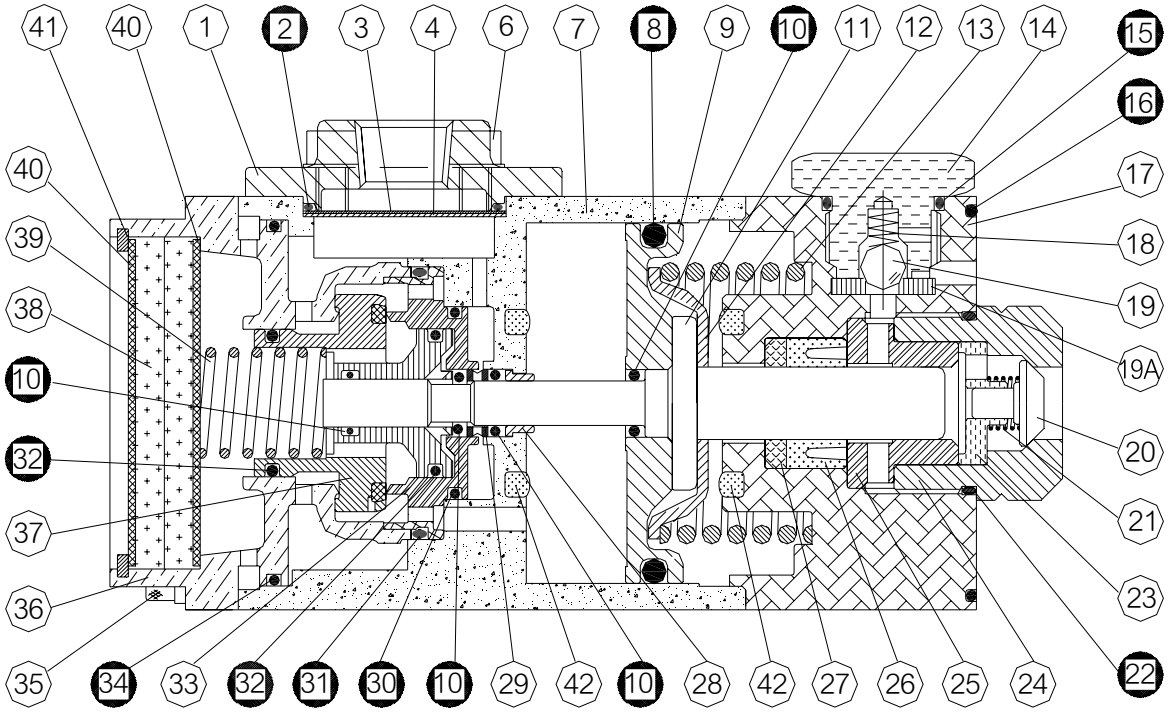
Contact point 21 & 22 of limit switch has to be “OFF” when insert 1.0 mm thickness gauge. And to be “ON” when insert 0.8 mm thickness gauge.



10. Troubleshooting:

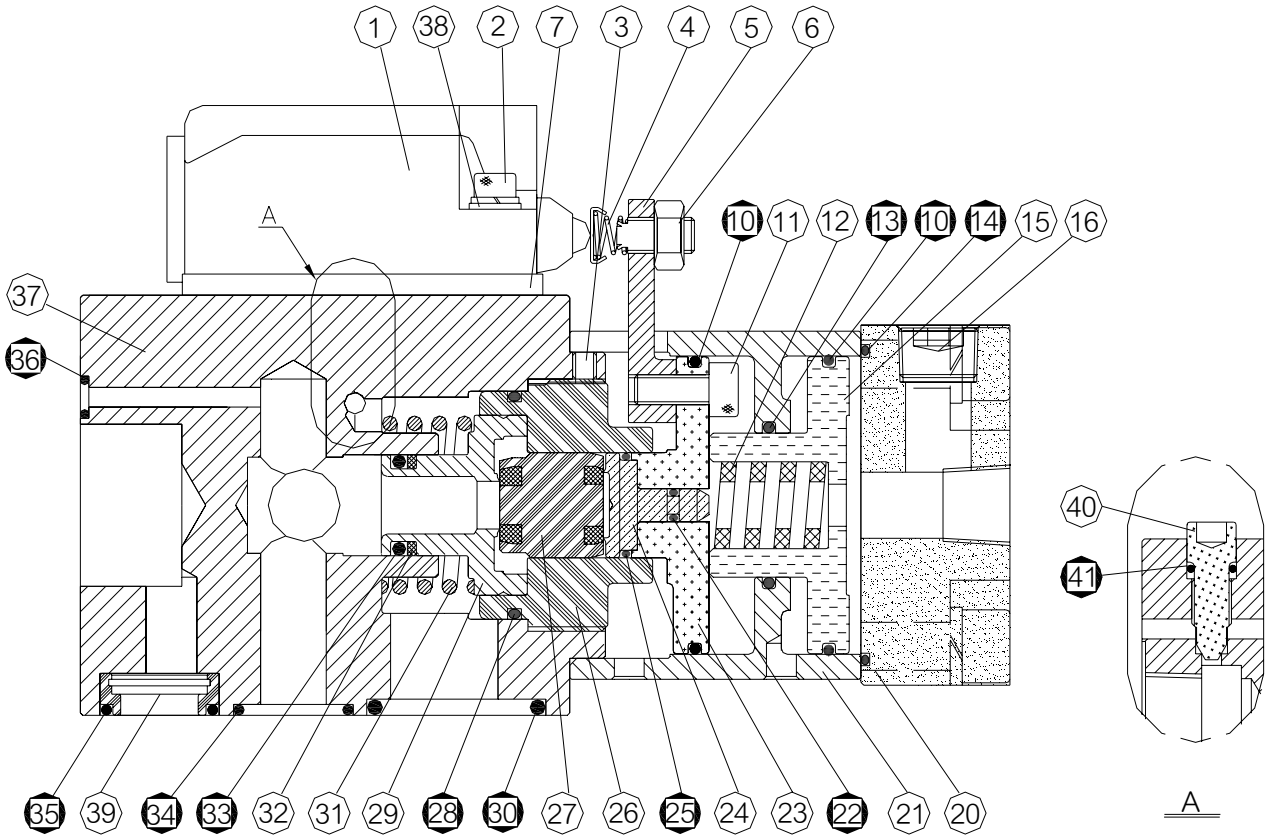
Item	Trouble		Cause	Step for Solution
I	Pump not work		1. Air supply was closed.	Open the air supply.
			2. Exchange valve ㊲ caught by fur.	Disassemble the pump for cleaning then smear the grease.
			3. Spring ⑬ broke.	Change the spring
			4. Spool ⑪ caught.	Check if any damage happens from the oil seal ㉖ and spool ⑪.
			5. Air pressure is too low or not enough.	Adjust the air pressure to over 3 kgf/cm^2
II	Air leak from the pump		1. Exchange valve ㊲ caught by fur.	Disassemble the pump for cleaning then smear the grease.
			2. The O-ring ⑩ of the exchange valve was damaged.	Change the O-ring.
III	Pump nonstop (highest speed)	The pump	1. Oil seal ㉖ damaged.	Change the oil seal.
			2. Inlet valve ⑳damaged or caught.	Check if any damage happens from the inlet base ㉔ and inlet valve ⑳.
		The overload valve	3. Without enough oil in the oil tank.	Refill hydraulic oil，and let the air drain.
			4. Pilot valve ㉙ caught.	Check if any damage happens from the pilot valve.
			5. Air drain bolt ㊵ loosen.	Fasten the air drain bolt.
IV	Pump nonstop (lower speed)	Piping	1. Oil leak out from outer piping.	Find out the leakage position then fasten it.
		The pump	2. Inlet valve ⑳ damaged.	Check if any damage happens from the inlet base ㉔ and inlet valve ⑳.
			3. The pressure valve automatically adjusts pressure due to the air pressure is too high now.	Adjust the air pressure to lower than 5 kgf/cm^2.
		The overload valve	4. O-Ring ㊱ damaged.	Change the O-ring.
			5. Pressure control valve ㉗ damaged.	Change the pressure control valve.
			6. Air drain bolt ㊵ not lock.	Fasten the air drain bolt.

11. PUMP ASSEMBLY DIAGRAM (Model:VP-5007)



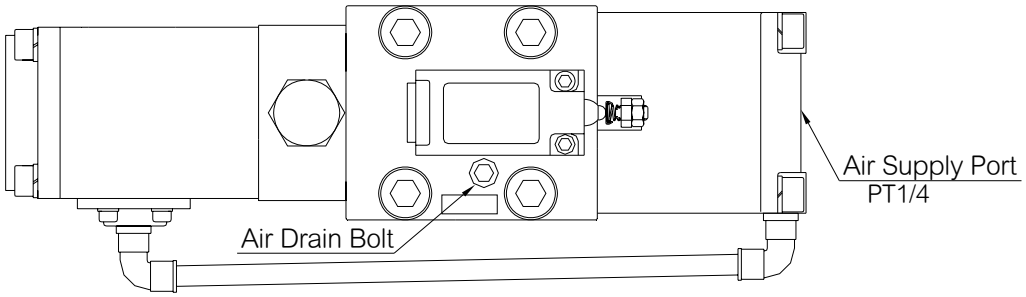
Item	Part Name	Specification	Qt'y	Item	Part Name	Specification	Qt'y
1	Air Supply base	61-3100	1	22	O-Ring	ARP-568-020	1
2	O-Ring	ARP-568-022	1	23	Inlet valve base	61-5500	1
3	Filter	61-3200	1	24	Inlet base	61-5200	1
4	Filter plate	61-3300	1	25	Spool bush	61-5607	1
6	Bolt	M4x10	4	26	Oil seal	UN-7.1	1
7	Cylinder body	61-2000	1	27	Back-up ring	TF-7.1-17.1-2	1
8	O-Ring	AP-44	1	28	Bush-(1)	61-2100	1
9	Piston	61-4100	1	29	Bush-(2)	61-2200	1
10	O-Ring	ARP-568-010	4	30	O-Ring	ARP-568-021	1
11	Spool	61-4207	1	31	O-Ring	ARP-568-028	1
12	Spring base	61-4300	1	32	O-Ring	ARP-568-017	2
13	Spring	61-4400	1	33	Pilot base	61-2300	1
14	Outlet base	61-6001	1	34	O-Ring	ARP-568-032	1
15	O-Ring	ARP-568-015	1	35	Bolt	M6x90	2
16	O-Ring	AS-50	1	36	Cover	61-2500	1
17	Hydraulic body	61-5007	1	37	Exchange valve	61-2400	1
18	Spring	61-6100	1	38	Silencer	61-2800	2
19	Steel ball	∅ 6.0	1	39	Spring	61-2600	1
19A	Check pad	61-6200	1	40	Silencer plate	61-2700	2
20	Inlet valve	61-5300	1	41	Check ring	R-45	1
21	Spring	61-5400	1	42	Buffer pad	61-5700	2

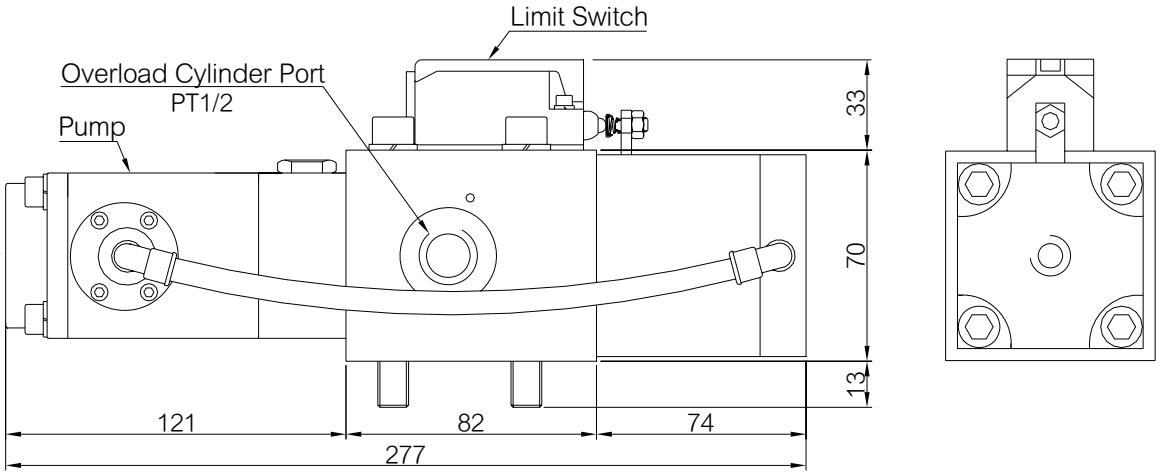
12. OVERLOAD VALVE ASSEMBLY DIAGRAM (Model:VA08H)

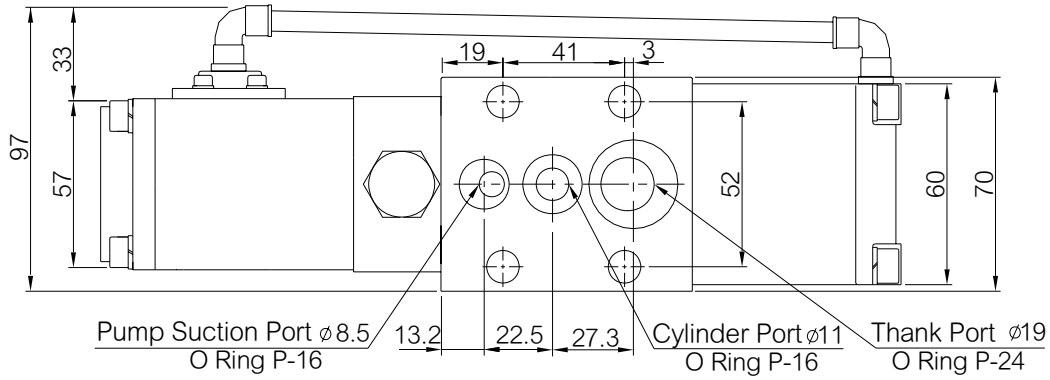


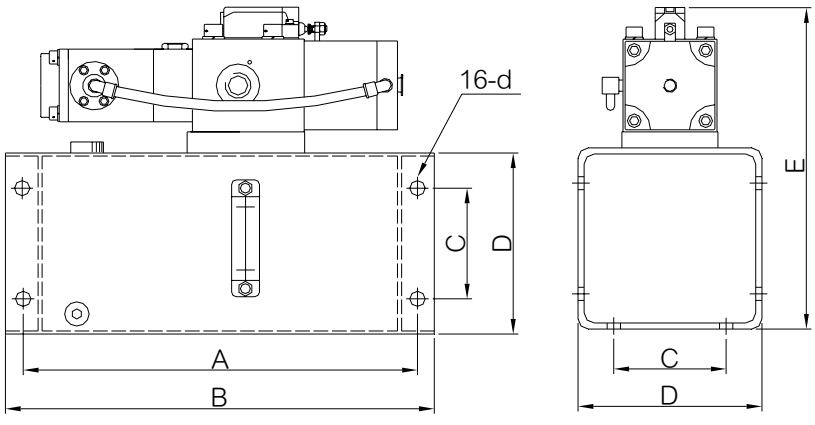
Item	Part Name	Specification	Qt'y	Item	Part Name	Specification	Qt'y
1	Limit switch	AT11-1-I(NO)	1	25	O-Ring	AS-15	1
		AT11-2-I(NC)	1	26	Pilot valve base	61-0401	1
2	Bolt	M4x25	2	27	Pressure control valve	61-0510	1
3	Bolt	M4x4	1	28	O-Ring	AS-35	1
4	Adjustable screw	61-1700	1	29	Pilot valve	61-0307 (VA08-7□□)	1
5	Coupled plate	61-1400	1			61-0309 (VA08-9□□)	1
6	Nut	M6	1	30	O-Ring	AP-24	1
7	Limit switch base	61-7100	1	31	Spring	61-0200	1
10	O-Ring	AS-46	2	32	Back-up ring	TP-12.5	1
11	Bolt	M5x12	1	33	O-Ring	BP-12.5	1
12	Spring	TM14x30	1	34	O-Ring	BP-16	1
13	O-Ring	AS-24	1	35	O-Ring	BP-16	1
14	O-Ring	AS-50	1	36	O-Ring	BP-4	1
15	Balance pistion	61-1200	1	37	Hydraulic body	61-0100	1
16	Bolt	M8x70	4	38	Flat pad	M4	2
20	Cover	61-1300	1	39	Filter	A00011	1
21	Cylinder	61-1100	1	40	Air drain bolt	61-1501	1
22	O-Ring	AS-3	1	41	O-Ring	AP-7	1
23	Coupled piston	61-1000	1				
24	Relief valve	61-0630	1				

13. Outline DimensionsVA08□-□□0 :









Model	VA08□-□61	VA08□-□63
A	206	285
B	230	310
C	50	80
D	100	150
E	226	276
d	ø11	ø13
L	1.2	4.0

L : Volume of oil tank (Liter)