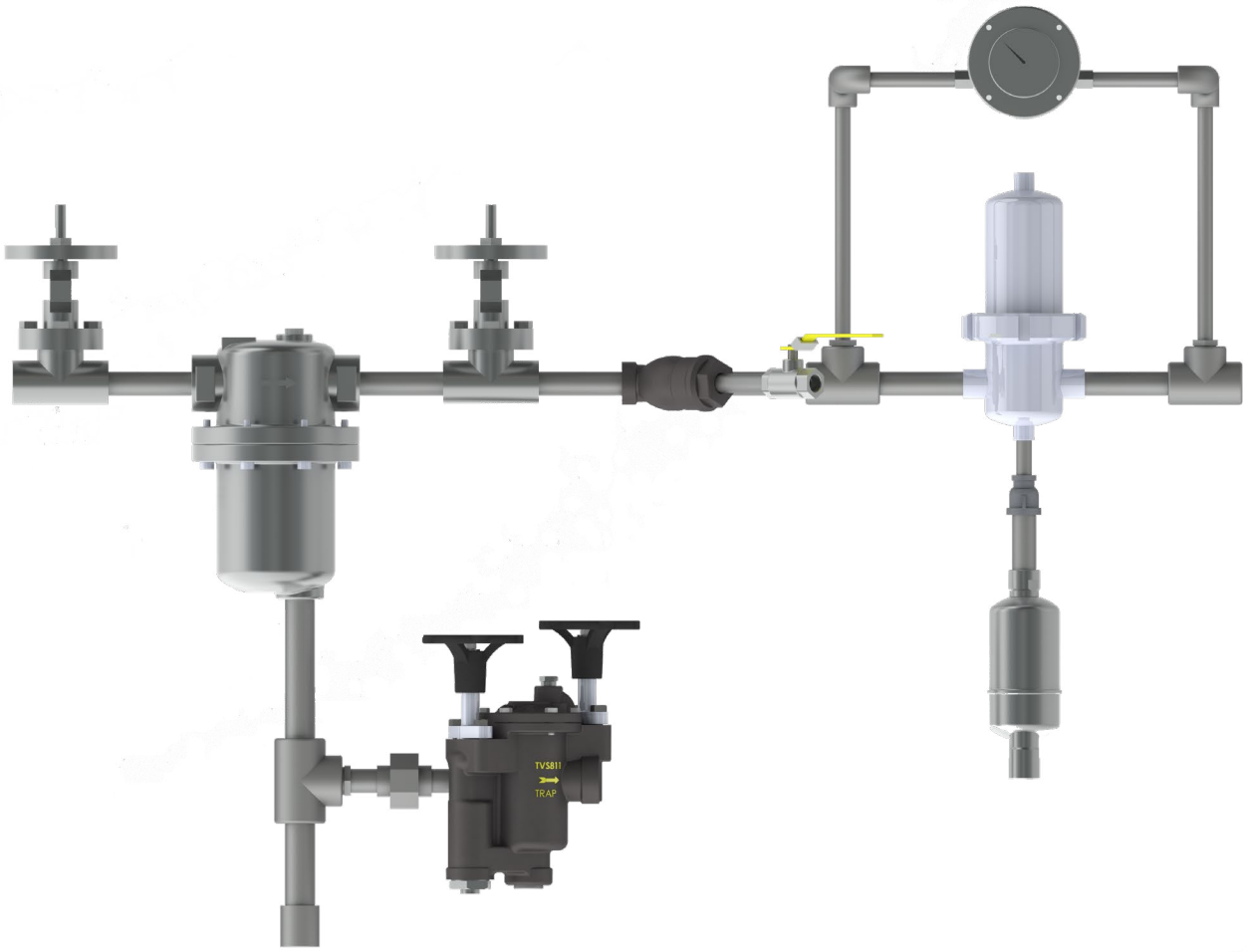
Steam Filter Station
Installation & Operations Manual



Please read and save these instructions

Armstrong®

1012-EN V1.1

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Safety

Icon Legend

DANGER! **Injury or death and property damage are imminent**

WARNING! **Injury or death and property damage are possible**

CAUTION! **Potential property damage, expensive repairs, and/or voiding the equipment warranty may result**

BURN HAZARD! **Contact with steam, hot water, or hot metal surfaces can cause severe skin burns. Skin exposure to 140°F (60°C) water or metal for only five (5) seconds may cause a second degree burn.**

Failure to comply with instructions following a safety icon may result in adverse consequences including, property damage, personal injury, or, in extreme cases, death

General Safety Guidelines:

1. Inappropriate use (beyond typical, intended use) could cause damage to the product and other property. It may also result in personal injury or, in extreme cases, death.

2. Only designated, qualified, and competent personnel should operate, maintain, and service this equipment in accordance with the directions in this product instruction manual.

3. Improper setup, operation, or maintenance may void the product warranty.

4. When operating and maintaining this product:

   a. ALWAYS select and wear appropriate personal protective equipment (PPE) before carrying out any physical work at the job site, per site-specific requirements. Appropriate PPE may include hard hats, safety glasses, gloves, boots or shoes w/ non-slip soles and toe guards, and protective overalls.

   b. ALWAYS scan the work area and take note of potential hazards before entering. Adjust your travel path or work position to avoid hazards and personal injury.

   c. ALWAYS observe designated safety procedures when working in hazardous locations (areas containing explosive and combustible gases, vapors, and dusts) and confined spaces (locations where the breathable air supply is limited or variable, or where entrapment could occur).

   d. ALWAYS use proper lockout-tagout procedures to disconnect power sources and de-energize machinery before conducting installation, service, and repair.

   e. ALWAYS use great care and appropriate safety gear when working above ground level, especially on ladders and platforms or in the presence of overhead, electrical power lines.

   f. ALWAYS shut off all “live” steam, water supply, and condensate return lines before breaking or loosening any plumbing joints.

   g. ALWAYS carefully relieve any residual internal pressure in the system or connecting pipe work before breaking or loosening any plumbing joints.

   h. ALWAYS allow hot parts to cool before servicing to avoid the risk of skin burns.

DS Series Drain Separators

Please read and save these instructions

Armstrong®

DS Series Drain Separators

Capacities for Steam Service

DS-1/DS-2 Series Steam Capacities (lb/hr)									
Size	**5 psig**	**10 psig**	**25 psig**	**50 psig**	**100 psig**	**150 psig**	**200 psig**	**250 psig**	**300 psig**
1/2”	34	43	69	113	200	287	374	461	548
3/4”	60	75	121	198	351	503	656	809	962
1”	98	122	197	320	568	816	1 063	1 311	1 559
1-1/4”	169	212	340	555	983	1 412	1 840	2 269	2 698
1-1/2”	230	288	463	755	1 338	1 922	2 505	3 088	3 672
2”	379	475	763	1 244	2 206	3 167	4 129	5 090	6 052
2-1/2”	541	678	1 089	1 775	3 147	4 519	5 891	7 263	8 635
3”	835	1 046	1 682	2 741	4 860	6 978	9 096	11 215	13 333
4”	1 437	1 802	2 896	4 720	8 368	12 016	15 664	19 312	22 960

DS-1/DS-2 Series Steam Capacities (kg/hr)									
Size	**0.34 barg**	**0.69 barg**	**1.7 barg**	**3.4 barg**	**6.9 barg**	**10.3 barg**	**13.8 barg**	**17.2 barg**	**20.7 barg**
1/2”	16	20	31	51	91	130	170	209	249
3/4”	27	34	55	90	159	228	298	367	436
1”	44	55	89	145	258	370	482	595	707
1-1/4”	77	96	154	252	446	640	835	1 029	1 224
1-1/2”	104	131	210	342	607	872	1 136	1 401	1 665
2”	172	215	346	564	1 001	1 437	1 873	2 309	2 745
2-1/2”	245	307	494	805	1 428	2 050	2 672	3 294	3 917
3”	379	475	763	1 243	2 204	3 165	4 126	5 087	6 048
4”	652	817	1 314	2 141	3 796	5 450	7 105	8 760	10 414

DS-3/DS-4 Series Steam Capacities (lb/hr)									
Size	**5 psig**	**10 psig**	**25 psig**	**50 psig**	**100 psig**	**150 psig**	**200 psig**	**250 psig**	**300 psig**
1"	190	225	295	390	550	675	780	860	1 000
1-1/4"	320	345	460	620	860	1 050	1 125	1 140	1 160
1-1/2"	460	500	680	880	1 225	1 550	1 800	2 000	2 250
2"	790	910	1 050	1 550	2 200	2 700	3 150	3 700	4 000
2-1/2"	1 075	1 120	1 585	2 400	3 400	4 300	5 000	5 375	6 400
3"	1 950	2 300	2 950	3 750	5 250	6 600	7 600	9 000	10 000
4"	3 250	3 800	4 975	6 100	9 000	11 100	13 000	11 500	11 650
5"	4 975	5 850	7 650	9 250	11 400	11 700	12 000	23 000	25 000
6"	7 700	8 990	10 100	10 450	21 500	26 500	31 000	36 000	39 000
8"	10 750	11 450	12 000	23 750	34 000	43 000	51 000	58 000	66 000
10"	20 000	22 500	29 500	37 000	54 500	68 000	78 000	90 000	100 000
12"	29 500	34 000	44 000	54 000	81 000	100 000	105 000	112 000	114 000

DS-3/DS-4 Series Steam Capacities (kg/hr)									
Size	**0.34 barg**	**0.69 barg**	**1.7 barg**	**3.4 barg**	**6.9 barg**	**10.3 barg**	**13.8 barg**	**17.2 barg**	**20.7 barg**
1"	86	102	134	177	249	306	354	390	454
1-1/4"	145	156	209	281	390	476	510	517	526
1-1/2"	209	227	308	399	556	703	816	907	1 021
2"	358	413	476	703	998	1 225	1 429	1 678	1 814
2-1/2"	488	508	719	1 089	1 542	1 950	2 268	2 438	2 903
3"	885	1 043	1 338	1 701	2 381	2 994	3 447	4 082	4 536
4"	1 474	1 724	2 257	2 767	4 082	5 035	5 897	5 216	5 284
5"	2 257	2 654	3 470	4 196	5 171	5 307	5 443	10 433	11 340
6"	3 943	4 078	4 581	4 740	9 752	12 020	14 061	16 329	17 690
8"	4 876	5 194	5 443	10 773	15 422	19 504	23 133	26 308	29 937
10"	9 072	10 206	13 381	16 783	24 721	30 844	35 380	40 823	45 359
12"	13 381	15 422	19 958	24 494	36 741	45 359	47 627	50 802	51 710

Models DS-1 and DS-2

Cyclone Separators
Zyklonabscheider
Séparateurs à cyclone
Separadores ciclónicos
Cycloonafscheiders
Separatori a ciclone

These instructions should be used by experienced personnel !
Diese Gebrauchsanweisung ist von Fachpersonal zu benutzen !
Ces instructions devraient être utilisées par du personnel expérimenté !
¡Estas instrucciones deben ser utilizadas por personal experimentado !
Onderhoud uitsluitend uit te voeren door ervaren personeel !
Queste istruzioni devono essere utilizzate da personale esperto !

PRODUCT DESCRIPTION - PRODUKTBESCHREIBUNG - DESCRIPTION DU PRODUIT - DESCRIPCION DEL PRODUCTO - PRODUKT OMSCHRIJVING - DESCRIZIONE DEL PRODOTTO

Model shown on the picture: DS-2 – Die Abbildung zeigt das Modell DS-2 – Photo : DS-2
Modelo de la foto: DS-2 – Model op foto: DS-2 – Modello in figura: DS-2

GB Armstrong Nodular Iron Cyclone Separator.
For Steam or Compressed Air.

D Armstrong Zyklonabscheider aus Sphäroguss.
Für Dampf oder Druckluft.

F Séparateur à cyclone Armstrong en fonte nodulaire.
Pour la vapeur ou l'air comprimé.

E Separador ciclónico de fundición dúctil de Armstrong.
Para vapor o aire comprimido.

NL Armstrong nodulair gietijzeren cycloonafscheider.
Voor stoom of perslucht.

I Separatore a ciclone in ferro nodulare Armstrong.
Per vapore e aria compressa.

For detailed material specifications, options, approximate dimensions and weights, see Armstrong literature or consult your local Representative.

Für detaillierte Werkstoffangaben, Zubehör, Abmessungen und Gewichte, sehen Sie die Armstrong Datenblätter oder fragen Sie Ihre Armstrong-Vertretung.

Pour toute spécification détaillée des matières, options, dimensions et poids, veuillez vous référer à la littérature Armstrong ou prendre contact avec votre Représentant local.

Para especificaciones de materiales detalladas, opciones, dimensiones aproximadas y pesos, ver catálogos Armstrong o consultar con su Representante local.

Voor gedetailleerde materiaal specificaties, afmetingen en gewichten, zie de Armstrong documentatie of neem contact op met uw plaatselijke Vertegenwoordiger.

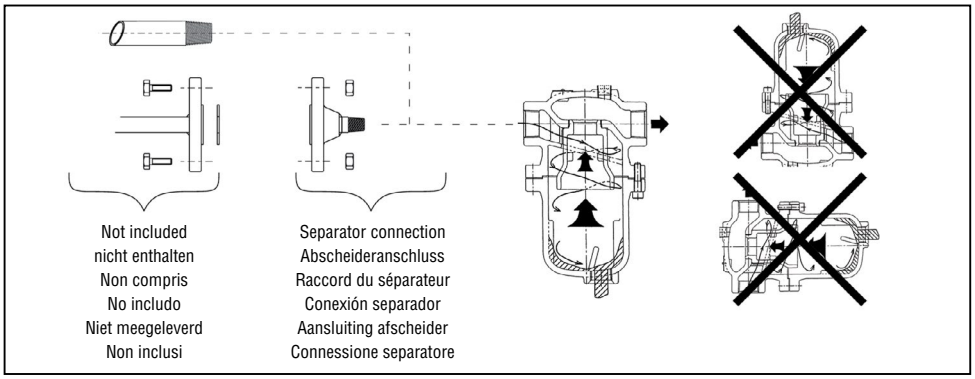
Per la specifica dettagliata dei materiali, accessori opzionali, dimensioni e pesi approssimativi, vedere la documentazione appropriata o contattare il Distributore locale.

Please read and save these instructions

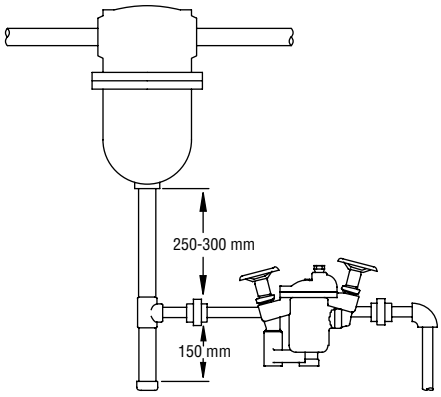
Armstrong®

INSTALLATION - INSTALLATIONSANWEISUNG - INSTALLATION
INSTALACION - INSTALLATIE - INSTALLAZIONE

Model shown on the drawing: DS-1 – Die Zeichnung zeigt das Modell DS-1 – Schéma : DS-1
Modelo del dibujo: DS-1 – Getoond model op tekening: DS-1 – Modello in figura: DS-1



START-UP AND SHUT-DOWN PROCEDURE – INBETRIEBNAHME UND AUSSERBETRIEBNAHME
MISE EN SERVICE ET ARRÊT – PUESTA EN MARCHA Y PARADA
PROCEDURE VOOR HET OPSTARTEN EN UITSCHAKELEN – PROCEDURE DI AVVIO E FERMATA



For detailed hookups and adapted start-up and shut-down procedures, see Armstrong literature or consult your local Representative.

The installation shown below is for steam applications. For air, the steam trap draining the separator should be replaced by a liquid drainer.

- No special start-up or shut-down procedure is needed. Make sure that the separator is drained by a steam trap or a liquid drainer as shown above.

GB

Para conocer las posibilidades de conexión y procedimientos de parada y puesta en marcha, consulte los catálogos Armstrong o hable con su Representante local.

La instalación que se muestra a continuación es para aplicaciones de vapor. Para el uso con aire, el purgador de vapor que drena el separador se debe reemplazar por un drenador de líquido.

- No se requiere ningún procedimiento especial de puesta en marcha o apagado. Asegúrese de que el separador está drenado por un purgador de vapor o un drenador de líquido tal como se indica arriba.

E

Detaillierte Informationen über Einbau, Inbetriebnahme und Außerbetriebnahme finden Sie in den Datenblättern, oder Sie fragen Ihre Vertretung.

Die unten abgebildete Installation bezieht sich auf Dampfanwendungen. Für Luft sollte der Kondensatableiter gegen einen Entwässerer ausgetauscht werden.

- Zur Inbetriebnahme und Außerbetriebnahme sind keine besonderen Maßnahmen erforderlich. Sicherstellen, dass der Abscheider durch einen Kondensatableiter oder Entwässer entleert wird (siehe oben).

D

Voor gedetailleerde montage en installatie instructies zie het betreffende Armstrong documentatieblad of neem contact op met uw plaatselijke Vertegenwoordiger.

Onderstaande installatie is bedoeld voor stoomtoepassingen. Voor lucht dient de condenspot van de afscheider te worden vervangen door een vloeistoflozer.

- Er is geen specifieke opstart- of uitschakelprocedure nodig. Controleer of de afscheider wordt ontwaterd door een condenspot of een vloeistoflozer - zie bovenstaande illustratie.

NL

Pour plus d'informations sur les procédures de démarrage et d'arrêt, ainsi que sur l'installation, veuillez consulter la documentation Armstrong ou contacter votre Représentant local.

L'installation illustrée ci-dessous concerne les applications à la vapeur. Pour l'air, le purgeur de vapeur du séparateur doit être remplacé par un purgeur de liquide.

- Aucune procédure spéciale de mise en service ou d'arrêt n'est nécessaire. Vérifier que le séparateur est purgé par un purgeur de vapeur ou de liquide (voir ci-dessus).

F

Per procedure dettagliate di collegamento, d'avviamento e di fermata, vedere la documentazione Armstrong o consultare il Distributore locale.

L'installazione mostrata sotto è per applicazioni a vapore. Per l'aria lo scaricatore di condensa per il drenaggio del separatore deve essere sostituito da uno scaricatore di liquidi.

- Non è richiesta alcuna particolare procedura di avvio e fermata. Assicurarsi che il separatore sia drenato da uno scaricatore di condensa o di liquidi come mostrato sopra.

I

MODELS WITH CE MARKING - MODELLE MIT CE KENNZEICHNUNG - MODELES MARQUES CE - MODELOS CON LA MARCA CE - MODELLEN MET CE KEUR - MODELLI CON MARCATURA CE

Separator Model	PMA	TMA	DN	PMO
Abscheidermodell	PMA	TMA	DN	PMO
Séparateur	PMA	TMA	DN	PMO
Modelo de separador	PMA	TMA	DN	PMO
Afscheider model	PMA	TMA	DN	PMO
Modello separatore	PMA	TMA	DN	PMO
DS-2	20 bar	232°C	65	20 bar
			80	
			100	

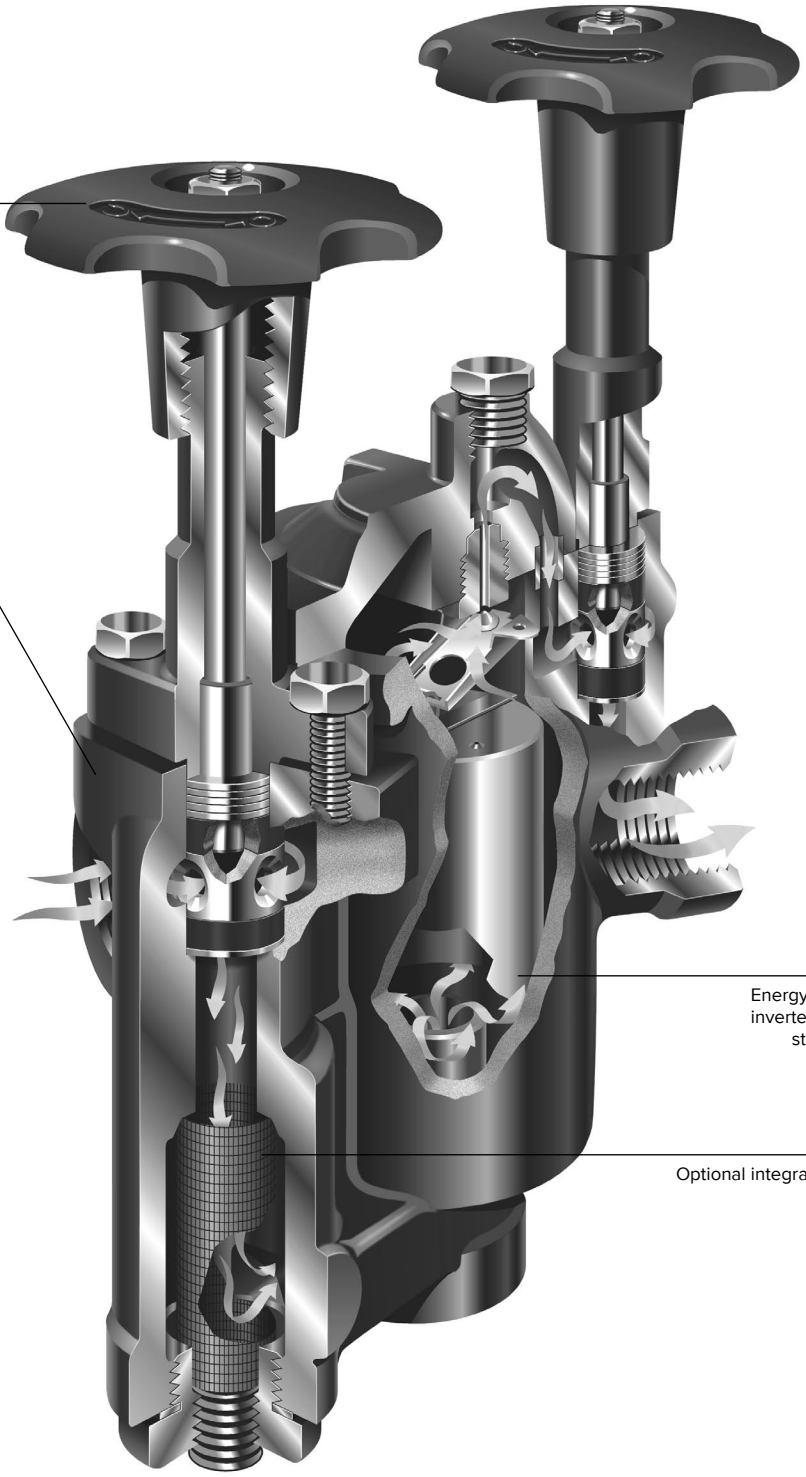
TVS-800 Series Cast Valve Station

Please read and save these instructions

TVS 800 Series Cast Iron Trap Valve Station

Put the principle of the inverted bucket to work in a tough cast iron package and you have the best of both worlds—energy efficiency and long-lasting reliability. Add the advantages of valves integrated into one compact trap/valve casting, and you extend the benefits into installation, trap testing and maintenance.

All the components are concentrated in a single, accessible package and can be dealt with in-line. And if you have existing Armstrong cast iron traps in-line, identical face-to-face dimensions will make retrofitting with the patented* Armstrong Trap Valve Station (TVS) a snap. You'll also reduce your inventory requirements. So you'll eliminate what you're paying just to keep parts on hand.



Reduced costs
TVS saves on these fronts: energy, installation and maintenance.

Integration of trap and valves
Inverted bucket long life and energy efficiency, plus the savings and convenience of components merged into one space-saving package.

A full range of options
TVS will accommodate a test valve, strainer, internal check valve, thermic vent bucket, AIM® and SteamEye®—remote steam trap monitoring system for steam traps.

Easy, in-line repairability

Elimination of potential leak points

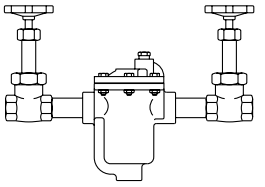
Reduced design time
Permits combining products with exact face-to-face dimensions.

*U.S. Patent 5,947,145

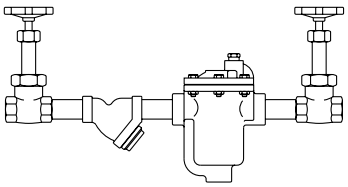
TVS 800 Series Cast Iron Trap Valve Station

TVS makes a long story...short.

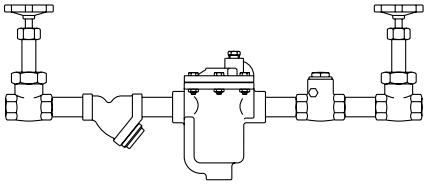
Typical Installation



Inverted bucket trap with two isolation valves



Inverted bucket trap with two isolation valves and strainer



Inverted bucket trap with two isolation valves, strainer and check valve

Trap Valve Station

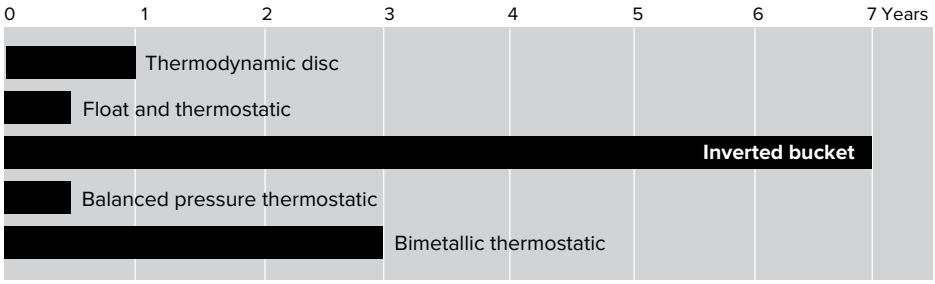
The Innovation Is Integration

The Armstrong TVS makes what used to be long, complicated steam installation stories simple and compact. It shortens installations by integrating components—specifically an inverted bucket steam trap with two or more valves.

For example, here's an old description for a typical installation: valve-nipple-strainer-nipple-trap-nipple-valve. It's a long tale, even for this simple piping arrangement. The Trap Valve Station rewrites this steam story: pipe-TVS-pipe. In other words, the TVS makes it all one, delivering the functions of multiple components in a dramatically smaller unit. It integrates two high-value products in a package of revolutionary versatility.

Look above to see how the Armstrong cast iron Trap Valve Station has rewritten these typical steam installations.

Average Service Life for Different Trap Types 200 psig (14 barg)

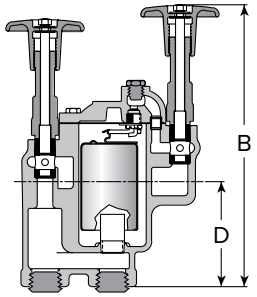


Above data from ICI Engineer January 1993 special issue with permission from ICI Engineering.

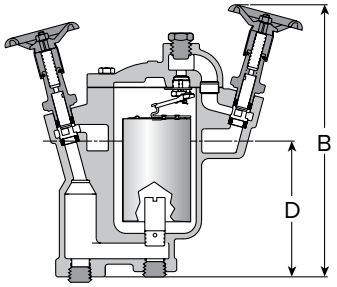
TVS 800 Series Trap Valve Station

Cast Iron for Horizontal Installation, With Integral Piston Valves

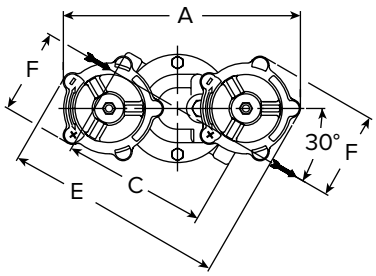
For Pressures to 250 psig (17 barg)...Capacities to 4 400 lb/hr (2 000 kg/hr)



Model TVS 811



Series TVS 812/813



Series TVS 811/812/813 - Top View

Same principle. Different package. Now the energy-saving performance and reliability of the inverted bucket steam trap are available in a versatile new package.

You'll still enjoy all the familiar benefits. And the same efficient condensate drainage from virtually every kind of steam-using equipment. But what you'll find new are all the benefits of a piston valve integrated into the same space-saving package.

Maximum Operating Conditions

Maximum allowable pressure (vessel design): 250 psig @ 450°F (17 barg @ 232°C)
Maximum operating pressure: 250 psig (17 barg)

Connections

Screwed NPT and BSPT

Materials

Cap and body:	ASTM A48 Class 30
Internals:	All stainless steel—304
Valve and seat:	Stainless steel—17-4PH
Handwheel:	Ductile iron
Internals:	Stainless steel
Valve sealing rings:	Graphite and stainless steel
Blowdown valve	Stainless steel

Options

- Stainless steel internal check valve
- Thermic vent bucket
- Stainless steel pop drain
- Integral strainer
- Scrub wire
- Probe connection
- Blowdown valve (TVS 811 and TVS 812 only)

Specification

Inverted bucket steam trap, type ... in cast iron, with continuous air venting at steam temperature, free-floating stainless steel mechanism, and discharge orifice at the top of the trap. Integral upstream and downstream shutoff piston style valves in same dimensional space as standard bucket trap.

How to Order

Specify:

- Model number
- Size and type of pipe connection
- Maximum working pressure that will be encountered or orifice size
- Any options required

For a fully detailed certified drawing, refer to:
TVS 811 CD #1099
TVS 812/813 CD #1100

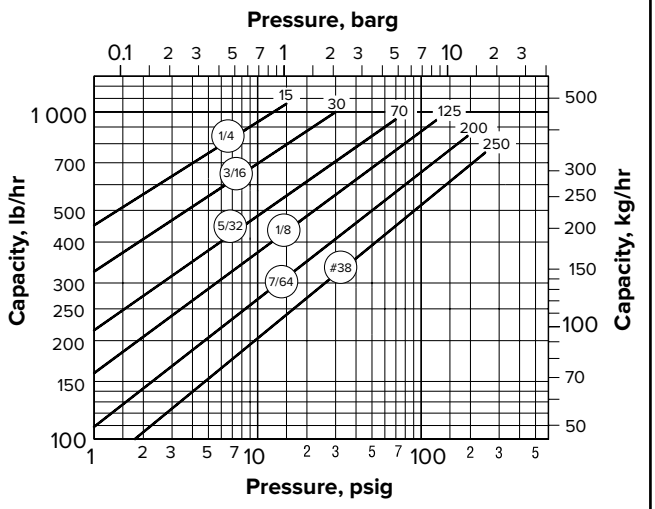
TVS 800 Series Trap Valve Station						
Model No.	**TVS 811**		**TVS 812**		**TVS 813**	
Pipe Connections	**in**	**mm**	**in**	**mm**	**in**	**mm**
	1/2, 3/4	15, 20	1/2, 3/4	15, 20	3/4, 1	20, 25
Test Plug	1/4	6	1/2	15	3/4	20
"A" Width Across Handwheels	8-1/4	210	13-3/4	349	15-1/8	384
"B" Outlet Valve Open	10-1/4	260	11-3/4	298	14-1/4	362
"C" Face to Face	5	127	6-1/2	165	7-3/4	197
"D" Connection ℄ to Bottom	3-11/16	94	4-3/4	121	7-1/4	184
"E"	7-5/8	194	13	330	14-3/8	365
"F"	3	76	4-1/2	114	4-7/8	124
Number of Bolts	6	6	6	6	6	6
Weight lb (kg)	12 (5.4)		25 (11.3)		47 (24)	

TVS 800 Series Trap Valve Station

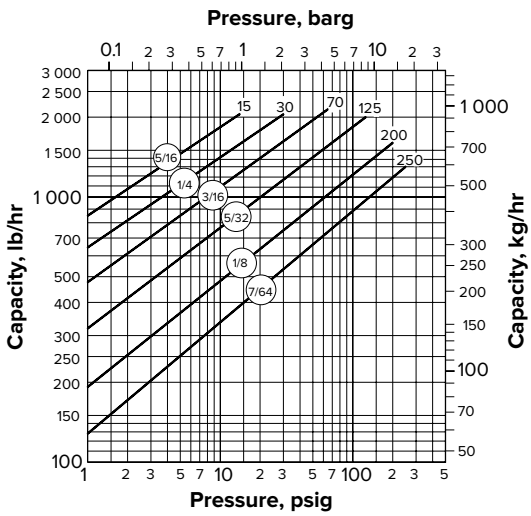
Cast Iron for Horizontal Installation, With Integral Piston Valves

For Pressures to 250 psig (17 barg)...Capacities to 4 400 lb/hr (2 000 kg/hr)

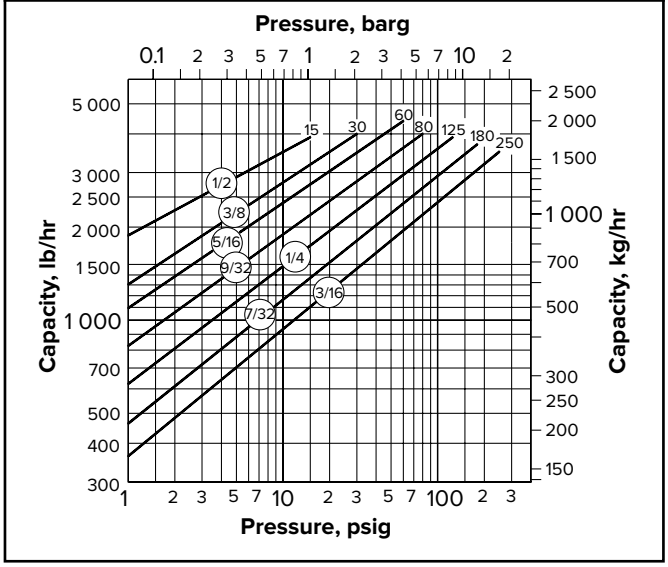
Model TVS 811 Capacity



Model TVS 812 Capacity



Model TVS 813 Capacity



Options

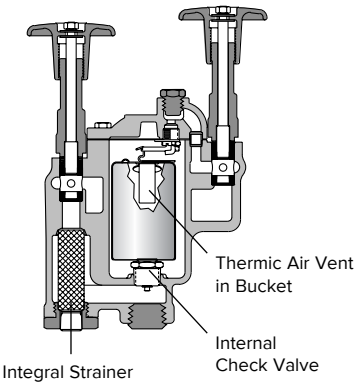
Internal Check Valves are spring-loaded stainless steel and screw directly into the trap inlet or into an extended inlet tube having a pipe coupling at the top to save fittings, labor and money.

Thermic Vent Buckets have a bimetal controlled auxiliary air vent for discharging large amounts of air on start-up.

Integral Strainer is made from 20 x 20 stainless steel screen.

Probe Connections are available for trap monitoring.

Blowdown Valve for clearing strainers of dirt and debris.



Series TVS-800

Inverted Bucket Steam Traps
Glockenkondensatableiter
Purgeurs à Flotteur Inversé Ouvert
Purgadores de Vapor de Cubeta Invertida
Omgekeerde Emmer Condenspot
Scaricatori di Condensa a Secchiello Rovesciato

These instructions should be used by experienced personnel !

Diese Gebrauchsanweisung ist von Fachpersonal zu benutzen !

Ces instructions devraient être utilisées par du personnel expérimenté !

¡Estas instrucciones deben ser utilizadas por personal experimentado !

Onderhoud uitsluitend uit te voeren door ervaren personeel !

Queste istruzioni devono essere utilizzate da personale esperto !

PRODUCT DESCRIPTION - PRODUKTBESCHREIBUNG - DESCRIPTION DU PRODUIT - DESCRIPCION DEL PRODUCTO - PRODUKT OMSCHRIJVING - DESCRIZIONE DEL PRODOTTO

Model shown on the picture: TVS-811 - Die Abbildung zeigt das Modell TVS-811 - Photo: modèle TVS-811

Modelo mostrado en la fotografía: TVS-811 - Model op foto: TVS-811 - Modello in figura: TVS-811

GB Armstrong Cast Iron Trap Valve Station
Horizontal Connection
Optional: Internal Strainer

D Armstrong Multifunktionseinheit aus Grauguß
Waagerechter Einbau
Option: Eingebauter Schmutzfänger

F Station de Purge Armstrong en Fonte
Raccordement Horizontal
En Option : Filtre Intégré

E Estación de Válvulas de Purgadores Armstrong en Fundición
Conexión Horizontal
Opcional: Filtro Interno

NL Armstrong Gietijzeren Trap Valve Station.
Horizontale Aansluiting
Optie: Ingebouwd Filter

I Gruppo di Drenaggio Compatto «Scaricatore e Valvole Integrate» - In Ghisa
Connessioni Orizzontali
Accessori Opzionali: Filtro Integrato

Detailed version of this IOM is available on our website at armstronginternational.com.
Reference Bulletin IB-81 – *English language (only)*

For detailed material specifications, options, approximate dimensions and weights, see Armstrong literature or consult your local Representative.

Für detaillierte Werkstoffangaben, Zubehör, Abmessungen und Gewichte, sehen Sie die Armstrong Datenblätter oder fragen Sie Ihre Armstrong-Vertretung.

Pour toute spécification détaillée des matières, options, dimensions et poids, veuillez vous référer à la littérature Armstrong ou prendre contact avec votre Représentant local.

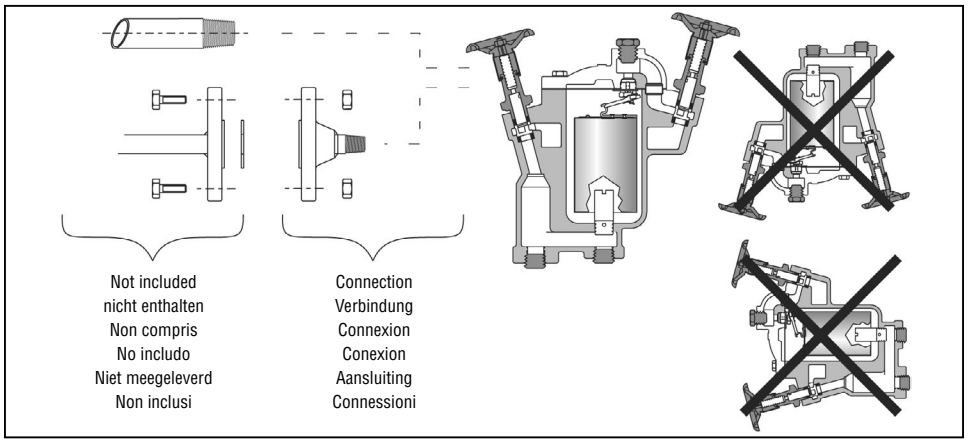
Para especificaciones de materiales detalladas, opciones, dimensiones aproximadas y pesos, ver catálogos Armstrong o consultar con su Representante local.

Voor gedetailleerde materiaal specificaties, afmetingen en gewichten, zie de Armstrong documentatie of neem contact op met uw plaatselijke Vertegenwoordiger.

Per la specifica dettagliata dei materiali, accessori opzionali, dimensioni e pesi approssimativi, vedere la documentazione appropriata o contattare il Distributore locale.

INSTALLATION - INSTALLATIONSANWEISUNG - INSTALLATION INSTALACION - INSTALLATIE - INSTALLAZIONE

Model shown on the drawing: TVS-812 - Die Zeichnung zeigt das Modell TVS-812 - Schéma: modèle TVS-812
Modelo mostrado en el dibujo: TVS-812 - Model op tekening: TVS-812 - Modello in figura: TVS-812
Possible connections: screwed or flanged - Mögliche Anschlußarten: Muffengewinde, Flansche
Raccordements possibles: taraudé ou à brides - Conexiones posibles: roscada o bridada
Mogelijke aansluiting: draad of flens - Connessioni disponibili: filettate o flangiate



START-UP PROCEDURE - INBETRIEBNAHME - PROCEDURE DE DEMARRAGE - PROCEDIMIENTO DE PUESTA EN MARCHA - OPSTARTPROCEDURE - PROCEDURA D'AVVIAMENTO

For detailed hookups and adapted start-up and shut-down procedures, see Armstrong literature or consult your local Representative.

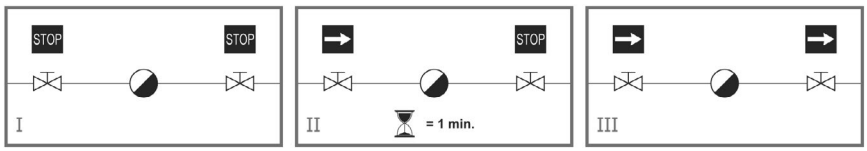
Für detaillierte Informationen über Installation, Inbetriebnahme und Außerbetriebnahme sehen Sie die Armstrong Datenblätter oder fragen Sie Ihre Armstrong-Vertretung.

Pour plus de détails à propos des procédures de démarrage et d'arrêt, ainsi que pour l'installation, veuillez vous référer à la littérature Armstrong ou prendre contact avec votre Représentant local.

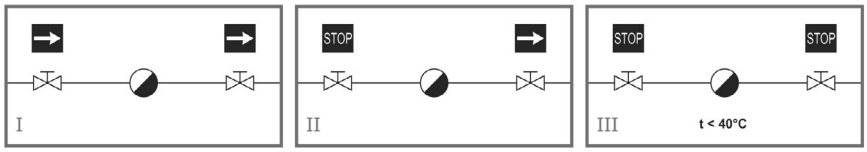
Para informarse sobre conexiones detalladas y procedimientos adaptados de puesta en marcha y parada, consulte los catálogos Armstrong o diríjase a su Representante local.

Voor gedetailleerde montage en installatie instructies zie het betreffende Armstrong documentatieblad of neem contact op met uw plaatselijke Vertegenwoordiger.

Per procedure dettagliate di collegamento, d'avviamento e di fermata, vedere la documentazione Armstrong o consultare il Distributore locale.



SHUT-DOWN PROCEDURE - AUSSERBETRIEBNAHME - PROCEDURE D'ARRET - PROCEDIMIENTO DE PARADA - UIT BEDRIJFNAME - PROCEDURA DI FERMATA



MAINTENANCE - WARTUNG - MAINTENANCE
MANTENIMIENTO - ONDERHOUD - MANUTENZIONE

For troubleshooting, testing methods, frequency of maintenance and detailed spare parts list, see Armstrong literature or consult your local Representative.

Für detaillierte Informationen über Fehlersuche, Testmethoden, Wartungsintervallen und Ersatzteillisten fragen Sie Ihre Armstrong-Vertretung.

Pour le dépannage, les méthodes de test, la fréquence d'entretien et la liste détaillée des pièces de rechange, veuillez vous référer à la littérature Armstrong ou prendre contact avec votre Représentant local.

Para detección de posibles averías, métodos de test, frecuencia de mantenimiento y lista detallada de repuestos, ver catálogos Armstrong o consultar con su Representante local.

Voor het oplossen van problemen, test methodes, onderhoud en gedetailleerde onderdelenlijsten, zie de Armstrong documentatie of neem contact op met uw plaatselijke Vertegenwoordiger.

Per la soluzione di eventuali problemi, metodi di prova funzionalità, frequenza di manutenzione e dettaglio della lista ricambi, vedere la documentazione Armstrong o consultare il Distributore locale.

Equipement under pressure - Operating temperature > 100°C - Make sure trap is cold before handling!

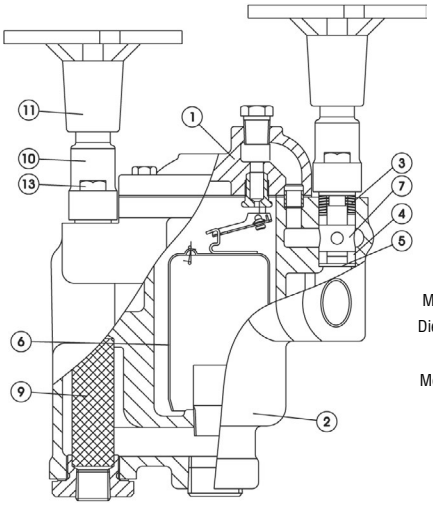
Armatur steht unter Druck - Arbeitstemperatur > 100°C - Stellen sie sicher, dass die Armatur kalt und drucklos ist, bevor an dieser gearbeitet wird!

Equipement sous pression - Température en fonctionnement > 100°C - Laisser le purgeur refroidir avant toute manipulation!

Equipo bajo presión - Temperatura de trabajo > 100°C ¡ - Asegúrese de que el purgador esté frío antes de manipularlo!

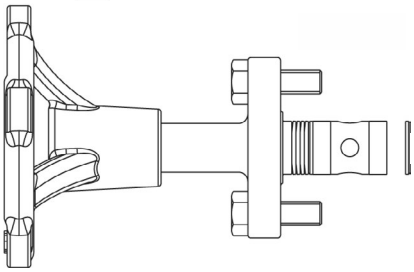
Toestel onder druk - Werktemperatuur > 100°C - Condenspot moet afgekoeld zijn alvorens eraan te werken!

Apparecchiatura in pressione - Temperatura operativa > 100°C - Assicurarsi che lo scaricatore sia freddo prima d'intervenire!

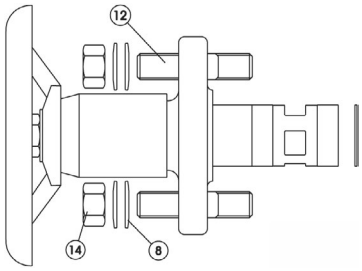


Model shown on the drawing: TVS-811
Die Zeichnung zeigt das Modell TVS-811
Schéma: modèle TVS-811
Modelo mostrado en el dibujo: TVS-811
Model op tekening: TVS-811
Modello in figura: TVS-811

A- 9542
&
B-5259



B-5249



B-5250

I. Internals Maintenance:

- For maintenance of trap internals, see Armstrong IOM-1001.

II. Valves Maintenance:

- Make sure to interrupt steam flow up and down stream in order to isolate the TVS;

- Using the TVS's handwheels (11), open completely each TVS's valve;

- Unscrew the bonnet bolts (13) and pull the isolation valve assembly (10) out of valve body;

- TVS-811: Place the special tool A-9542 (sealing ring extractor) into the body of the valve and turn its top square nut (A) in order to allow the spindle (C) to expand under the valve washer (5);

- TVS-812 & TVS-813: Place the special tool B-5259 (sealing ring extractor) into the body of the valve and turn its top square nut (A) in order to allow the spindle (C) to expand under the valve washer (5);

- Turn the lower nut (B) of the extractor in order to pull the tool out of the valve body. The disc springs (3), valve sealing rings (4) and lantern bushing (7) will come out on the end of the tool. Check to see if all components have been removed and clean any remaining debris.

- TVS-811: Place valve washer (5) into valve body with Beveled Edge down;

- TVS-812 & TVS-813: Place valve washer (5) into valve body;

- TVS-811: Place Armstrong part B-5249 (isolation valve assembly) into valve body and lightly tap it to the bottom. Screw evenly the bolts (13) until the bonnet (10) seats on the valve body;

- TVS-812 & TVS-813: Place Armstrong part B-5250 (isolation valve assembly) into valve body and lightly tap it to the bottom. Place 2 bonnet disc springs (8) - oval surfaces facing each other - on each stud (12) and coat the studs (12). Place the bonnet nuts (14) on the studs (12) and tighten evenly.

GB

I. Wartung Innenteile:

- Armstrong IOM-1001für Wartung der Innenteile des Kondensatableiters verwenden.

II. Wartung der Ventile:

- Absperren der Dampfzufuhr und Kondensatseite um TVS von der Leitung zu trennen;

- Mit den Handrädern (11) beide TVS-Ventile voll öffnen;

- Schrauben am Bügeldeckel (13) lösen und Ventileinheit (10) aus Ventilgehäuse ziehen;

- TVS-811: Spezialwerkzeug A-9542 (Auszieher für Dichtungsring) in Ventilgehäuse einführen und oberen Vierkant (A) drehen, sodaß sich Spindel (C) unterhalb der Ventildichtung (5) ausdehnen kann;

- TVS-812 & TVS-813: Spezialwerkzeug B-5259 (Auszieher für Dichtungsring) in Ventilgehäuse einführen und oberen Vierkant (A) drehen, sodaß sich Spindel (C) unterhalb der Ventildichtung (5) ausdehnen kann;

- Untere Sechskantmutter (B) des Ausziehers festschrauben und Werkzeug aus dem Ventilgehäuse ziehen; Federscheibe (3) Ventil-Dichtungsringe (4) und die Laterne (7) werden mit dem Werkzeug herausgezogen. Sicherstellen, daß alle Teile entfernt wurden und Bohrung von evtl. zurückgebliebenen Bruchstücken reinigen;

- TVS-811: Ventildichtung (5) mit abgeschrägter Kante unten in Ventilgehäuse einsetzen.

- TVS-812 & TVS-813: Ventildichtung (5) in Ventilgehäuse einsetzen.

- TVS-811: Armstrong Ersatzteil B-5249 (Ventileinheit) in Ventilgehäuse einsetzen und leicht gegen Boden festsklopfen. Schrauben (13) gleichmäßig festziehen bis der Bügel (10) am Ventilgehäuse aufsitzt;

- TVS-812 & TVS-813: Armstrong Ersatzteil B-5250 (Ventileinheit) in Ventilgehäuse einsetzen und leicht gegen Boden festsklopfen; 2 Federscheiben (8) für Bügel - ovale Oberflächen gegenüber - auf jeden Bolzen (12) stecken und Bolzen (12) einstreichen. Muttern (14) auf Bolzen (12) setzen und gleichmäßig festziehen.

D

I. Entretien des pièces internes:

- Pour l'entretien des pièces internes, voir le document Armstrong IOM-1001.

II. Entretien des vannes :

- Couper la vapeur en amont et en aval afin d'isoler le TVS;

- En utilisant les volants du TVS (11), ouvrir complètement chacune des vannes;

- Dévisser les boulons du bonnet (13) et retirer l'assemblage (10) du corps de la vanne;

- TVS-811: Placer l'outil spécial A-9542 (extracteur) dans le corps de la vanne et visser le boulon carré (A) pour permettre à la tige (C) de s'élargir sous la rondelle (5);

- TVS-812 & TVS-813: Placer l'outil spécial B-5259 (extracteur) dans le corps de la vanne et visser le boulon carré (A) pour permettre à la tige (C) de s'élargir sous la rondelle (5);

- Serrer l'écrou inférieur (B) de l'extracteur et retirer l'outil du corps de la vanne. Les ressorts circulaires (3), les bagues d'étanchéité (4) et la lanterne (7) vont sortir de la vanne, au bout de l'outil. Vérifier que tous les composants ont été retirés et bien nettoyer le moindre débris;

- TVS-811: Placer la rondelle (5) dans le corps de la vanne avec le côté chanfreiné vers le bas;

- TVS-812 & TVS-813: Placer la rondelle (5) dans le corps de la vanne;

- TVS-811: Placer la pièce Armstrong N° B-5249 (empilage de joints) dans le corps de la vanne et le faire glisser au fond en tapant légèrement. Visser les boulons (13) de manière équilibrée jusqu'à ce que le bonnet (10) se pose sur le corps de la vanne;

- TVS-812 & TVS-813: Placer la pièce Armstrong N° B-5250 (empilage de joints) dans le corps de la vanne et le faire glisser au fond en tapant légèrement. Placer les 2 ressorts circulaires du bonnet (8) - avec les faces ovales l'une contre l'autre - sur chaque goujon (12) et enduire les goujons de graisse (12). Placer les écrous du bonnet (14) sur les goujons (12) et serrer de manière équilibrée.

F

I. Mantenimiento de las piezas internas:

- Para el mantenimiento de piezas internas en purgadores, consulte Armstrong IOM-1001.

II. Mantenimiento de las válvulas:

- Asegúrese de interrumpir el flujo de vapor ascendente y descendente para aislar el TVS;
- Utilice los volantes del TVS (11) para abrir por completo cada válvula;
- Afloje los pernos del bonete (13) y retire del cuerpo el conjunto de válvulas de aislamiento (10);
- TVS-811: Coloque la herramienta especial A-9542 (extractor del anillo de cierre) dentro del cuerpo de la válvula y gire la tuerca cuadrada superior (A) de manera que el eje (C) se expanda debajo de la arandela de la válvula (5);
- TVS-812 y TVS-813: Coloque la herramienta especial B-5253 (extractor del anillo de cierre) dentro del cuerpo de la válvula y gire la tuerca cuadrada superior (A) de manera que el eje (C) se expanda debajo de la arandela de la válvula (5);
- Ajuste la tuerca inferior (B) del extractor y quite la herramienta del cuerpo de la válvula. Los resortes de disco (3), los anillos de cierre de la válvula (4) y el buje linterna (7) saldrán en la parte inferior de la herramienta. Verifique que todos los componentes fueron retirados y limpie los restos que puedan quedar.
- TVS-811: Coloque la arandela (5) dentro del cuerpo de la válvula con el borde biselado hacia abajo;
- TVS-812 y TVS-813: Coloque la arandela (5) dentro del cuerpo de la válvula;
- TVS-811: Coloque la pieza Armstrong B-5249 (conjunto de válvulas de aislamiento) dentro del cuerpo de la válvula y golpéela ligeramente hacia el fondo. Ajuste uniformemente los pernos (13) hasta que el bonete (10) se apoye en el cuerpo de la válvula;
- TVS-812 y TVS-813: Coloque la pieza Armstrong B-5250 (conjunto de válvulas de aislamiento) dentro del cuerpo de la válvula y golpéela ligeramente hacia el fondo. Coloque dos resortes de disco (8) - con las superficies ovales enfrentadas - en cada perno (12) y cubra los pernos (12). Coloque las tuercas del bonete (14) en los pernos (12) y ajuste uniformemente.

E

I. Onderhoud aan binnenwerk:

- Voor onderhoud en reparatie aan condenspot, zie blad IOM-1001.

II. Afsluiter onderhoud en reparatie:

- Verzeker u ervan dat zowel de toe- als de afvoer naar de TVS afgesloten zijn;

- Draai d.m.v. de handwielen (11) beide afsluiters geheel open;

- Demonteer de drukstukbouten (13) en trek het afsluiter binnenwerk (10) geheel uit het huis;

- TVS-811: Plaats het speciale gereedschap A-9542 in het afsluiterhuis en draai de topbout (A) , waardoor de spindel (C) uitzet onder de onderste afdichtring (5);

- TVS-812 & TVS-813: Plaats het speciale gereedschap A-5259 in het afsluiterhuis en draai de topbout (A) , waardoor de spindel (C) uitzet onder de onderste afdichtring (5);

- Draai de moer (B) en trek het gereedschap uit het huis. De veerringen (3), de afdichtringen (4) en de lantaarnring (7) komen met het gereedschap mee; Controleer of alle onderdelen verwijderd zijn en reinig de binnenkant van het huis.

- TVS-811: Plaats de ring (5) met de schuine kant naar beneden in het huis;

- TVS-812 & TVS-813: Plaats de ring (5) in het huis;

- TVS-811: Plaats het bovendeel (B-5249 voorzien van nieuwe ringen) in het huis en druk dit stevig, maar voorzichtig door tot op de bodem. Draai de bouten (13) gelijkmatig aan, totdat het drukstuk (10) op het afsluiterhuis zit;

- TVS-812 & TVS-813: Plaats het bovendeel (B-5250 voorzien van nieuwe ringen) in het huis en druk dit stevig, maar voorzichtig door tot op de bodem. Plaats 2 veerringen (8) met de ovale vlakken naar elkaar toe, op elk draadeind (12) en smeer de draadeinden (12). Draai de bouten (14) gelijkmatig aan.

NL

I. Manutenzione degli organi interni:

- Per la manutenzione degli organi interni vedere istruzioni Armstrong IOM-1001.

II. Manutenzione delle valvole:

- Interrompere il flusso vapore ed isolare il gruppo TVS;

- Aprire completamente le 2 valvole, agendo sui volantini (11);

- Svitare i bulloni (13) del bonnet ed estrarre gli interni (10) fuori dal corpo valvole;

- TVS-811: Posizionare nel corpo valvola l'utensile speciale A-9542 (Estrattore anelli di tenuta) e girando (A) far espandere lo spinotto (C) al di sotto della rondella (5);

- TVS-812 & TVS-813: Posizionare nel corpo valvola l'estrattore anelli di tenuta B-5259 e girando (A) far espandere lo spinotto (C) al di sotto della rondella (5);

- Stringere il dado (B) e tirar fuori l'estrattore dal corpo valvola. Le molle a tazza (3), gli anelli di tenuta (4) e la lanterna (7) verranno così estratti. Controllare se tutti i componenti sono stati rimossi e procedere con le normali operazioni di pulizia delle parti interessate;

- TVS-811: Riposizionare nel corpo valvola la rondella (5), con la parte smussata in basso;

- TVS-812 & TVS-813: Riposizionare nel corpo valvola la rondella (5);

- TVS-811: Riposizionare l'assieme B-5249 nel corpo valvola ed avvitarlo delicatamente sino al fondo. Avvitare uniformemente i bulloni (13) sino a che il bonnet (10) sia correttamente posizionato sul corpo valvola;

- TVS-812 & TVS-813: Riposizionare l'assieme B-5250 nel corpo valvola ed avvitarlo delicatamente sino al fondo. Posizionare le 2 molle a tazza (8) su ogni tirante (12). Posizionare i dadi (14) sui tiranti (12) e stringerli uniformemente.

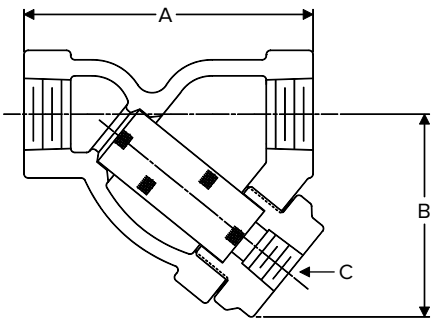
I

Y-Strainers

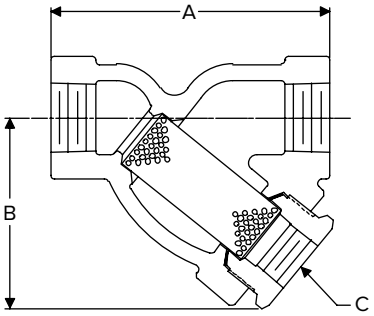
Please read and save these instructions

Armstrong®

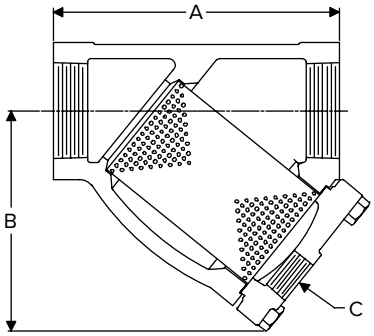
Cast Iron
250 lb Screwed 1/2" - 3"



CA1SC 1/2", 3/4", 1", 1-1/2", 2"



CA1SC 1-1/4"

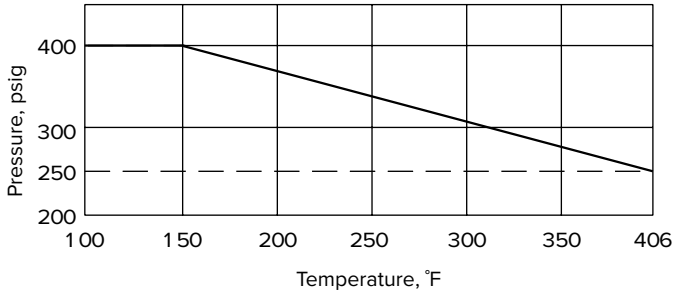


A1SC 2-1/2", 3"

For a fully detailed certified drawing, refer to:

CA1SC 1/2", 3/4", 1", 1-1/4", 1-1/2", 2"	**CD #1111**
A1SC 2-1/2", 3"	**CD #1043**

Pressure/Temperature Rating

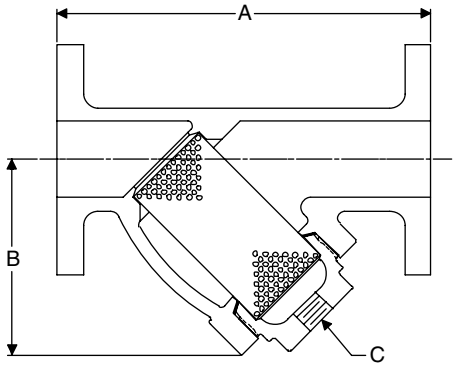


Materials: 250 lb Screwed 1/2" - 3" (15 - 80 mm)						
Connections Size		**Body**	**Standard Screen**	**Screen Retainer**	**Gasket**	**Bolting**
in	**mm**					
1/2, 3/4	15, 20	ASTM A48 Class 30 Cast Iron	304 SS .045" perforated†	ASTM A48 Class 30 Cast Iron	Spiral Wound	N/A
1, 1-1/2, 2	25, 40, 50					
1-1/4	32				Soft Steel	
2-1/2, 3	65, 80		304 SS .045" perforated†		Non-asbestos	Cap Screws ASTM A193 Gr. B7

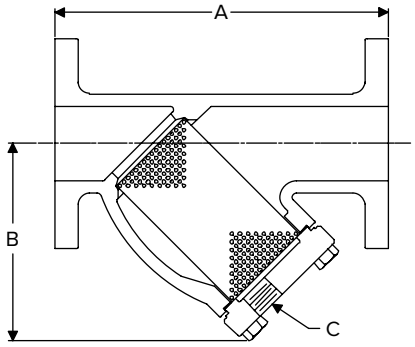
†NOTE: Other screen materials available. See page 435.

Physical Data: 250 lb Screwed 1/2" - 3" (15 - 80 mm)																
Size		**Ordering Code, Standard Screen**	**Weight**		**Dimensions**						**Maximum Pressure**				**Screen Retainer Type**	**Connections**
					A		**B**		**C**		**Saturated Steam**		**150°F (66°C) non-shock**			
in	**mm**		**lb**	**kg**	**in**	**mm**	**in**	**mm**	**in**	**mm**	**psig**	**barg**	**psig**	**barg**		
1/2	15	CA1SC	3	1.4	4-1/4	108	3	76	3/8	9.5	250	17	400	28	Threaded	ANSI B1.20.1 Screwed
3/4	20								1/2	15						
1	25		4-1/2	2	5	127	3-3/4	95								
1-1/4	32		7	3	5-1/2	140	3-7/8	98								
1-1/2	40		10	4.5	6-5/16	160	4-7/16	113								
2	50		15	6.8	7-1/2	191	5-7/16	138								
2-1/2	65	A1SC	24-1/2	11	8-1/2	216	6-7/16	164	3/4	20					Bolted	
3	80		45-1/2	21	10-1/2	267	8	203	1-1/4	32						

Cast Iron
Class 125 Flanged 2"- 6" and Class 250 Flanged 2" - 6"



2" Class 125 or 250 Flanged



2-1/2" - 6" Class 125 Flanged, 2-1/2" - 6" Class 250 Flanged

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

2" Class 125 or 250 Flanged	**CD #1044**
2-1/2" - 6" Class 125 Flanged	**CD #1045**
2-1/2" - 6" Class 250 Flanged	**CD #1046**

Materials: Class 125 Flanged 2" - 6" (50 - 150 mm) and Class 250 Flanged 2" - 6" (50 - 150 mm)

Connection Size		Body	Screen Retainer	Gasket	Bolting	Standard Screen
in	mm					
2	50	ASTM A48 Class 30 Cast Iron		Soft Steel	N/A	304 SS .045" perforated†
2-1/2, 3, 4, 6	65, 80, 100, 150			Non-asbestos	Cap Screws ASTM A193	

†NOTE: Other screen materials available. See page 435.

Physical Data: Class 125 Flanged 2" - 6" (50 - 150 mm) and Class 250 Flanged 2" - 6" (50 - 150 mm)

Size		Ordering Code, Standard Screen	Weight		Dimensions						Maximum Pressure				Screen Retainer Type	Conn.
					A		B		C		Saturated Steam		150°F (66°C) non-shock			
in	mm		lb	kg	in	mm	in	mm	in	mm	psig	barg	psig	barg		
2	50	A1FL125	22	10	9-3/4	248	5-1/8	130	1/2	15	125	8.6	175	12	Threaded	Class 125 ANSI B16.1 Flat Faced
2-1/2	65		36	16	11-1/16	281	6-7/16	164	3/4	20					Bolted	
3	80		49	22	12-1/4	311	7-1/4	184	1-1/4	32						
4	100		83	38	14-7/8	378	9-1/2	241	1-1/4	32						
6	150		187	85	20-7/16	519	13-7/8	353	1-1/2	40						
2	50	A1FL250	25	11	10-1/4	260	5-1/8	130	1/2	15	250	17	400	28	Threaded	Class 250 ANSI B16.1 1/16" RF
2-1/2	65		42	19	11-11/16	297	6-7/16	164	3/4	20					Bolted	
3	80		70	32	14-1/8	283	8-1/2	216	1-1/4	32						
4	100		125	57	17-1/8	435	10-3/4	273	1-1/4	32						
6	150		294	133	23-1/2	597	15-3/4	400	1-1/2	40						

Armstrong Steam Filter

Please read and save these instructions

Armstrong®

ASF Steam Filter Housings

Steam Filter Housings

Stainless Steel Steam Filter Housings

Armstrong ASF housings are designed for filtering of steam. They are equipped with NPT thread or flange connections depending on size and have an electro-polished or bead-blast surface finish. ASF housings are designed to yield low differential pressure at high flow rates.

ASF housings are available in 18 different sizes with a capacity range from 100 to 17,100 lbs/hr at 50 psig. Optional connections are also available to adapt the filter to your specific requirements. Standard housings utilize Armstrong filter elements with 2-inch, double o-ring, plug-in connections.

ASF Housing

Specifications

Materials	
Filter Housing	304 SS 316L SS (on request)
Seating Nut	304 stainless steel
Plug	304SS/PTFE gasket
Housing Gasket	EPDM 291 (up to 356°F) Fluoraz®* (up to 392°F)

*Fluoraz is a registered trademark of Greene, Tweed & Co.

Design Pressure/Temperature	
FNPT Housing (ASF-H4 1/4 NPT - 3 NPT L)	200 psig @ 392°F
FNPT Housing (ASF-H4 3 NPT H)	174 psig @ 392°F
ANSI Flange Housing (ASF-H4 4 FWL - 8 FWH)*	150 psig @ 392°F

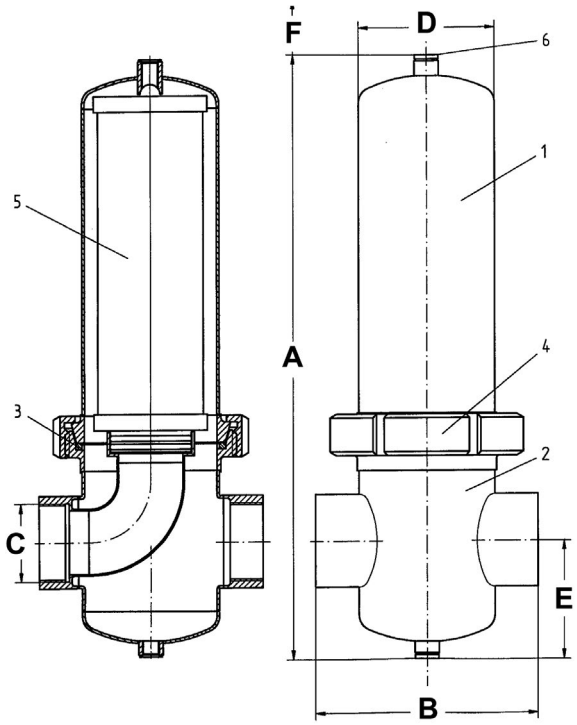
* ANSI Flanged housings (4” - 8”) are ASME code stamped

Surface Finish	
Inner	
ASF-H4 1/4 NPT - 3 NPT	Pickled and passivated Ra 63
ASF-H4 4 FWL - 8 FWH	Bead blast
Outer	
ASF-H4 1/4 NPT - 3 NPT	Pickled, passivated, and polished Ra 63
ASF-H4 4 FWL - 8 FWH	Bead blast

Connection Types
NPT thread connection (standard for 1/4” - 3”)
ANSI flange (standard for 4” - 8”; optional for 1/4” - 3”)
Other connections and bigger housings are available on request

ASF Steam Filter Housings

Dimensions



Threaded Connection

Callout	Quantity	Description
1	1	upper housing bowl
2	1	lower housing bowl
3	1	housing gasket

Callout	Quantity	Description
4	1	sealing nut
5	1	filter element
6	2	plug

Model Number	Connection Size (inch)	Volume (gal)	Weight* (lb)	Dimensions (inches)						Element Size
				A	B (± .125)	C w/NPT thread connection	D	E	F	
ASF-H4 1/4	1/4	0.1	4	8.2	4.1	0.25	3	2	4	03/10
ASF-H4 3/8	3/8	0.2	4	9.5	4.25	0.375	3	2	5	04/10
ASF-H4 1/2	1/2	0.2	4	9.5	4.25	0.50	3	2	5	04/20
ASF-H4 3/4	3/4	0.2	4	10.5	4.9	0.75	3	2.3	6	05/20
ASF-H4 1	1	0.3	6	11.5	4.9	1.00	3	2.6	6	05/25
ASF-H4 1-1/4	1-1/4	0.3	7	13.5	5.5	1.25	3	2.6	8	07/25
ASF-H4 1-1/2	1-1/2	0.6	9	15	6.7	1.50	4	3.5	8	07/30
ASF-H4 2 L**	2	0.9	11	18	6.7	2.00	4	3.5	11	10/30
ASF-H4 2 H**	2	1.1	12	23	6.7	2.00	4	3.5	18	15/30
ASF-H4 2-1/2	2-1/2	2.1	20	29	8.5	2.50	5	4.5	23	20/30
ASF-H4 3 L**	3	2.9	24	39	8.5	3.00	5	4.5	33	30/30
ASF-H4 3 H**	3	4.4	36	40	9.5	3.00	6	4.5	33	30/50

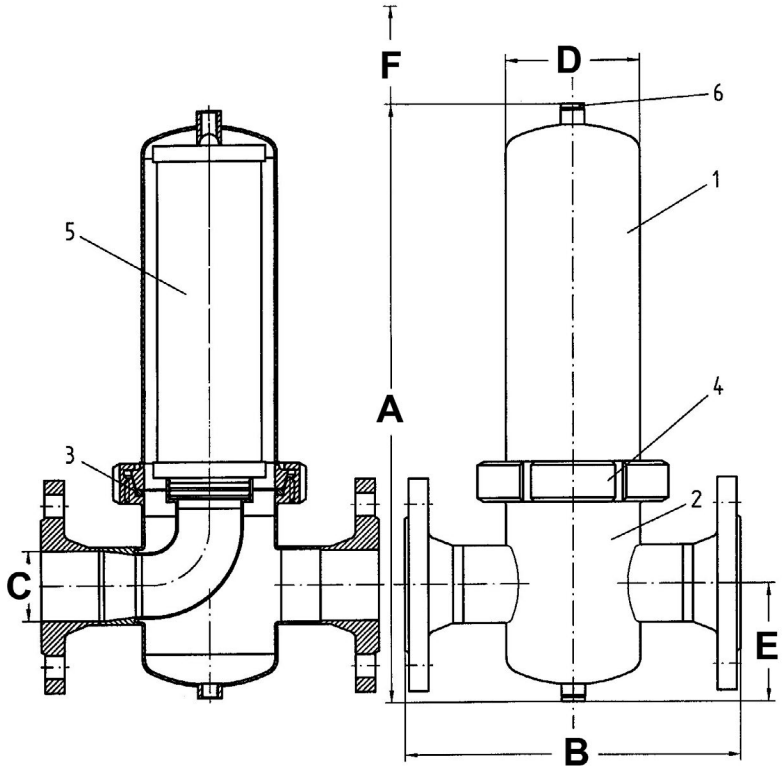
* Without filter element

** L designates low capacity and H designates high capacity

NOTE: Drain Connection = 1/4" NPT, Vent Connection = 1/4" BSPP

ASF Steam Filter Housings

Dimensions



Flange Connection ANSI Class 150

Callout	Quantity	Description
1	1	upper housing bowl
2	1	lower housing bowl
3	1	housing gasket

Callout	Quantity	Description
4	1	sealing nut
5	1	filter element
6	2	plug

Model Number	Connection Size (inch)	Volume (gal)	Weight* (lb)	Dimensions (inches)						Element Size
				A	B (± .125)	C**	D	E	F	
ASF-H4 1/4 FW	1/4	0.1	6	8.5	8.00	0.50	3	2	4	03/10
ASF-H4 3/8 FW	3/8	0.2	6	9.5	8.00	0.50	3	2	5	04/10
ASF-H4 1/2 FW	1/2	0.2	7	9.5	8.00	0.50	3	2	5	04/20
ASF-H4 3/4 FW	3/4	0.2	9	10.5	9.00	0.75	3	2	6	05/20
ASF-H4 1 FW	1	0.3	11	11.5	9.69	1.00	3	3	6	05/25
ASF-H4 1-1/4 FW	1-1/4	0.3	14	13.5	10.00	1.25	3	3	8	07/25
ASF-H4 1-1/2 FW	1-1/2	0.6	18	15.2	11.58	1.50	4	4	8	07/30
ASF-H4 2 FW L***	2	0.9	22	18.1	11.69	2.00	4	4	11	10/30
ASF-H4 2 FW H***	2	1.1	23	23.1	11.69	2.00	4	4	18	15/30
ASF-H4 2-1/2 FW	2-1/2	2.1	33	28.8	13.39	2.50	5	4	23	20/30
ASF-H4 3 FW L***	3	2.9	40	39.0	13.39	3.00	5	4	33	30/30
ASF-H4 3 FW H***	3	4.4	52	40.4	14.96	3.00	6	5	33	30/50

* Without filter element

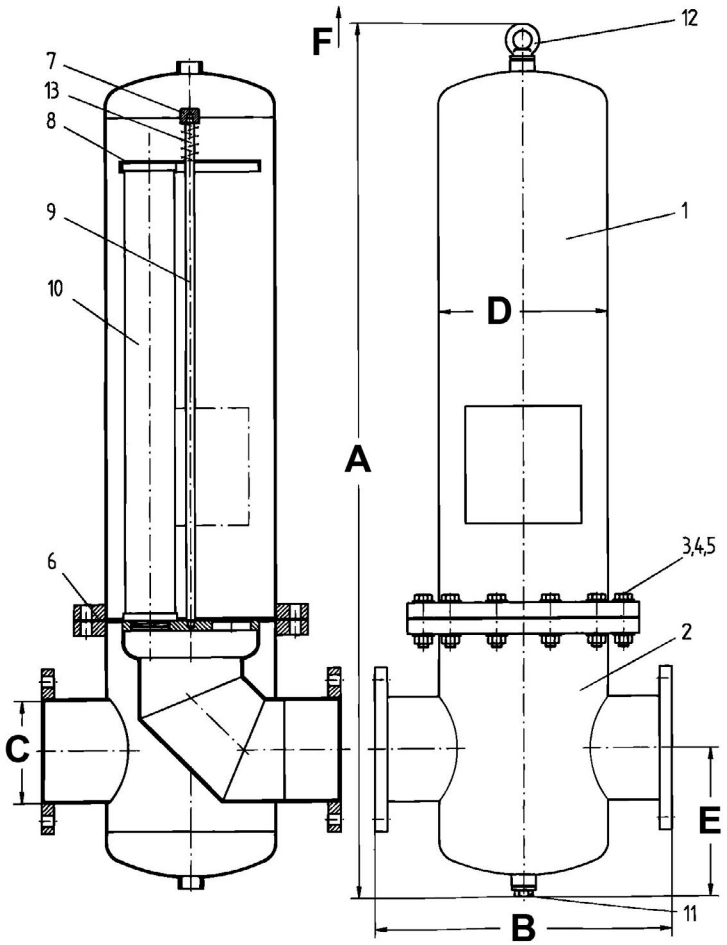
** ANSI B16.5 Class 150. Sizes 1/4" - 3" are not ASME code stamped

*** L designates low capacity and H designates high capacity

NOTE: Drain Connection = 1/4" NPT, Vent Connection = 1/4" BSPP

ASF Steam Filter Housings

Dimensions



Flange Connection ANSI Class 150

Position	Description
1	upper housing bowl
2	lower housing bowl
3	hexagon bolt
4	washer
5	nut
6	gasket
7	bracket bolt
8	bracket plate
9	tie rod
10	filter element
11	plug
12	lifting eye bolts
13	spring

Model Number	Connection Size (inch)	Volume (gal)	Weight* (lb)	Dimensions (inches)						Element Size
				A	B (± .125)	C**	D	E	F	
ASF-H4 4 FW L***	4	9.5	140	36.7	16.14	4	8.6	7.3	23	3 x 20/30
ASF-H4 4 FW H***	4	11.9	183	47.0	16.14	4	8.6	7.3	33	3 x 30/30
ASF-H4 6 FW L***	6	20.3	225	51.3	18.90	6	10.8	8.2	33	4 x 30/30
ASF-H4 6 FW H***	6	29.1	338	54.8	21.26	6	12.8	8.8	33	6 x 30/30
ASF-H4 8 FW L***	8	50.2	628	58.8	26.00	8	16.0	12.3	33	8 x 30/30
ASF-H4 8 FW H***	8	50.2	628	58.8	26.00	8	16.0	12.3	33	10 x 30/30

* Without filter element

** ANSI B16.5 Class 150. Sizes 4" - 8" are ASME code stamped

*** L designates low capacity and H designates high capacity

NOTE: Drain Connection = 1/2" NPT, Vent Connection = 1/2" BSPP

ASFS Sanitary Filter Housings

Stainless Steel Filter Housings For Sanitary Applications

The Armstrong ASFS housings are designed for filtering of steam in the pharmaceutical, biotechnology, chemical, electronic, food and beverage industries.

ASFS housings are equipped with sanitary Tri-Clamp and flange connections, and have an electropolished surface finish of Ra 32. The top vent is sealed with a pharma plug while the bottom condensate drain is equipped with a pharma valve. ASFS housings are designed to yield low differential pressures at high flow rates.

Available in 12 different sizes with a capacity range for steam from 100 to 17,100 lbs/hr at 50 psig. Optional connections are also available to adapt the filter to your specific requirements. Standard housings utilize Armstrong filter elements with 2-inch, double o-ring, plug-in connections.

Specifications

Materials	
Filter Housing	316L stainless steel
Clamp	304 stainless steel
Pharma Plug	316 stainless steel
Pharma Valve	316 stainless steel
Housing Gasket	EPDM 291 (up to 356°F) Fluoraz® (up to 392°F)

Design Pressure/Temperature	
Tri-Clamp Housing (ASF-HS 1/2 Tri - 3 Tri)	200 psig @ 392°F
ANSI Flange Housing (ASF-HS 4FW - 8FW)	150 psig @ 392°F

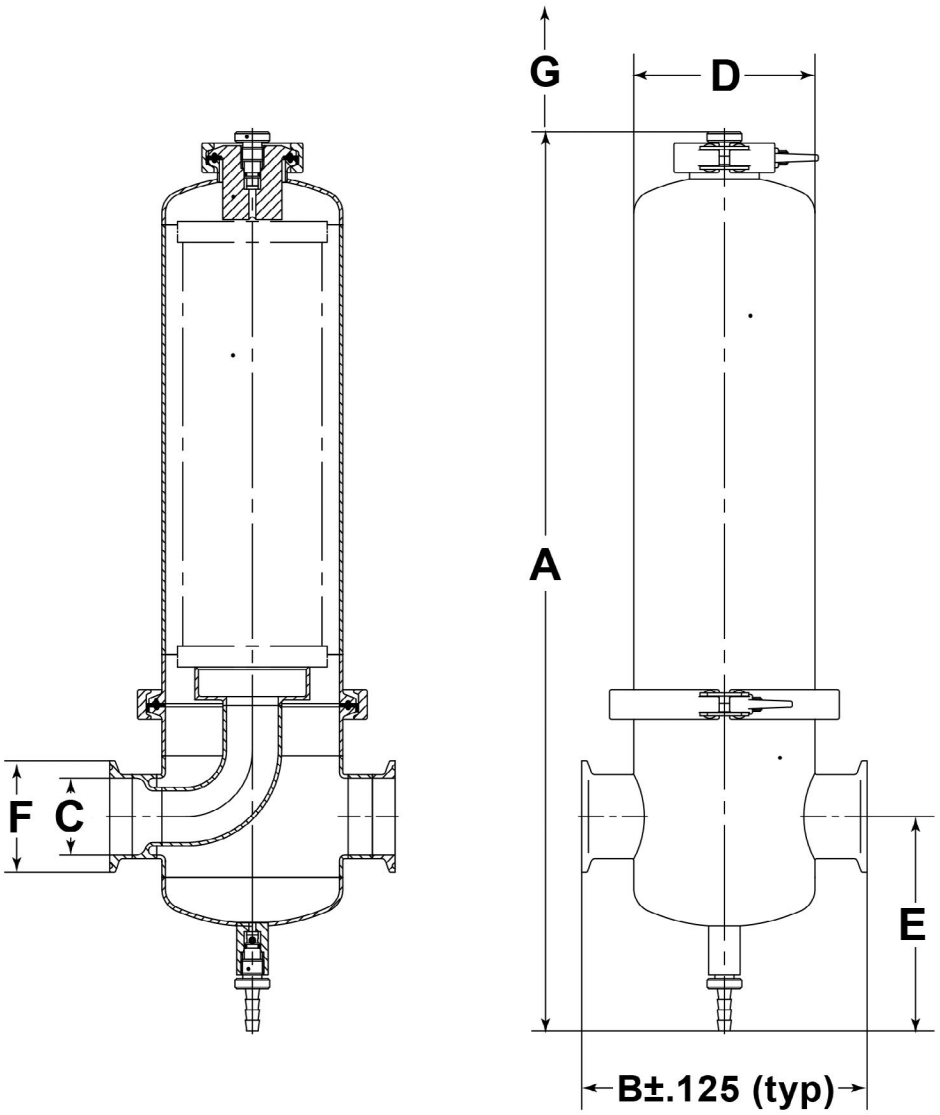
3-A Sanitary Certified	
ASF-H4 1/2 Tri - 3 Tri	3-A stamped

Surface Finish
Etched, passivated, and electropolished to Ra32

Connection Types
Tri-Clamp (standard for 1/2” - 3”)
ANSI flange (standard for 4” - 8”; optional up to 3”)
Other connections and bigger housings are available on request

ASFS Sanitary Filter Housings

Dimensions



Tri-Clamp Connection

Model Number	Connection Size (inch)	Volume (gal)	Weight* (lb)	Dimensions (inches)							Element Size
				A	B	ØC	ØD	E	ØF	G	
ASF-HS 1/2 Tri L**	1/2	0.16	3.3	10.50	4.72	0.50	2.76	3.76	0.98	5.9	03/10
ASF-HS 1/2 Tri H**	1/2	0.21	3.8	12.54	4.72	0.50	2.76	3.76	0.98	8.0	05/20
ASF-HS 1 Tri	1	0.50	5.0	14.90	6.40	1.00	4.10	4.84	2.00	9.0	05/30
ASF-HS 2 Tri	2	0.90	6.5	19.90	6.50	2.00	4.10	4.84	2.52	14.2	10/30
ASF-HS 2-1/2 Tri	2-1/2	1.43	10.0	31.00	8.14	2.50	4.10	5.43	2.96	24.0	20/30
ASF-HS 3 Tri	3	1.95	12.5	41.00	8.14	3.00	4.10	5.43	3.60	33.9	30/30

* Without filter element

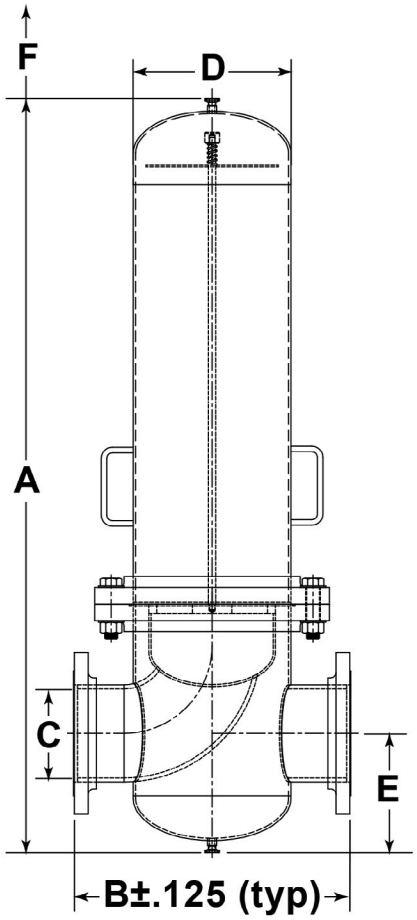
** L designates low capacity and H designates high capacity

Note: 1/2" ASFS housings have 1/8" Pharma Valve drain connection and 1/8" Pharma Plug Vent Connection

Note: 1"-3" ASFS housings have 1/4" Pharma Valve drain connection and 1/4" Pharma Plug Vent Connection

ASFS Sanitary Filter Housings

Dimensions



Flange Connection ANSI Class 150

Model Number	Connection Size (inch)	Volume (gal)	Weight* (lb)	Dimensions (inches)						Element Size
				A	B	ØC**	ØD	E	F	
ASF-HS 4 FW L***	4	9.5	95	38.0	16.14	4	8.6	7.3	23	3x20/30
ASF-HS 4 FW H***	4	11.9	97	48.8	16.14	4	8.6	7.3	33	3x30/30
ASF-HS 6 FW L***	6	20.3	154	51.5	18.90	6	10.8	8.12	33	4x30/30
ASF-HS 6 FW H***	6	29.1	176	55.7	21.26	6	12.8	9.3	33	6x30/30
ASF-HS 8 FW L***	8	50.2	298	59.5	25.98	8	16.0	12.8	33	8x30/30
ASF-HS 8 FW H***	8	50.2	298	59.7	25.98	8	16.0	12.8	33	10x30/30

* Without filter element

** ANSI B16.5 Class 150

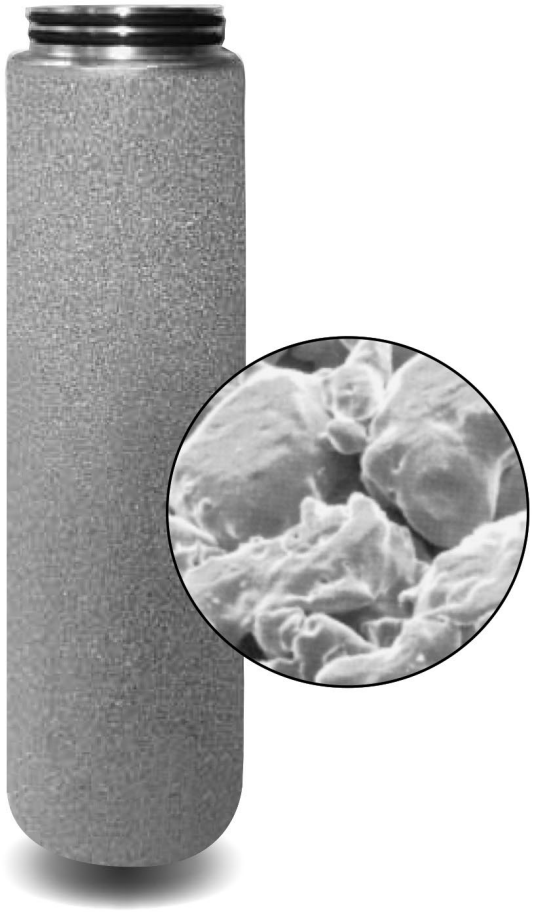
*** L designates low capacity and H designates high capacity

Note: Vent and Drain are 1/2" Tri-Clamp connection

Filter Elements - Sintered

Features & Benefits

- Thirteen sizes, three micron ratings, and connection options to meet virtually all purification requirements in steam filtration applications.
- High-quality continuous 316L sintered stainless steel filter media construction with 304 SS welded end caps ensures excellent material resistance to steam.
- Heavy-duty design withstands a maximum differential pressure up to 72 psi and an operating temperature range of -60°F to 392°F (with optional Fluoraz®* o-rings).
- The Sintered ASF 5 micron element exceeds 3-A guidelines for the production of Culinary Steam (95% @ 2 micron) under Accepted Practice T609-04.
- The 50+% porosity level ensures high dirt holding capacity at low differential pressure and high flow rate.
- Multiple regenerative methods are possible including back-flushing, ultrasonic cleaning, and solvent cleaning with hydrogen peroxide and other chemicals allowing for longer filter life and reduced operating costs.
- All components meet the FDA requirements for contact with food in accordance with the Code of Federal Regulations (CFR), Title 21. The filter element is manufactured according to DIN EN ISO 9001.



Applications

There are several terms used for steam. Process steam is used in process applications as a source of energy for process heating, pressure control and mechanical drives. Culinary steam can be direct injected during food processing. Culinary steam needs to meet 3-A Culinary Standards for the dairy industry. Process steam does not generally come in contact with the final product whereas culinary steam can, and often does, come in direct contact with the final product.

Steam Filtration

- Aseptic packaging
- Breweries
- Chemicals
- Dairies
- Electronics
- Food and beverage
- Pharmaceuticals
- Plastics

Filter Elements - Sintered

Product Specifications

Continuous Operating Temperature Range	-60°F to 356°F (EPDM 291 o-rings) -60°F to 392°F (Fluoraz® o-rings)
Configurations	Push-in 2" plug connection and flat end cap
Maximum Differential Pressure	72 psid, regardless of the system pressure or temperature
Element Pore Sizes	1, 5*, 25 micron
Typical Service Life	Total filter element life dependent on cleaning cycle frequency. Element replacement recommended after a maximum of 6 cleanings to prevent loss of integrity.

* 5 micron elements exceed the 3A standard for culinary steam (95% @ 2 micron)

Filtration Surface Area

Element Size	03/10	04/10	04/20	05/20	05/25	05/30	07/25	07/30	10/30	15/30	20/30	30/30	30/50
Surface Area (ft^2)	.065	.092	.103	.135	.173	.248	.254	.367	.540	.837	1.13	1.77	3.18

Materials

Filter Media	316L sintered stainless steel	CFR Title 211.65
End Caps	304 stainless steel	CFR Title 211.65
O-Rings Standard	EPDM 291	CFR Title 177.2600
O-Rings Optional	Fluoraz® (high temp) Silicone Buna N PTFE over silicone PTFE over Viton®*	CFR Title: 177.2600 CFR Title: 177.2600 CFR Title: 177.2600 CFR Title: 177.1550 CFR Title: 177.1550

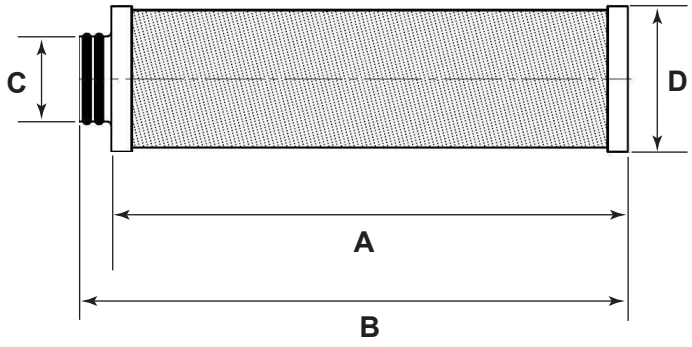
* Viton® is a registered trademark of DuPont Performance Elastomers L.L.C.

Filter Elements - Sintered

Push-in Plug Connection

Dimensions (inches)					
Element Size	A	B	C (I.D.)*	C (O.D.)*	D
03/10	3.0	3.4	0.8	1.2	1.65
04/10	4.1	4.6	0.8	1.2	1.65
04/20	4.1	4.6	1	1.5	2.05
05/20	5.0	5.6	1	1.5	2.05
05/25	5.0	5.6	1	1.5	2.44
07/25	7.1	7.6	1	1.5	2.44
05/30	5.0	5.7	1	1.5	3.39
07/30	7.1	7.7	2	2.4	3.39
10/30	10.0	10.6	2	2.4	3.39
15/30	15.0	15.6	2	2.4	3.39
20/30	20.0	20.6	2	2.4	3.39
30/30	30.0	30.6	2	2.4	3.39
30/50	30.0	30.6	3.2	3.5	5.50

* Plug-type connection with double o-ring



Quality Assurance

All components of the Sintered ASF element with welded end caps are FDA listed for food contact use in the Code of Federal Regulations (CFR), Title 21.

All products have been inspected and released by Quality Assurance as having met the following requirements:

- All filter elements are fabricated without the use of binders, adhesives, additives or surface-active agents.
- All filter components based on plastics are non-toxic and are certified bio-safe in accordance with current USP Class VI Tests for Plastic.
- All filter elements are staged, assembled, tested, and packaged according to DIN EN ISO 9001.

Sterile Air, Steam and Liquid Filtration

Higher Capacities And Longer Filter Life

Improved steam quality ensures increased efficiency of the entire process and longer service life of the filters to be sterilized. The Armstrong Pleated ASF is a regenerable, stainless steel filter element that captures contaminants such as particles, abrasion of valves and sealings, and rust. The Pleated ASF can be used in higher capacity applications where low pressure drop and reduced space are critical.

All components meet the USA requirements for Food Contact Use in accordance with the Code of Federal Regulations (CFR) Title 21, and the EU requirements for Food Contact Use according to EC/1935/2004. The filter element is manufactured in accordance with these manufacturing requirement, has no migration of filter media, and is non-fiber releasing.

Features & Benefits

- Filter down to 0.01µm in air/saturated steam
- Pleated, stainless steel media
- Low pressure drop
- Regenerable by back-flushing or ultrasonic cleaning
- Double O-ring
- Reduced operational risk with a 5µm element – users know that their steam meets the 3-A guidelines for culinary steam and approved for food contact use (according to CFR Title 21 and 1935/2004/EC)
- Higher dirt holding capacity at a low pressure drop
- Reduced operating costs allowing for energy savings
- Longer service life which leads to a lower cost of ownership

Common Industries

- Processed Food
- Beverage
- Dairy
- Chemical
- Pharmaceutical
- Fermentation

Material Compliance

All components of the Pleated ASF filter element are FDA listed for food contact use in the Code of Federal Regulations (CFR), Title 21. All products have been inspected and released by Quality Assurance as meeting the requirements. All filters are fabricated without the use of binders, adhesives, additives or surface-active agents.

Filter Matrix	304 Stainless Steel
Support	304 Stainless Steel
End Caps	304 Stainless Steel
O-rings	EDPM (alternate O-rings available upon request)

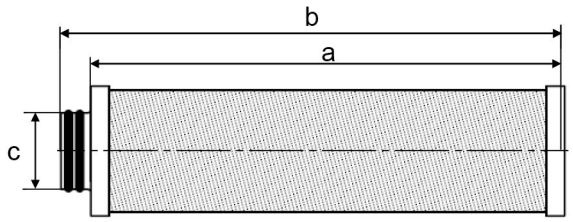
Filtration Surface	1.9 ft^2 per 10” element 10/30
Temperature Range	-68°F to 410°F >356°F special o-rings are required
Maximum Differential Pressure (Flow Direction = outside to inside)	145 psid, independent of the system pressure or temperature

Sterile Air, Steam and Liquid Filtration

Specifications & Dimensions

Fraction Efficiency, 1µm, Air/Saturated Steam Fraction						
Efficiency [%]						
Pore Size (µm)	0.01 µm	0.07 µm	0.1 µm	0.2 µm	0.3 µm	0.4 µm
1	99.99	99.65	98.69	99.08	99.49	99.74

Push-in End Connection				
Filter Size	Dimensions (in)			Correction Factors**
	a	b	c*	
03/10	2.99	3.42	1.18	0.17
04/10	4.09	4.53	1.18	0.26
04/20	4.09	4.64	1.46	0.26
05/20	5.04	5.67	1.46	0.35
07/20	4.25	7.64	1.46	0.52
03/30	2.99	3.62	2.40	0.21
05/30	5.04	5.67	2.40	0.44
07/30	7.08	7.71	2.40	0.67
10/30	10	10.63	2.40	1.00
15/30	15	15.63	2.40	1.57
20/30	20	20.63	2.40	2.13
30/30	30	30.63	2.40	3.27
30/50	10	10.63	3.31	1.45



* Plug-type connection with double o-ring
** Correction factors filtration surface area

Sizing and Selection Guidelines

Sizing & Selection Guidelines

Proper sizing and component selection of a steam filtration system is essential to ensuring that your application is operating as effectively and efficiently as possible. The following are some general guidelines, but additional sizing and selection tools are available to better optimize product selection to your specific needs.

Housings

Armstrong Steam Filter (ASF) NPT housings in 304 SS are suitable for process steam filtration applications. In applications or installations where chemical corrosion is a concern, 316L SS as the material of construction is advisable.

For culinary steam, food contact and other sanitary applications the ASF Sanitary Grade, ASFS 3-A certified housing is used.

Sintered Elements

The Armstrong Steam Filter (ASF) element is available in a number of different micron filtration ratings. For culinary steam applications, the 5 micron element exceeds the 3-A requirement of 2 micron at 95% efficiency. The micron rating selection for other applications will depend on the size of particles to be filtered and the purity requirements of the downstream process using the filtered steam.

Clean Steam

In many applications, steam comes into contact with the product itself. For example, direct injection of steam into large vats of processed foods is one method used to cook those foods. In other cases, steam is used to clean or sterilize surfaces, tools and containers used in processing and packaging various products such as pharmaceuticals. In all cases, steam is being generated and distributed in piping systems, and these often end in small orifices or nozzles that can be easily fouled by contaminants in the steam.

Filtration of steam is essential to avoid product contamination and equipment downtime. Particulate contaminants found in steam can include rust, scale, dirt and sediments carried over from the water source.

Sizing

Properly sizing a steam filter system will depend on a number of variables, which include:

- Flow rate (lbs/hr)
- Pressure and temperature
- Element micron rating
- Acceptable pressure drop across filtration system

Regeneration/Cleaning

Regeneration

Steam filter elements are commonly regenerated to reduce pressure drop, remove settled contaminants, and prevent permanent contamination buildup. The Armstrong Sintered ASF elements can be regenerated using a number of different techniques. In general, the more frequently an element is cleaned, the better the regeneration. It is recommended that all cleaners are in compliance with CFR, Title 21. The following is some general background in methods of steam filter element regeneration.

Counter-Flow

The filter media can be washed with either clean liquid or clean gas in a reverse or counterflow cycle. Pulsing the flow to loosen attached particles can enhance cleaning. This method is excellent where retained particles are on the surface of the media. Use of a soft nylon brush can also enhance this method of cleaning.

Solvent Cleaning Forward Flow

In some cases, oil and other contaminants in the steam cause particles to be retained on or within the filter media. Detergents and/or solvents might be required in these instances, not only to remove the oil or oil-like contaminants, but also to allow particles to be released. The chemical resistance of o-rings should be checked prior to solvent cleaning. After cleaning with solvents, it is essential to flush with cold water thoroughly and let all liquid evaporate.

Ultrasonic Cleaning

The most thorough regeneration can be achieved using ultrasonic cleaning. In this method, filter elements are immersed in a non-flammable solvent or water bath in which ultrasonic waves lead to a loosening and removal of particles embedded in the media. Regeneration is nearly total, leaving elements close to their original state.

Capacities for Steam

Steam Flow Capacities[1] (lbs/hr)

304 SS Housings		Filter Element		Steam Pressure (psig)							
		Size	QTY	15	35	50	75	100	115	125*	150
FNPT Housings (also available in ANSI Flange)	ASF-H4 1/4	03/10	1	46	77	100	139	177	200	215	253
	ASF-H4 3/8	04/10	1	69	116	150	209	266	300	323	380
	ASF-H4 1/2	04/20	1	81	135	175	243	310	350	376	443
	ASF-H4 3/4	05/20	1	104	173	225	313	398	450	484	569
	ASF-H4 1	05/25	1	138	231	300	417	531	600	645	759
	ASF-H4 1-1/4	07/25	1	198	331	430	598	761	860	925	1088
	ASF-H4 1-1/2	07/30	1	281	470	610	848	1080	1220	1312	1543
	ASF-H4 2 L**	10/30	1	368	616	800	1112	1416	1600	1720	2024
	ASF-H4 2 H**	15/30	1	495	828	1075	1494	1903	2150	2311	2720
	ASF-H4 2-1/2	20/30	1	759	1271	1650	2294	2921	3300	3548	4175
	ASF-H4 3 L**	30/30	1	943	1579	2050	2850	3629	4100	4408	5187
	ASF-H4 3 H**	30/50	1	1164	1948	2530	3517	4478	5060	5440	6401
ANSI Flanged Housings	ASF-H4 4 L**	20/30	3	2070	3465	4500	6255	7965	9000	9675	11385
	ASF-H4 4 H**	30/30	3	2691	4505	5850	8132	10355	11700	12578	14801
	ASF-H4 6 L**	30/30	4	4232	7084	9200	12788	16284	18400	19780	23276
	ASF-H4 6 H**	30/30	6	5520	9240	12000	16680	21240	24000	25800	30360
	ASF-H4 8 L**	30/30	8	6854	11473	14900	20711	26373	29800	32035	37697
	ASF-H4 8 H**	30/30	10	7866	13167	17100	23769	30267	34200	36765	43263

316L SS Sanitary Housings		Filter Element		Steam Pressure (psig)							
		Size	QTY	15	35	50	75	100	115	125*	150
Tri-Clamp Housings, 3-A Certified	ASF-HS 1/2 L**	03/10	1	46	77	100	139	177	200	215	253
	ASF-HS 1/2 H**	05/20	1	74	123	160	222	283	320	344	405
	ASF-HS 1	05/30	1	184	308	400	556	708	800	860	1012
	ASF-HS 2	10/30	1	368	616	800	1112	1416	1600	1720	2024
	ASF-HS 2-1/2	20/30	1	828	1386	1800	2502	3186	3600	3870	4554
	ASF-HS 3	30/30	1	1150	1925	2500	3475	4425	5000	5375	6325
ANSI Flanged Housings[2]	ASF-HS 4 L**	20/30	3	2070	3465	4500	6255	7965	9000	9675	11385
	ASF-HS 4 H**	30/30	3	2691	4505	5850	8132	10355	11700	12578	14801
	ASF-HS 6 L**	30/30	4	4232	7084	9200	12788	16284	18400	19780	23276
	ASF-HS 6 H**	30/30	6	5520	9240	12000	16680	21240	24000	25800	30360
	ASF-HS 8 L**	30/30	8	6854	11473	14900	20711	26373	29800	32035	37697
	ASF-HS 8 H**	30/30	10	7866	13167	17100	23769	30267	34200	36765	43263

1. Published capacity based on 5 micron sintered filter element and 2 psig pressure drop. Capacities are general recommendations and may vary based on element selections, operating conditions and allowable pressure losses. Consult factory for different filtration capacities.
2. All 4" - 8" ANSI flange housing are designed and built to ASME code and are stamped accordingly. The ANSI flange housings are not 3-A Certified.
3. Consult factory for capacities of pleated filter elements.

* For steam pressures greater than 125 psig, it is recommended to use Fluoraz® gaskets and o-rings

** L designates low capacity and H designates high capacity

Free Floating Lever Drain Traps

Please read and save these instructions

Armstrong®

Free Floating Lever Drain Traps

For Loads to 50 000 lb/hr (22 679 kg/hr)...Pressures to 1 000 psig (69 barg)

Table LD-14. Maximum Operating Pressures for Handling Different Specific Gravity Liquids With Orifices Available in Guided Free Floating Lever Drain Traps. (See pages LD-29 and LD-30.)

Model No.	Sp. Grav	1.00		.95		.90		.85		.80		.75		.70		.65		.60		.55		.50	
	Orifice	Maximum Operating Pressure psig (barg)																					
	in	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg
1-LD	1/8	121	8.3	109	7.6	98	6.8	87	6.0	75	5.2	64	4.4	52	3.6	41	2.8	29	2.0	18	1.2	6	0.4
	7/64	143	9.9	130	9.0	116	8.0	103	7.1	89	6.1	75	5.2	62	4.3	48	3.3	35	2.4	21	1.4	7	0.5
	#38	182	12.5	164	11	147	10.2	130	9.0	113	7.8	95	6.6	78	5.4	61	4.2	44	3.0	26	1.8	9	0.6
	5/64	300	20.7	289	19.9	259	17.8	228	15.7	198	13.7	168	11.6	137	9.5	107	7.4	77	5.3	47	3.2	16	1.1
11-LD	1/8	176	12.1	161	11.1	146	10.1	130	9.0	115	7.9	100	6.9	85	5.8	69	4.8	54	3.7	39	2.7	24	1.6
	7/64	209	14	191	13	173	12	155	10.7	137	9.4	119	8.2	100	6.9	82	5.7	64	4.4	46	3.2	28	1.9
	#38	264	18	242	17	219	15	196	14	173	12	150	10.4	127	8.8	104	7.2	81	5.6	59	4.0	36	2.5
	5/64	400	28	400	28	384	27	344	24	304	21	264	18	224	15	183	13	143	9.9	103	7.1	63	4.3
2-LD to 250 psig (17 barg)	5/16	22	1.5	20	1.4	18	1.3	17	1.1	15	1.0	13	0.9	11	0.8	10	0.7	8	0.5	6	0.4	4	0.3
	1/4	36	2.5	33	2.3	30	2.1	27	1.9	24	1.7	22	1.5	19	1.3	16	1.1	13	0.9	10	0.7	7	0.5
	3/16	79	5.5	73	5.0	67	4.6	60	4.2	54	3.7	47	3.3	41	2.8	35	2.4	28	2.0	22	1.5	16	1.1
	5/32	137	9.4	126	8.7	115	7.9	104	7.2	93	6.4	82	5.6	71	4.9	60	4.1	49	3.4	38	2.6	27	1.8
22-LD to 533 psig (37 barg)	1/8	234	16.1	215	14.8	196	13.5	178	12.2	159	10.9	140	9.6	121	8.4	102	7.1	83	5.8	65	4.5	46	3.2
	7/64	299	20.6	275	19	251	17.3	227	15.7	203	14	179	12	155	10.7	131	9.0	107	7.4	83	5.7	59	4.0
	#38	372	25.7	342	23.6	313	21.6	283	19.5	253	17.4	223	15	193	13	163	11.2	133	9.2	103	7.1	73	5.0
	5/64	533	37	475	33	461	32	417	29	372	26	328	23	284	20	240	17	196	14	152	10.5	108	7.4
32-LD	5/16	29	2.0	26	1.8	23	1.6	21	1.4	18	1.2	15	1.0	12	0.9	10	0.7	7	0.5	4	0.3	2	0.1
	1/4	47	3.3	43	3.0	38	2.6	34	2.3	29	2.0	25	1.7	20	1.4	16	1.1	12	0.8	7	0.5	3	0.2
	3/16	104	7.2	94	6.5	85	5.8	75	5.2	65	4.5	55	3.8	45	3.1	35	2.4	25	1.8	16	1.1	6	0.4
	5/32	180	12	163	11	146	10	129	8.9	112	7.7	95	6.5	78	5.4	61	4.2	44	3.0	27	1.9	10	0.7
	1/8	307	21	278	19	249	17	220	15	191	13	162	11	133	9	104	7.2	75	5.2	46	3.2	17	1.2
	7/64	393	27	356	25	319	22	282	19	245	17	207	14	170	12	133	9	96	6.6	59	4.1	22	1.5
	#38	489	34	443	31	397	27	351	24	304	21	258	18	212	15	166	11	120	8	73	5.1	27	1.9
	5/64	600	41	600	41	585	40	517	36	449	31	381	26	313	22	244	17	176	12	108	7	40	2.8
3-LD to 250 psig (17 barg) (Cast Iron)	1/2	16	1.1	14	1.0	13	0.9	12	0.8	10	0.7	9	0.6	7	0.5	6	0.4	5	0.3	3	0.2	2	0.1
	3/8	33	2.3	31	2.1	28	1.9	25	1.7	22	1.5	19	1.3	16	1.1	13	0.9	10	0.7	7	0.5	4	0.3
	5/16	54	3.7	49	3.4	44	3.0	39	2.7	35	2.4	30	2.1	25	1.7	20	1.4	16	1.1	11	0.8	6	0.4
	9/32	71	4.9	65	4.5	59	4.0	52	3.6	46	3.2	40	2.7	34	2.3	27	1.9	21	1.4	15	1.0	8	0.6
13-LD to 570 psig (39 barg) (Stainless)	1/4	107	7.4	97	6.7	88	6.1	79	5.4	69	4.8	60	4.1	50	3.5	41	2.8	32	2.2	22	1.5	13	0.9
	7/32	153	10.5	139	9.6	126	8.7	112	7.7	99	6.8	85	5.9	72	5.0	59	4.0	45	3.1	32	2.2	18	1.2
	3/16	230	16	209	14	189	13	169	12	149	10.3	129	8.9	108	7.5	88	6.1	68	4.7	48	3.3	27	1.9
33-LD to 900 psig (62 barg) (Steel)	5/32	359	25	327	23	296	20	264	18	233	16	201	14	169	12	138	9.5	106	7.3	74	5.1	43	2.9
	1/8	726	50	662	46	598	41	534	37	470	32	406	28	342	24	278	19	214	15	150	10.3	86	5.9
	7/64	900	62	847	58	765	53	683	47	601	41	519	36	437	30	356	25	274	19	192	13	110	7.6
6-LD Cast Iron	1-1/16	21	1.4	19	1.3	18	1.2	16	1.1	15	1.0	13	0.9	12	0.8	10	0.7	9	0.6	7	0.5	6	0.4
	7/8	32	2.2	30	2.1	28	1.9	26	1.8	23	1.6	21	1.4	19	1.3	16	1.1	14	1.0	12	0.8	9	0.6
	3/4	47	3.2	44	3.0	40	2.8	37	2.5	34	2.3	30	2.1	27	1.9	24	1.6	20	1.4	17	1.2	14	0.9
	5/8	72	4.9	67	4.6	61	4.2	56	3.9	51	3.5	46	3.2	41	2.8	36	2.5	31	2.1	26	1.8	21	1.4
	9/16	95	6.5	88	6.1	81	5.6	75	5.2	68	4.7	61	4.2	55	3.8	48	3.3	41	2.8	34	2.4	28	1.9
	1/2	138	9.5	128	8.8	118	8.1	108	7.5	99	6.8	89	6.1	79	5.4	69	4.8	59	4.1	50	3.4	40	2.8
	7/16	196	13	182	13	168	12	154	11	140	10	126	8.7	112	7.7	98	6.8	85	5.8	71	4.9	57	3.9
	3/8	250	17	250	17	250	17	243	17	221	15	199	14	177	12	155	11	133	9.0	111	7.7	90	6.2
	11/32	250	17	250	17	250	17	250	17	250	17	250	17	236	16	207	14	178	12	148	10	119	8.2
	5/16	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	228	16	191	13	153	11
	9/32	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	201	14
	1/4	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17
	7/32	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17
	3/16	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17	250	17
36-LD Forged Steel	1-1/16	16	1.1	15	1.01	13	0.91	12	0.81	10	0.71	9	0.6	7	0.5	6	0.4	4	0.3	3	0.2	1	0.1
	7/8	25	1.7	23	1.6	21	1.4	18	1.3	16	1.1	14	0.95	11	0.79	9	0.63	7	0.47	5	0.31	2	0.16
	3/4	36	2.5	33	2.3	30	2.1	27	1.8	23	1.6	20	1.4	17	1.1	13	0.91	10	0.68	7	0.45	3	0.22
	5/8	56	3.9	51	3.5	46	3.1	41	2.8	35	2.4	30	2.1	25	1.7	20	1.4	15	1.05	10	0.69	5	0.34
	9/16	74	5.1	67	4.6	60	4.2	54	3.7	47	3.2	40	2.8	34	2.3	27	1.8	20	1.4	13	0.92	7	0.46
	1/2	107	7.4	97	6.7	88	6.0	78	5.4	68	4.7	58	4.0	49	3.4	39	2.7	29	2.0	19	1.3	10	0.66
	7/16	152	10.5	138	9.6	125	8.6	111	7.6	97	6.7	83	5.7	69	4.8	55	3.8	41	2.9	27	1.9	14	0.94
	3/8	240	17	218	15	197	14	175	12	153	10.5	131	9.0	109	7.5	87	6.0	65	4.5	43	3.0	21	1.5
	11/32	320	22	291	20	262	18	233	16	203	14	174	12	145	10	116	8.0	87	6.0	58	4.0	29	2.0
	5/16	411	28	374	26	336	23	299	21	262	18	224	15	187	13	149	10.3	112	7.7	74	5.1	37	2.5
	9/32	539	37	490	34	441	30	392	27	343	24	293	20	244	17	195	13	146	10.1	97	6.7	48	3.3
	1/4	788	54	716	49	644	44	573	39	501	35	429	30	357	25	286	20	214	15	142	9.8	70	4.9
	7/32	1 000	69	1 000	69	910	63	808	56	707	49	606	42	505	35	403	28	302	21	201	14	99	6.9
	3/16	1 000	69	1 000	69	1 000	69	1 000	69	1 000	69	992	68	826	57	660	46	494	34	328	23	163	11.2
Specific Gravity		1.00		.95		.90		.85		.80		.75		.70		.65		.60		.55		.50	

NOTE: If specific gravity falls between those shown in the chart, use the next lower gravity. For example, if specific gravity is 0.73, use 0.70 gravity data.

High Temperature Service

Maximum allowable working pressures of floats decrease at temperatures above 100°F (37.8°C). Allow for approximately:

- 10% decrease at 200°F (93.3°C)
- 15% decrease at 300°F (148.9°C)
- 20% decrease at 400°F (204.4°C)

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.

Free Floating Lever Drain Traps

For Loads to 49 000 lb/hr (22 226 kg/hr)...Pressures to 300 psig (21 barg)

Armstrong's cast iron, free floating lever drain traps 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 drain trap size and weight.

The hemispherical valve, seat and leverage of the 1-LD, 2-LD, 3-LD and 6-LD cast iron traps are identical in design, materials and workmanship to those for saturated steam service up to 300 psig (21 barg) with the exception of the addition of a guidepost to assure a positive, leaktight valve closing under all conditions.

For a fully detailed certified drawing, refer to:
1-LD CD #1070
2-LD, 3-LD, 6-LD CD #1034

List of Materials

Table LD-15.

Model No.	Valve & Seat	Leverage System	Float	Body & Cap	Gasket
1-LD 2-LD 3-LD 6-LD	Stainless Steel			Cast Iron ASTM A48 Class 30	Compressed Asbestos-free

For information on special materials, consult the Armstrong Application Engineering Department.

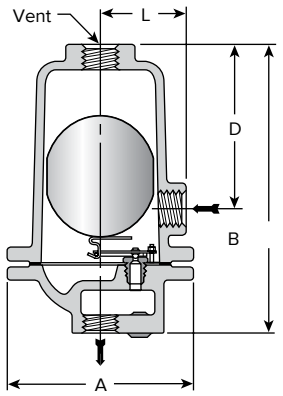


Figure LD-33.
No. 2-LD, 3-LD and 6-LD cast iron guided lever drain traps. No. 1-LD has standard top inlet and optional side connection.

Physical Data

Table LD-16. Armstrong Guided Lever Liquid Drain Traps

Model No.	Cast Iron							
	1-LD		2-LD		3-LD		6-LD	
Pipe Connections	in	mm	in	mm	in	mm	in	mm
	1/2*	15*	1/2, 3/4	15, 20	1/2, 3/4, 1	15, 20, 25	1-1/2, 2	40, 50
"A"	3-3/4	95	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"	2-7/8	73	5-1/8	130	7	188	9-3/8	238
"K" (℄ Outlet to ℄ Inlet)	13/16	21	—	—	—	—	—	—
"L"	1-7/8	48	2-7/16	62	2-7/8	73	4-5/8	117
Approx. Wt. lb (kg)	4 (2)		12 (5.5)		21 (9.5)		78 (35.5)	
Max. Allow. Pressure (Vessel Design)	300 psig @ 200°F† (21 barg @ 93°C)		250 psig @ 450°F (17 barg @ 232°C)					

NOTE: Vessel design pressure may exceed float collapse pressure in some cases.
Pipe size of vent connection is same as that of inlet and outlet connections.
†For pressures not exceeding 250 psig (17 barg), a maximum temperature of 450°F (232°C) is allowed.
*1/4" (6 mm) outlet.

Free Floating Lever Drain Traps Installation and Troubleshooting

Models 11LD, 22LD and 13LD

Free Floating Lever Liquid Drainer Traps - All Stainless Steel Construction

This bulletin should be used by experienced personnel as a guide to the installation of Armstrong Liquid Drain Traps. Selection or installation of equipment should always be accompanied by competent technical assistance. You are encouraged to contact Armstrong International, Inc. or your local sales representative for additional information.

Install liquid drainers at the low points on air or gas service systems, or any gas storage or distribution system. See Figures 1, 2, 3 and 4 for typical installations.

INSTALLATION PROCEDURES:

1. Do not exceed the maximum allowable pressure noted on the label on the side of the liquid drainer body. Also, check to see if the liquid drainer has the proper maximum differential pressure for your particular application.
2. Be certain the drainer is installed properly. Note the direction of flow arrow on the label and the red label indicating UP for liquid drainer service.
3. Before installing the drainer, flush out the line to remove loose dirt. Use pipe dope or teflon tape sparingly and on male threads only. Leave the end thread exposed to avoid introducing sealant into the system.
4. When tightening a pipe into either the inlet or outlet fittings of an 11LD, 22LD or 13LD use only the hex-shaped fittings as wrenching surfaces. Do not use drainer body for a wrenching surface.
5. The inlet and outlet piping should be the same size as the liquid drainer's connections. Do not reduce the size of the inlet on light loads; however, smaller pipe or tubing may be used on the outlet. Keep the piping as short as possible, with a minimum of valves and fittings. If you are installing a liquid drainer without an equalizing connection, try not to use elbows in the inlet line from the equipment to the liquid drainer.
6. Install gate valves or full ported ball valves (Do Not Use Globe Valves) so the drainer can be isolated from the system to permit servicing. If the drainer is installed in a closed piping arrangement, install a union on each side of the drain trap.
7. Use of a pipeline strainer in the line leading to the drainer is recommended for dirty systems.
8. Liquid drainers should be installed so that they can be checked periodically.

Caution: Do not install liquid drainers with an open discharge where a malfunction could cause damage.

TROUBLESHOOTING:

A. Liquid drainer does not discharge.

1. Insufficient liquid coming to drainer to permit discharge. Continue operation.
2. Drainer filled with dirt or sludge. Remove drainer and clean thoroughly. Install strainer on inlet side of drainer.
3. Differential pressure across drainer too high. Check inlet and outlet pressure. If the difference exceeds the maximum pressure stamped on the drainer, the drainer will remain closed. Reduce differential pressure if possible, or install properly sized drainer.
4. Worn valve seat. As the seat becomes worn, the seating area enlarges, lowering the drainer's maximum operating pressure. Replace with new drainer.
5. Inlet or outlet line valves closed. Open valves.
6. Strainer clogged. Clean strainer screen.
7. Collapsed float. Replace with new drainer.

For assistance with an unusual installation or service problems, contact your Armstrong Representative or Armstrong's Application Engineering Department.

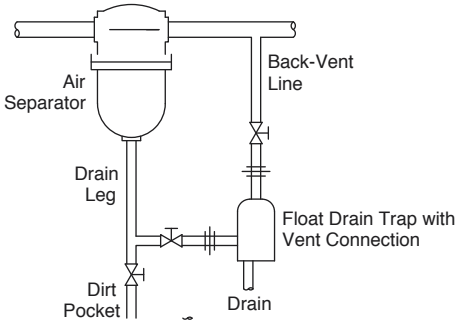


Figure 1. Installation of a liquid drainer with equalizing line downstream of the separator in order to assure a quick and regular flow to the drainer. Note side inlet connection from separator.

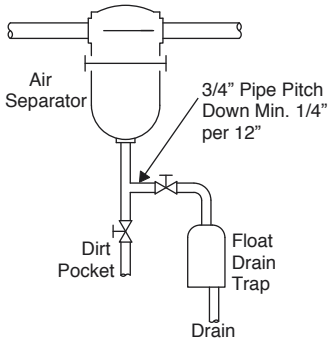


Figure 2. Installation of a liquid drain trap on side of separator.

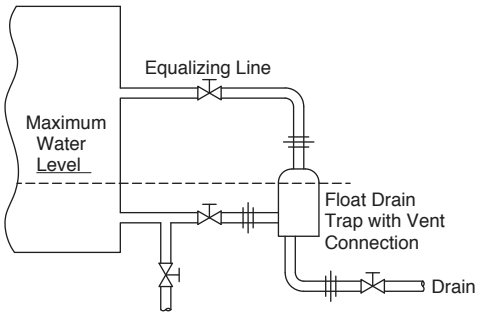


Figure 3. Liquid drainer trap installed at side of a receiver, close to floor. Water will rise to broken line before drain trap opens.

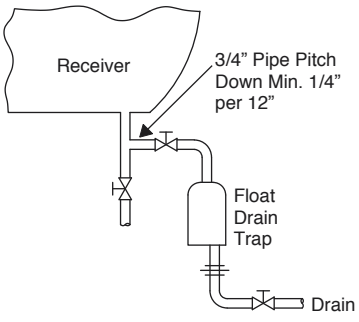


Figure 4. Install the drain trap on side to get better access or compensate for lack of space under the receiver (particularly for drain trap used under compressors).

Notes

Limited Warranty and Remedy

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