

About MIYAWAKI

Over 85 years Experience, Technology and Quality



The company MIYAWAKI has over 85 years history as one of the leading Japanese manufacturers of equipment for steam and condensate lines.

MIYAWAKI has a long experience as the leading supplier of steam traps for oil refineries and chemical plants in Japan. Besides of steam traps the company offers a wide range of pressure reducing valves for steam and other media, steam-water-mixing valves, separators, strainer, sight glasses and other ancillary equipment.

MIYAWAKI offers sophisticated hardware and software solutions for managing the steam trap population in a plant.

As the world leader of the production of bimetallic temperature control steam traps, the most effective steam traps for steam tracing and steam main lines in the sense of energy conservation, MIYAWAKI contributes substantially to the reduction of CO₂ emissions and to the development of a healthy environment.

Our mission



Kensuke Miyawaki,
President, member
of the executive board
of MIYAWAKI Inc.

"MIYAWAKI's mission is to promote the ideas of energy saving and environmental protection, to fulfil the deliveries of its products with a high rate of reliability and to provide a high level of technical support for our products.

Reducing the consumption of energy in the form of steam is an extremely important goal of each modern industrial enterprise. Steam Traps are able to play an important role in this process, because by improving the management of the steam and condensate system and by regular professional steam trap surveys, up to 40% of the steam losses can be reduced which are not caused by the manufacturing process.

We have every confidence that the high quality of MIYAWAKI products will enable our customers to save energy and to meet their production goals."

Our history

MIYAWAKI opened its doors in 1933 and began designing steam traps for industrial use. In 1949, after extensive experiments and tests, MIYAWAKI developed an entirely new type of steam trap, with a "Duplex"-type valve, a double-ported valve operating by the pressure differential to increase the condensate capacity.

In the following years, the design was further refined and sales soared to the point where by 1953 the company MIYAWAKI Steam Trap Manufacturing Co., Ltd. was able to incorporate. Along with the development and sales of products other than steam traps, the name changed to MIYAWAKI Inc. in April 1986.

To emphasize the growing international activities of MIYAWAKI Inc., in June 1991 the subsidiary company MIYAWAKI GmbH was established in Germany. Later a joint venture in Russia had been opened. In April 2018, the subsidiary company MIYAWAKI WEST Co., Ltd was established in China. During the last decade the network of sales representatives around the world was enlarged considerably.



Quality, Performance and Challenges to energy saving

Since 1933, MIYAWAKI has committed itself to a policy of **uncompromising quality, performance and challenges to energy conservation.**

Research and development has a high priority at MIYAWAKI. To meet industry's demands and to ensure quality, MIYAWAKI invests heavily in the best personnel, facilities, manufacturing techniques and quality control systems available today.

This policy of „**Technology First**“ has resulted in major advances in steam trap design and operation.

As a result of the certification MIYAWAKI can assure all our customers of its continuing policy of high quality standards and of the fact that all products are manufactured in accordance with international regulations and technical requirements.

ISO 9001

ISO 14001

European Directive 2014/68/EU



AD 2000-W0

Certificate of Conformity Russia



Pressure Equipment Directive 2014/68/EU of the European Parliament and of the Council



In the course of the harmonization of the laws of the EU Member States concerning pressure equipment, the Pressure Equipment Directive 97/23/EC (PED) had been adopted in May 1997. The Directive came into effect on 30 May 2002. Considering the experience and changes during the implementation of the Directive 97/23/EC, the European Union published on June 27, 2014 the new Pressure Equipment Directive 2014/68/EU. The new Directive entered into force on July 19, 2016.

According to the PED all manufacturers of pressure equipment covered by the PED, are under the obligation to subject each item of equipment to one of the conformity assessment procedures described in the PED. The conformity assessment procedures to be applied to an item of pressure equipment with a view to

affixing the CE marking shall be determined by the category, in which the equipment is classified. In this connection it is necessary to take into consideration the statement of the PED, that pressure equipment which is subject to Article 4, Section 3 of the PED "...shall be designed and manufactured in accordance with the sound engineering practice of a Member State in order to ensure safe use. ... Such equipment ... shall not bear the CE marking referred to in Article 18" of the PED.

In cooperation with TÜV Rheinland Industrie Service GmbH MIYAWAKI Inc., Osaka, Japan examined all products with respect to the PED and certified its production process in accordance with Modul A2 of the PED (internal manufacturing checks with monitoring of the final assessment).

As a result of this certification process MIYAWAKI Inc. draws the following conclusions:

- The following MIYAWAKI products are classified according to Article 4, Section 3 of the PED which does not allow to bear the CE marking:

Steam Traps:

TB1N, TBC2, TBC2B, TB7N, TB9N, TB51, TB52, TBH71, TBH72, TBH81, TBH82, W, DC1, DC2, DV1, DL1, DX1, DF1, S31N, SC31, SC, SF, SV, SL, SU2N, SU2H, SD1, S55N, S55H, S61N, S62N, ER105, ER110, ER116, ES5, ESU5, ES8N, ES10, ES12N, ESH8N, G11N, G12N, G3N-10R (to DN65), G3N-16R (to DN50), G2, GC1, GC20, G20N

Steam Pressure Reducing Valves: RE1, RE2, RE3, REC1, RE10N

Steam-Water-Mixing Valve: MX1N

All above MIYAWAKI products are designed and manufactured in accordance with the sound engineering practice as requested by the PED.

- Steam traps not included into point 1 belong to category I or category II according to Annex II & III of the PED. They will bear the CE marking and the conformity with the PED will be confirmed by issuing a declaration of conformity.



As a result of the certification by TÜV Rheinland Industrie Service GmbH MIYAWAKI can assure all our customers of its continuing policy of high quality standards and of the fact, that all products are manufactured in accordance with the regulations and technical requirements of the EU.

		First Choice	Second Choice
Steam Mains	< 1,6 MPa	TB9N	GC1, D, S, ES
	< 2,1 MPa	TB7N	GC1, S
	< 6,4 MPa	TB51, TB52	S61N, S62N, ESH
	< 20,0 MPa	TBH71, 72, 81, 82	
Process Equipment	Heater	G, ES, ER	S
	Heat Exchanger	G	ES, ER
	Vaporizer	G	ES, S
	Distiller	D	ES, S
	Sterilizer	D	ES, G, S
	Cylinder Dryer	ES, ER	
	Band Dryer	G	ES, ER, D
	Multi-Platen Presses	G	ES, D, S
	Vulcanizer	D	S, ES
	Tyre Presses	D	S, ES
	Autoclaves	D	G, ES
Laundry Equipment	Dryer	G	ES, D, S
	Tumbler	ES, ER	D, S
	Presses	D	S, ES
	Steam Mannequins	D	ES, S
	Steam Iron	SL3	SD1
	Steam Mangles	D, G	ES, S
Food Processing Equipment	Process Boiling Pans	G	ES, D
	Hot Tables	D, G	ES
	Jacketed Boiling Pans	D	G, ES, S
	Tilting Pans	ES	D
	Brewing Pans	G	ES, D
	Evaporator	G	ES, ER
	Retorts	G	ES, ER
Heating & Air Conditioning	Steam Radiator	W	D
	Unit Heaters	G	ES
	Convectors	W	D, ES
	Radiant Panels	W	D, ES
	Air Heater	D	ES, G
	Air Humidifiers	ES, G	D, S
	Heating Coils	D, ES	G, S
	Air Conditioning Units	ES, G	D
	Calorifiers	G, ES	D
Tracing	Steam Tracer Lines	TB	D
	Tank Heating	TB	D, ES, S
	Copper Tracing (Instrument Tracing)	TB1N	DC1

Thermodynamic Disc Traps

SERIES S

Thermodynamic steam traps operate on the basis of the Bernoulli principle, depending on the relationship between the velocity and the pressure exerted by the condensate and steam inside the steam trap.

They have only one moving part – the disc.

Due to their compact design and cost effectiveness thermodynamic steam traps are widely used in applications where the condensate must be removed immediately from steam lines and steam equipment. They discharge the condensate near the saturation temperature. The traps may operate up to a back pressure of 80% of the inlet pressure, but for smooth operation it is recommended that the back pressure does not exceed 50% of the inlet pressure. Thermodynamic steam traps discharge the condensate intermittently.

All steam traps are equipped with a hardened stainless steel disc and seat. After the lapping process all disc surfaces are controlled individually before releasing them for use in steam traps. These features and very high and severe quality standards for the whole production process give MIYAWAKI's thermodynamic steam traps a long and reliable service life.

Models S31N

Ductile Cast Iron Steam Traps with replaceable internals

SC31

Stainless steel steam traps with replaceable internals

SC, SF

Cast Iron Steam Traps for high capacity

SV

Steam Traps with inbuilt bypass

SL3

Compact, very small trap for low capacity applications

SU2N, SU2H, SD1

Stainless steel steam traps for low to high pressure applications

S55N, S55H, S61N, S62N

Forged steel steam traps for high pressure applications

Features

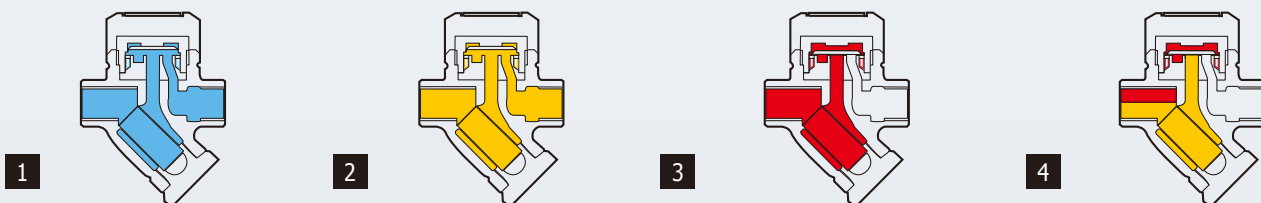
- Immediate discharge of condensate
- Insensitive to waterhammer, superheated steam and freezing
- Most types contain a bimetal ring which improves the ability of the trap to discharge air and cold condensate quickly at start-up and prevents air locking during times of operation
- Can be installed in vertical or horizontal position
- In case of danger of air locking special discs available
- All traps equipped with additional cover for reduced frequency of cycling and energy savings
- All traps with inbuilt strainers (except SL3)
- Easy maintenance

Suitable for

light to medium condensate loads: steam tracing, steam main drips, small heat exchangers, unit heaters, sterilizers and many other applications in the petrochemical, chemical, textile, food, pharma-ceutical and further industries. Series SV Thermodynamic steam traps with inbuilt bypass are designed for special applications in the food, pharmaceutical or other industries or for laundry applications where costs and space must be saved.

Operating principle

■ cold condensate ■ hot condensate ■ steam



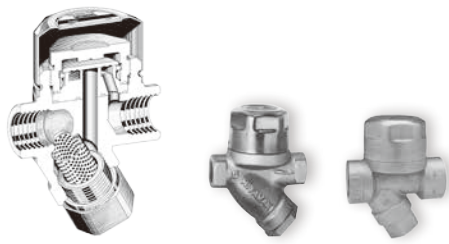
1 At the time of start-up the pressure of the incoming cold condensate and air raise the disc and water and air are discharged quickly.

2 When hot condensate flows into the trap, the trap is still open and the hot condensate can be discharged quickly.

3 After hot condensate flows into the trap, steam enters it. As the velocity of the fluid increases, the pressure under the seat exerted by the steam decreases. At the same time the pressure in the pressure chamber above the disc increases. The disc is pressed down and closes.

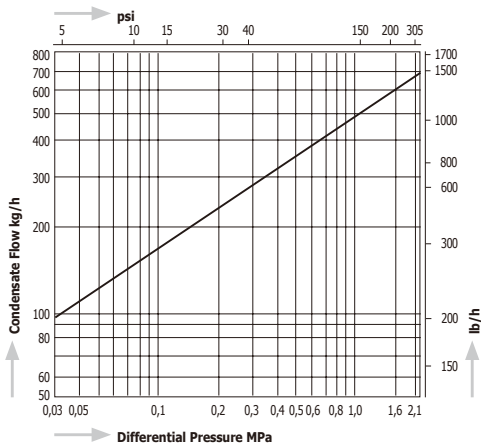
4 While hot condensate flows into the trap, the trap remains closed for a certain period, as far as the steam inside the pressure chamber does not condense. The more condensate flows into the trap, the more the temperature cools down. The steam inside the pressure chamber also cools down and condenses. As a result, the pressure of the incoming condensate raises the disc and condensate is discharged. Cycles 2, 3 and 4 repeat.

S31N, SC31

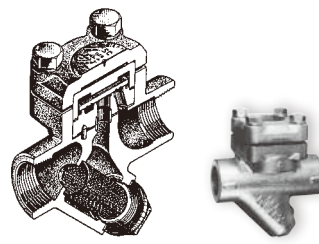


Capacity Chart

SC31 & SC31F/S31N & S31NF 1/2" – 1"

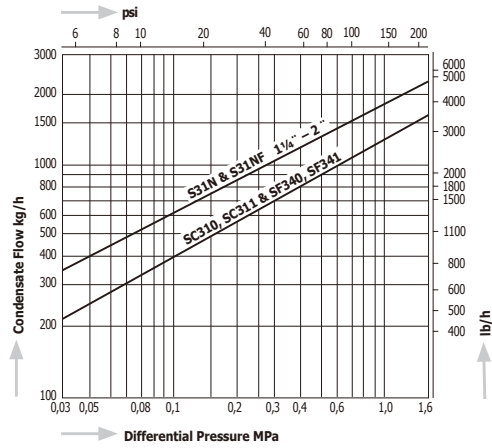


SC, SF



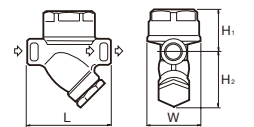
Capacity Chart

S31N & S31NF 1 1/4" – 2"; SC310, SC311 & SF340, SF341

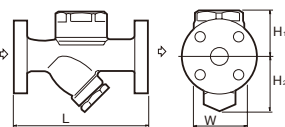


Dimensions

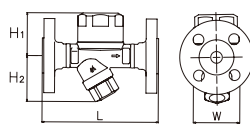
S31N/SC31 1/2" – 1"



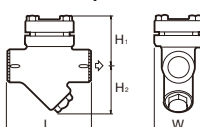
S31NF 1/2" – 1"



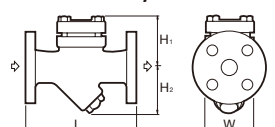
SC31F 1/2" – 1"



S31N 1 1/4" – 2"
SC310, SC311



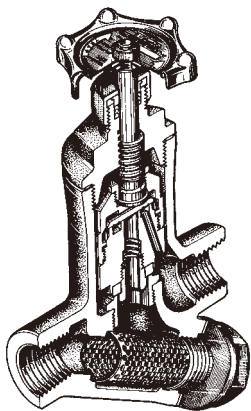
S31NF 1 1/4" – 2"
SF340, SF341



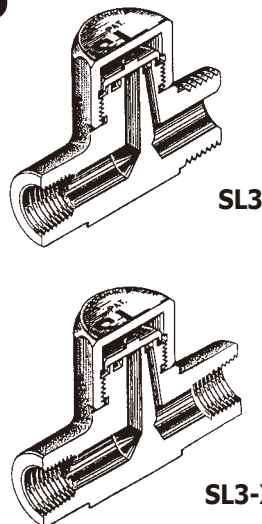
Model	Connections	Size	Max. Operating Pressure		Max. Operating Temperature		Dimensions (mm)				Dimensions (in)				Body Material	Weight												
			MPa	psig	°C	°F	L	H ₁	H ₂	W	L	H ₁	H ₂	W		kg	lb											
SC31	Screwed Rc, G, NPT	1/2"	2,1	305	220	428	78	55			3.1	2.2	2.3	2.4	Stainless Steel SCS14	1,0	2,2											
		90					61	59			61	3.5				2.4	2.3	2.4	Stainless Steel SCS14+SUSF304	1,3	2,9							
		1"										3.7								2.4	2.3	2.4	1,2	2,6				
143	61	59					61	5.6	2.4	2.3	2.4	Stainless Steel SCS14+SUS304	2,7	6,0														
3/4"								6.1					2.4	2.3		2.4	3,9	8,6										
1"								6.9									4,7	10,4										
SC31F	Flanged JIS, ASME	1/4"					2,1	305	220	428	185	61	59	61	7.3	2.4	2.3	2.4		Stainless Steel SCS14+SUS304	4,2-5,5 *1	9,3-12,1 *1						
		1 1/4"									61				59				61		7.7	2.4	2.3	2.4	5,0-7,3 *1	11,0-16,0 *1		
		1 1/2"																							6,6-8,2 *1	14,6-18,1 *1		
		2"									61	59	61	5.9	2.4	2.3	2.4	Stainless Steel SCS14+SUSF304	2,7		6,0							
		DN15																	61		59	61	6.3	2.4	2.3	2.4	3,9	8,6
		DN20																									4,7	10,4
DN25	150	61	59	61	5.9	2.4					2.3	2.4	2,7	6,0														
S31N	Screwed Rc, NPT	1/2"	1,6	230	220	428					90	55	60	65	60	3.5	2.2		2.6	2.4	Ductile Cast Iron FCD450	1,1	2,4					
		3/4"									60	65				60	3.7					2.4	2.6	2.4	1,2	2,6		
		1"															95	3.7							1,3	2,9		
		1 1/4"									180	104	100	106	7.1	4.1	3.9	4.2	8,0	17,6								
		1 1/2"													111	4.4	8,7	19,1										
2"	140	55					65	60	5.5	2.2	2.6	2.4	9,3	20,5														
S31NF	Flanged JIS, ASME, DIN	1/2"					1,6	230	220	428	140	55	60	65	60	5.5	2.2	2.6	2.4	Ductile Cast Iron FCD450	2,3-2,7 *1	5,1-6,0 *1						
		3/4"									60	65				60	5.9				2.4	2.6	2.4	2,9-3,9 *1	6,4-8,6 *1			
		1"															6.3							3,6-4,7 *1	7,9-10,3 *1			
		1 1/4"									240	104	100	106	9.5	4.1	3.9	4.2	12,0		26,4							
		1 1/2"													13,5	29,7												
2"	140	55									65	60	5.5	2.2	2.6	2.4	14,5	31,9										
SC - 310	Screwed Rc, NPT	3/4"	1,6	230	220	428					180	87	81	96	7.1	3.4	3.2	3.8	Cast Iron FC250	6,0	13,2							
SC - 311		1"									81	96			9.5	3.5				3.2	3.8	10,0	22,0					
SF - 340	3/4"	81																						96	9.5	3.5	3.2	3.8
SF - 341	1"										81	96	9.5	3.5	3.2	3.8	10,0	22,0										

*1 Depending on size and flange standard the weight of the traps differs. Please, look at our technical drawings.

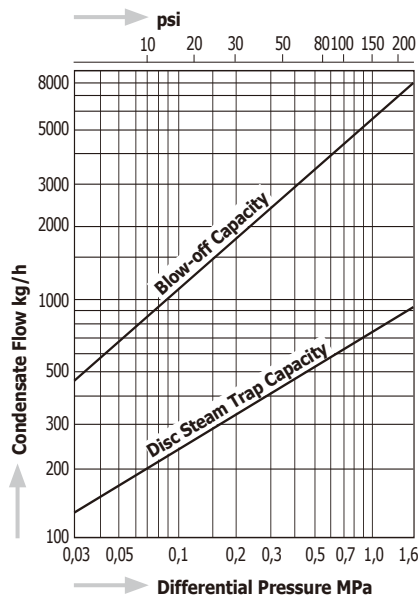
SV



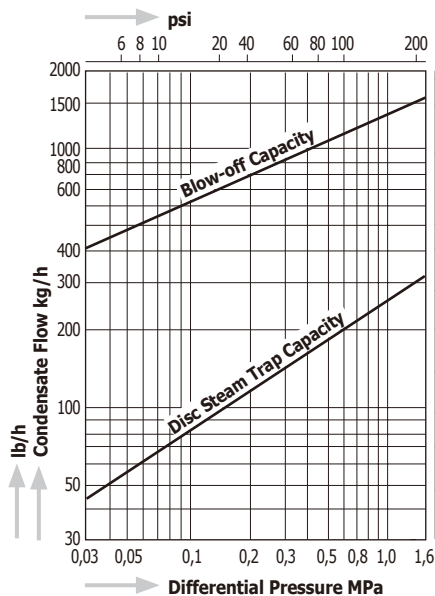
SL3



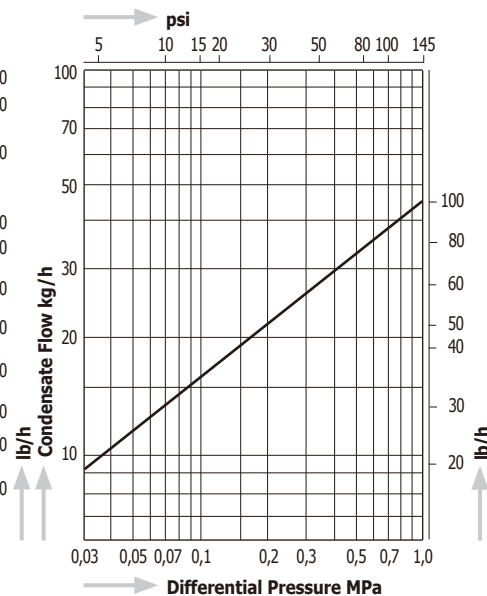
Capacity Chart SV-N



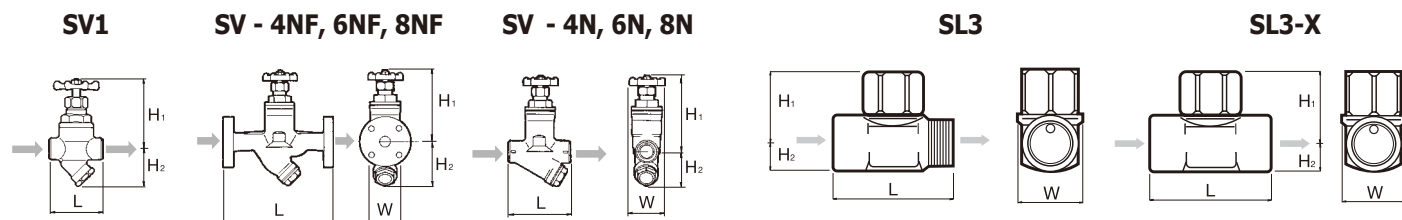
Capacity Chart SV1



Capacity Chart SL3

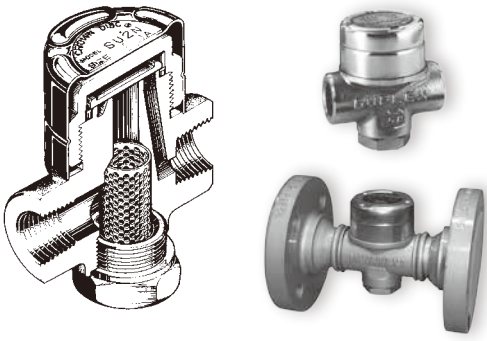


Dimensions

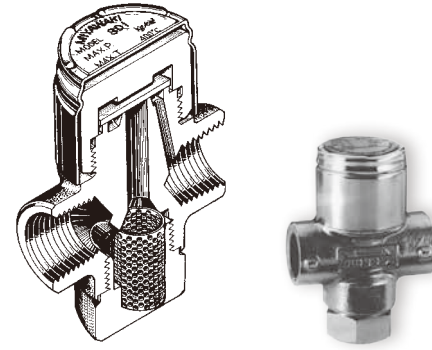


Model	Connections	Size	Max. Operating Pressure		Max. Operating Temperature		Dimensions (mm)				Dimensions (in)				Body Material	Weight						
			MPa	psig	°C	°F	L	H ₁	H ₂	W	L	H ₁	H ₂	W		kg	lb					
SV1	Screwed Rc, NPT	3/8", 1/2"	1,6	230	220	428	75	105	53	65	3.0	4.1	2.1	2.6	Forged Steel A105	1,0	2.2					
		107						4.2				1,2				2.6						
SV - 4N 6N 8N 4NF 6NF 8NF	Screwed Rc, NPT	1/2"					1,6	230	220	428	110	60	65	65		4.3	2.4	2.6	2.6	Cast Iron FC250	2,4	5.3
		155										65					70				6.1	2.6
		220									150	90	65	8.7		5.9	3.5	2.6	2,7		5.9	
																			9.1		4,1	9.0
																			4,7		10.3	
																			5,2		11.5	
SL3	Screwed Inlet : Rc, NPT Outlet: G	1/4"					1,0	145	400	752	40	22	8	19		1.6	0.9	0.3	0.7	Stainless Steel SUS416	0,06	0.13
SL3-X	Screwed Rc, NPT	1/4"					1,0	145	400	752	40	22	8	19		1.6	0.9	0.3	0.7		0,06	0.13

SU2N, SU2H

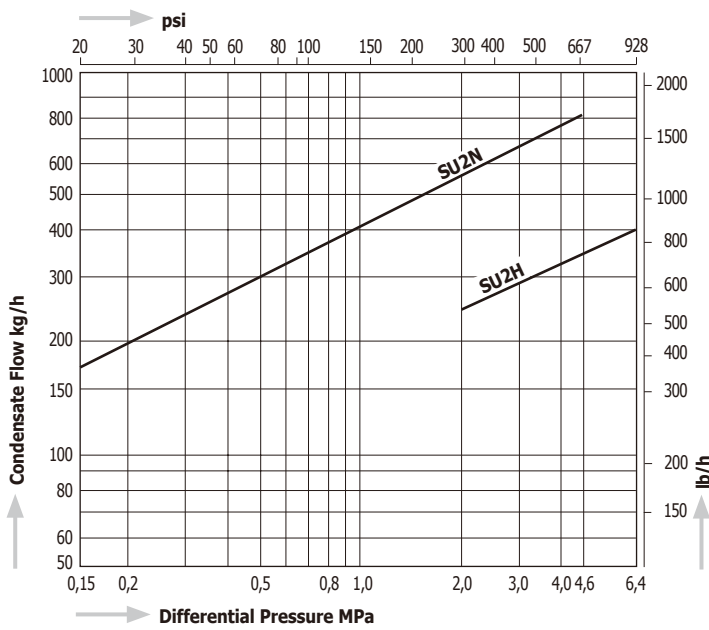


SD1

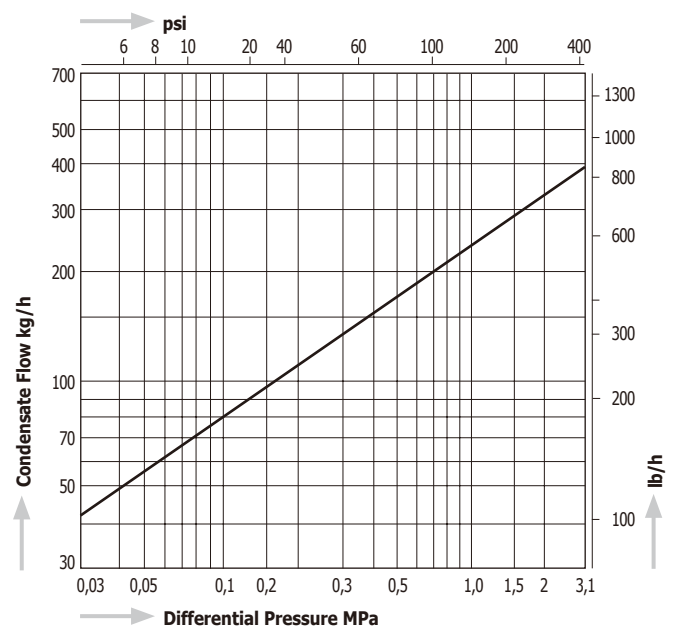


Special face-to-face dimensions available.

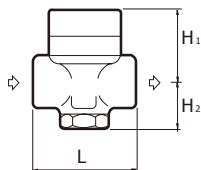
Capacity Chart SU2N, SU2H



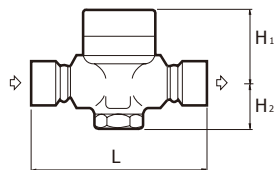
Capacity Chart SD1



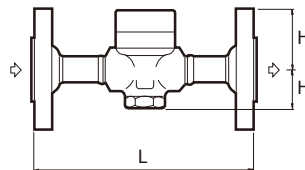
Dimensions SU2N, SU2H



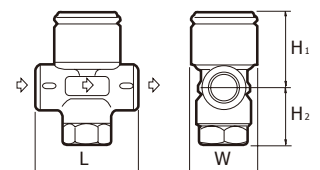
SU2NW, SU2HW



SU2NF, SU2HF

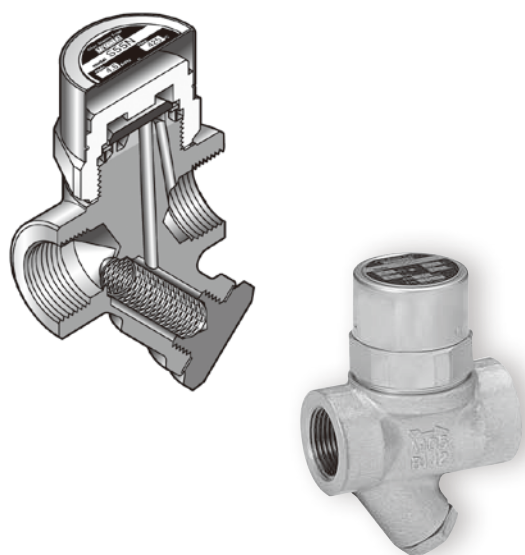


SD1

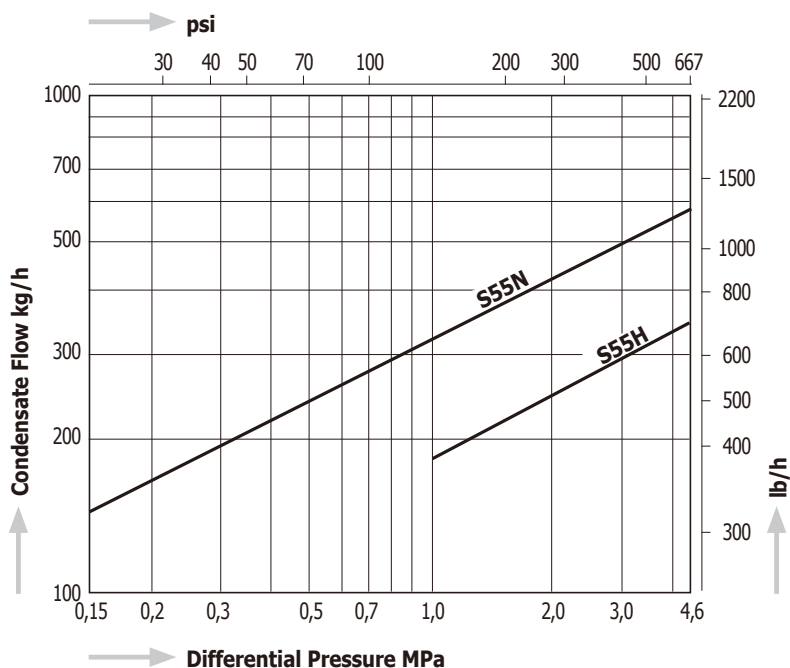


Model	Connections	Size	Max. Operating Pressure		Max. Operating Temperature		Dimensions (mm)				Dimensions (in)				Body Material	Weight						
			MPa	psig	°C	°F	L	H ₁	H ₂	W	L	H ₁	H ₂	W		kg	lb					
SU2N (SU2H)	Screwed Rc, NPT	1/2"	4,6 (6,4)	667 (928)	425	800	70	47	32	53	2.8	1.9	1.3	2.1	Stainless Steel SUS420J2	0,8	1.8					
		3/4"					75	51		3.0	2.0			0,9		2.0						
		1"																				
SU2NW (SU2HW)	Socket Weld JIS, ASME, DIN	1/2"									140	47	32	53		5.5	1.9	1.3	2.1	1,4	3.1	
		3/4"																	1,3	2.9		
		1"																	1,2	2.6		
SU2NF (SU2HF)	Flanged JIS, ASME	1/2"									205	47	32	53		8.1	1.9	1.3	2.1	Stainless Steel SUS420J2	2,7	5.9
		3/4"																	3,7		8.1	
		1"																	4,3		9.5	
	Flanged DIN PN40	DN15					150	47	32	53	5.9	1.9	1.3	2.1	2,6	5.7						
		DN20									6.3				3,3	7.3						
SD1	Screwed Rc, NPT	1/4"	3,1	450	400	752	52	39	25	34	2.0	1.5	1.0	1.3	Stainless Steel SUS420J2	0,3	0.7					
		3/8"					60	41	23		2.4	1.6	0.9									
		1/2"																				

S55N, S55H



Capacity Chart S55N, S55H



Dimensions

S55N, S55H,
S55NW, S55HW

S55NF, S55HF

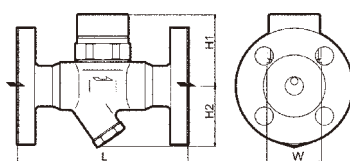
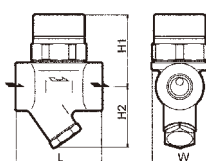
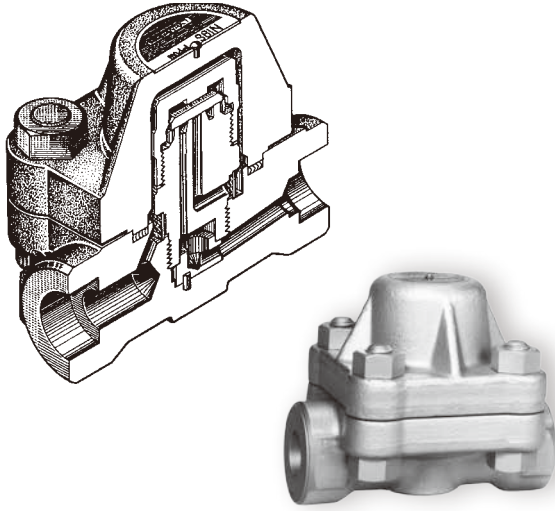


Table 1: Weights

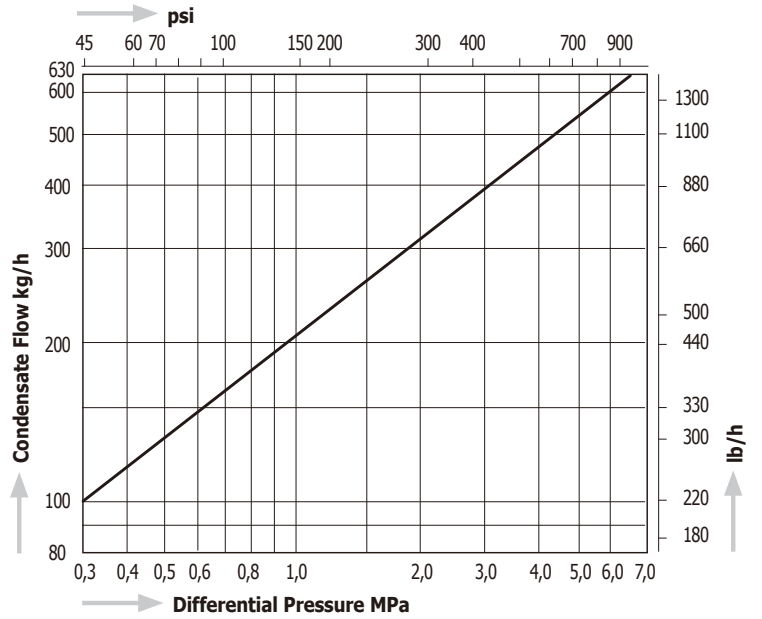
Model	Size (in)	JIS 10/16K		JIS 20K		JIS 30/40K		ASME 150lb		ASME 300lb		ASME 600lb		DIN PN40		DIN PN100	
		kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb
S55NF S55HF	1/2"	2,4	5.3	2,6	5.7	3,8	8.4	2,4	5.3	2,9	6.4	3,0	6.6	3,1	6.8	3,7	8.2
	3/4"	2,9	6.4	3,1	6.8	4,2	9.3	2,9	6.4	3,8	8.4	4,0	8.8	3,7	8.2	5,3	11.7
	1"	4,0	8.8	4,3	9.5	5,4	11.9	4,0	8.8	5,3	11.7	5,5	12.1	4,4	9.7	6,3	13.9

Model	Connections	Size	Max. Operating Pressure		Max. Operating Temperature		Dimensions (mm)				Dimensions (in)				Body Material	Weight	
			MPa	psig	°C	°F	L	H1	H2	W	L	H1	H2	W		kg	lb
S55N (S55HF)	Screwed Rc, NPT	1/2"	4,6	667	425	800	70	60	52	45	2.8	2.4	2.0	1.8	Forged Steel A105	1,0	2.2
		3/4"					75	65	56	3.0	2.6	2.2	1,2	2.6			
		1"					140	5.5	1,2	2.6							
S55NF (S55HF)	Flanged JIS, ASME	1/2"					165	60	52	45	6.5	2.4	2.0	1.8		Table1	Table1
		3/4"					175	6.9	Table1	Table1							
		1"					150	5.9	2.4	2.0	1.8	Table1	Table1				
S55NF (S55HF)	Flanged DIN	DN15					160	6.3	2.4	2.0	1.8	Table1	Table1				
		DN20					70	60	52	45	2.8	2.4	2.0	1.8		1,0	2.2
		DN25					75	65	56	3.0	2.6	2.2	1,2	2.6			
S55NW (S55HW)	Socket Weld JIS, ASME, DIN	1/2"					4,6	667	425	800	70	60	52	45		2.8	2.4
		3/4"	75	65	56	3.0					2.6	2.2	1,2	2.6			
		1"	140	5.5	1,2	2.6											

S61N, S62N

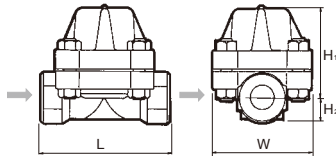


Capacity Chart S61N, S62N



Dimensions

S61N, S62N



S61NF, S62NF

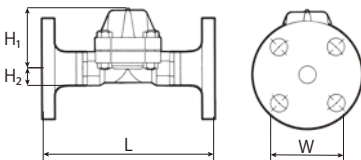


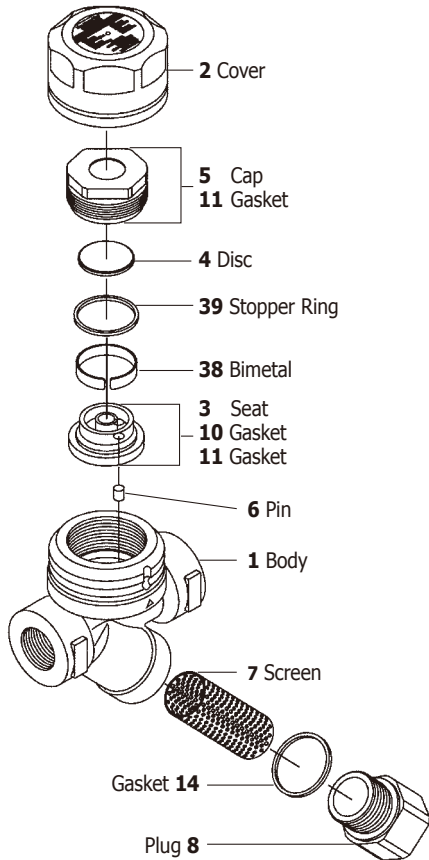
Table 1: Dimensions L and Weight

Model	Size (in)	JIS 30K				JIS 40K				JIS 63 K			
		mm	in	kg	lb	mm	in	kg	lb	mm	in	kg	lb
S61NF S62NF	1/2"	200	7.9	8,4	18.5	200	7.9	8,7	19.2	220	8.7	9,6	21.2
	3/4"	210	8.3	8,9	19.6	210	8.3	9,2	20.3	230	9.1	11,1	24.5
	1"	240	9.4	10,1	22.3	240	9.4	10,5	23.1	240	9.4	12,1	26.7

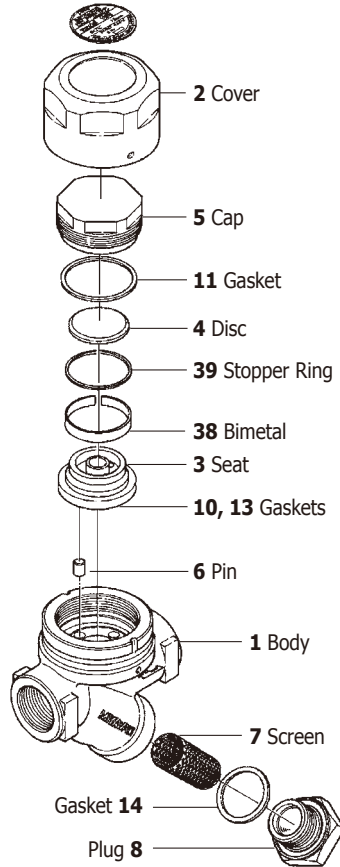
Model	Size (in)	ASME Class 300				ASME Class 600				ASME Class 900			
		mm	in	kg	lb	mm	in	kg	lb	mm	in	kg	lb
S61NF S62NF	1/2"	200	7.9	7,2	15.9	200	7.9	7,3	16.1	220	8.7	9,6	21.2
	3/4"	210	8.3	8,2	18.1	210	8.3	8,5	18.7	230	9.1	10,9	24.0
	1"	240	9.4	9,4	20.7	240	9.4	9,6	21.2	240	9.4	13,3	29.3

Model	Connections	Size	Max. Operating Pressure		Max. Operating Temperature		Dimensions (mm)				Dimensions (in)				Body Material	Weight													
			MPa	psig	°C	°F	L	H ₁	H ₂	W	L	H ₁	H ₂	W		kg	lb												
S61N (S62N)	Screwed Rc, NPT	1/2"	6,5	943	425 (S62N: 475)	800 (S62N: 887)	130	90	25	100	5.1	3.5	1.0	3.9	Forged Steel A105 (S62N: A182F22)	5,7	12.6												
		3/4"																											
		1"																											
S61NF (S62NF)	Flanged JIS, ASME	1/2"					6,5	943	425 (S62N: 475)	800 (S62N: 887)	Table 1	90	25	100				Table 1	3.5	1.0	3.9	Forged Steel A105 (S62N: A182F22)	9,4	20.7					
		3/4"																											
		1"																											
Flanged DIN (PN63, PN100)	DN15	6,5									943	425 (S62N: 475)	800 (S62N: 887)	210				90	25	100	8.3				3.5	1.0	3.9	11,4	25.1
	DN20																												
	DN25																												
S61NW (S62NW)	Socket Weld JIS, ASME, DIN	1/2"	6,5	943	425 (S62N: 475)	800 (S62N: 887)	130	90	25	100	5.1	3.5	1.0	3.9	Forged Steel A105 (S62N: A182F22)	5,7	12.6												
		3/4"																											
		1"																											

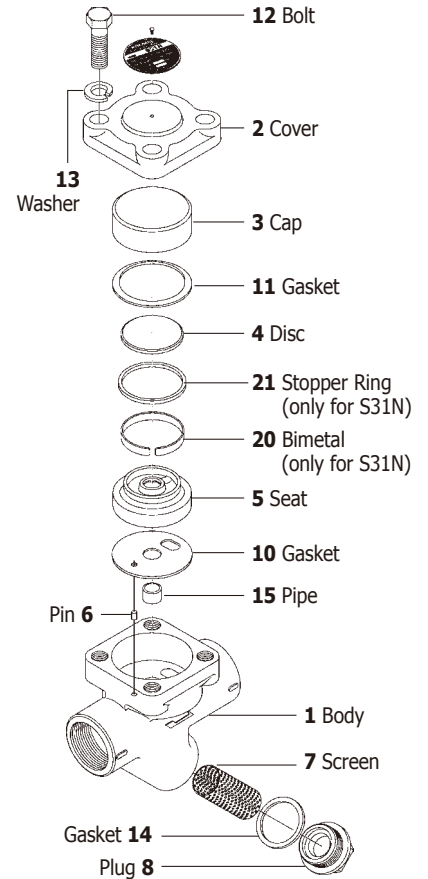
SC31



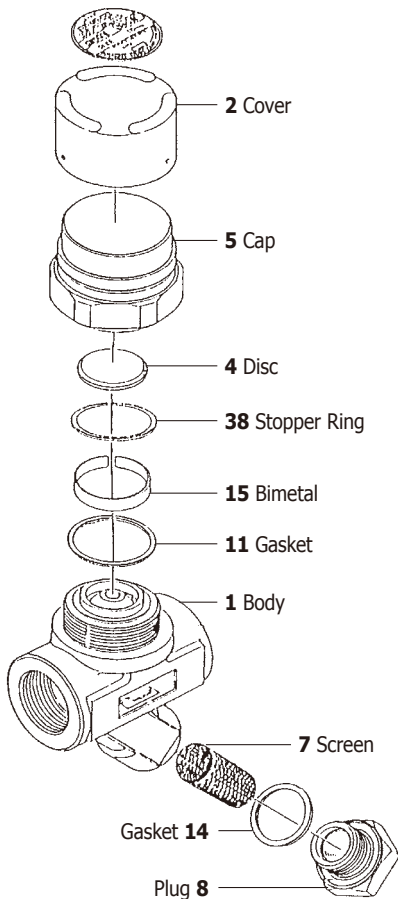
S31N (1/2"–1")



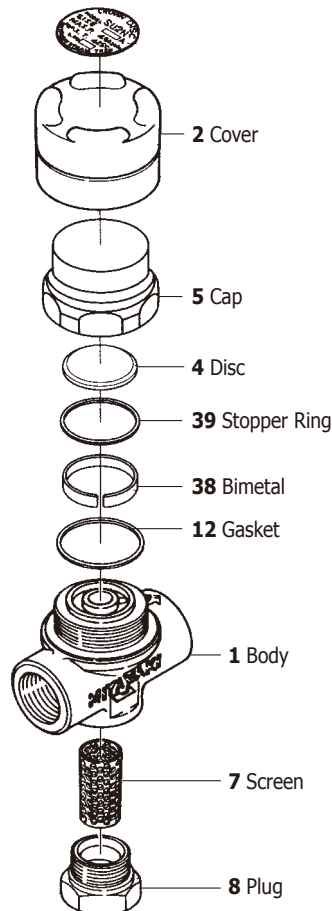
S31N (1 1/4"–2"), SC, SF (3/4"–1")



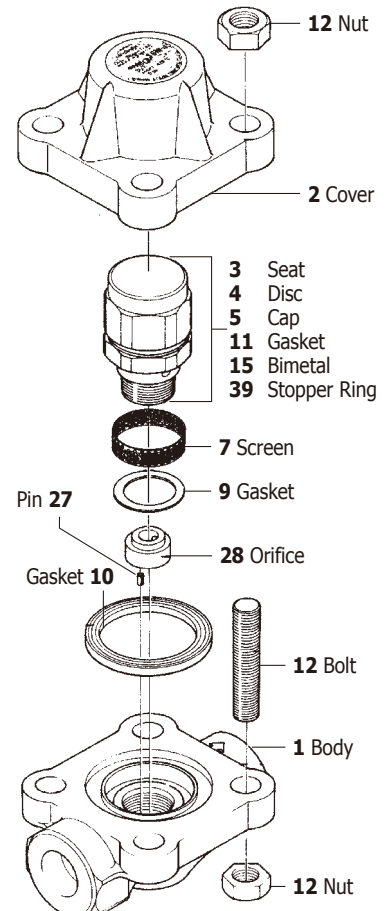
S55N/S55H



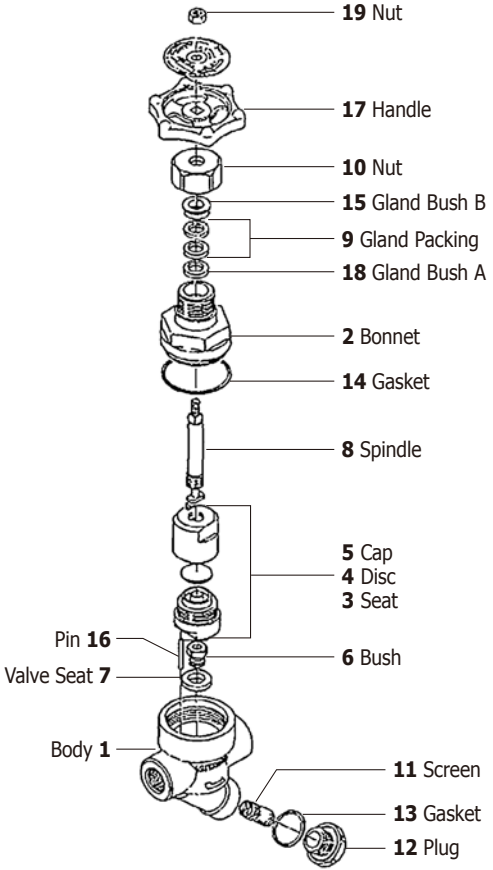
SU2N/SU2H



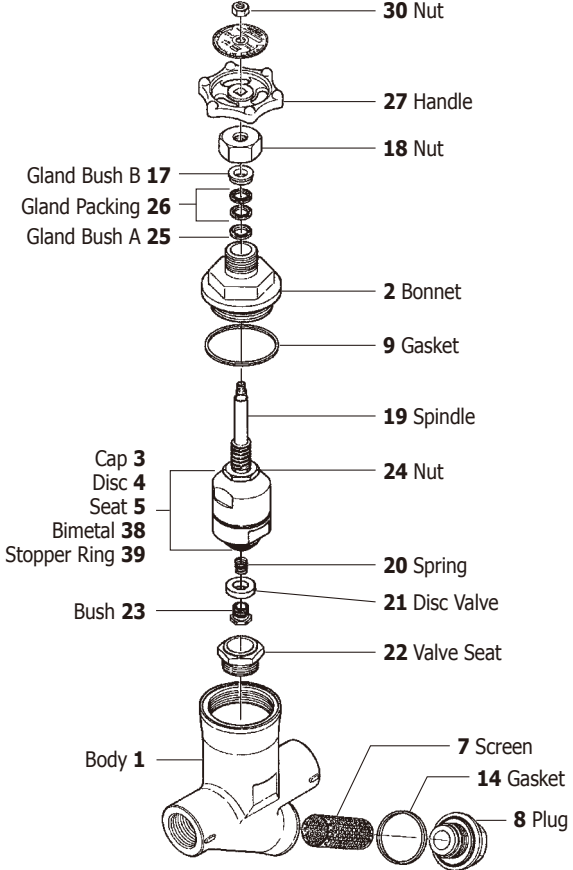
S61N/S62N



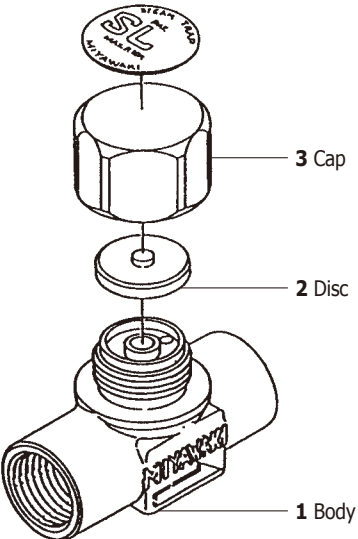
SV1



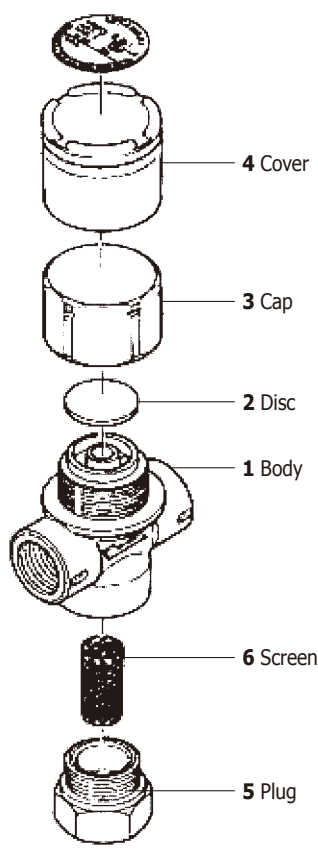
SV-N



SL3



SD1



Steam Trap Survey Assistant

Dr. Trap® Jr.

PM15

It is the ideal partner for steam trap inspections.

PM15 is capable to work with most of the steam traps of the main manufacturers.



Ultrasonic Checker PM11



Temperature Probe



SurveyPro Light PM150 V2.0

Features PM15

The Steam Trap Ultrasonic Checker PM11 has been designed to assess the operating condition of steam traps during operation by measuring the vibration and the temperature of the surface.

- The system consists of the Ultrasonic Checker PM11, a Temperature Probe and the SurveyPro Light PM 150 Software version 2.0.
- Measures vibration and temperature at the same time
- The temperature probe can measure temperatures between 0°C and 250°C
- Estimates and displays the saturation pressure by measuring the temperature.
- Useful for testing not only steam traps, but also valves
- One key operation for all functions
- Long battery life – 40 hours or more of continuous use
- Shuts off automatically if the device is not in use for 5 minutes
- Includes a stop watch for monitoring periodic characteristics of vibrations
- Compact, lightweight and easy to carry

Software SurveyPro Light PM150 V2.0

Software for analyzing the data which had been measured by using the steam trap checker PM11 and for determining the condition of the steam trap.

- Standard and Special versions available
- Both versions allow the estimation of CO₂ emissions which correspond to leaking steam traps.
- Compatible with Windows 7, Windows 8/8.1 and Windows 10 – 32 and 64 bit versions.
- Full data compatibility. Data generated by the previous version can be integrated into the new software*
- The version 2.0 comes with an updated list of steam trap models of the main steam trap manufacturers.
- The updated software allows a better classification of steam traps to various groups and areas inside a plant with the possibility for more detailed analysis of selected groups or areas.

* For more details please contact MIYAWAKI Inc. or an authorized representative

Working Flow

<p>1 Tagging of Steam Traps</p> <p>Put a tag on or text to each trap in your factory, so that it can be easily identified any time.</p>	<p>2 Survey List set-up</p> <p>Run the Survey Pro Light software and fill in the basic information of the steam traps. Information such as survey list name, tag number, area, manufacturer, inlet pressure or size are filled in at this moment.</p>	<p>3 Traps inspection</p> <p>Diagnose each trap on site using the checker PM11. Write down the vibration data measured for each trap.</p>
<p>4 Filling out of Survey List</p> <p>Run again the Survey Pro Light software and enter the measured vibration data into the survey list for each trap. Once the vibration value of a trap has been entered, the operating condition of the trap will be displayed immediately. The list will also display the steam loss of each trap (if detected) and the related financial losses.</p>	<p>5 Analysis</p> <p>After entering all test results of the survey, the software can show an analysis for each trap type and manufacturer, an analysis of steam losses and related financial losses for each manufacturer and trap type, an analysis of CO₂ emission, or an analysis for kind of application (process, tracing, etc.), with the possibility of showing the results by areas or groups.</p>	<p>6 Trend Analysis</p> <p>Comparisons can be made by Manufacturer, by the installed types, by the pressure classification and by applications. In each case:</p> <ul style="list-style-type: none"> - the failure rate - the steam loss - and money loss tendencies <p>will be shown.</p>

Technical Specification

Probes	Vibration	Piezo-electric-ceramic acceleration sensor (10 kHz – 40 kHz)	Displays	Illuminated liquid crystal display (LCD)
	Temperature	Thermistor Range: 0 – 250°C / 32 – 482°F	Housing	Heat-resistant plastic (ABS), simple waterproof design
Weight	230 g (incl. batteries)		Ambient working temperature	0 – 40°C (32 – 104°F)
Power supply	2 x 1.5V AA alkaline batteries (40 hours or more) 2 x 1.2V AA NiMH (32 hours or more)			

Steam Trap Survey Assistant

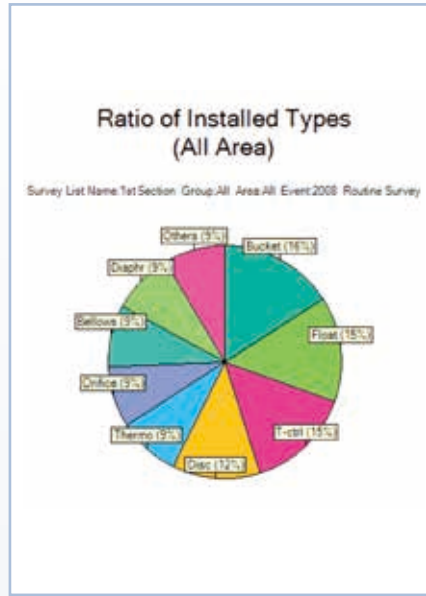
Dr. Trap® Jr.

SurveyPro Light PM150 V2.0

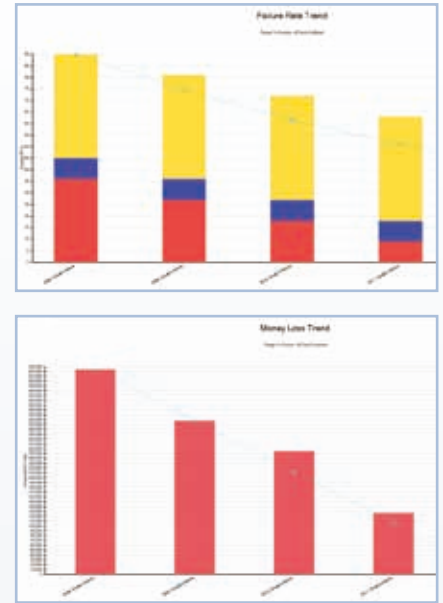
Main Functions – Standard Version

Survey List

Analysis



Trend Analysis



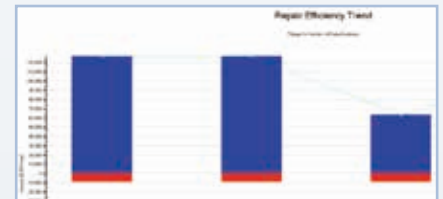
Additional Functions – Special Version

The Special Version includes the functions of the Standard Version plus the following ones:

Integration of multiple survey files into a single one

Repair Cost Management

Repair Efficiency



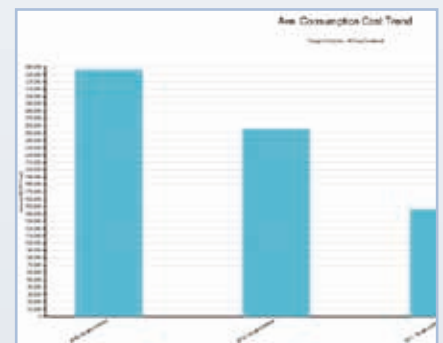
Management of other kind of failures

- Failure of inlet valve
- Failure of outlet valve
- Failure of other than valves

User and Ranking Summaries

Service Period

Average Consumption Cost



Steam Trap Management System

Dr. Trap®

PM500

Steam Trap Management System PM500

Checker (PM520)

It detects the vibration and temperature in steam traps at the same time.

The survey accuracy has been improved from the previous model (PM321) by MIYAWAKI's sensor technology.



Checker (PM520)



* Tablet to be prepared by customer
* For Windows® only

Trap Survey App (PM510)

Trap Survey App (PM510)

The App will be installed on a tablet computer, which must be prepared by the customer.

It displays and stores survey results transferred from the checker using Bluetooth connection.

Software SurveyPro 4.0 (PM530)

The software will be installed on a personal computer. It aggregates and analyzes steam trap data from the Trap Survey App, identifying faulty steam traps, providing steam loss and financial loss data and includes many other possibilities to manage the steam traps easily.

It provides detailed charts and graphs.



* Standard and Special versions available

Software SurveyPro 4.0 (PM530)

Features of PM500

- **High-speed survey**

The special design of the vibration sensor integrating a contact-type thermocouple sensor guarantees a high survey speed. Each steam trap will be surveyed within 2 seconds at the shortest, and 10 seconds at the maximum.

- **Improved survey accuracy**

The holding mechanism of the probe tip ensures a pressing force, which reduces the discrepancy of survey results substantially.

- **Simple operation**

The checker is ergonomic shaped to handle and operate with one hand. The survey will start automatically by simply pressing down the probe on the trap with minimum force. It is possible to proceed with the survey uninterruptedly without using the tablet.

- **Improved durability**

Dust and water protection : IP34 (Conforming to IEC 60529)
Drop test (Conforming to IEC 60068-2-31)

- **Estimation of CO₂ emissions**

The software can estimate CO₂ emissions based on steam trap leakage amounts.

- **Full data compatibility**

After converting survey data generated by the previous version (V3.1), the data can be integrated into the new software without any problems.

Technical Specifications

Hardware	Weight		Sensor		Ambient working temperature		Max. surface temperature		Power supply *not included in package	Continuous operating (approximately) Hours	Working survey time Seconds	Bluetooth	
	g	lb	Vibration	Temperature	°C	°F	°C	°F				Interface	Communication distance
Checker PM520	220	0.49	Piezo-electro-ceramic sensor	Type K thermocouple	-5 to +50	23 to 122	400	752	2 x 1.2V AA size NiMH	8 (discharged capacity: 1900mAh)	10 (2 minimum)	Ver. 2.1 + EDR SPP	Approx. 5 m
	excl. battery												

Accessory: 1 x Soft case

Display: Transmission type TFT color liquid crystal

Software	Medium	Environment						Others
		Operating System	CPU	Memory (RAM)	Hard disk	Display resolution (pixel)		
Trap Survey App PM510*	CD-ROM	Windows 7, Windows 8/8.1, Windows 10 (32 or 64 bit)	1.6GHz or more	4GB or more	20GB or more free space (excl. Data area)	1280 x 800 or more	Bluetooth: Ver.2.1 + EDR SPP Microsoft NET Framework 4.5 Microsoft SQL Server Compact 3.5 SP2	
SurveyPro PM530 V4.0			1GHz or more	1GB (64bit: 2GB) or more		1024 x 768 or more		Microsoft NET Framework 4.5 Microsoft SQL Server Compact 3.5 SP2 USB Port, CD Drive

* PM510 is to be installed on a tablet. The above specifications of PM510 are hardware requirement for the tablet.

Steam Trap Management System

Dr. Trap®

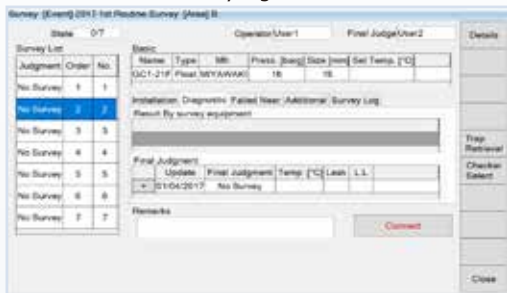
Trap Survey App PM510

The App displays and stores the survey results from the checker. It includes a lot of new and additional functions such as viewing and editing a survey map or a camera function. It can contribute to create a paperless environment. The available functions depend on the version of SurveyPro 4.0, standard or special.

Main Functions

Survey screen

The touch-screen tablet makes it easy to browse and edit a survey list. A lot of detailed information is available on the survey screen and can be edited there. The survey log information will be also displayed on the screen.



Survey map

A survey map can be displayed and edited on the tablet computer. The map can be associated with each steam trap on the survey list. Then, the order of the steam trap survey can be set.



Camera function

The camera function allows to take images and record videos on the Camera screen. It is possible to edit and save the images for each steam trap. The images and videos will be displayed on the detailed screen of each steam trap.

PM510 Function correspondence table

Several functions of PM510 are unavailable depending on the version of PM530.

[○] : Available, [-] : Unavailable

PM510 Function	PM530	
	Standard	Special
List Import/Export	○	○
List Retrieval	○	○
Edit Area	○	○
Survey	○	○
Survey map	-	○
Whole map	-	○
Edit Drawing	-	○
Camera	-	○

SurveyPro 4.0 PM530

The software was updated from SurveyPro V3.1. It offers to analyse survey data, view trends, and manage survey files. Same as V3.1, it displays various summary sheets and graphs depending on the purpose, and export them to Excel and image files. It helps to create survey reports. Standard and Special versions are available.

Upgraded Functions

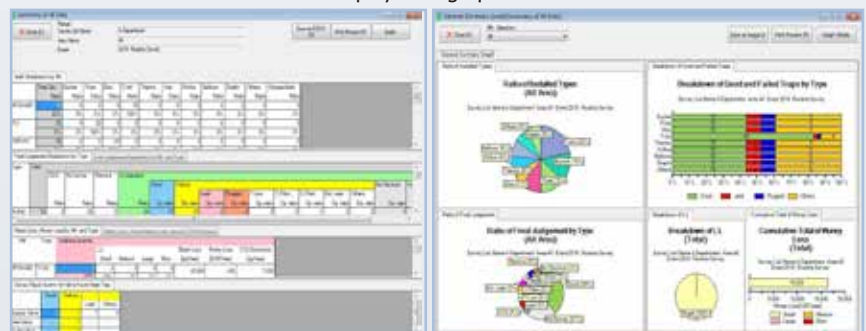
Single Sheet

Each survey list can be displayed as a Single Sheet. Then, it can be exported to Excel as well. It is possible to browse and edit survey list detail information on the sheet at once.



Data Summary Sheet

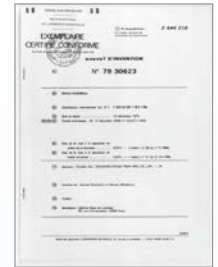
Different from the previous version, SurveyPro V3.1, the data summary sheets will be displayed as one sheet. Consequently, it is easier to use various analysis functions to create summary sheets such as by Manufacturer and by Type. The summaries of all data can be displayed in graphical form same as V3.1.



The MIYAWAKI SCCV®-System: worldwide patented

MIYAWAKI's internationally patented Self Closing and Centering Valve SCCV®-System has proven its high reliability and effectiveness during more than two decades. Many thousands of steam traps equipped with the SCCV®-System have proven enormous advantages for our customers:

1. A substantially longer service life compared with other steam traps
2. No partial or one-sided precipitate wear of valve and seat
3. Greatly reduced wear of all internal parts due to the reduction of the closing forces required to maintain a seal
4. No steam loss for all Temperature Control Traps

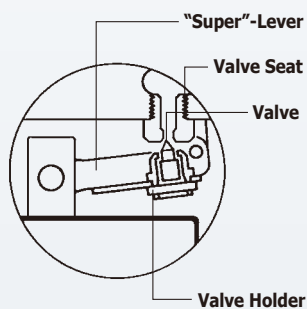


The MIYAWAKI SCCV®-System: variable adjusted to various types

Intensive research and development activities over many years have enabled MIYAWAKI to incorporate the SCCV®-System in various types of steam traps. Thus it became possible to adopt the SCCV®-System to a wide pressure range and to utilize the SCCV®-System not only for Bimetal Steam Traps, but also for Inverted Bucket and Float Type Steam Traps.

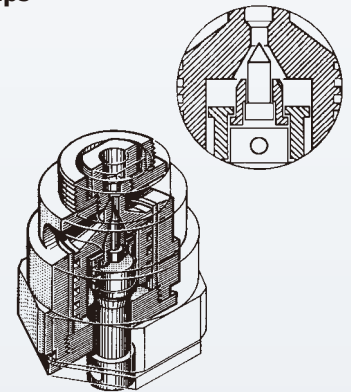
Inverted Bucket Steam Traps Series ES

The Valve Holder is fixed to a specially developed "Super-Lever". The Valve is "free floating" inside the Valve Holder. Thus the control space inside the Valve Holder decreases the force toward the seat caused by the movement of the bucket. The Valve will close softly and exactly in the center of the seat.



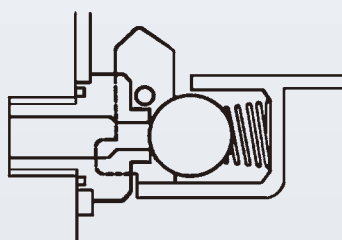
Inverted Bucket Steam Traps Series ER

The SCCV®-System is part of a "Double Valve Unit", which is operating on the basis of the pressure difference inside the unit. The trap is thus characterized by extended lifetime of the valve assembly and a greater condensate discharge per body size when compared to conventional inverted bucket steam traps.



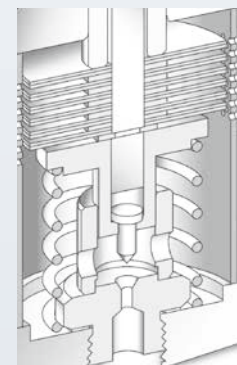
Ball Float Steam Trap G11N, G12N

The Valve (Ball) lies inside a Valve Holder, which is directly connected through a lever with the float. By installing a spring inside the Valve Holder the movements of the float and the forces caused by it will not be directly transferred to the Valve. This will increase the service life of the sealing surfaces.



Temperature Control Steam Trap TB7N

The Bimetal Unit including the valve are guided inside the body. A spring reduces the force caused by the deflection of the bimetal which move the valve toward the seat. The guiding of the valve within the seat and the lift of the valve is designed in such a way that the valve will close very smoothly in the center of the seat.



MIYAWAKI-Technology

SCCV®-System

Basic Principle

Regulating

The design of the Valve and Seat and the Valve lift (distance between the closed and open position of the valve) are calculated and designed in such a way that the valve closes its seat at the time that the condensate reaches the steam trap adjusted temperature.

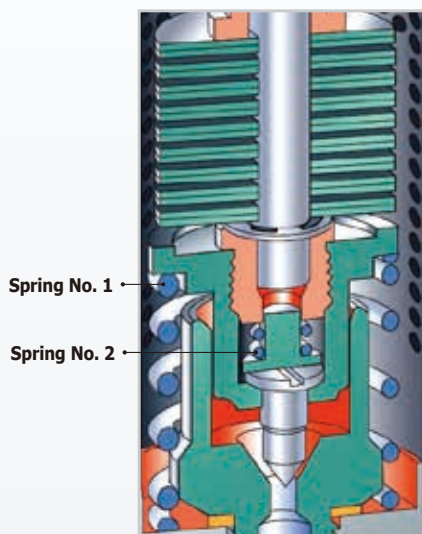
Centering and Soft Closing

The valve is "free floating" inside the valve holder. The valve moves to the center caused by the pressure and the flow of condensate. The tip of the valve is drawn down to the center axis of the valve seat. A spring and a stop ring inside the control chamber absorb and soften the movement of the valve (caused by the temperature and pressure of the steam system) towards its seat. The centering and soft closing characteristics prevents premature or uneven wearing of the valve and its seat, extending the lifetime of the steam trap.

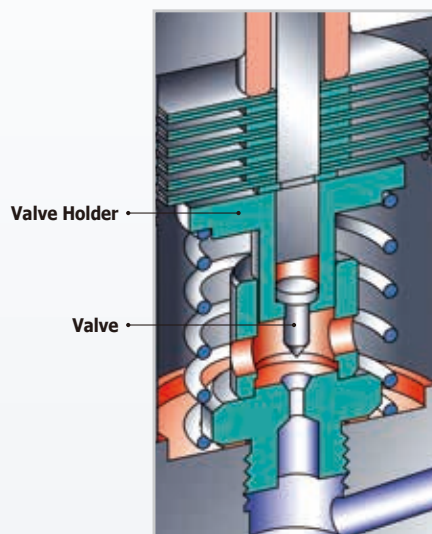
No Steam Loss

The valve closes exactly in the center of the seat at the adjusted temperature, slightly below the saturation temperature assuring Zero steam loss.

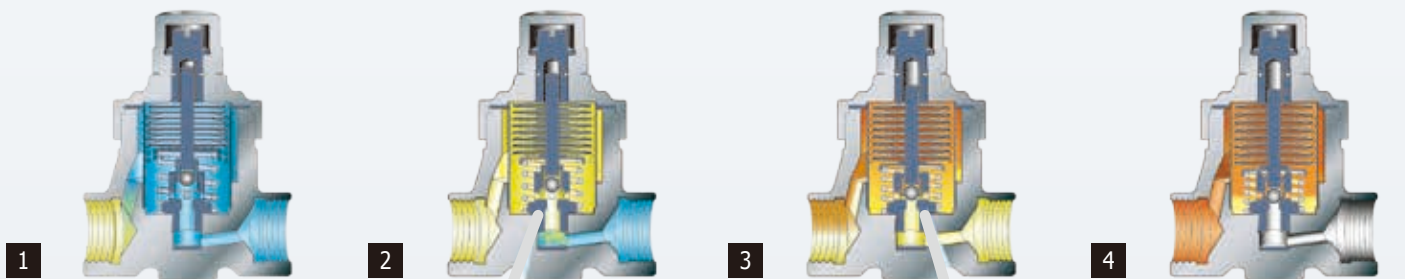
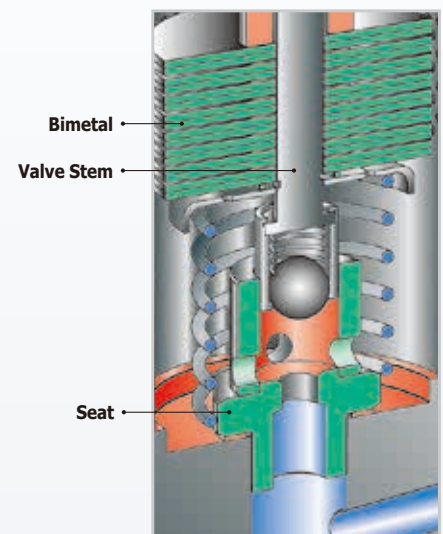
TB51



TB7N



TB9N



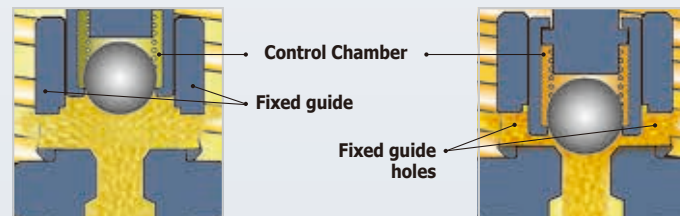
1 On start-up, the bimetal discs are all flat and the valve shaft is up with the valve fully open. Virtually all cold condensate and air are discharged.

2 As the temperature of the condensate increases, the bimetal discs begin to curve gradually and force the valve shaft and the valve holder to move down.

3 When condensate with higher temperature (near to set temperature) flows in, the bimetal discs are curved even more and, at the same time, the valve shaft moves down and the valve holder closes the holes in the guide partially.

4 In case of very low condensate flow, the holes in the guide are closed completely by the valve holder and the valve will close precisely in the center of the seat. Normally, the trap is filled with hot condensate and the operation will rest in the state shown in figure 3. Condensate will be discharged continuously.

Most of the condensate is still discharged quickly, since the valve and the holes in the fixed guide on the valve seat are still fully open.



The amount of condensate being discharged is reduced quickly. This prolongs the time that the hot condensate stays near the bimetal discs and the heat of the condensate is transferred to the bimetal discs much more effectively.

Material Standards

Following you find a list of materials mainly used by MIYAWAKI for its Steam Traps, according to Japanese Standards and the most closely corresponding numbers of American (ASTM), European (EN) and German (DIN) Standards.

1. Iron Castings

JIS	ASTM	EN	DIN
FC200	A48 – class 30	EN-GJL-200	GG-20 (0.6020)
FC250	A48 – class 35	EN-GJL-250 (EN-JL 1040)	GG-25 (0.6025)
FCD450	A536 65-45-12	EN-GJS-450-10 (EN-JS1040)	GGG40.3 (0.7043)

2. Steel Casting and Forgings

JIS	ASTM	EN	DIN
SCPH 2	A216WCB	GP240GH (1.0619)	GS-C25
SCPH 21	A217WC6	G17CrMo5-5 (1.7357)	GS17CrMo55 (1.7357)
SCPH32	A217WC9	GS12CrMo9-10 (1.7380)	10CrMo9-10 (1.7380)
SFVC2A	A105	P250GH (1.0460)	C22.8 (1.0460)
SFVAF22B	A182F22	10CrMo9-10 (1.7380)	10CrMo9-10 (1.7380)

3. Stainless and Heat Resisting Steels

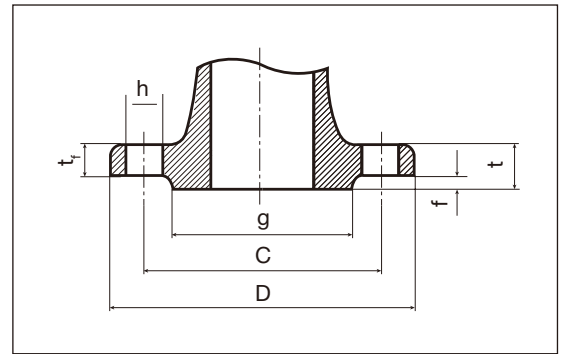
JIS	ASTM	EN	DIN
SCS13A	A351CF8	GX5CrNi19-10 (1.4308)	G-X6CrNi189 (1.4308)
SCS14	A351CF8M	GX5CrNiMo19-11-2 (1.4408)	G-X6CrNiMo1810 (1.4408)
SUS303	A582S30300	X8CrNiS18-9 (1.4305)	X10CrNiS189 (1.4305)
SUS304	A276S30400	X5CrNi18-10 (1.4301)	X5CrNi1810 (1.4301)
SUS403	A276S40300	X6Cr13 (1.4000)	X6Cr13 (1.4000)
SUS420J2	–	X30Cr13 (1.4028)	X30Cr13 (1.4028)

4. Alloys

JIS	ASTM	EN	DIN
C3771	C37700 (B 124-89)	CuZn39Pb2 (CW612N)	CuZn39Pb2

Diameters and Drilling of Flanges

(see Page 91)



Conversion Factors

$$T_{\text{°C}} = \frac{5}{9}(T_{\text{°F}} - 32) \quad T_{\text{°F}} = 1,8 T_{\text{°C}} + 32$$

°C	°F	°F	°C	°F	°F
10,0	50	122	127	260	500
12,8	55	131	132	270	518
15,6	60	140	138	280	536
18,3	65	149	143	290	554
21,1	70	158	149	300	572
23,9	75	167	154	310	590
26,7	80	176	160	320	608
29,2	85	185	166	330	626
32,2	90	194	171	340	644
35,0	95	203	177	350	662
37,8	100	212	182	360	680
40,6	105	221	188	370	698
43	110	230	193	380	716
46	115	239	199	390	734
49	120	248	204	400	752
52	125	257	210	410	770
54	130	266	216	420	788
57	135	275	221	430	806
60	140	284	227	440	824
63	145	293	232	450	842
66	150	302	238	460	860
68	155	311	243	470	878
71	160	320	249	480	896
74	165	329	254	490	914
77	170	338	260	500	932
79	175	347	266	510	950
82	180	356	271	520	968
85	185	365	277	530	986
88	190	374	282	540	1004
91	195	383	288	550	1022
93	200	392	293	560	1040
99	210	410	299	570	1058
104	220	428	304	580	1076
110	230	446	310	590	1094
116	240	464	316	600	1112
121	250	482			

American Standard ASME B 16.5-2009

Size (in)	Dimensions	class 150		class 300		class 600		class 900		class 1500	
		in	mm	in	mm	in	mm	in	mm	in	mm
1/2 "	D	3.5	90	3.75	95	3.75	95	4.75	120	4.75	120
	tr	0.38	9,6	0.5	12,7	0.56	14,3	0.88	22,3	0.88	22,3
	f	0.06	2	0.06	2	0.25	7	0.25	7	0.25	7
	g	1.38	34,9	1.38	34,9	1.38	34,9	1.38	34,9	1.38	34,9
	C	2.38	60,3	2.62	66,7	2.62	66,7	3.25	82,6	3.25	82,6
	n x h	4 x 5/8	4 x 15,9	4 x 5/8	4 x 15,9	4 x 5/8	4 x 15,9	4 x 7/8	4 x 22,2	4 x 7/8	4 x 22,2
3/4 "	D	3.88	100	4.62	115	4.62	115	5.12	130	5.12	130
	t	0.44	11,2	0.56	14,3	0.62	15,9	1	25,4	1	25,4
	f	0.06	2	0.06	2	0.25	7	0.25	7	0.25	7
	g	1.69	42,9	1.69	42,9	1.69	42,9	1.69	42,9	1.69	42,9
	C	2.75	69,9	3.25	82,6	3.25	82,6	3.5	88,9	3.5	88,9
	n x h	4 x 5/8	4 x 15,9	4 x 3/4	4 x 19,0	4 x 3/4	4 x 19,0	4 x 7/8	4 x 22,2	4 x 7/8	4 x 22,2
1 "	D	4.25	110	4.88	125	4.88	125	5.88	150	5.88	150
	t	0.5	12,7	0.62	15,9	0.69	17,5	1.12	28,6	1.12	28,6
	f	0.06	2	0.06	2	0.25	7	0.25	7	0.25	7
	g	2	50,8	2	50,8	2	50,8	2	50,8	2	50,8
	C	3.12	79,4	3.5	88,9	3.5	88,9	4	101,6	4	101,6
	n x h	4 x 5/8	4 x 15,9	4 x 3/4	4 x 19,0	4 x 3/4	4 x 19,0	4 x 1	4 x 25,4	4 x 1	4 x 25,4
1 1/4 "	D	4.62	115	5.25	135	5.25	135	6.25	160	6.25	160
	t	0.56	14,3	0.69	17,5	0.81	20,7	1.12	28,6	1.12	28,6
	f	0.06	2	0.06	2	0.25	7	0.25	7	0.25	7
	g	2.5	63,5	2.5	63,5	2.5	63,5	2.5	63,5	2.5	63,5
	C	3.5	88,9	3.88	98,4	3.88	98,4	4.38	111,1	4.38	111,1
	n x h	4 x 5/8	4 x 15,9	4 x 3/4	4 x 19,0	4 x 3/4	4 x 19,0	4 x 1	4 x 25,4	4 x 1	4 x 25,4
1 1/2 "	D	5	125	6.12	155	6.12	155	7	180	7	180
	t	0.62	15,9	0.75	19,1	0.88	22,3	1.25	31,8	1.25	31,8
	f	0.06	2	0.06	2	0.25	7	0.25	7	0.25	7
	g	2.88	73	2.88	73	2.88	73	2.88	73	2.88	73
	C	3.88	98,4	4.5	114,3	4.5	114,3	4.88	123,8	4.88	123,8
	n x h	4 x 5/8	4 x 15,9	4 x 7/8	4 x 22,2	4 x 7/8	4 x 22,2	4 x 1 1/8	4 x 28,6	4 x 1 1/8	4 x 28,6
2 "	D	6	150	6.5	165	6.5	165	8.5	215	8.5	215
	t	0.69	17,5	0.81	20,7	1	25,4	1.5	38,1	1.5	38,1
	f	0.06	2	0.06	2	0.25	7	0.25	7	0.25	7
	g	3.62	92,1	3.62	92,1	3.62	92,1	3.62	92,1	3.62	92,1
	C	4.75	120,7	5	127	5	127	6.5	165,1	6.5	165,1
	n x h	4 x 3/4	4 x 19,0	8 x 3/4	8 x 19,0	8 x 3/4	8 x 19,0	8 x 1	8 x 25,4	8 x 1	8 x 25,4

Japanese Standard: JIS B 2210 – 1984

Size (in)	Dimensions	Dimensions at Pressure Rating (mm)					
		10 K	16 K	20 K	30 K	40 K	63 K
1/2 "	D	95	95	95	115	115	120
	t	12	12	14	18	20	23
	f	1	1	1	1	1	1
	g	51	51	51	55	55	55
	C	70	70	70	80	80	80
	n x h	4 x 15	4 x 15	4 x 15	4 x 19	4 x 19	4 x 19
3/4 "	D	100	100	100	120	120	135
	t	14	14	16	18	20	25
	f	1	1	1	1	1	1
	g	56	56	56	60	60	60
	C	75	75	75	85	85	95
	n x h	4 x 15	4 x 15	4 x 15	4 x 19	4 x 19	4 x 23
1 "	D	125	125	125	130	130	140
	t	14	14	16	20	22	27
	f	1	1	1	1	1	1
	g	67	67	67	70	70	70
	C	90	90	90	95	95	100
	n x h	4 x 19	4 x 19	4 x 19	4 x 19	4 x 19	4 x 23
1 1/4 "	D	135	135	135	140	140	150
	t	16	16	18	22	24	30
	f	2	2	2	2	2	2
	g	76	76	76	80	80	80
	C	100	100	100	105	105	110
	n x h	4 x 19	4 x 19	4 x 19	4 x 19	4 x 19	4 x 23
1 1/2 "	D	140	140	140	160	160	175
	t	16	16	18	22	24	32
	f	2	2	2	2	2	2
	g	81	81	81	90	90	90
	C	105	105	105	120	120	130
	n x h	4 x 19	4 x 19	4 x 19	4 x 23	4 x 23	4 x 25
2 "	D	155	155	155	165	165	185
	t	16	16	18	22	26	34
	f	2	2	2	2	2	2
	g	96	96	96	105	105	105
	C	120	120	120	130	130	145
	n x h	4 x 19	8 x 19	8 x 19	8 x 19	8 x 19	8 x 23

European Standard EN 1092-1

Size (in)	Dimensions	PN 10	PN 16	PN 25	PN 40	PN 63	PN 100
		mm	mm	mm	mm	mm	mm
DN15	D	95	95	95	95	105	105
	t	16	16	16	16	20	20
	f	2	2	2	2	2	2
	g	45	45	45	45	45	45
	C	65	65	65	65	75	75
	n x h	4 x 14	4 x 14	4 x 14	4 x 14	4 x 14	4 x 14
DN20	D	105	105	105	105	130	130
	t	18	18	18	18	22	22
	f	2	2	2	2	2	2
	g	58	58	58	58	58	58
	C	75	75	75	75	90	90
	n x h	4 x 14	4 x 14	4 x 14	4 x 14	4 x 18	4 x 18
DN25	D	115	115	115	115	140	140
	t	18	18	18	18	24	24
	f	2	2	2	2	2	2
	g	68	68	68	68	68	68
	C	85	85	85	85	100	100
	n x h	4 x 14	4 x 14	4 x 14	4 x 14	4 x 18	4 x 18
DN32	D	140	140	140	140	155	155
	t	18	18	18	18	24	24
	f	2	2	2	2	2	2
	g	78	78	78	78	78	78
	C	100	100	100	100	110	110
	n x h	4 x 18	4 x 18	4 x 18	4 x 18	4 x 22	4 x 22
DN40	D	150	150	150	150	170	170
	t	18	18	18	18	26	26
	f	3	3	3	3	3	3
	g	88	88	88	88	88	88
	C	110	110	110	110	125	125
	n x h	4 x 18	4 x 18	4 x 18	4 x 18	4 x 22	4 x 22
DN50	D	165	165	165	165	180	195
	t	18	18	20	20	26	28
	f	3	3	3	3	3	3
	g	102	102	102	102	102	102
	C	125	125	125	125	135	145
	n x h	4 x 18	4 x 18	4 x 18	4 x 18	4 x 22	4 x 26

Pressure

Conversion Table from psi to bar

psi	bar	psi	bar	psi	bar	psi	bar	psi	bar	psi	bar	psi	bar	psi	bar	psi	bar	psi	bar	psi	bar			
1		0,07		105		7,24		310		21,37		510		35,17		820		56,55		1250		86,19		
	1,5	0,1			108,8		7,5		319,0		22,0		514,8		35,5		826,5		57,0		1276		88,0	
5		0,34		110		7,58		320		22,06		520		35,86		840		57,93		1300		89,66		
	7,3	0,5			116,0		8,0		326,3		22,5		522,0		36,0		855,5		59,0		1305		90,0	
10		0,69		120		8,27		330		22,75		530		36,55		860		59,31		1350		93,08		
	14,5	1,0			123,3		8,5		333,5		23,0		536,5		37,0		870,0		60,0		1378		95,0	
15		1,03		130		8,96		340		23,44		540		37,24		880		60,69		1400		96,55		
	18,9	1,3			130,5		9,0		348,0		24,00		543,8		37,5		899,0		62,0		1407		97,0	
20		1,38		140		9,65		350		24,13		550		37,92		900		62,06		1450		100,00		
	21,8	1,5			145,0		10,00		355,3		24,5		551,0		38,0		913,5		63,0		1479		102,0	
25		1,72		150		10,34		360		24,82		560		38,62		920		63,45		1500		103,45		
	29,0	2,0			159,5		11,0		362,5		25,0		565,5		39,0		928,0		64,0		1523		105,0	
30		2,07		160		11,03		370		25,51		570		39,31		940		64,83		1550		106,87		
	33,4	2,3			166,8		11,5		377,0		26,00		572,8		39,5		942,5		65,0		1595		110,0	
35		2,41		170		11,72		380		26,20		580		40,00		960		66,21		1600		110,32		
	36,3	2,5			174,0		12,0		384,3		26,5		587,3		40,5		971,5		67,0		1624		112,0	
40		2,76		180		12,41		390		26,89		590		40,69		980		67,59		1650		113,77		
	43,5	3,0			188,5		13,0		391,5		27,0		594,5		41,0		986,0		68,0		1668		115,0	
45		3,10		190		13,10		400		27,85		600		41,37		1000		68,95		1700		117,22		
	47,9	3,3			195,8		13,5		406,0		28,0		609,0		42,0		1015		70,0		1711		118,0	
50		3,45		200		13,79		410		28,27		620		42,76		1020		70,34		1750		120,66		
	50,8	3,5			203,0		14,0		413,3		28,5		623,5		43,0		1029		71,0		1784		123,0	
55		3,79		210		14,48		420		28,96		640		44,14		1040		71,72		1800		124,11		
	58,0	4,0			217,5		15,0		420,5		29,0		652,5		45,0		1044		72,0		1813		125,0	
60		4,14		220		15,17		430		29,65		660		45,52		1060		73,10		1850		127,56		
	62,4	4,3			224,8		15,5		435,0		30,0		667,0		46,0		1073		74,0		1885		130,0	
65		4,48		230		15,86		440		30,34		680		46,90		1080		74,48		1900		131,01		
	65,3	4,5			232,0		16,0		449,5		31,0		696,0		48,0		1088		75,0		1929		133,0	
70		4,83		240		16,55		450		31,03		700		48,27		1100		75,86		1950		134,45		
	72,5	5,0			246,5		17,0		456,8		31,5		710,5		49,0		1117		77,0		1958		135,0	
75		5,17		250		17,24		460		31,72		720		49,66		1120		77,24		2000		137,90		
	79,8	5,5			253,8		17,5		464,0		32,0		725,0		50,0		1131		78,0		2030		140,0	
80		5,52		260		17,93		470		32,41		740		51,03		1140		78,62		2050		141,35		
	82,7	5,7			261,0		18,0		478,5		33,0		754,0		52,0		1146		79,0		2074		143,0	
85		5,86		270		18,62		480		33,10		760		52,41		1160		80,00		2100		144,80		
	87,0	6,0			275,5		19,0		485,8		33,5		768,5		53,0		1175		81,0		2103		145,0	
90		6,21		280		19,31		490		33,79		780		53,79		1180		81,38		2150		148,24		
	94,3	6,5			282,8		19,5		493,0		34,0		797,5		55,0		1189		82,0		2175		150,0	
95		6,55		290		20,00		500		34,48		800		55,16		1200		82,76		2200		151,69		
	97,2	6,7			297,3		20,5		507,5		35,0		812		56,0		1233		85,0		2320		160,0	
100		6,9		300		20,69																		
	101,5	7,0			304,5		21,0																	

Conversion Factors

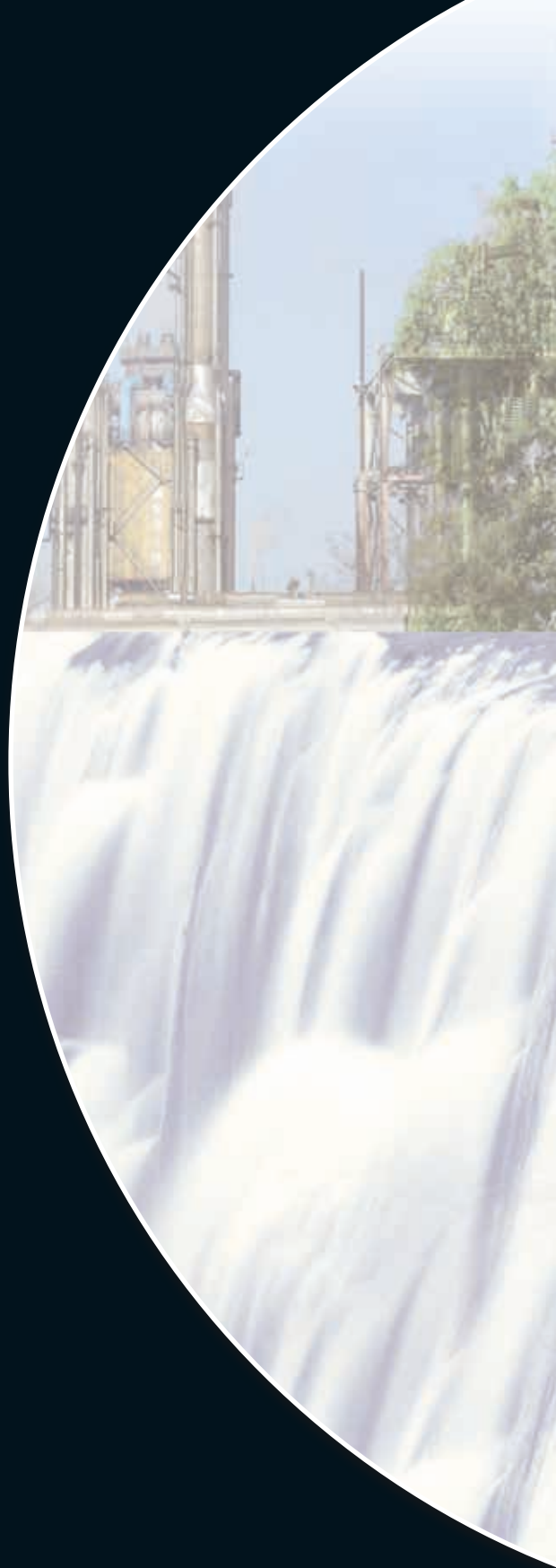
Units of measurement								
Pa	KPa	MPa	bar	kg/cm ²	atm	mm H ₂ O	mm Hg (Torr)	lbf/in ² (psi)
1	0,001	1 x 10 ⁻⁶	1 x 10 ⁻⁵	1,01972 x 10 ⁻⁵	9,86923 x 10 ⁻⁶	0,101972	7,50062 x 10 ⁻³	1,450377 x 10 ⁻⁴
1000	1	0,001	0,01	0,0101972	9,86923 x 10 ⁻³	101,972	7,50062	0,1450377
1 x 10 ⁶	1000	1	10	10,1972	9,86923	1,01972 x 10 ⁵	7500,62	145,0377
1 x 10 ⁵	100	0,1	1	1,01972	0,986923	1,01972 x 10 ⁴	750,062	14,50377
9,80665 x 10 ⁴	98,0665	0,0980665	0,980665	1	0,967841	10000	735,559	14,22334
1,01325 x 10 ⁵	101,325	0,101325	1,01325	1,03323	1	10332,3	760,000	14,69595
9,80665	9,80665 x 10 ⁻³	9,80665 x 10 ⁻⁶	9,80665 x 10 ⁻⁵	0,0001	9,67841 x 10 ⁻⁵	1	0,0735559	0,001422334
133,322	0,133322	1,33222 x 10 ⁻⁴	0,00133322	0,00135951	0,00131579	13,5951	1	0,01933678
6894,76	6,89476	0,00689476	0,0689476	0,0703070	0,0680460	703,070	51,7149	1

Properties of Saturated Steam

Absolute Pressure	Saturation Temperature	Steam Volume	Steam Density	Sensible Heat	Total Steam Heat	Latent Heat
p MPa	t _s °C	v ^{''} m ³ /kg	ρ ^{''} kg/m ³	h ['] kJ/kg	h ^{''} kJ/kg	r = h ^{''} - h ['] kJ/kg
0,1	99,63	1,6940	0,5904	417,51	2.675,4	2.257,9
0,15	111,37	1,1590	0,8628	467,13	2.693,4	2.226,3
0,2	120,23	0,8854	1,1290	504,70	2.706,3	2.201,6
0,25	127,43	0,7184	1,3920	535,34	2.716,4	2.181,1
0,3	133,54	0,6056	1,6510	561,43	2.724,7	2.163,3
0,35	138,87	0,5240	1,9080	584,27	2.731,6	2.147,3
0,4	143,62	0,4622	2,1630	604,67	2.737,6	2.132,9
0,45	147,92	0,4138	2,4170	623,16	2.742,9	2.119,7
0,5	151,84	0,3747	2,6690	640,12	2.747,5	2.107,4
0,55	155,46	0,3426	2,9200	655,78	2.751,7	2.095,9
0,6	158,84	0,3155	3,1700	670,42	2.755,5	2.085,1
0,65	161,99	0,2925	3,4190	684,12	2.758,8	2.074,7
0,7	164,96	0,2727	3,6670	697,06	2.762,0	2.064,9
0,75	167,75	0,2554	3,9150	709,29	2.764,8	2.055,5
0,8	170,41	0,2403	4,1620	720,94	2.767,5	2.046,6
0,85	172,94	0,2268	4,4090	732,02	2.769,9	2.037,9
0,9	175,36	0,2148	4,6550	742,64	2.772,1	2.029,5
0,95	177,66	0,2040	4,9010	752,81	2.774,2	2.021,4
1,0	179,88	0,1930	5,1470	762,61	2.776,2	2.013,6
1,1	184,07	0,1747	5,6370	781,13	2.779,7	1.998,6
1,2	187,96	0,1632	6,1270	798,43	2.782,7	1.984,3
1,3	191,61	0,1511	6,6170	814,70	2.785,4	1.970,7
1,4	195,04	0,1407	7,1060	830,08	2.787,8	1.957,7
1,5	198,29	0,1317	7,5960	844,67	2.789,9	1.945,2
1,6	201,37	0,1237	8,0850	858,56	2.791,7	1.933,1
1,7	204,31	0,1166	8,5750	871,84	2.793,4	1.921,6
1,8	207,11	0,1103	9,0650	884,58	2.794,8	1.910,2
1,9	209,80	0,1047	9,5550	896,81	2.796,1	1.899,3
2,0	212,37	0,0996	10,0500	908,59	2.797,2	1.888,6
2,2	217,24	0,0907	11,0300	930,95	2.799,1	1.868,2
2,4	221,78	0,0832	12,0200	951,93	2.800,4	1.848,5
2,6	226,04	0,0769	13,0100	971,72	2.801,4	1.829,7
2,8	230,05	0,0714	14,0100	990,48	2.802,0	1.811,5
3,0	233,84	0,0666	15,0100	1.008,40	2.802,3	1.793,9
3,2	237,45	0,0624	16,0200	1.025,40	2.802,3	1.776,9
3,4	240,88	0,0587	17,0300	1.041,80	2.802,1	1.760,3
3,6	244,16	0,0554	18,0500	1.057,60	2.801,7	1.744,1
3,8	247,31	0,0524	19,0700	1.072,70	2.801,1	1.728,4
4,0	250,33	0,0498	20,1000	1.087,40	2.800,3	1.712,9
5,0	263,91	0,0394	25,3600	1.154,50	2.794,2	1.639,7
6,0	275,55	0,0324	30,8300	1.213,70	2.785,0	1.571,3
7,0	285,79	0,0274	36,5300	1.267,40	2.773,5	1.506,1
8,0	294,97	0,0235	42,5100	1.317,10	2.759,9	1.442,8
9,0	303,31	0,0205	46,7900	1.363,70	2.744,6	1.380,9
10,0	310,96	0,0180	55,4300	1.408,00	2.727,7	1.319,7
11,0	318,05	0,0160	62,4800	1.450,60	2.709,3	1.258,7
12,0	324,65	0,0143	70,0100	1.491,80	2.689,2	1.197,4
13,0	330,83	0,0128	78,1400	1.532,00	2.667,0	1.135,0
14,0	336,64	0,0115	86,9900	1.571,60	2.642,4	1.070,8
15,0	342,13	0,0103	86,7100	1.611,00	2.615,0	1.004,0
16,0	347,33	0,0093	107,4000	1.650,50	2.584,9	934,4
17,0	352,26	0,0084	119,5000	1.691,70	2.551,6	859,9
18,0	356,96	0,0075	133,4000	1.734,80	2.513,9	779,1
19,0	361,43	0,0067	149,8000	1.778,70	2.470,6	691,9
20,0	365,70	0,0059	170,2000	1.826,50	2.418,4	591,9
22,0	373,69	0,0037	268,3000	2.011,10	2.195,6	184,5
22,12	374,15	0,0032	315,5000	2.107,40	2.107,4	0,0



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