MODEL AL-300 Series

AL-300, AL-300T, AL-301 and AL-301T

SAFETY RELIEF VALVE

PRODUCT MANUAL

Thank you very much for choosing the Yoshitake's product. To ensure the correct and safe use of the product, please read this manual before use. This manual shall be kept with care for future references.
The symbols used in this manual have the following meanings.

Warning	This symbol indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.
Caution	This symbol indicates a hazardous situation that, if not avoided, may result in minor or moderate injury or may result in only property damage.

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Yoshitake INC.

■EPDT-094b■

1. Usage of the Product

The AL-300 series safety relief valves are used in small boilers, various pressure vessels, instrumentation devices, pumps and at outlet of pressure reducing valves.

2. Features

1. Simple in structure and easy to maintain.
2. Can be adjusted easily.
3. The AL-300T and the AL-301T for liquid/gas use can close completely since PTFE disc is used between their valve and valve seat.

3. Specifications

Caution	Please confirm that the indications on the product correspond with the specifications of the ordered product model before use. * If they are different, please contact us without using the product.

Model		AL-300	AL-301
Structure		Closed type *1	
Application		Steam	
Working pressure		0.05-1.0 MPa	0.05-1.6 MPa
Max. temperature		220℃	
Material	Valve case, spring case	Ductile cast iron	
	Valve, valve seat	Cast bronze	Stainless steel
Connection		JIS 10K FF flanged *4	

*1: The structure in which fluid is discharged only from the outlet.
*4: JIS 16K FF flanged when working pressure is more than 1.0 MPa.

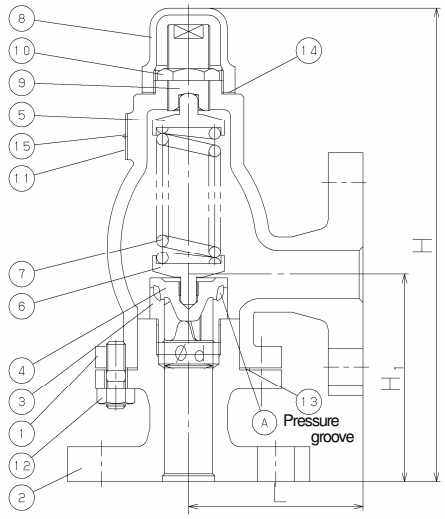
Model		AL-300T	AL-301T
Structure		Closed type *1	
Application		Air, Cold and hot water, Oil, Other non-dangerous fluid	
Working pressure		0.05-1.0 MPa	0.05-1.3 MPa *2
Max. temperature		150℃	
Material	Valve case, spring case	Ductile cast iron	
	Valve, valve seat	Cast bronze and PTFE	Stainless steel and PTFE
Connection		JIS 10K FF flanged *3	

*1: The structure in which fluid is discharged only from the outlet.
*2: Please contact us if working pressure is between 1.31 MPa and 1.6 MPa.
*3: JIS 16K FF flanged when the working pressure is more than 1.0 MPa.

4. Dimensions and Weights

■ AL-300, 301 [mm]

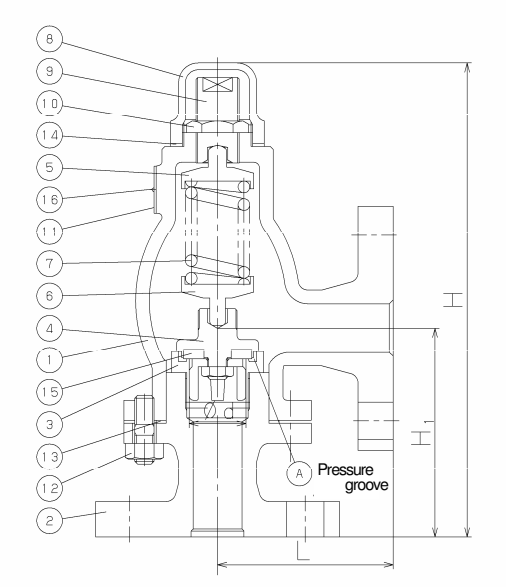
Nominal size	L	H	H_1	d	Flow area [mm^2]	Weight [kg]
15	90	245	108	25	49.1	4.7
20	90	245	108	25	49.1	5.0
25	90	245	108	25	49.1	6.2
32	91	285	115	37	107.6	8.6
40	91	285	115	38	113.5	8.8
50	105	311	132	50	196.4	12.6



No.	Part name
1	Spring case
2	Valve case
3	Valve seat
4	Valve
5	Top spring plate
6	Bottom spring plate
7	Spring
8	Cap
9	Adjusting screw
10	Lock nut
11	Name plate
12	Stud bolt & nut
13	Gasket
14	Gasket
15	Rivet

■ AL-300T, 301T [mm]

Nominal size	L	H	H_1	d	Flow area [mm^2]	Weight [kg]
15	90	245	108	29	66.1	4.7
20	90	245	108	29	66.1	5.0
25	90	245	108	29	66.1	6.2
32	91	285	115	37	107.6	8.6
40	91	285	115	37	107.6	8.8
50	105	311	132	50	196.4	12.6



No.	Part name
1	Spring case
2	Valve case
3	Valve seat
4	Valve
5	Top spring plate
6	Bottom spring plate
7	Spring
8	Cap
9	Adjusting screw
10	Lock nut
11	Name plate
12	Stud bolt & nut
13	Gasket
14	Gasket
15	Disc
16	Rivet

5. Operation

- Opening operation
  As the inlet pressure approaches the opening pressure, the force of fluid pushing up the valve [4] approaches the force pressing down the valve [4]. The safety relief valve starts to discharge when the inlet pressure reaches around 3% below the opening pressure, and the fluid accumulates gradually on the pressure groove [A]. When the fluid pressure reaches the opening pressure, the valve [4] pops.

- Closing operation
  Since the inlet pressure of the safety relief valve decreases when the fluid is released into the atmosphere by the pop action of valve [4], the fluid lift force is lowered. At this point, the repelling force of the spring [7] becomes larger than the force of fluid lift and thus the valve closes.

6. Nominal Size Selection Table

6.1 For steam (at saturated temperature)

■ AL-300 and AL-301

<Pressure vessel structure standard> [kg/h]

Nominal size [mm]	Valve dia. [mm]	Pressure [MPa]										
		0.05	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
15	38	38	50	73	98	123	148	172	196	220	244	268
20	38	38	50	73	98	123	148	172	196	220	244	268
25	38	38	50	73	98	123	148	172	196	220	244	268
32	84	85	110	160	214	270	324	377	430	482	535	588
40	89	89	116	168	226	285	342	398	454	509	564	620
50	154	155	201	292	392	494	592	689	785	881	977	1073

[kg/h]

Nominal size [mm]	Valve dia. [mm]	Pressure [MPa]					
		1.1	1.2	1.3	1.4	1.5	1.6
15	275	292	316	340	364	387	411
20	275	292	316	340	364	387	411
25	275	292	316	340	364	387	411
32	604	640	693	745	798	849	902
40	637	675	731	786	841	896	951
50	1102	1169	1265	1360	1456	1551	1646

- AL-300: 0.05-1.0 MPa
  AL-301: 0.05-1.6 MPa

6.2 For air (at 20˚C)

■ **AL-300T and AL-301T**

<Pressure vessel structure standard> [kg/h]

Nominal size [mm]	Valve dia. [mm]	Pressure [MPa]										
		0.05	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
15	74	84	109	159	213	268	322	377	432	486	541	595
20	74	84	109	159	213	268	322	377	432	486	541	595
25	74	84	109	159	213	268	322	377	432	486	541	595
32	121	136	178	259	347	436	525	614	703	792	880	969
40	121	136	178	259	347	436	525	614	703	792	880	969
50	221	249	325	473	635	797	959	1121	1283	1445	1607	1769

[kg/h]

Nominal size [mm]	Valve dia. [mm]	Pressure [MPa]					
		1.1	1.2	1.3	1.4	1.5	1.6
15	650	650	704	759	604	645	685
20	650	650	704	759	604	645	685
25	650	650	704	759	604	645	685
32	1058	1058	1147	1236	1324	1413	1502
40	1058	1058	1147	1236	1397	1491	1584
50	1931	1932	2094	2256	2418	2580	2742

- AL-300T: 0.05-1.0 MPa
  AL-301T: 0.05-1.6 MPa

6.3 For water (accumulation: 25%)

■ **AL-300T and AL-301T**

<Yoshitake standard> [m^3/h]

Nominal size [mm]	Pressure [MPa]										
	0.05	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
15	0.8	1.1	1.6	2.0	2.3	2.6	2.8	3.1	3.3	3.5	3.7
20	0.8	1.1	1.6	2.0	2.3	2.6	2.8	3.1	3.3	3.5	3.7
25	0.8	1.1	1.6	2.0	2.3	2.6	2.8	3.1	3.3	3.5	3.7
32	1.3	1.9	2.7	3.3	3.8	4.2	4.7	5.0	5.4	5.7	6.0
40	1.3	1.9	2.7	3.3	3.8	4.2	4.7	5.0	5.4	5.7	6.0
50	2.4	3.5	4.9	6.0	7.0	7.8	8.5	9.2	9.9	10.5	11.0

[m^3/h]

Nominal size [mm]	Pressure [MPa]					
	1.1	1.2	1.3	1.4	1.5	1.6
15	3.9	4.0	4.2	3.2	3.3	3.5
20	3.9	4.0	4.2	3.2	3.3	3.5
25	3.9	4.0	4.2	3.2	3.3	3.5
32	6.3	6.6	6.9	7.1	7.4	7.6
40	6.3	6.6	6.9	7.5	7.8	8.1
50	11.6	12.1	12.6	13.1	13.5	14.0

- AL-300T: 0.05-1.0 MPa
  AL-301T: 0.05-1.6 MPa

7. Installation

⚠ Warning

1. Do not install any closing device such as a stop valve at inlet and outlet sides of the product.
2. Do not disassemble the product unnecessarily.
   * Failure to follow this notice may prevent the product from functioning properly and lead to danger.
3. Lead outlet pipe to a place where there is no risk of physical damage even if fluid blows out.
   * Failure to follow this notice may result in injury and scalds in case of fluid blow out.
4. Do not apply viscous fluid that may make fixation of the valve and valve seat.
   * Failure to follow this notice may prevent the product from functioning properly.

⚠ Caution

1. Before installing the product, remove foreign substances and scale from the piping.
   * Failure to follow this notice may prevent the product from functioning properly.
2. When installing the product, match the direction of fluid flow with the inlet and outlet of the product respectively.
   * Failure to follow this notice may prevent the product from functioning properly.
3. Install the product in a way that excessive load, torque or vibration cannot be applied to the product.
   * Failure to follow this notice may result in malfunction or a drastically shortened service life of the product.
4. Inner diameters of pipe mount and of exhaust pipe shall be equal to or larger than those of each inlet and outlet of the product.
   * Failure to follow this notice may result in malfunction or insufficient amount of blowout.
5. Install the product in a posture in which the stem of the adjusting screw is vertical to the ground and the cap faces upward. Preferably attach the product directly to a pressure vessel. In addition, place the product in a position where maintenance and inspection can be done easily.
   * Failure to follow this notice may prevent the product from functioning properly.
6. When installing an exhaust pipe, its inner diameter shall be more than that of the product outlet to avoid improper back pressure.
   * Failure to follow this notice may prevent the product from functioning properly.

8. Operating Procedure

⚠ Warning

1. Do not apply the product to devices which do not allow any valve seat leakage.
   * The product has allowable valve seat leakage and does not close completely (the valve seat leakage cannot be zero).
2. Do not touch the product with bare hands when fluid is hot.
   * Failure to follow this notice may scald your skin.
3. Do not look down or touch the product outlet.
   * Failure to follow this notice may result in injury or scalds in case that fluid blows out suddenly.
4. Do not turn the adjusting screw unless it is necessary.
   * Failure to follow this notice may cause improper and dangerous operation such as blowout at a lower pressure than the set pressure or not blowing at the set pressure.

■ Opening pressure adjustment

1. Turn the cap [8] counterclockwise and remove it.
2. Loosen the lock nut [10] by turning it counterclockwise using a spanner.
3. To increase the set pressure, turn the adjusting screw [9] clockwise using a spanner.
4. To decrease the set pressure, turn the adjusting screw [9] counterclockwise using a spanner.
5. After adjustment is completed, tighten the lock nut [10] and then the cap [8].

9. Maintenance

Warning	Disassembly and inspection must be done by experienced professional. Completely discharge inside pressure from the product, piping and equipment prior to disassembly or inspection. When fluid is hot, cool down the product to the condition that it can be touched with bare hands. * Failure to follow this notice may result in scalds or injury due to the residual pressure.

■ Disassembly

1. Remove the cap [8] and loosen the lock nut [10]. Measuring the height from the top surface of the adjusting screw [9] to that of the spring case [1] before disassembly can provide a guide for reassembly.
2. Loosen the adjusting screw [9] by turning it counterclockwise to the condition that the spring [7] is free of load.
3. Remove the spring case [1] by loosing the stud bolts and nuts [12]. Then remove the top spring plate [5], spring [7], bottom spring plate [6] and the valve [4].

■ Reassembly

Clean the parts before reassembling. Reassemble them in the reverse order of disassembly.