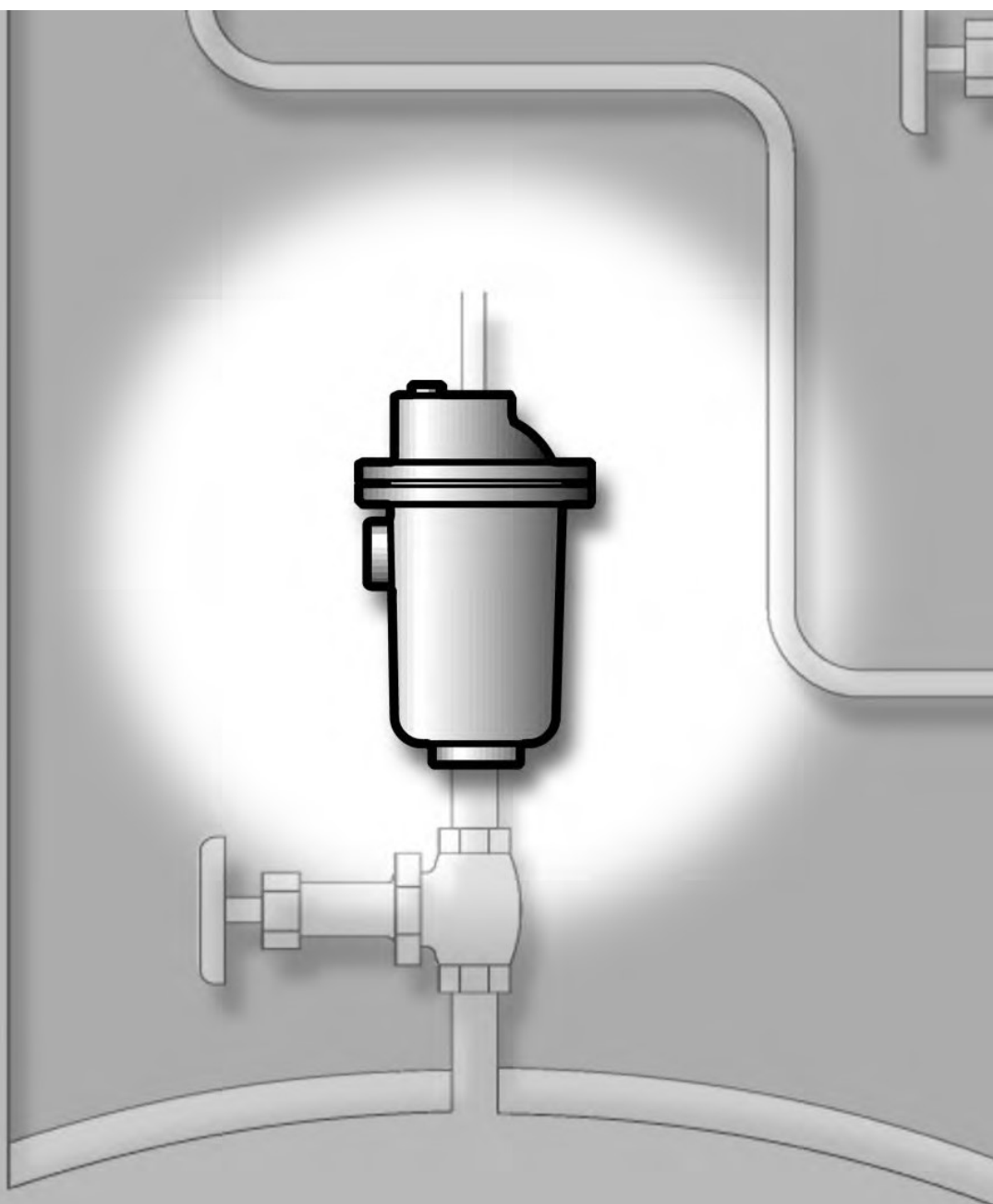
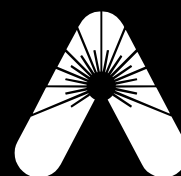


Air Vents



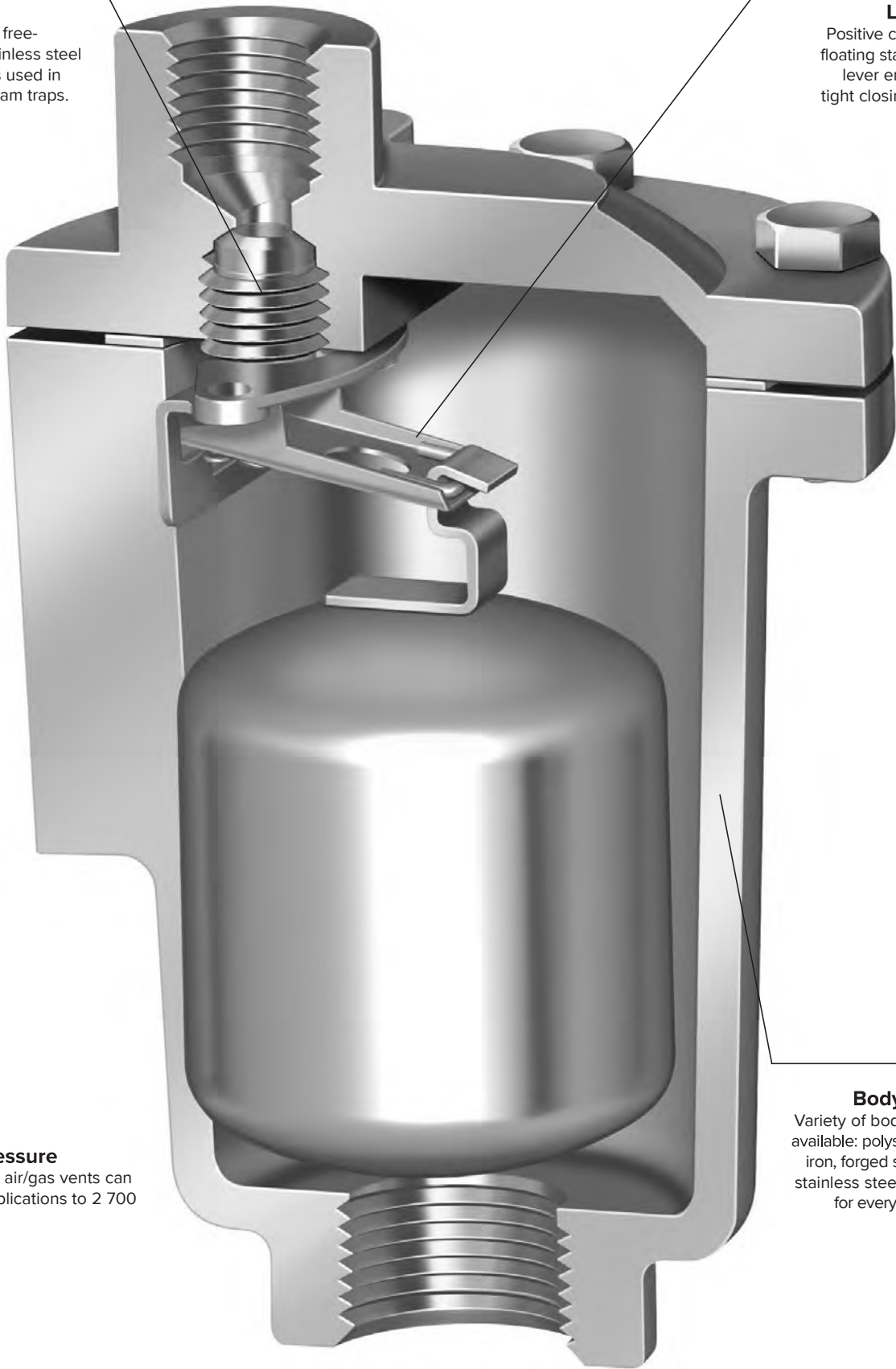
**Armstrong**



**Armstrong®**

**Proven**  
Same proven, free-floating all stainless steel mechanism as used in Armstrong steam traps.

**Leak-tight**  
Positive closing, free-floating stainless steel lever ensures leak-tight closing under all conditions.



**High pressure**  
Armstrong air/gas vents can handle applications to 2 700 psig.

**Body options**  
Variety of body materials available: polysulfone, cast iron, forged steel and all stainless steel. A material for every application.



# Selecting The Armstrong Air/Gas Vent

With the desired CFM capacity known, find the orifice size required from the table on this page. Then find the vent or vents with the correct orifice size on pages 457, 459, 461 or 469 that will operate at the required pressure with a liquid of the specific gravity being handled.

$$V = \frac{W}{d} = \frac{2.05 C A P_2 \times 60}{d} \sqrt{\frac{\left(\frac{P_1}{P_2}\right)^{2.83} \left[ \left(\frac{P_1}{P_2}\right)^{2.83} - 1 \right]}{T}}$$

Example—Find a model number that will vent 52 cfm of air (including safety factor of 1.5 - 2.0) from a liquid with a specific gravity of 0.93 at 250 psig. Using the table below, follow the 250 psig line across to the number 60.9. Orifice size is 5/32". Now go to pages 457, 459, 461 or 469 checking the 5/32" orifice lines to locate a vent for 250 psig or higher with 0.90 gravity liquid.

NOTE: Since specific gravity falls between 0.95 and 0.90, use 0.90 gravity data. The model 3-AV on page 456 is the one to use.

Where:

- V = Volume flow rate, ft<sup>3</sup>/min
- W = Mass flow rate, lb/min
- d = Density, 0.07494 lb/ft<sup>3</sup> at standard conditions
- C = Flow coefficient = 0.65
- A = Orifice area, in<sup>2</sup>
- P1 = Upstream pressure, psia
- P2 = Pressure at throat orifice or downstream pressure = greater of 0.53 P1 or 14.7 psia
- T = Upstream temperature = 530°R

Ref: Baumeister & Marks, Standard Handbook for Mechanical Engineers, 7th edition.

## For Venting During Filling Only

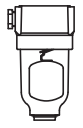

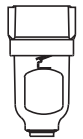



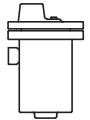
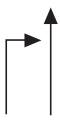

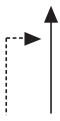
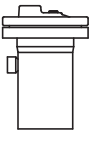
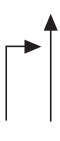
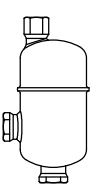

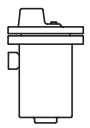



If a vent is required only for getting rid of air when a system is started up, such as when starting up a deep well pump or filling an empty pipe, tank or other vessel, ability of the vent to open at operating pressure can be ignored. In these cases, a model number with a large orifice for fast venting may be selected, **but the vent will not open after air is expelled and the system reaches operating pressure.**

Discharge of Air Through an Orifice in Standard Cubic Feet per Minute at a Standard Atmospheric Pressure of 14.7 psia and 70°F																						
pressure psig	Orifice Diameter, inches																					
	1/16	5/64	3/32	#38	7/64	1/8	9/64	5/32	3/16	7/32	1/4	9/32	5/16	11/32	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1-1/16
5	0.64	1.00	1.44	1.54	1.96	2.56	3.24	4.00	5.76	7.84	10.2	13.0	16.0	19.4	23.0	31.4	41.0	51.9	64.0	92.2	125	185
6	0.70	1.09	1.57	1.69	2.14	2.80	3.54	4.37	6.30	8.57	11.2	14.2	17.5	21.2	25.2	34.3	44.8	56.7	70.0	101	137	202
7	0.75	1.18	1.70	1.82	2.31	3.02	3.82	4.71	6.78	9.23	12.1	15.3	18.8	22.8	27.1	36.9	48.2	61.1	75.4	109	148	218
9	0.85	1.33	1.91	2.05	2.61	3.40	4.31	5.32	7.66	10.4	13.6	17.2	21.3	25.7	30.6	41.7	54.4	68.9	85.1	122	167	246
12	0.98	1.52	2.19	2.35	2.99	3.90	4.94	6.10	8.78	11.9	15.6	19.8	24.4	29.5	35.1	47.8	62.4	79.0	97.5	140	191	282
15	1.09	1.70	2.44	2.62	3.33	4.34	5.50	6.79	9.78	13.3	17.4	22.0	27.2	32.9	39.1	53.2	69.5	88.0	109	156	213	314
20	1.27	1.98	2.86	3.06	3.89	5.08	6.42	7.93	11.4	15.5	20.3	25.7	31.7	38.4	45.7	62.2	81.2	103	127	183	249	367
25	1.45	2.27	3.27	3.50	4.45	5.81	7.35	9.07	13.1	17.8	23.2	29.4	36.3	43.9	52.3	71.1	92.9	118	145	209	285	420
30	1.63	2.55	3.68	3.94	5.01	6.54	8.28	10.2	14.7	20.0	26.2	33.1	40.9	49.5	58.9	80.1	105	132	163	235	320	472
35	1.82	2.84	4.09	4.38	5.57	7.27	9.20	11.4	16.4	22.3	29.1	36.8	45.4	55.0	65.4	89.1	116	147	182	262	356	525
40	2.00	3.13	4.50	4.82	6.13	8.00	10.1	12.5	18.0	24.5	32.0	40.5	50.0	60.5	72.0	98.0	128	162	200	288	392	578
45	2.18	3.41	4.91	5.26	6.69	8.73	11.1	13.6	19.6	26.7	34.9	44.2	54.6	66.0	78.6	107	140	177	218	314	428	631
50	2.37	3.70	5.32	5.70	7.25	9.46	12.0	14.8	21.3	29.0	37.9	47.9	59.2	71.6	85.2	116	151	192	237	341	464	684
60	2.73	4.27	6.15	6.58	8.37	10.9	13.8	17.1	24.6	33.5	43.7	55.3	68.3	82.6	98.3	134	175	221	273	393	535	790
70	3.10	4.84	6.97	7.46	9.49	12.4	15.7	19.4	27.9	37.9	49.6	62.7	77.4	93.7	112	152	198	251	310	446	607	895
80	3.46	5.41	7.79	8.34	10.6	13.9	17.5	21.6	31.2	42.4	55.4	70.1	86.6	105	125	170	222	281	346	499	679	1001
90	3.83	5.98	8.62	9.2	11.7	15.3	19.4	23.9	34.5	46.9	61.3	77.5	95.7	116	138	188	245	310	383	551	750	1107
100	4.19	6.55	9.44	10.1	12.8	16.8	21.2	26.2	37.8	51.4	67.1	84.9	105	127	151	206	268	340	419	604	822	1212
110	4.56	7.13	10.3	11.0	14.0	18.2	23.1	28.5	41.0	55.9	73.0	92.4	114	138	164	223	292	369	456	657	894	1318
125	5.11	7.98	11.5	12.3	15.6	20.4	25.9	31.9	46.0	62.6	81.7	103	128	155	184	250	327	414	511	736	1001	1477
150	6.02	9.41	13.6	14.5	18.4	24.1	30.5	37.6	54.2	73.8	96.4	122	151	182	217	295	385	488	602	867	1181	1741
200	7.85	12.3	17.7	18.9	24.0	31.4	39.8	49.1	70.7	96.2	126	159	196	238	283	385	503	636	785	1131	1539	2269
250	9.68	15.1	21.8	23.3	29.6	38.7	49.0	60.5	87.1	119	155	196	242	293	348	474	620	784	968	1394	1897	2798
300	11.5	18.0	25.9	27.7	35.2	46.0	58.3	71.9	104	141	184	233	288	348	414	564	737	932	1151	1657	2256	3326
400	15.2	23.7	34.1	36.5	46.4	60.7	76.8	94.8	136	186	243	307	379	459	546	743	971	1228	1517	2184	2973	4383
500	18.8	29.4	42.4	45.3	57.6	75.3	95.3	118	169	231	301	381	471	569	678	922	1205	1525	1882	2711	3689	5440
600	22.5	35.1	50.6	54.1	68.8	89.9	114	141	202	275	360	455	562	680	809	1102	1439	1821	2248	3237	4406	6497
750	28.0	43.7	62.9	67.4	85.6	112	142	175	252	343	447	566	699	846	1007	1370	1790	2265	2797	4027	5481	8082
1000	37.1	58.0	83.5	89.4	114	148	188	232	334	455	594	751	928	1123	1336	1818	2375	3006	3711	5344	7273	10725

Air Vents



# Armstrong® Air Vent ID Charts

Illustration	Type	Flow Direction	Connection Type	Max. Allow. Press. psig	TMA °F	Body Material	Model	Max. Oper. Press. psig	Connection Size							Located on Page		
									1/8"	1/4"	1/2"	3/4"	1"	1-1/2"	2"			
	<b>Series 1-AVC</b> See-Thru Free Floating Lever Air/Gas Vents		Screwed	150	150	Nylon Cap Polycarbonate Body	1-AVC	150			●	●	★★				454	
	<b>Series 1-AVCW</b> See-Thru Free Floating Lever Air Vents for Ozone Applications		Screwed	150	150	PBT Cap (Polybutylene Terephthalate) Polycarbonate Body	1-AVCW	150			▲	●	★★				455	
	<b>Series 21-AR</b> Fixed Pivot Ball Float Air/Gas Vents		Screwed	250	450	ASTM A48 Class 30 Cast Iron	21-AR	250			●	●					459	
	<b>Series 21-312</b> Fixed Pivot Ball Float Air/Gas Vents		Screwed Socketweld Flanged ***	600 or 500	100 or 750	ASTM A105 Forged Steel	21-312AR 21-312VAR	68 600			●	●					459	
	<b>Series 1, 2, 3, 6</b> Free Floating Lever Air/Gas Vents		Screwed	300 250	200 450	ASTM A48 Class 30 Cast Iron	1-AV* 2-AV 3-AV 6-AV	300 250 250 250			●	●	★	★		●	●	456
	<b>Series 30</b> Free Floating Lever Air/Gas Vents		Screwed Socketweld Flanged ***	600 or 500 1000 or 600 1000 or 600	100 or 750 100 or 750 100 or 750	ASTM A105 Forged Steel	32-AV 33-AV 36-AV	600 900 1000			●	●				●	●	458
	<b>Series 10</b> Free Floating Lever Air/Gas Vents		Screwed Socketweld (22 and 13 only)	500 or 440 555 or 475 570 or 490	100 or 500 100 or 500 100 or 500	304-L Stainless Steel	11-AV ** 22-AV 13-AV	400 555 570			●	●	★★					460
	<b>Series HLAR</b> High Leverage Air/Gas Vents		Screwed Socketweld Flanged ***	100 or 600	100 or 750	ASTM A105 Forged Steel	2313 HLAR 2315 HLAR 2316 HLAR	1000			●	●	●			●	●	462
	<b>Series HLAR</b> High Leverage Air/Gas Vents		Screwed Socketweld Flanged ***	1500 or 900 1800 or 900	100 or 850 100 or 900	ASTM A182 Gr. F22 Forged Steel	2413 HLAR 2415 HLAR 2416 HLAR	1500 1800 1500			●	●	●			●	●	462

★ 1/4" outlet connection    ★★ 1/2" outlet connection    † Side connection available    ▲ Alternate inlet 1/2"  
 †† Side connection not available    ††† Flange selection may limit pressure and temperature rating.

Air Vents

# Air Vent ID Charts



Illustration	Type	Flow Direction	Connection Type	Max. Allow. Press. psig	TMA °F	Body Material	Model	Max. Oper. Press. psig	Connection Size							Located on Page
									1/8"	1/4"	1/2"	3/4"	1"	1-1/2"	2"	
	<b>Series HLAR</b> High Leverage Air/Gas Vents		Screwed Socketweld Flanged ††	2 120 or 1 700	100 or 900	ASTM A182 Gr. F22 Forged Steel	25133G- HLAR	2 125			●	●	●			462
				2 520 or 2 000	100 or 900		25155G- HLAR	2 500			●	●	●	1-1/4		
				3 700 or 3 000	100 or 900		26155G- HLAR	2 700				●	●	1-1/4		
	<b>Series TTF</b> Thermostatic Air Vents		Straight-Thru Right Angle	300	450	304-L Stainless Steel	TTF-1	300			●	●			464	
							TTF-1R									
	<b>Series TV-2</b> Thermostatic Air Vents		Screwed	125	350	ASTM B62 Cast Bronze	TV-2	125			●				465	
	<b>Series TS-2</b> Thermostatic Air Vents		Threaded	50	300	ASTM B62 Bronze	TS-2	50			●	●			466	
	<b>AV-11, AV-13</b> Air Vents		Screwed	50 150	210	Brass	AV-11 AV-13	50 150	●		●	●			467	
	<b>SV-12</b> Steam Radiator Air Vent		Threaded	15	250	Nickel Plated Brass	SV-12	15	●	●	●	●			468	

★ 1/4" outlet connection    ★★ 1/2" outlet connection    † Side connection available    ▲ Alternate inlet 1/2"  
 †† Side connection not available    ††† Flange selection may limit pressure and temperature rating.

Air Vents



# 1-AVC See-Thru Air Vent

For Pressures to 150 psig (10 barg) or Specific Gravity Down to 0.80

## A See-Thru Body—So You'll Know When It's Working

Now, you can literally see what you've been missing—the early warning signs of a system problem. Since you'll know the operating condition of the air vent, you won't have to waste time and money scheduling maintenance that isn't needed. In other words, you will be able to react to a condition before it becomes a problem.

A simple ball float mechanism requiring no electricity to operate, the new Armstrong 1-AVC discharges automatically only when air/gas are present. That means no liquid loss as with manual venting.

## An Inside Look

See-thru body means you can observe changing conditions as they occur. See a problem in the making—instead of having to deal with it after the fact.

## Efficient Operation

Simple ball float mechanism discharges only when air is present so it doesn't waste liquid.

## Positive Seating

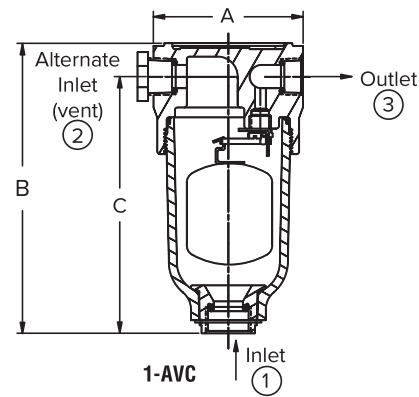
Free-floating valve mechanism assures positive seating so it prevents liquid loss. There are no fixed pivots to wear or create friction, and wear points are heavily reinforced for long life.

## Reduced Maintenance

Stainless steel internals mean corrosion resistance and reduced maintenance.

## Corrosion Resistance

Long-lasting polysulfone body and reinforced nylon cap resist corrosion and provide long, trouble-free service life.



## How to Order

Inlet ①	Alternate Inlet ②	Outlet ③
3/4"	1/2"	1/2"
1/2" or 3/4"	1/2" or 3/4"	1/2"

**NOTE: The Armstrong 1-AVC should not be used in an environment where there are high levels of ketones or chlorinated or aromatic hydrocarbons.**

For a fully detailed certified drawing, contact Armstrong.

Model 1-AVC Capacity				
Differential Pressure		Orifice Size	scfm	m <sup>3</sup> /hr
psig	barg			
15	1.0	1/8"	4.3	7.3
30	2.0		6.5	11.0
50	3.5		9.5	16.1
75	5.0		13.1	22.2
100	7.0		16.9	28.7
125	8.5		20.5	34.8
150	10.5		24.2	41.3

NOTE: Discharge of air through an orifice in scfm (standard cubic feet of free air per minute) at a standard atmospheric pressure of 14.7 psig (1 barg) and 70°F (21°C).

List of Materials	
Name of Part	Material
Cap	Reinforced Nylon*
Body	polysulfone
O-Rings (Body Cap and Fitting)	Nitrile Elastomer Compound
Float Lever and Screws	Stainless Steel
Valve & Seat	Stainless Steel
Fitting & Pipe Plug	Reinforced Nylon
Retainer Ring	Zinc Plated Steel

\*UV sensitive.

Physical Data		
	in	mm
Inlet Connection	1/2, 3/4	15, 20
Outlet Connection	1/2	15
"A" Face-to-Face	3-1/2	89
"B" Height	6-3/4	171
"C" Bottom to $\phi$	6	552
Maximum Allowable Pressure (Vessel Design)	150 psig @ 150°F (10 barg @ 65°C)	
Maximum Operating Pressure	150 psig (10 barg)	
Specific Gravity Range	1.00 to 0.80	
Weight, lb (kg)	1 (.45)	

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# 1-AVCW See-Thru Air Vent for Ozone Applications

For Pressures to 150 psig (10 barg) or Specific Gravity Down to 0.80



## What Is Ozone?

Ozone is a gas that forms naturally during thunderstorms when lightning converts normal oxygen molecules (O<sub>2</sub>) into ozone (O<sub>3</sub>). The fresh, sweet smell in the air after a storm is the smell of ozone. The unstable ozone molecule reacts rapidly with most substances and is an extremely strong natural oxidant.

## How Is Commercial Ozone Produced?

Ozone can be formed by exposing air to ultraviolet light; however, the most common method of generating ozone is by passing air through an electrical discharge. Because ozone has strong oxidizing properties, its production requires corrosion-resistant equipment.

## How Is Ozone Used in Water Filtration and Purification?

Because ozone is such an effective oxidant, it kills viruses, bacteria, mold, mildew, fungus and germs. Passing ozone through water achieves high purification rates without any chemical residue. Oxygen is the only by-product.

## Typical Customer Applications:

- Purifying standing ground water in Third World countries.
- Conditioning water for poultry and livestock.
- Purifying water in the bottled water industry.
- Filtering and purifying water for process applications.

## A See-Thru Body Shows You It's Working

Now, you can literally see what you've been missing. The Armstrong 1-AVCW See-Thru Air Vent lets you easily check its operating condition. You won't have to waste time and money scheduling maintenance that isn't needed, and you can quickly react to a condition before it becomes a problem.

## Efficient Operation

Simple ball-float mechanism doesn't need electricity to operate. The air vent automatically discharges only when air or gas is present. No liquid is lost, as with manual venting.

## Positive Seating

Free-floating valve mechanism ensures positive seating and prevents liquid loss. There are no fixed pivots to wear or create friction. Wear points are heavily reinforced for long life.

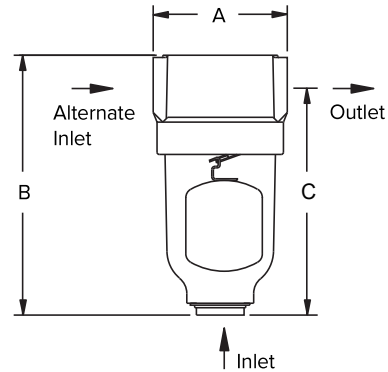
## Corrosion Resistance

Long-lasting CPVC cap and polysulfone body provides trouble-free operation. T316 stainless steel internal parts resist corrosion and reduce maintenance.

## Compare—and Save the Difference

Seeing really is believing—especially when you compare the Armstrong 1-AVCW See-Thru Air Vent with manual venting. Measure the time and money you can save with a more efficient, easier-to-maintain system. For more information or technical assistance, contact your local Armstrong Representative.

**NOTE: The Armstrong 1-AVCW should not be used in an environment where there are high levels of ketones or chlorinated or aromatic hydrocarbons.**



1-AVCW

List of Materials	
Name of Part	Material
Cap	CPVC
Body	Polysulfone
O-Rings (Body Cap and Fitting)	Aflas
Float Lever and Screws	T316 Stainless Steel
Valve & Seat	T316 Stainless Steel
Fitting	CPVC
Retainer Ring	Zinc Plated Steel

Physical Data		
	in	mm
Inlet Connection (In Body)	3/4	20
Inlet Connection (Alternate)	1/2	15
Outlet Connection	1/2	15
"A" Face-to-Face	3-1/2	89
"B" Height	6-13/16	172
"C" Bottom to $\varnothing$	6	152
Maximum Allowable Pressure (Vessel Design)	150 psig @ 150°F (10 barg @ 66°C)	
Maximum Operating Pressure	150 psig (10 barg)	
Specific Gravity Range	1.00 to 0.80	
Weight, lb (kg)	1 (.5)	

Model 1-AVCW Capacity				
Differential Pressure		Orifice Size	scfm	m <sup>3</sup> /hr
psig	barg			
15	1.0	1/8"	4.3	7.3
30	2.0		6.5	11.0
50	3.5		9.5	16.1
75	5.0		13.1	22.2
100	7.0		16.9	28.7
125	8.5		20.5	34.8
150	10.5		24.2	41.3

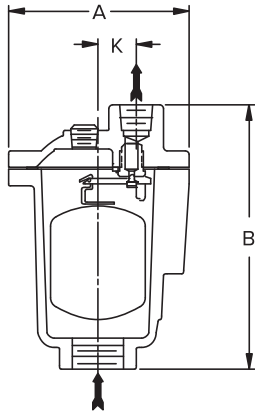
**NOTE:** Discharge of air through an orifice in scfm (standard cubic feet of free air per minute) at a standard atmospheric pressure of 14.7 psig (1 barg) and 70°F (21°C).

Air Vents

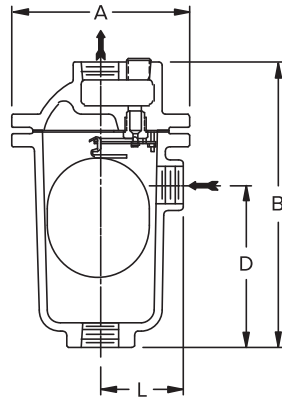


# Free Floating Lever Air/Gas Vents—Cast Iron

For Pressures to 300 psig (21 barg) or Specific Gravity Down to 0.40



Model 1-AV



Model 2-AV, 3-AV and 6-AV



Armstrong free floating lever Air/Gas Vents use the same bodies, caps, lever mechanisms, valves and seats of Armstrong inverted bucket steam traps that have been proven in years of service.

Elliptical floats and high leverage make it possible to open large orifices to provide adequate capacity for vent size and weight. The hemispherical valve, seat and leverage are identical in design, materials and workmanship to those for saturated steam service up to 1 000 psig, with the exception of the addition of a guidepost to assure a positive, leaktight valve closing under all conditions.

**1-AV**—A cast iron air vent that uses a positive-closing free floating lever to ensure leaktight closing under all conditions. This vent is good for low capacity air/gas venting up to 300 psig.

For a fully detailed certified drawing, refer to CD #1070.

**2-AV, 3-AV and 6-AV**—Cast iron vents using the same proven free floating lever mechanisms used in Armstrong steam traps. For applications where high air/gas venting capacity is required up to 250 psig.

For a fully detailed certified drawing, refer to CD #1034.

Physical Data		Cast Iron							
Model No.	1-AV**		2-AV		3-AV		6-AV		
	in	mm	in	mm	in	mm	in	mm	
Pipe Connections	1/2*, 3/4*	15, 20	1/2, 3/4	15, 20	3/4, 1	20, 25	1-1/2, 2	40, 50	
"A"	3-3/4	89	5-1/4	133	6-3/8	162	10-3/16	259	
"B"	5-1/2	140	8-3/4	222	11-1/2	292	18	457	
"D"	-	-	5-1/8	130	7	188	9-3/8	238	
"K"	13/16	21	-	-	-	-	-	-	
"L"	-	-	2-7/16	62	2-7/8	73	4-5/8	-	
Weight, lb (kg)	4 (1.8)		12 (5.5)		21 (9.5)		78 (35.5)		
Max. Allowable Pressure (Vessel Design)	300 psig @ 200°F (21 barg @ 93°C) 250 psig @ 450°F (17 barg @ 232°C)		250 psig @ 450°F (17 barg @ 232°C)						

\*Outlet connection 1/4" (7 mm). \*\*1-AV available with side connection if specified on order. On models 2-AV, 3-AV and 6-AV, pipe size of side connections is same as that of inlet and outlet connections. Some floats are oil filled. Consult factory for details.

List of Materials							
Model No.	Valve & Seat	Leverage System	Float	Body & Cap	Gasket	Nuts	
1-AV	Stainless Steel			ASTM A48 Class 30 Cast Iron	Non-asbestos	ASTM A193 Gr. B7	
2-AV						SAE Gr. 2	ASTM A563 Gr. A
3-AV							
6-AV							

Air Vents



# Free Floating Lever Air/Gas Vents—Cast Iron

For Pressures to 300 psig (21 barg) or Specific Gravity Down to 0.40



1-AV Maximum Operating Pressures		
Minimum Specific Gravity	0.80	
Orifice Size (in)	Maximum Operating Pressure	
	psig	barg
1/8	146	10
7/64	173	12
#38	219	15
5/64	300	21

Maximum Operating Pressures of free floating lever vents with weighted floats for different orifice sizes, and the specific gravities on which they can be used.

2-AV Maximum Operating Pressures																						
Specific Gravity*	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50											
Float wt., oz (g)	7.7 (217)	7.3 (206)	6.9 (195)	6.5 (184)	6.1 (174)	5.7 (163)	5.4 (152)	5.0 (141)	4.6 (130)	4.2 (119)	3.8 (109)											
Orifice Size (in)	Maximum Operating Pressure																					
	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
5/16	27	1.8	25	1.8	24	1.7	23	1.6	22	1.5	20	1.4	19	1.3	18	1.2	16	1.1	15	1.0	14	0.9
1/4	44	3.0	42	2.9	40	2.7	38	2.6	35	2.4	33	2.3	31	2.1	29	2.0	27	1.8	24	1.7	22	1.5
3/16	97	6.7	92	6.4	88	6.0	83	5.7	78	5.4	73	5.0	68	4.7	64	4.4	59	4.1	54	3.7	49	3.4
5/32	167	12	159	11	151	10.4	142	9.8	134	9.3	126	8.7	118	8.1	110	7.6	101	7.0	93	6.4	85	5.8
1/8	250	17	250	17	250	17	244	17	230	16	216	15	202	14	187	13	173	12	159	11	145	10.0
7/64	250	17	250	17	250	17	250	17	250	17	250	17	250	17	240	17	222	15	204	14	186	13
#38	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	231	16
5/64	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17

3-AV Maximum Operating Pressures																						
Specific Gravity*	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60													
Float wt., oz (g)	14.9 (423)	14.2 (402)	13.4 (381)	12.7 (360)	12.0 (339)	11.2 (318)	10.5 (296)	9.7 (275)	9.0 (254)													
Orifice Size (in)	Maximum Operating Pressure																					
	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
1/2	21	1.5	20	1.4	19	1.3	18	1.3	17	1.2	16	1.1	15	1.0	14	1.0	13	0.9	12	0.9	11	0.8
3/8	45	3.1	43	3.0	41	2.8	38	2.7	36	2.5	34	2.3	32	2.2	30	2.0	27	1.9	25	1.8	23	1.7
5/16	72	5.0	69	4.7	65	4.5	61	4.2	58	4.0	54	3.8	51	3.5	47	3.3	44	3.0	41	3.0	38	2.7
9/32	96	6.6	91	6.3	87	6.0	82	5.6	77	5.3	72	5.0	68	4.7	63	4.3	58	4.0	54	3.7	50	3.4
1/4	144	9.9	137	9.4	130	8.9	123	8.5	116	8.0	109	7.5	102	7.0	94	6.5	87	6.0	80	5.5	73	6.0
7/32	206	14	196	13	186	13	176	12	165	11	155	10.7	145	10.0	135	9.3	125	8.6	115	8.0	105	7.3
3/16	250	17	250	17	250	17	250	17	249	17	234	16	218	15	203	14	188	13	173	12	158	11
5/32	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17

6-AV Maximum Operating Pressures																										
Specific Gravity*	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40													
Float wt., oz (g)	73.5 (2 084)	69.8 (1 979)	66.2 (1 875)	62.5 (1 771)	58.8 (1 667)	55.1 (1 563)	51.5 (1 459)	47.8 (1 354)	44.1 (1 250)	40.4 (1 146)	36.8 (1 042)	33.1 (938)	29.4 (833)													
Orifice Size (in)	Maximum Operating Pressure																									
	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg		
1-1/16	22	1.5	21	1.5	20	1.4	19	1.3	18	1.2	17	1.2	16	1.1	14	1.0	13	0.9	12	0.8	11	0.8	10	0.70	9	0.62
7/8	35	2.4	33	2.3	31	2.2	30	2.0	28	1.9	26	1.8	24	1.7	23	1.6	21	1.5	19	1.3	18	1.2	16	1.1	14	1
3/4	50	3.5	48	3.3	45	3.1	43	3.0	40	2.8	38	2.6	35	2.4	33	2.3	30	2.1	28	1.9	25	1.8	23	1.6	20	1.4
5/8	77	5.3	73	5.0	69	4.8	66	4.5	62	4.3	58	4.0	54	3.7	50	3.5	46	3.2	43	2.9	39	2.7	35	2.4	31	2.2
9/16	102	7.0	97	6.7	92	6.3	87	6.0	82	5.6	77	5.3	72	4.9	67	4.6	62	4.2	57	3.9	51	3.6	46	3.2	41	3.9
1/2	148	10.2	140	9.7	133	9.2	126	8.7	119	8.2	111	7.7	104	7.2	97	6.7	89	6.2	82	5.6	75	5.1	67	4.6	60	4.1
7/16	210	14	200	14	189	13	179	12	168	12	158	11	148	10.2	137	9.5	127	8.7	116	8.0	106	7.3	96	6.6	85	5.9
3/8	250	17	250	17	250	17	250	17	250	17	249	17	233	16	216	15	200	14	184	13	167	12	151	10.4	134	9.3
11/32	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	245	17	223	15	201	14	179	12	157	11
5/16	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	230	16
9/32	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17
1/4	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17

\*If specific gravity falls between those shown, use next lowest: e.g., if actual gravity is 0.73, use 0.70 specific gravity data.

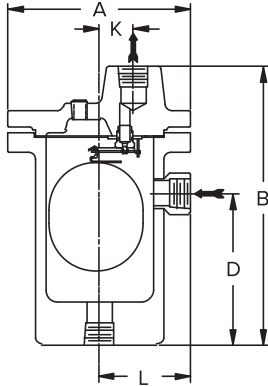
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Air Vents



# Free Floating Lever Air/Gas Vents—Forged Steel

For Pressures to 1 000 psig (69 barg) or Specific Gravity Down to 0.40



Model 32-AV, 33-AV and 36-AV



**32-AV, 33-AV and 36-AV**—Forged steel vents using the same proven free floating lever mechanisms used in Armstrong steam traps.

For applications where high air/gas venting capacity is required up to 1 000 psig. Available with screwed, socketweld or flanged connections.

For a fully detailed certified drawing, refer to CD #1035.

List of Materials						
Model No.	Valve & Seat	Leverage System	Float	Body & Cap	Gasket	Bolting
32-AV	Stainless Steel			ASTM A105 Forged Steel	Non-asbestos	Bolts ASTM A193 Gr. B7 Nuts ASTM A194 Gr. 2H
33-AV						
36-AV						

Physical Data						
Model No.	Forged Steel					
	32-AV <sup>†</sup>		33-AV <sup>†</sup>		36-AV <sup>†</sup>	
Pipe Connections	1/2, 3/4, 1	15, 20, 25	3/4, 1	20, 25	1-1/2, 2	40, 50
"A"	6-3/4	171	8	203	11-7/8	301
"B"	10-3/16	259	11-9/16	294	17-1/8	435
"D"	5-9/16	141	6-1/16	154	9	229
"K"	1-1/4	32	1-7/16	37	2-1/8	54
"L"	3-3/8	86	3-7/8	98	6-1/16	154
Approx. Wt. lb (kg)	31 (14)		49 (22)		163 (74)	
Max. Allow. Pressure (Vessel Design)	600 psig @ 100°F (41 barg @ 38°C) 500 psig @ 750°F (34 barg @ 399°C)		1 000 psig @ 100°F (69 barg @ 38°C) 600 psig @ 750°F ( 41 barg @ 399°C)			

<sup>†</sup>Available in Type 316 SS. Consult factory. Pipe size of side connections if provided is same as that of inlet and outlet connections. Some floats are oil filled. Consult factory for details.

# Free Floating Lever Air/Gas Vents—Forged Steel

For Pressures to 1 000 psig (69 barg) or Specific Gravity Down to 0.40



## High-Temperature Service

Maximum allowable working pressures of floats decrease at temperatures above 100°F. Allow for approximately:

- 10% decrease at 200°F
- 15% decrease at 300°F
- 20% decrease at 400°F

The float is not always the limiting factor, however. Consult with Armstrong Application Engineering if you have a high-temperature application that also requires maximum operating pressures.

## Sour Gas Service

Forged steel and stainless steel traps can be modified to resist hydrogen sulfide stress corrosion. These modifications involve annealing the float, which will reduce the maximum working pressure of the float to about half of its normal value. Consult Armstrong Application Engineering for allowable working pressures.

**Maximum Operating Pressures of free floating lever vents with weighted floats for different orifice sizes, and the specific gravities on which they can be used.**

32-AV Maximum Operating Pressures																	
Specific Gravity*	1.00		0.95		0.90		0.85		0.80		0.75		0.70		0.65		
Float wt., oz (g)	11.8 (335)		11.2 (318)		10.6 (301)		10.0 (285)		9.4 (268)		8.9 (251)		8.3 (234)		7.7 (218)		
Orifice Size (in)	Maximum Operating Pressure																
	psig		barg		psig		barg		psig		barg		psig		barg		psig
5/16	41	2.8	39	2.7	37	2.6	35	2.4	33	2.3	31	2.1	29	2.0	27	1.9	
1/4	68	4.7	64	4.4	61	4.2	58	4.0	54	3.7	51	3.5	47	3.3	44	3.0	
3/16	149	10.3	142	9.8	134	9.3	127	8.8	120	8.2	112	7.7	105	7.2	97	6.7	
5/32	257	18	244	17	231	16	219	15	206	14	193	13	180	12	168	12	
1/8	439	30	417	29	396	27	374	26	352	24	330	23	309	21	287	20	
7/64	562	39	534	37	506	35	478	33	450	31	423	29	395	27	367	25	
#38	600	41	600	41	600	41	595	41	561	39	526	36	491	34	457	31	
5/64	600	41	600	41	600	41	600	41	600	41	600	41	600	41	600	41	

33-AV Maximum Operating Pressures																		
Specific Gravity*	1.00		0.95		0.90		0.85		0.80		0.75		0.70		0.65		0.60	
Float wt., oz (g)	14.9 (423)		14.2 (402)		13.4 (381)		12.7 (360)		12.0 (339)		11.2 (318)		10.5 (296)		9.7 (275)		9.0 (254)	
Orifice Size (in)	Maximum Operating Pressure																	
	psig		barg		psig		barg		psig		barg		psig		barg		psig	
1/2	21	1.5	20	1.4	19	1.3	18	1.3	17	1.2	16	1.1	15	1.0	14	1.0	13	0.9
3/8	45	3.1	43	3.0	41	2.8	38	2.7	36	2.5	34	2.3	32	2.2	30	2.0	27	1.9
5/16	72	5.0	69	4.7	65	4.5	61	4.2	58	4.0	54	3.8	51	3.5	47	3.3	44	3.0
9/32	96	6.6	91	6.3	87	6.0	82	5.6	77	5.3	72	5.0	68	4.7	63	4.3	58	4.0
1/4	144	9.9	137	9.4	130	8.9	123	8.5	116	8.0	109	7.5	102	7.0	94	6.5	87	6.0
7/32	206	14	196	13	186	13	176	12	165	11	155	10.7	145	10.0	135	9.3	125	8.6
3/16	309	21	294	20	279	19	264	18	249	17	234	16	218	15	203	14	188	13
5/32	484	33	460	32	437	30	413	28	389	27	365	25	342	24	318	22	294	20
1/8	900	62	900	62	883	61	835	58	787	54	739	51	691	48	643	44	595	41
7/64	900	62	900	62	900	62	900	62	900	62	900	62	883	61	822	57	760	52

36-AV Maximum Operating Pressures																											
Specific Gravity*	1.00		0.95		0.90		0.85		0.80		0.75		0.70		0.65		0.60		0.55		0.50		0.45		0.40		
Float wt., oz (g)	73.5 (2 084)		69.8 (1 979)		66.2 (1 875)		62.5 (1 771)		58.8 (1 667)		55.1 (1 563)		51.5 (1 459)		47.8 (1 354)		44.1 (1 250)		40.4 (1 146)		36.8 (1 042)		33.1 (938)		29.4 (833)		
Orifice Size (in)	Maximum Operating Pressure																										
	psig		barg		psig		barg		psig		barg		psig		barg		psig		barg		psig		barg		psig		barg
1-1/16	22	1.5	21	1.5	20	1.4	19	1.3	18	1.2	17	1.2	16	1.1	14	1.0	13	0.9	12	0.8	11	0.8	10	0.70	9	0.62	
7/8	35	2.4	33	2.3	31	2.2	30	2.0	28	1.9	26	1.8	24	1.7	23	1.6	21	1.5	19	1.3	18	1.2	16	1.1	14	1	
3/4	50	3.5	48	3.3	45	3.1	43	3.0	40	2.8	38	2.6	35	2.4	33	2.3	30	2.1	28	1.9	25	1.8	23	1.6	20	1.4	
5/8	77	5.3	73	5.0	69	4.8	66	4.5	62	4.3	58	4.0	54	3.7	50	3.5	46	3.2	43	2.9	39	2.7	35	2.4	31	2.2	
9/16	102	7.0	97	6.7	92	6.3	87	6.0	82	5.6	77	5.3	72	4.9	67	4.6	62	4.2	57	3.9	51	3.6	46	3.2	41	3.9	
1/2	148	10.2	140	9.7	133	9.2	126	8.7	119	8.2	111	7.7	104	7.2	97	6.7	89	6.2	82	5.6	75	5.1	67	4.6	60	4.1	
7/16	210	14	200	14	189	13	179	12	168	12	158	11	148	10.2	137	9.5	127	8.7	116	8.0	106	7.3	96	6.6	85	5.9	
3/8	331	23	315	22	299	21	282	19	266	18	249	17	233	16	216	15	200	14	184	13	167	12	151	10.4	134	9.3	
11/32	441	30	419	29	398	27	376	26	354	24	332	23	310	21	288	20	266	18	245	17	223	15	201	14	179	12	
5/16	567	39	539	37	511	35	483	33	455	31	427	29	399	27	371	26	342	24	250	17	250	17	250	17	230	16	
9/32	743	51	706	49	669	46	633	44	596	41	559	39	522	36	485	33	449	31	250	17	250	17	250	17	250	17	
1/4	1 000	69	1 000	69	979	67	925	64	871	60	817	56	763	53	710	49	656	45	250	17	250	17	250	17	250	17	
7/32	1 000	69	1 000	69	1 000	69	1 000	69	1 000	69	1 000	69	1 000	69	1 000	69	926	64	250	17	250	17	250	17	250	17	
3/16	1 000	69	1 000	69	1 000	69	1 000	69	1 000	69	1 000	69	1 000	69	1 000	69	250	17	250	17	250	17	250	17	250	17	

\*If specific gravity falls between those shown, use next lowest: e.g., if actual gravity is 0.73, use 0.70 specific gravity data.

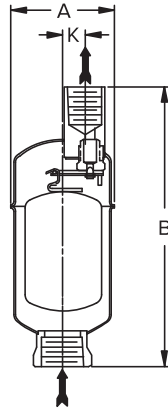
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Air Vents

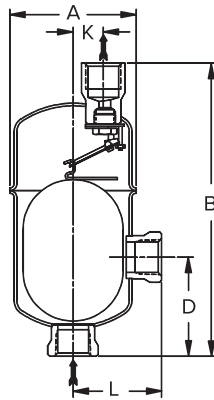


# Free Floating Lever Air/Gas Vents—All Stainless Steel

For Pressures to 600 psig (41 barg) or Specific Gravity Down to 0.50



Model 11-AV



Model 22-AV and 13-AV



The Armstrong stainless steel free floating lever air vents have been developed to provide positive venting of air/gases under pressure.

The body and cap and all working parts of the No. 11-AV, 22-AV and 13-AV are made of high strength, corrosion resistant stainless steel. Body and caps are welded together to form a permanently sealed, tamperproof unit with no gaskets. Elliptical floats and high leverage provide up to 115 SCFM capacity for these compact air/gas vents. Lever action is guided to assure proper seating of the valve under all operating conditions.

**11-AV, 22-AV and 13-AV**—All stainless steel construction where exposure to either internal or external corrosion is a problem. These air/gas vents have the same proven free floating mechanisms used in other Armstrong steam traps. Pressures to 600 psig @ 100°F (41 barg @ 38°C).

For a fully detailed certified drawing, refer to list below:

**11-AV CD #1066**

**13-AV and 22-AV CD #1086**

Physical Data						
Model No.	11-AV		22-AV		13-AV	
Pipe Connections	1/2, 3/4**	15, 20**	3/4	20	1	25
"A"	2-3/4	70	3-7/8	99	4-1/2	114
"B"	7-1/4	184	8-13/16	224	11-3/8	289
"D"	—	—	3-3/8	86	6-1/8	156
"K"	9/16	14	7/8	22	1-3/16	30
"L"	—	—	2-5/8	67	3-1/4	83
Weight, lb (kg)				5 (2.3)	7-1/2 (3.4)	
Max. Allow. Pressure (Vessel Design)	500 psig @ 100°F (34 barg @ 38°C) 440 psig @ 500°F (30 barg @ 260°C)		600 psig @ 100°F (41 barg @ 38°C) 475 psig @ 500°F (33 barg @ 260°C)		570 psig @ 100°F (39 barg @ 38°C) 490 psig @ 500°F (34 barg @ 260°C)	

\*\* 1/2" (15 mm) outlet.

List of Materials				
Model No.	Valve & Seat*	Leverage System*	Float*	Body & Cap*
11-AV	Hardened chrome steel—17-4PH	303/304 Stainless Steel	304 Stainless Steel	Sealed Stainless Steel 304-L
22-AV				
13-AV				

\*Type 316 SS valve and seat available. Consult factory.

\*\*11-LD available in all-316SS. Consult factory.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# Free Floating Lever Air/Gas Vents—All Stainless Steel

For Pressures to 600 psig (41 barg) or Specific Gravity Down to 0.50



Maximum Operating Pressures of free floating lever vents with weighted floats for different orifice sizes, and the specific gravities on which they can be used.

11-AV Maximum Operating Pressures				
Minimum Specific Gravity	0.75		0.50	
Float wt., oz (g)	2.90 (82) Standard		2.08 (59) Special	
Orifice Size (in)	Maximum Operating Pressure			
	psig		barg	
1/8	178	12	118	8
#38	267	18	177	12
5/64	400	28	311	21

22-AV Maximum Operating Pressure																						
Specific Gravity*	1.00		0.95		0.90		0.85		0.80		0.75		0.70		0.65		0.60		0.55		0.50	
Float wt., oz (g)	10.0 (282)		9.5 (268)		9.0 (254)		8.5 (240)		8.0 (226)		7.5 (212)		5.4 (152)		5.0 (141)		4.6 (130)		4.2 (119)		3.8 (109)	
Orifice Size (in)	Maximum Operating Pressure																					
	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
5/16	35	2.4	33	2.3	31	2.2	30	2.0	28	1.9	26	1.8	19	1.3	18	1.2	16	1.1	15	1.0	14	0.9
1/4	57	3.9	54	3.7	51	3.5	49	3.4	46	3.2	43	3.0	31	2.1	29	2.0	27	1.8	24	1.7	22	1.5
3/16	126	8.7	120	8.2	113	7.8	107	7.4	101	7.0	95	6.5	68	4.7	64	4.4	59	4.1	54	3.7	49	3.4
5/32	217	14.9	206	14.2	195	13.5	185	12.7	174	12.0	163	11.2	118	8.1	110	7.6	101	7.0	93	6.4	85	5.8
1/8	371	25.6	352	24.3	334	23.0	316	21.8	297	20.5	279	19.2	202	13.9	187	12.9	173	12.0	159	11.0	145	10.0
7/64	474	32.7	451	31.1	427	29.5	404	27.9	380	26.2	357	24.6	258	17.8	240	16.5	222	15.3	204	14.0	186	12.8
#38	590	40.7	561	38.7	532	36.7	503	34.7	473	32.7	444	30.6	321	22.1	298	20.6	276	19.0	253	17.5	231	15.9
5/64	600	41.4	600	41.4	600	41.4	600	41.4	600	41.4	600	41.4	473	32.6	440	30.3	407	28.1	374	25.8	341	23.5

13-AV Maximum Operating Pressures																						
Specific Gravity*	1.00		0.95		0.90		0.85		0.80		0.75		0.70		0.65		0.60		0.55		0.50	
Float wt., oz (g)	14.9 (423)		14.2 (402)		13.4 (381)		12.7 (360)		12.0 (339)		11.2 (318)		10.5 (296)		9.7 (275)		9.0 (254)		8.2 (233)		7.4 (212)	
Orifice Size (in)	Maximum Operating Pressure																					
	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
1/2	21	1.5	20	1.4	19	1.3	18	1.3	17	1.2	16	1.1	15	1.0	14	1.0	13	0.9	12	0.8	11	0.8
3/8	45	3.1	43	3.0	41	2.8	38	2.7	36	2.5	34	2.3	32	2.2	30	2.0	27	1.9	25	1.8	23	1.7
5/16	72	5.0	69	4.7	65	4.5	61	4.2	58	4.0	54	3.8	51	3.5	47	3.3	44	3.0	41	3.0	37	2.8
9/32	96	6.6	91	6.3	87	6.0	82	5.6	77	5.3	72	5.0	68	4.7	63	4.3	58	4.0	54	3.8	50	3.6
1/4	144	9.9	137	9.4	130	8.9	123	8.5	116	8.0	109	7.5	102	7.0	94	6.5	87	6.0	80	5.8	73	5.4
7/32	206	14	196	13	186	13	176	12	165	11	155	10.7	145	10.0	135	9.3	125	8.6	115	10.0	105	7.8
3/16	309	21	294	20	279	19	264	18	249	17	234	16	218	15	203	14	188	13	173	13	158	11
5/32	484	33	460	32	437	30	413	28	389	27	365	25	342	24	318	22	294	20	270	20	246	18
1/8	570	39	570	39	570	39	570	39	570	39	570	39	570	39	570	39	570	39	570	39	570	39
7/64	570	39	570	39	570	39	570	39	570	39	570	39	570	39	570	39	570	39	570	39	570	39

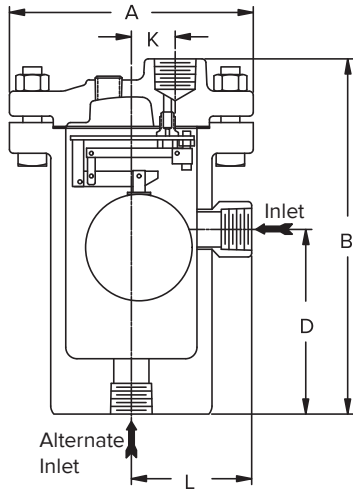
\*If specific gravity falls between those shown, use next lowest: e.g., if actual gravity is 0.73, use 0.70 specific gravity data.

Air Vents



# High Leverage Ball Float Type Air Relief Traps

For Low Flows at Pressures to 2 700 (186 barg) or Specific Gravity Down to 0.49



The Armstrong High Leverage Series of Air Relief traps were developed especially for venting gases from low specific gravity fluids at high pressures. They use standard Armstrong forged steel bodies with very high leverage air relief mechanisms. Available with screwed, socketweld or flanged connections.

**NOTE:** Models 2313-HLAR, 2316-HLAR, 2413-HLAR and 2415-HLAR are also available with cast T-316 stainless steel body and all-stainless steel internals. Consult factory.

### Sour Gas Service

Forged steel and stainless steel traps can be modified to resist hydrogen sulfide stress corrosion. These modifications involve annealing the float, which will reduce the maximum working pressure of the float to about half its normal value. Consult Armstrong Application Engineering for allowable working pressures.

### Physical Data—High Leverage Ball Float Type Air Relief Traps

Model No.	2313-HLAR†		2315-HLAR		2316-HLAR		2413-HLAR†		2415-HLAR		2416-HLAR		25133G-HLAR		25155G-HLAR		26155G-HLAR			
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm		
Pipe Connections	1/2, 3/4, 1	15, 20, 25	1, 1-1/4, 1-1/2	25, 32, 40	1-1/2, 2	40, 50	1/2, 3/4, 1	15, 20, 25	1, 1-1/4, 1-1/2	25, 32, 40	1-1/2, 2	40, 50	1/2, 3/4, 1	15, 20, 25	3/4, 1, 1-1/4	20, 25, 32	1, 1-1/4	25, 32		
"A"	8	203	9-3/4	248	11-7/8	302	8-5/8	219	10-3/4	273	12-1/2	318	8-1/2	216	10-3/8	263	11-3/4	298		
"B"	11-9/16	294	15-1/16	383	17-1/8	435	11-7/8	302	15	381	17-3/4	451	14-1/4	362	16-7/32	412	24-1/8	613		
"D"	6-1/16	154	7-13/16	198	9	229	5-3/8	137	7-1/4	184	9	229	3	75	4	102	5	127		
"G"	5-1/8	130	6-7/8	175	8-3/8	213	5-3/8	137	6-7/8	175	8-5/8	219	5-3/4	146	7-3/8	187	8-3/8	213		
"K"	1-7/16	37	1-3/4	44	2-1/8	54	1-7/16	37	1-3/4	44	2-1/8	54	1-5/16	33	1-3/4	44	1-3/4	44		
"L"	3-7/8	98	4-11/16	119	5-3/4	146	4	102	4-13/16	122	5-13/16	148	—	—	—	—	—	—		
Weight, lbs (kg)	46 (21)		98 (44)		160 (73)		69 (31)		130 (59)		210 (95)		113 (51)		171 (78)		325 (147)			
Maximum Allowable Pressure (Vessel Design)	1 000 psig @ 100°F (69 barg @ 38°C) 600 psig @ 750°F (41 barg @ 400°C)				1 500 psig @ 100°F (103 barg @ 38°C) 900 psig @ 850°F (62 barg @ 454°C)				1 800 psig @ 100°F (125 barg @ 38°C) 900 psig @ 900°F (62 barg @ 482°C)				2 120 psig @ 100°F (146 barg @ 38°C) 1 700 psig @ 900°F (117 barg @ 482°C)				2 520 psig @ 100°F (174 barg @ 38°C) 2 3 000 psig @ 900°F (207 barg @ 482°C)			

†Available with cast 316 stainless steel body and all stainless steel internals. Consult factory.

Air Vents

### List of Materials

Model No.	Valve & Seat	Leverage System	Float	Body & Cap	Gasket
2313-HLAR 2315-HLAR 2316-HLAR	Stainless Steel	Stainless Steel	Stainless Steel	ASTM A105 Forged Steel	Compressed Asbestos-free
2413-HLAR 2415-HLAR 2416-HLAR				ASTM A182 Grade F22 Forged Steel	
25133G-HLAR 25155G-HLAR 26155G-HLAR				Spiral Wound Stainless Steel non-asbestos	

### 2315-HLAR Maximum Operating Pressures

Specific Gravity	1.00 – 0.61		0.60 – 0.51	
Float Weight, oz (g)	9.0 (255)		7.1 (201)	
Orifice	Maximum Operating Pressure			
	psig	barg	psig	barg
3/16	825	56	600	41
5/32	1 000	69		
1/8				
3/32				

Maximum Operating Pressures of free floating lever vents with weighted floats for different orifice sizes, and the specific gravities on which they can be used.

### 2313-HLAR Maximum Operating Pressures

Specific Gravity	1.00 - 0.69		0.68 - 0.54	
Float Weight, oz (g)	6.75 (191)		4.75 (135)	
Orifice size (in)	Maximum Operating Pressure			
	psig	barg	psig	barg
1/8	1 000	69	475	33
7/64				
3/32				
5/64				
1/16				

### 2316-HLAR Maximum Operating Pressures

Specific Gravity	1.00 – 0.70		0.69 – 0.55	
Float Weight, oz (g)	22 (624)		15.5 (439)	
Orifice	Maximum Operating Pressure			
	psig	barg	psig	barg
7/32	1 000	69	475	33
3/16				
5/32				
1/8				
3/32				

# High Leverage Ball Float Type Air Relief Traps

For Low Flows at Pressures to 2 700 (186 barg) or Specific Gravity Down to 0.49



Maximum Operating Pressures of free floating lever vents with weighted floats for different orifice sizes, and the specific gravities on which they can be used.

2413-HLAR Maximum Operating Pressures							
Specific Gravity	1.00 – 0.90		0.89 – 0.69		0.68 – 0.54		
Float Weight, oz (g)	9.375 (266)		6.75 (191)		4.75 (135)		
Orifice size (in)	Maximum Operating Pressure						
	psig		barg		psig		barg
1/8	1 500	103	1 000	69	475	33	
7/64							
3/32							
5/64							
1/16							

Specific Gravity	1.00 – 0.70		0.69 – 0.55	
Float Weight, oz (g)	22 (624)		15.5 (439)	
Orifice	Maximum Operating Pressure			
	psig		barg	
7/32	1 400	96	475	33
3/16				
5/32				
1/8				
3/32				

2415-HLAR Maximum Operating Pressures							
Specific Gravity	1.00 – 0.85		0.84 – 0.61		0.60 – 0.51		
Float weight, oz (g)	13.75 (390)		9.0 (255)		7.1 (201)		
Orifice	Maximum Operating Pressure						
	psig		barg		psig		barg
3/16	1 200	83	825	56	600	41	
5/32	1 725	119	1 150	80			
1/8	1 800	124	1 200	83			
3/32							

### 2416-HLAR Maximum Operating Pressures

25133G HLAR Maximum Operating Pressures											
Specific gravity	1.00 – 0.98			0.97 – 0.90		0.89 – 0.69		0.68 – 0.54			
Float weight, oz (g)	10.5 (298)			9.375 (266)		6.75 (191)		4.75 (135)			
Orifice	Maximum Operating Pressure										
	psig			barg			psig			barg	
7/64	2 125	146	1 500	103	1 000	69	475	33			
3/32											
5/64											
1/16											

25155G HLAR Maximum Operating Pressures											
Specific gravity	1.00 – 0.95			0.94 – 0.86		0.85 – 0.63		0.62 – 0.52			
Float weight, oz (g)	15.4 (437)			13.75 (390)		9.25 (262)		7.1 (201)			
Orifice	Maximum Operating Pressure										
	psig			barg			psig			barg	
3/16	1 350	93	1 200	83	825	58	600	41			
5/32	1 925	132	1 725	119	1 200	82					
1/8	2 500	172	2 000	138	1 200	83					
3/32											

26155G HLAR Maximum Operating Pressures											
Specific gravity	1.00 – 0.95			0.94 – 0.86		0.85 – 0.63		0.62 – 0.52			
Float weight, oz (g)	15.4 (437)			13.75 (390)		9.25 (262)		7.1 (201)			
Orifice	Maximum Operating Pressure										
	psig			barg			psig			barg	
3/16	1 350	93	1 200	83	825	58	600	41			
5/32	1 925	132	1 725	119	1 200	82					
1/8	2 700	186	2 000	138	1 200	83					
3/32											

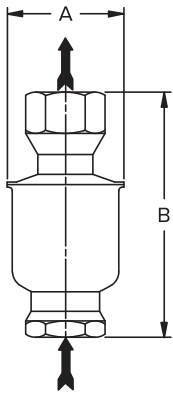
Air Vents

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

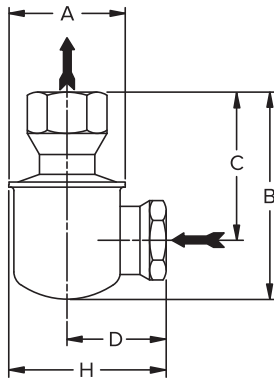


# Armstrong Stainless Steel Thermostatic Air Vents

For Pressures to 300 psig (20 barg)...Capacities to 104 scfm



**TTF-1**  
Straight-Thru



**TTF-1R**  
Right Angle



Armstrong offers Thermostatic Air Vents for positive venting of air and other non-condensable gases from steam in chamber type heat transfer equipment. Typical applications include jacketed kettles, retorts, vulcanizers, jacketed sterilizers or other contained equipment where air could accumulate in remote areas of the steam chamber and reduce heat transfer capacity. These vents are balanced pressure air vents that respond to the pressure-temperature curve of steam. Air is automatically vented at slightly below steam temperature throughout the entire operating pressure range.

## Features

- Suitable for pressures from 0 - 300 psig
- All 304-L stainless steel bodies—sealed, tamper-proof
- Balanced pressure thermostatic element vents air at slightly below steam temperature over the entire pressure range—no adjustments required
- Dependable, proven phosphor-bronze bellows caged in stainless steel with bronze valve and stainless steel seat
- Available in straight-thru or right-angle connections

Armstrong thermostatic air vents should be installed at the highest point on a steam chamber, with the air vent located above the chamber. This will minimize the possibility of any liquid carryover, and air can be vented at atmosphere without a drain line.

**For a fully detailed certified drawing, refer to CD #1018.**

### List of Materials

Name of Part	Material
Body	304-L Stainless steel
Connections	304 Stainless steel
Balanced Pressure Thermostatic Air Vent	Stainless steel and bronze with phosphor-bronze bellows, entire unit caged in stainless steel
Gasket	Copper clad non-asbestos

Optional: All stainless steel thermostatic air vent.

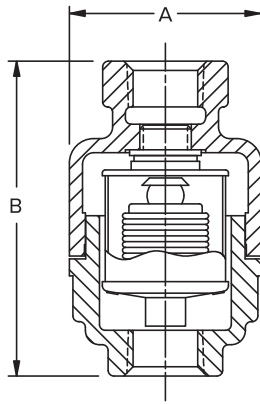
### Physical Data

Model No.	Straight-Thru Connections TTF-1				Right-Angle Connections TTF-1R			
	in	mm	in	mm	in	mm	in	mm
<b>Pipe Connections</b>	1/2	15	3/4	20	1/2	15	3/4	20
"A" Diameter	2-1/4	57	2-1/4	57	2-1/4	57	2-1/4	57
"B" Height	4-1/2	114	4-11/16	119	3-3/4	95	3-15/16	100
"C" $\varnothing$ inlet to face of outlet	—		—		2-5/8	67	2-13/16	71
"D" $\varnothing$ outlet to face of inlet	—		—		1-15/16	49	1-7/8	48
"H"	—		—		3-1/16	78	3	76
Weight, lb (kg)	3/4 (0.4)		1 (0.5)		3/4 (0.4)		1 (0.5)	
Maximum Allowable Pressure (Vessel Design)	300 psig @ 450°F (20 barg @ 232°C)							
Maximum Operating Pressure, psig (barg)	300 (20)							
Discharge Orifice Size	3/16"							



# TV-2 Thermostatic Air Vent

For Pressures to 125 psig (9 barg)...Capacities to 46 scfm



**TV-2**  
Thermostatic Air Vent



Armstrong offers the Model TV-2 Balanced Pressure Thermostatic Air Vent for positive venting of air from chamber type heat transfer equipment with no loss of steam. Typical applications include jacketed kettles, retorts, vulcanizers, jacketed sterilizers or other contained equipment where air could accumulate at the top of the steam chamber and reduce heat transfer capacity.

The Model TV-2 is a balanced-pressure thermostatic air vent that responds to the pressure-temperature curve of steam at any pressure from light vacuum to maximum operating pressure. Air is automatically vented at slightly below steam temperature throughout the entire operating pressure range.

The thermostatic element is a charged multi-convolution phosphor bronze bellows caged in stainless steel. Valve and seat are also stainless steel designed to meet the most rigid cycling specifications known for this type of service.

## Features

- Stainless steel hemispherical valve and seat
- Thermostatic element comprises a multi-convolution phosphor bronze bellows caged in stainless steel
- Thermostatic element is charged with water to provide positive opening of the valve at slightly below steam temperature and positive closing in the presence of steam throughout the operating pressure range
- ASTM B62 cast bronze body

Armstrong Model TV-2 Thermostatic Air Vents should be installed at the highest points of steam chambers with inlet connections to the vents higher than the highest points of the chambers. Thus installed there is a minimum hazard of any liquid carryover and air can be vented to atmosphere with no drain line necessary.

**For a fully detailed certified drawing, refer to CD #1032.**

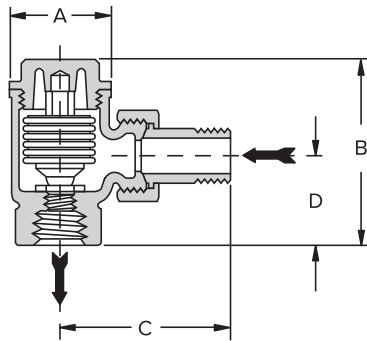
TV-2 Physical Data		
Pipe Connections	in	mm
"A" (Diameter)	2-3/16	56
"B" (Height)	3-1/2	89
Weight, lb (kg)	1-1/2 (0.8)	
Maximum Operating Pressure	125 psig (9 barg)	
Temperature Maximum, °F (°C)	350°F (177°C)	

TV-2 Materials	
Name of Part	Material
Body & Cap	Cast bronze ASTM B62
Gasket	Compressed non-asbestos
Thermostatic Unit	
Bellows	Phosphor bronze
Cage and Cover	Stainless steel
Thermostatic Unit Gasket	Copper clad

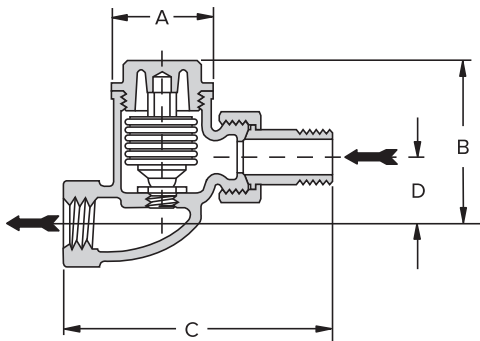


# TS-2 Thermostatic Air Vent

For Pressures to 50 psig (3.4 barg)...Capacities to 25.9 scfm



TS-2 Air Vent Angle Type



TS-2 Air Vent Straight Type



Armstrong TS thermostatic air vent is offered in both angle and straight patterns. The TS-2 has a balanced pressure thermostatic element with a high quality multiple-convolution bellows. It's ideal for venting air from equipment such as steam radiators and convectors, small heat exchangers, and unit heaters. The TS-2 comes with a strong, cast bronze body and a stainless steel seat. The valve and seat are renewable in-line.

### Materials

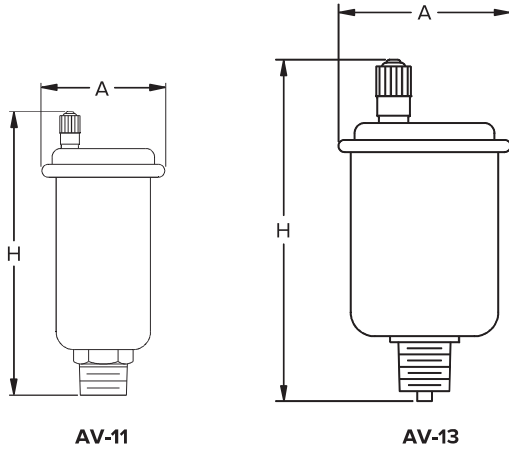
Cap:	Bronze, ASTM B62
Body:	Bronze, ASTM B62
Union Nipple:	Brass, ASTM B584
Valve:	Brass
Valve Seat:	Stainless steel
Element:	Phosphor-bronze bellows

For a fully detailed certified drawing, refer to CDY #1045.

Physical Data								
Model	TS-2							
Pattern	Angle				Straight			
Pipe Connections	in	mm	in	mm	in	mm	in	mm
	1/2	15	3/4	20	1/2	15	3/4	20
"A" Diameter	1-5/8	41	1-5/8	41	1-5/8	41	1-5/8	41
"B" Height	2-15/16	75	3	76	2-11/16	68	2-7/8	73
"C"	2-9/16	65	2-7/8	73	4	102	4-1/2	114
"D"	1-3/8	35	1-5/8	41	1-1/8	28	1-5/16	33
Weight, lb (kg)	1-1/2 (0.68)		1-3/4 (0.79)		1-1/2 (0.68)		2 (0.91)	

# AV-11/AV-13 Air Vents

For Pressures to 150 psig (10 barg)



## For Hot or Cold Water and Non-Viscous Liquids

Air vent models AV-11 and AV-13 are compact float-type valves for the removal of air and other gases from hydronic heating and cooling systems, liquid chilling operations and other light liquid services.

Physical Data						
Model	AV-11		AV-13			
Connection Size	in	mm	in	mm	in	mm
		1/8	3	1/2 Female	15 Female	3/4 Male
"A"	1-3/4	44	2-1/8	54	2-1/8	54
"H"	3-3/8	86	4-5/8	118	4-5/8	118
Weight, lb (kg)	1/4 (0.11)		1/2 (0.23)			

Capacities							
AV-11				AV-13			
$\Delta P$		Capacities		$\Delta P$		Capacities	
psig	barg	cfm	m <sup>3</sup> /hr	psig	barg	cfm	m <sup>3</sup> /hr
3.5	0.24	0.5	0.84	16	1.1	1	1.7
10	0.69	1.0	1.7	48	3.3	2	3.4
24	1.7	1.5	2.5	84	5.8	3	5.1
35	2.4	1.9	3.2	120	8.3	4	6.8
50	3.4	2.0	3.4	150	10	4.9	8.3

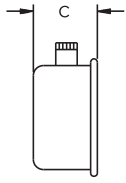
Specifications								
Model	Application	Working Pressure		Maximum Temperature		Connection	Hydraulic Test Body	
		psig	barg	°F	°C		psig	barg
AV-11	Hot or Cold Water	1 - 50	0.06 - 3.4	210	99	NPT Screwed	200	14
AV-13		1 - 150	0.06 - 10.3				350	24

Materials		
Valve	Float	Disc
Brass	Polypropylene	Nitrile

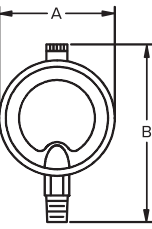
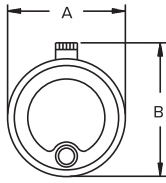
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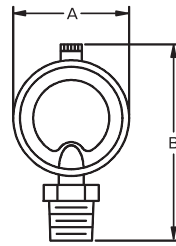
# Armstrong® SV-12 Steam Radiator Air Vent



SV-12 Angle Air Vent



SV-12 Straight Air Vent



SV-12 Straight Main Air Vent

### For Steam Service

A vent port size for every room location with the largest size for the coldest rooms and the smallest size for the “too hot” rooms. SV-12 air vents are easy to install on any steam radiator.

For a fully detailed certified drawing, refer to CDY #1042.

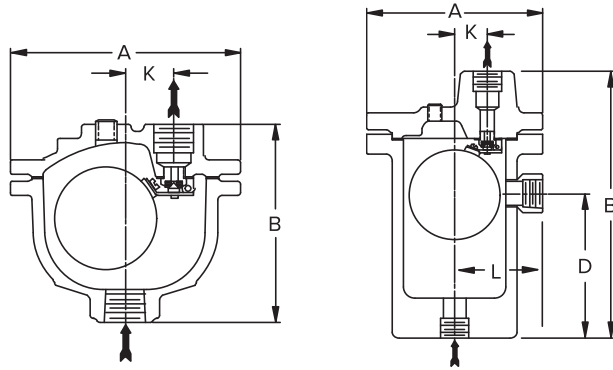


Materials	
Name of Part	Material
Body	Nickel plated brass
Float	Polypropylene
Valve Seat	Brass
Bimetal Thermostatic Element	Stainless steel

Physical Data						
Pattern	Angle Connection		Straight Connection		Straight Main Connection	
	in	mm	in	mm	in	mm
Pipe Connection Size	1/8	3	1/8, 1/4	3, 6	1/2, 3/4	15, 20
“A”	2-3/16	56	2-3/16	56	2-3/16	56
“B”	2-5/16	59	3-1/4	83	3-1/2	89
“C”	1-3/16	30	1-3/16	30	1-3/16	30
Max. Operating Pressure, psig (barg)	15 (1)					
Vent Port Designation and Port Size	4 = .040" 5 = .070"		6 = .0935" C = .1285" D = .1850"		1 = .1850" Only one vent port will be provided	
Each air vent is provided with all five of the above vent ports						

# Fixed Pivot Ball Float Air/Gas Vents

For Pressures to 600 psig (41 barg) or Specific Gravity Down to 0.83



Model 21-AR

Model 21-312 AR/VAR



Physical Data				
Model No.	Cast Iron		Forged Steel	
	21-AR		21-312 AR/VAR	
Pipe Connections	in	mm	in	mm
	"A"	6-3/16	157	6-3/4
"B"	5-1/4	133	10-1/4	260
"D"	-	-	5-9/16	141
"K"	1-5/16	33	1-1/4	32
"L"	-	-	3-5/16	84
Approximate Weight, lb (kg)	8 (4)		30 (14)	
Maximum Allowable Pressure (Vessel Design)	250 psig @ 450°F** (17 barg @ 232°C**)		600 psig @ 100°F (41 barg @ 38°C) 500 psig @ 750°F** (34 barg @ 399°C**)	

\*\*Viton valve seat insert limited to 400°F (204°C).

**21-AR**—A small, high-quality economical air vent. It employs a single lever with a fixed pivot and viton seat, ensuring a tight shut-off.

For a fully detailed certified drawing, refer to CD #1037.

**21-312 AR/VAR** —Forged steel version of the Model 21 with a larger float and higher leverage. Available with screwed, socketweld or flanged connections.

For a fully detailed certified drawing, refer to CD #1106.

21-AR Maximum Operating Pressures				
Minimum Specific Gravity	0.49		0.84	
	Float Weight, oz (g)		4.12 (118)	
Orifice (in)	Maximum Operating Pressure			
	psig	barg	psig	barg
7/32	17	1.2	-	-
3/16	23	1.6	-	-
5/32	33	2.3	-	-
9/64	41	2.8	-	-
1/8	52	3.6	-	-
3/32	92	6.4	-	-
5/64	133	9.2	-	-
1/16	208	14	-	-
1/16	-	-	250	17

21-312 AR/VAR Maximum Operating Pressures				
Model	Minimum Specific Gravity	0.83		
		Float Weight, oz (g)		
Orifice (in)	Maximum Operating Pressure	5 (143)		
		psig	barg	
21-312AR	1/4	22	1.5	
	7/32	28	1.9	
	3/16	38	2.7	
	5/32	55	3.8	
	9/64	68	4.7	
21-312VAR	1/8	173	12	
	3/32	308	21	
	5/64	443	31	
	1/16	600	41	

List of Materials							
Model No.	Valve	Seat	Leverage System	Float	Body & Cap	Gasket	Bolting
21-AR	Stainless Steel	Stainless Steel with *Viton Insert	Stainless Steel	Stainless Steel	ASTM A48 Class 30 Cast Iron	Non-Asbestos	Bolts SAE Gr. 2 Nuts ASTM A563 Gr. A
21-312 AR 21-312 VAR					ASTM A105 Forged Steel		Bolts and Nuts ASTM B633 Type 1

NOTE: Above vents available in T-316 SS bodies and caps and all SS internals. Aluminum body and cap available for Model 21-AR only.

\*Other seat insert materials available. Consult factory.

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