

# 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 CO<sub>2</sub> 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.

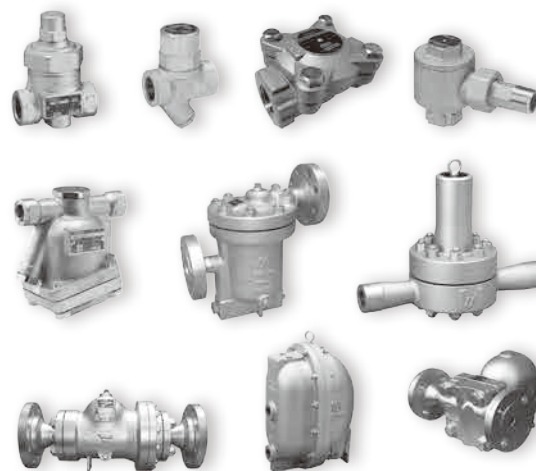
To emphasize the growing international activities of MIYAWAKI Inc., in June 1991 the subsidiary company MIYAWAKI GmbH was established in Germany. Later a joint venture in Russia had been opened. In April 2018, the subsidiary company MIYAWAKI WEST Co., Ltd was established in China. During the last decade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



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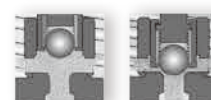
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In the interest of the development and improvement of our products, MIYAWAKI Inc. reserves the right to change the specification of the products.

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# 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:

1. 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.

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

# Ball Float Steam Traps

## SERIES G

**Ball Float Steam Traps** belong to the family of mechanical traps. They operate on the difference in density between steam and water. A ball float is connected with a lever to the valve and seat or it is floating freely inside the valve body. Condensate will be discharged once it reaches a certain level inside the trap. Condensate is discharged continuously.

<b>Models</b>	<b>G11N, G12N</b>	Cast Iron Steam Traps for small and medium condensate loads
	<b>G15N</b>	Cast Iron Steam Trap for low pressure and large condensate loads
	<b>G3N, G5</b>	Ductile Cast Iron Steam Traps for large condensate loads
	<b>G2-G8</b>	Cast Iron Steam Traps for large condensate loads
	<b>G20N</b>	Ductile Cast Iron Steam Trap for medium condensate loads
	<b>GH3N, GH5, GH2-GH8, GH50, GH60, GH70</b>	Cast Steel Steam Traps for large condensate loads
	<b>GH40, GTH12</b>	Cast Steel Steam Traps for medium condensate loads
	<b>GC1, GC1V</b>	Stainless Steel Steam Traps for small condensate loads
	<b>GC20</b>	Stainless Steel Steam Trap for medium condensate loads

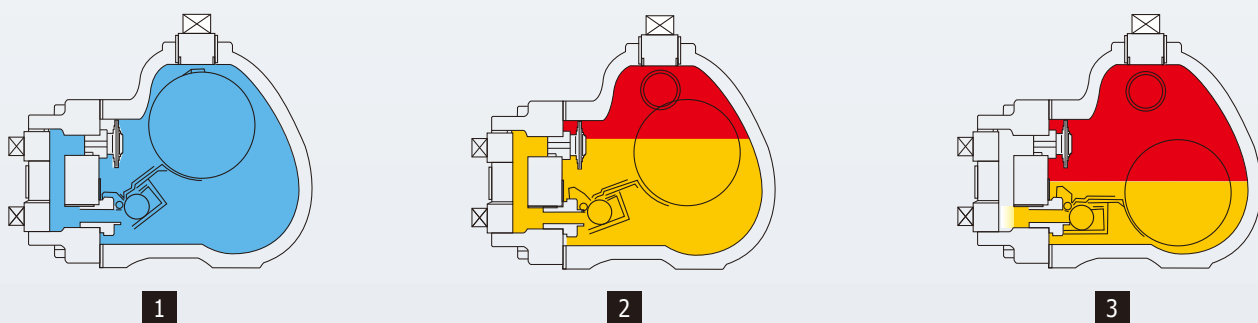
- Features**
- All traps are equipped with stainless steel wear and corrosion resistant float, lever, valve and seat systems for a long and problem free operation.
  - Each ball float steam trap is equipped with an air vent for venting air and gases at the time of start-up and during operation.
  - The large capacity steam traps like G2-G8, GH2-GH8 use a double ported balance valve system, which is small in its physical size compared with the very high capacity of the traps.
  - All traps are designed for quick and easy maintenance.

## Application

Ball Float Steam Traps can be used in all process applications, like all kind of heat exchangers, tank and unit heaters and others, where condensate must be removed immediately after it forms.

The type GC1 is especially designed for applications in the food, pharmaceutical and other industries with small condensate loads and the need for stainless steel bodies. It can be also installed for drainage of steam main lines.

## Operating principle

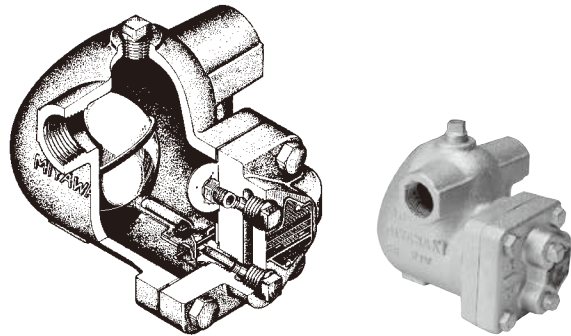


On start-up air is quickly discharged through the thermostatic air vent (membrane or bimetal type). Cold condensate fills the steam trap body. As soon as a certain water level is reached, the float rises and opens the valve. The cold condensate is discharged through the open valve and the open air vent.

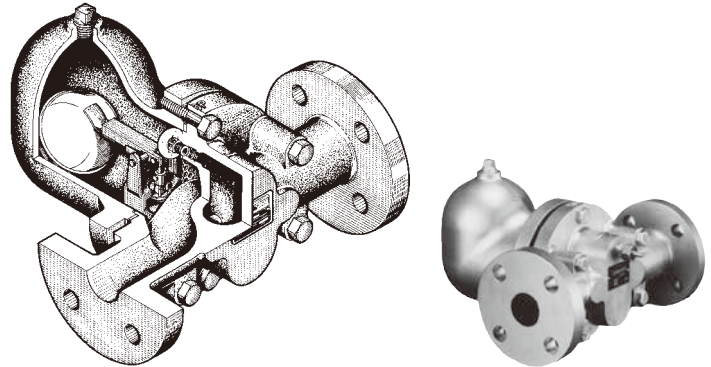
When the condensate reaches saturation temperature, the air vent closes and condensate is discharged only through the main valve orifice. The condensate forms a water seal inside the trap body, which prevents live steam loss at all times.

The opening degree of the valve is regulated by the water level inside the trap body. Condensate is discharged continuously. As long as air enters the trap and accumulates at the top of the trap body, the temperature cools down a little bit and the air vent, which opens slightly below saturation temperature, begins to discharge the air from the trap.

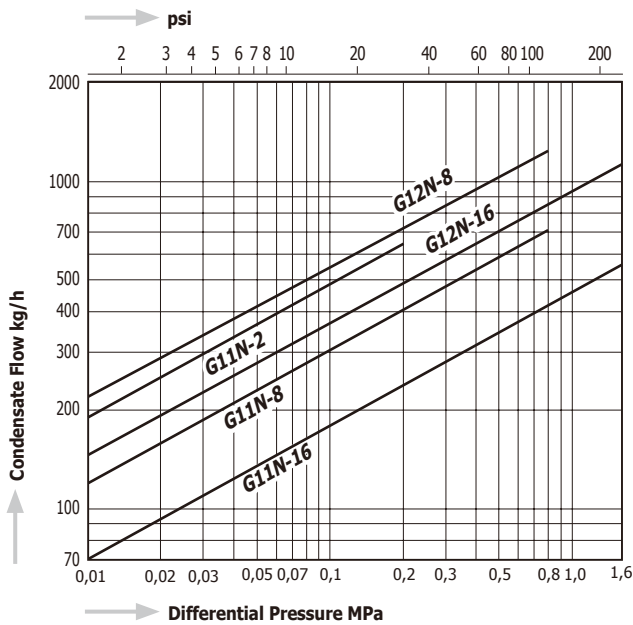
# G11N, G12N



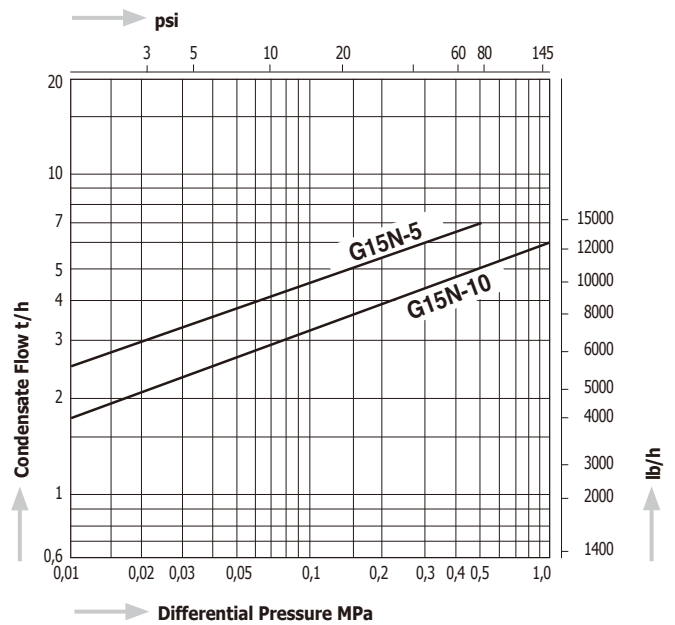
# G15N



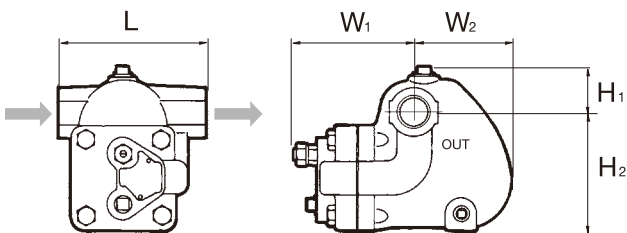
Capacity Chart G11N, G12N



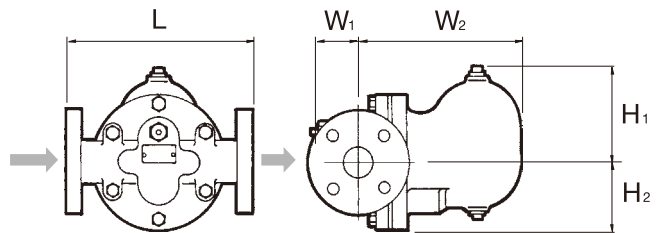
Capacity Chart G15N



Dimensions G11N, G12N



G15N

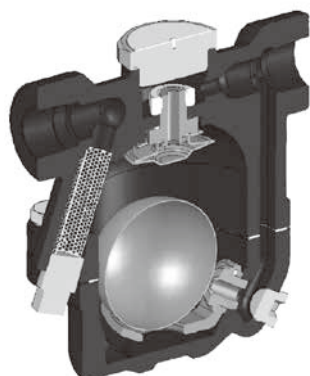


Model	Connections	Size	Max. Operating Pressure		Max. Operating Temperature		Dimensions (mm)					Dimensions (in)					Body Material	Weight			
			MPa	psig	°C	°F	L	H <sub>1</sub>	H <sub>2</sub>	W <sub>1</sub>	W <sub>2</sub>	L	H <sub>1</sub>	H <sub>2</sub>	W <sub>1</sub>	W <sub>2</sub>		kg	lb		
G11N - 2 8 16	Screwed Rc, NPT	1/2", 3/4"	0,2	29	220	428	120	37	92	97	60	4.7	1.5	3.6	3.8	2.4	Cast Iron FC250	3,9	8.6		
			0,8	116																	
			1,6	230																	
G12N - 8 16	Screwed Rc, NPT	3/4", 1"	0,8	116	220	428	140	47	113	102	92	5.5	1.9	4.4	4.0	3.6				6,0	13.2
			1,6	230																	
G15N - 5 10	Flanged JIS, ASME, DIN	1 1/4" - 2"	0,5	73	220	428	300	130	90	30	230	11.8	5.1	3.5	1.2	9.1				20,0	44.0
			1,0	145																	

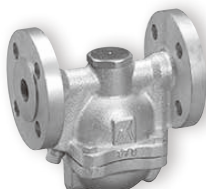
For G11N and G12N, flanged connection is available as special design. Please contact MIYAWAKI Inc. or an authorized representative.

# G20N

# GC20



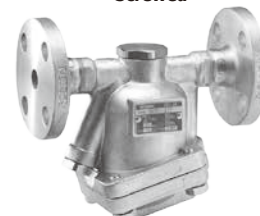
Screwed



Flanged Connection

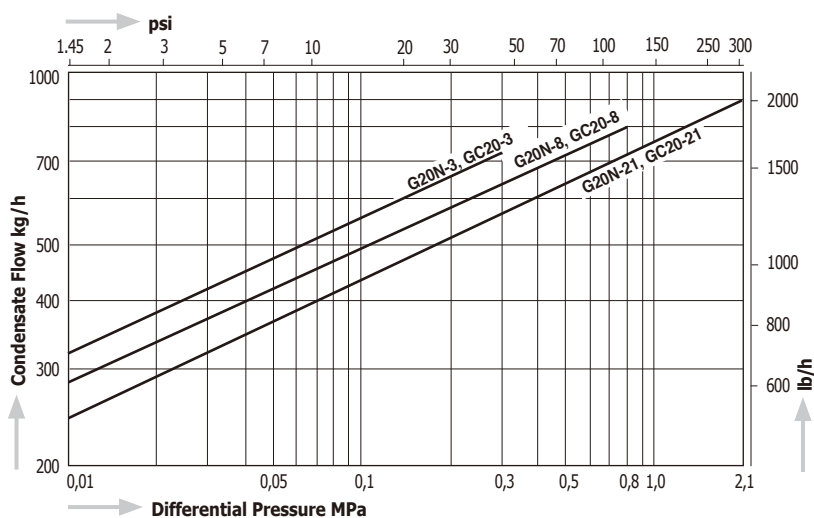


Screwed

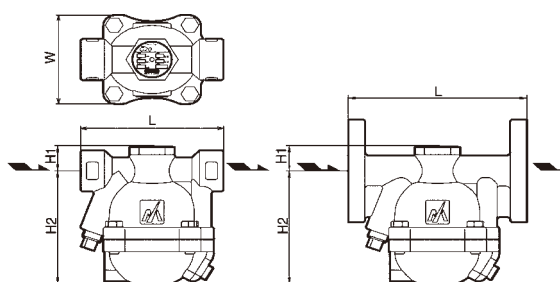


Flanged Connection

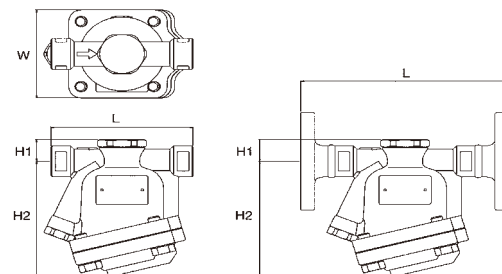
## Capacity Chart G20N / GC20



## Dimensions G20N



## Dimensions GC20



## Available versions G20N / GC20

### Max. Operating Pressure:

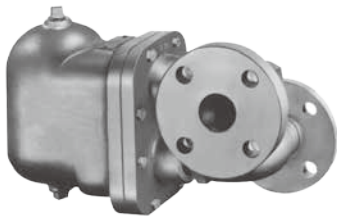
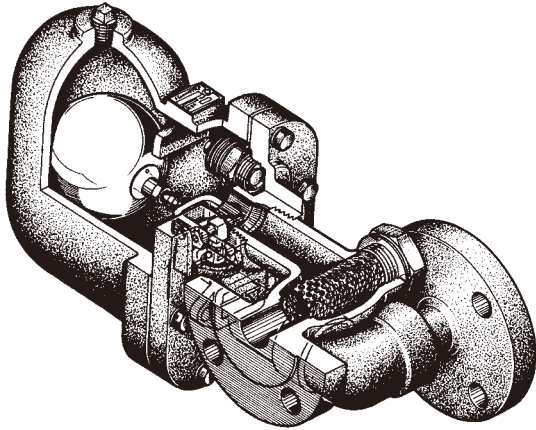
- G20N (GC20)- 3      0,3 MPa (43 psig)
- G20N (GC20)- 8      0,8 MPa (116 psig)
- G20N (GC20)- 21    2,1 MPa (305 psig)

Model	Connections	Size	Max. Operating Pressure, PMO		Max. Operating Temperature, TMO		Dimensions (mm)				Dimensions (in)				Body Material	Weight						
			MPa	psig	°C	°F	L	H <sub>1</sub>	H <sub>2</sub>	W	L	H <sub>1</sub>	H <sub>2</sub>	W		kg	lb					
<b>G20N</b>	Screwed Rc, NPT	1/2"	2,1	305	220	428	120	24	105	82	4.7	1.0	4.1	3.2	Ductile Cast Iron FCD450	2,5	5.5					
		3/4"							105				4.1			2,5	5.5					
		1"							107				4.2			2,6	5.7					
<b>G20NF</b>	Flanged JIS, ASME	1/2"					150	24	105	82	5.9	5.9	1.0	4.1		3.2	3,7*	8.1*				
		3/4"					150										4,2*	9.2*				
		1"					160										6.3	4,8*	10.6*			
	Flanged DIN	DN15					150				5.9						3,7	8.1				
		DN20					150				5.9						4,2	9.2				
		DN25					160				6.3						4,8	10.6				
<b>GC20</b>	Screwed Rc, NPT	1/2"					2,1	305	220	428	120	21	113	86		4.7	0.8	4.4	3.4	Stainless Steel SCS13A	2,4	5.3
		3/4"											175					6.9			2,4	5.3
		1"											195					7.7			2,5	5.5
<b>GC20F</b>	Flanged JIS, ASME	1/2"	215	21	113	86					8.5	0.8	4.4	3.4	3,9*	8.6*						
		3/4"	150												5.9	5,0*	11.0*					
		1"	215												8.5	5,8*	12.8*					
	Flanged DIN	DN15	150								5.9				3,4	7.5						
		DN20	150								5.9				3,9	8.6						
		DN25	160								6.3				4,6	10.1						

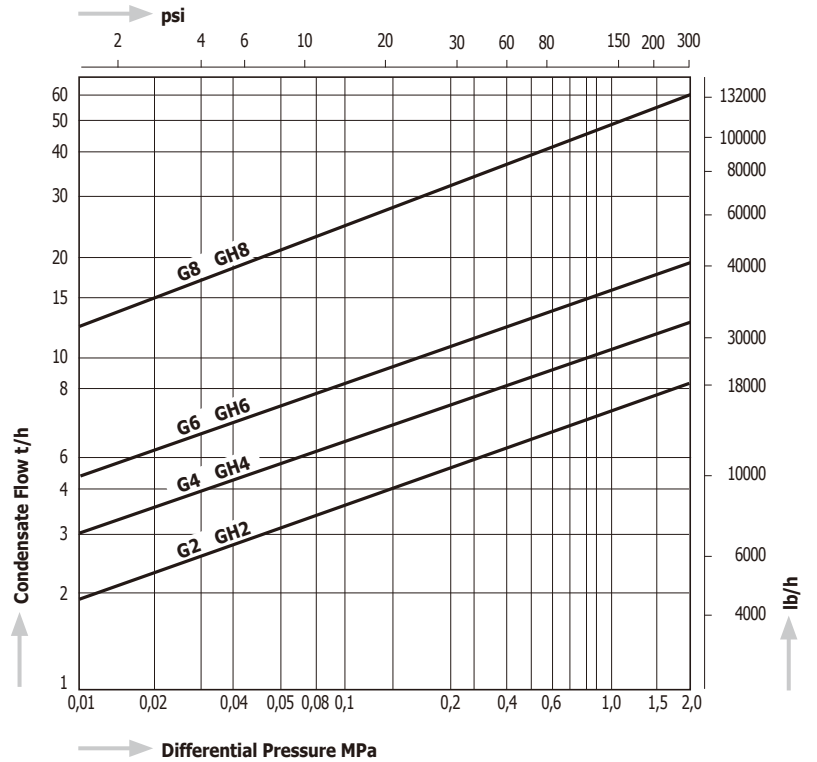
\*Depending on the flange rating the weight may differ.



# G2, G4, G6, G8 GH2, GH4, GH6, GH8



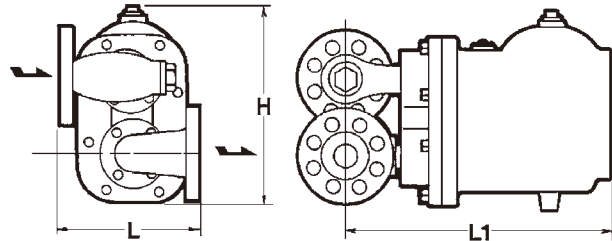
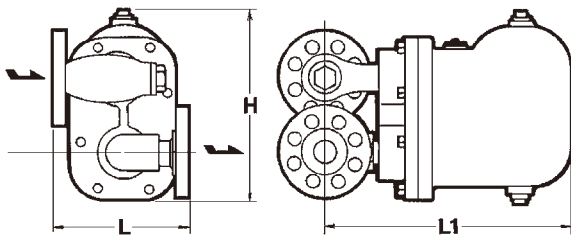
Capacity Chart



Dimensions

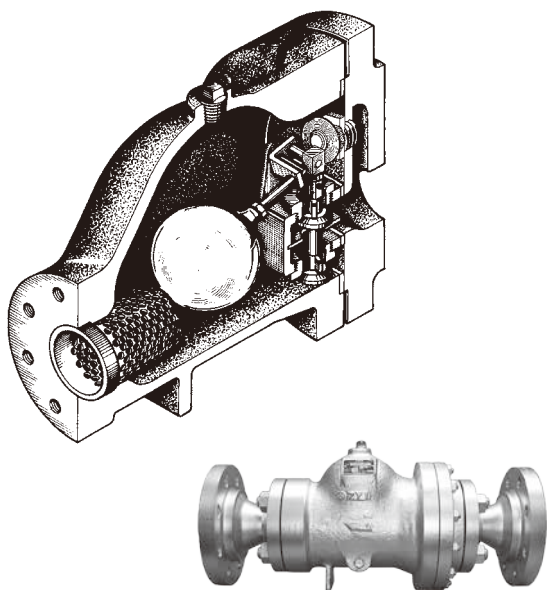
G2 / GH2

G4, G6, G8 / GH4, GH6, GH8

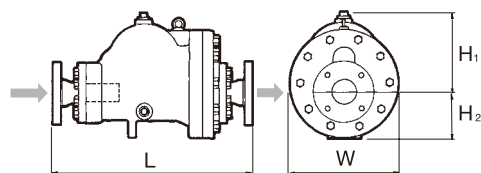


Model	Connections	Size	Max. Operating Pressure		Max. Operating Temperature		Dimensions (mm)			Dimensions (in)			Body Material	Weight	
			MPa	psig	°C	°F	L	L <sub>1</sub>	H	L	L <sub>1</sub>	H		kg	lb
G2 G4 G6 G8	Flanged JIS, ASME, DIN	1"	1,6	230	220	428	175	310	250	6.9	12.2	9.8	Cast Iron FC250	21	46.2
		180					7.1								
		190					7.5								
		200					7.9								
		270					10.6								
GH2 GH4 GH6 GH8	Flanged JIS, ASME, DIN	1" - 1½"	2,0	290	400	752	200	310	235	7.9	12.2	9.1	Cast Steel SCPH2	24	52.8
		210					8.3								
		200					7.9								
		270					10.6								
		350					13.8								

# G3N, G5 GH3N, GH5



Dimensions **G3N-R, G5-R, GH3N-R, GH5-R**



Capacity Chart

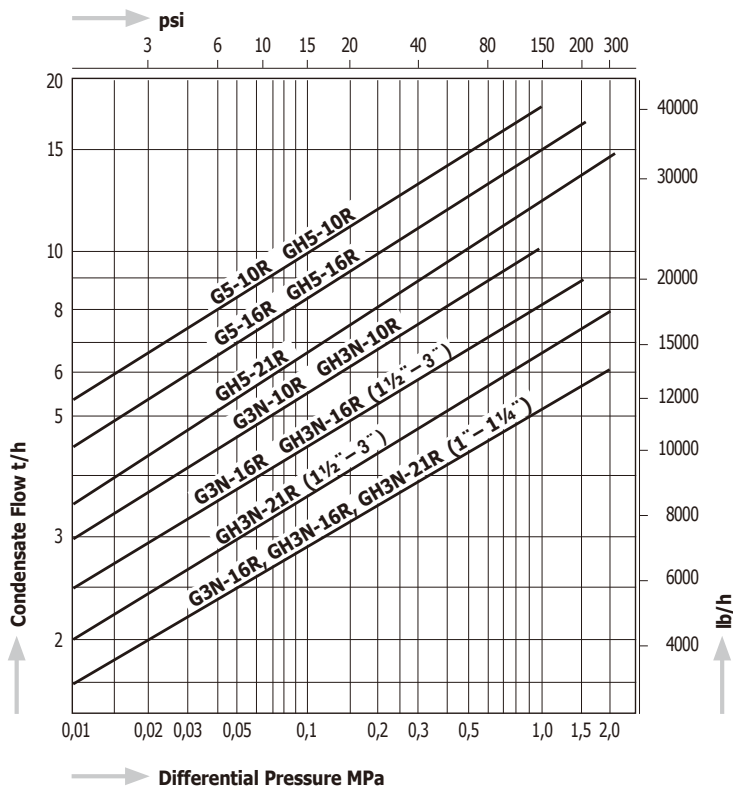


Table 1: Dimensions (ASME and DIN)

Model	Size	Flange Standards		L (mm)	L (in)
G3N-R	1" - 1½"	ASME 150 lb / 300 lb RF	DIN PN16 (DN25 / DN32 / DN40)	437	17.2
	2"		DIN PN16 (DN50)	467	18.4
	2½", 3"		DIN PN16 (DN65 / DN80)	497	19.6
GH3N-R	1" , 1¼"	ASME 150 lb / 300 lb RF	DIN PN40 (DN25 / DN32)	457	18.0
	1½"		DIN PN40 (DN40)	477	18.8
	2"		DIN PN40 (DN50)	487	19.2
	2½", 3"		DIN PN40 (DN65 / DN80)	517	20.4
G5-R	2"	ASME 150 lb / 300 lb RF	DIN PN16 (DN50)	540	21.3
	2½", 3"		DIN PN16 (DN65 / DN80)	570	22.4
	4"		DIN PN16 (DN100)	600	23.6
GH5-R	2"	ASME 150 lb / 300 lb RF	DIN PN40 (DN50)	550	21.7
	2½", 3"		DIN PN40 (DN65 / DN80)	580	22.8
	4"		DIN PN40 (DN100)	620	24.4

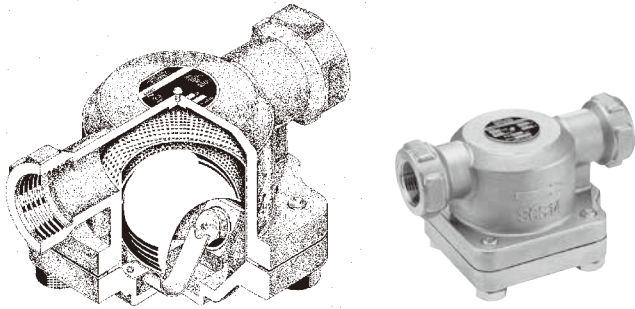
Model	Connections	Size	Max. Operating Pressure		Max. Operating Temperature		Dimensions (mm)				Dimensions (in)			Body Material	Weight										
			MPa	psig	°C	°F	L	H <sub>1</sub>	H <sub>2</sub>	W	H <sub>1</sub>	H <sub>2</sub>	W		kg	lb									
G3N - 10R 16R	Flanged JIS, ASME, DIN	1½" - 3"	1,0	145	235	455	Table 1 (*1)	140	95	198	5.5	3.7	7.8	Ductile Cast Iron FCD 450	28 - 31 (*2)		62 - 68 (*2)								
		1" - 3"	1,6	230											52 - 69 (*2)		114 - 152 (*2)								
G5 - 10R 16R		2" - 4"	1,0	145											205	110	270	8.1	4.3	10.6	38 - 50 (*2)		84 - 110 (*2)		
		2" - 4"	1,6	230																	63 - 80 (*2)		139 - 176 (*2)		
GH3N - 10R 16R 21R	Flanged JIS, ASME, DIN	1½" - 3"	1,0	145	400	752		Table 1 (*1)	139	106	212	5.5	4.2	8.3	Cast Steel SCPH2	38 - 50 (*2)		84 - 110 (*2)							
		1" - 3"	1,6	230												63 - 80 (*2)		139 - 176 (*2)							
GH5 - 10R 16R 21R		2" - 4"	1,0	145												200	115	270	7.9	4.5	10.6	38 - 50 (*2)		84 - 110 (*2)	
		2" - 4"	1,6	230																		63 - 80 (*2)		139 - 176 (*2)	
GH5 - 16R 21R	Flanged JIS, ASME, DIN	2" - 4"	2,1	305	400	752	Table 1 (*1)		200	115	270	7.9	4.5	10.6	Cast Steel SCPH2	38 - 50 (*2)		84 - 110 (*2)							
		2" - 4"	1,0	145												63 - 80 (*2)		139 - 176 (*2)							
GH5 - 16R 21R		2" - 4"	1,6	230												200	115	270	7.9	4.5	10.6	38 - 50 (*2)		84 - 110 (*2)	
		2" - 4"	2,1	305																		63 - 80 (*2)		139 - 176 (*2)	

(\*1) Please look at our technical drawings for JIS dimensions.

(\*2) Depending on size and flange standard the weight of the traps differs. Please, look at our technical drawings.

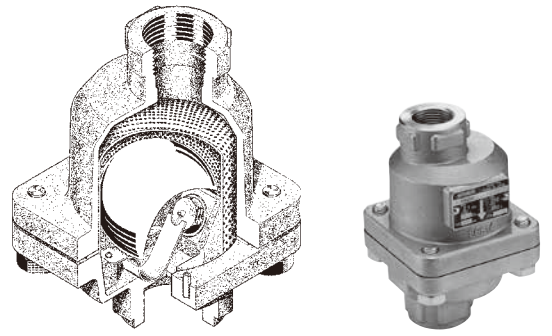
Stainless Steel as body material for GH3N and GH5 is available as special design. For more details, please contact MIYAWAKI Inc. or an authorized representative.

# GC1



Horizontal installation

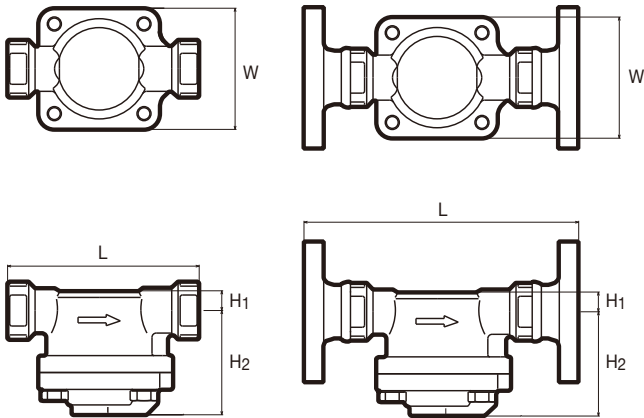
# GC1V



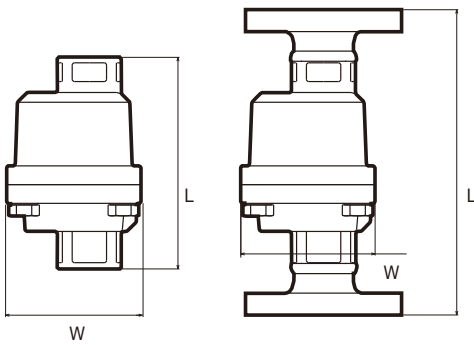
Vertical installation

## Dimensions

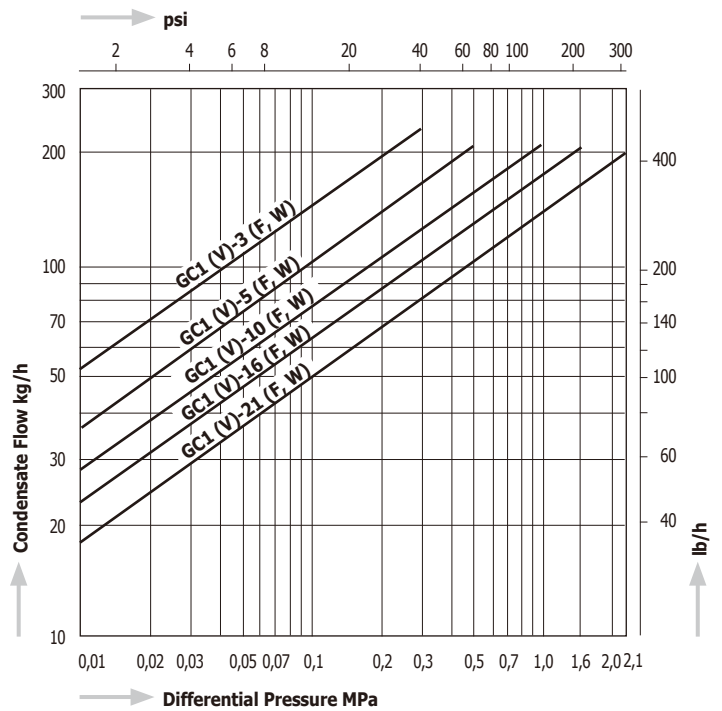
### GC1



### GC1V



## Capacity Chart GC1 / GC1V

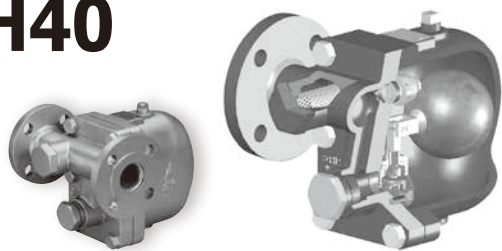


## Available pressure ranges GC1/GC1V

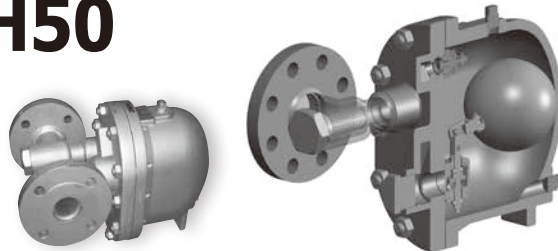
Model	Max. Operating Pressure	
	MPa	psig
<b>GC1 / GC1V - 21</b>	2,1	305
<b>GC1 / GC1V - 16</b>	1,6	230
<b>GC1 / GC1V - 10</b>	1,0	145
<b>GC1 / GC1V - 5</b>	0,5	72.5
<b>GC1 / GC1V - 3</b>	0,3	43.5

Model	Connections	Size	Max. Operating Pressure		Max. Operating Temperature		Dimensions (mm)				Dimensions (in)				Body Material	Weight	
			MPa	psig	°C	°F	L	H <sub>1</sub>	H <sub>2</sub>	W	L	H <sub>1</sub>	H <sub>2</sub>	W		kg	lb
<b>GC1 (GC1V)</b>	Screwed Rc, NPT	1/2"	2,1	305	350	662	127	15	75	86	5.0	0.6	3.0	3.4	Stainless Steel SCS13A	1,8	4.0
		3/4"					136				5.4					1,9	4.2
		1"					140				5.5					2,0	4.4
<b>GC1-W (GC1V-W)</b>	Socket Weld JIS, ASME, DIN	1/2"	2,1	305	350	662	127	15	75	86	5.0	0.6	3.0	3.4		1,8	4.0
		3/4"					136				5.4					1,9	4.2
		1"					140				5.5					2,0	4.4
<b>GC1-F (GC1V-F)</b>	Flanged JIS, ASME, DIN	1/2"	2,1	305	350	662	175	15	75	86	6.9	0.6	3.0	3.4	3,3	7.3	
		3/4"					195				7.7				4,5	9.9	
		1"					215				8.5				5,3	11.7	

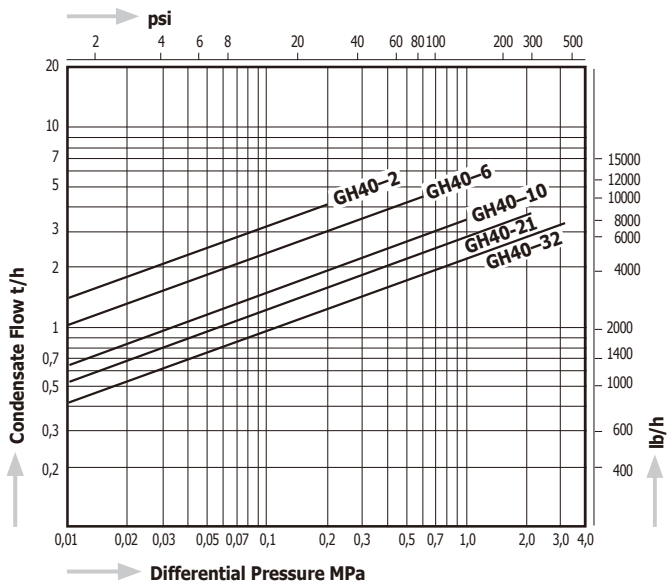
# GH40



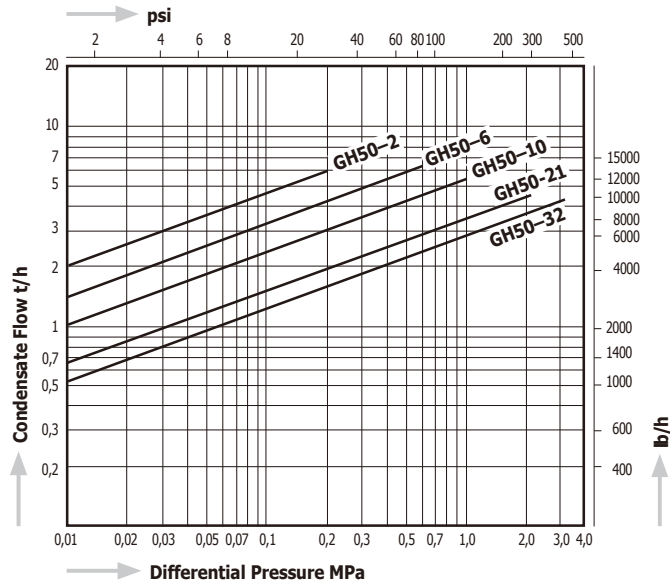
# GH50



Capacity Chart **GH40**

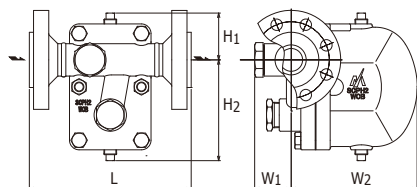


Capacity Chart **GH50**

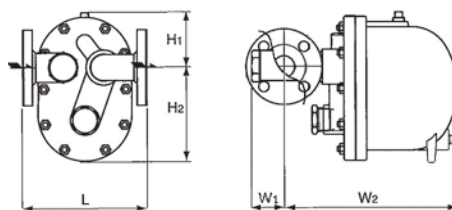


Dimensions

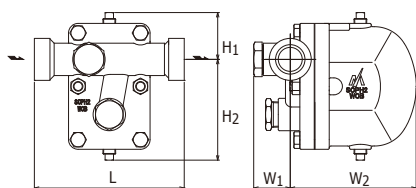
**GH40-F**



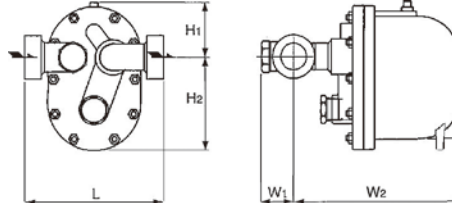
**GH50-F**



**GH40-W**



**GH50-W**



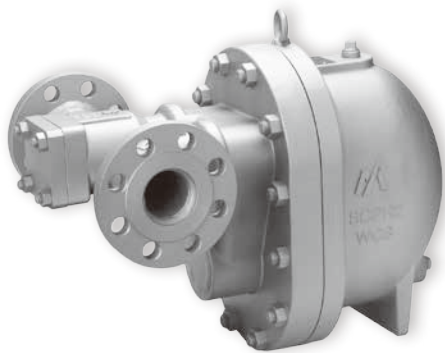
Model	Connections	Size	Max. Operating Pressure		Max. Operating Temperature, TMO		Dimensions (mm)					Dimensions (in)					Body Material	Weight	
			MPa	psig	°C	°F	L	H1	H2	W1	W2	L	H1	H2	W1	W2		kg	lb
<b>GH40 - F</b>	Flanged JIS, ASME, DIN	1½", 2"	3,2	464	400	752	230	80	170	60	210	9.1	3.15	6.7	2.4	8.3	Cast Steel SCPH2	24	53
<b>GH40 - W</b>	Socket Weld JIS, ASME, DIN	1½"					250	80	170	60	210	9.8	3.15	6.7	2.4	8.3		19	41.9
		2"					260	10.2	32	70.4									
<b>GH50 - F</b>	Flanged JIS, ASME, DIN	1½", 2"									230	107	173	60	330	9.1		4.2	6.8
<b>GH50 - W</b>	Socket Weld JIS, ASME, DIN	1½"					250	107	173	60	330	9.8	4.2	6.8	2.4	13.0	32	70.4	
		2"	260	10.2															

Available pressure ranges	Max. Operating Pressure (PMO)											
	MPa		psig		MPa		psig		MPa		psig	
	0,2	29	0,6	87	1,0	145	2,1	305	3,2	464		
Models	GH40-2F, GH40-2W GH50-2F, GH50-2W		GH40-6F, GH40-6W GH50-6F, GH50-6W		GH40-10F, GH40-10W GH50-10F, GH50-10W		GH40-21F, GH40-21W GH50-21F, GH50-21W		GH40-32F, GH40-32W GH50-32F, GH50-32W			

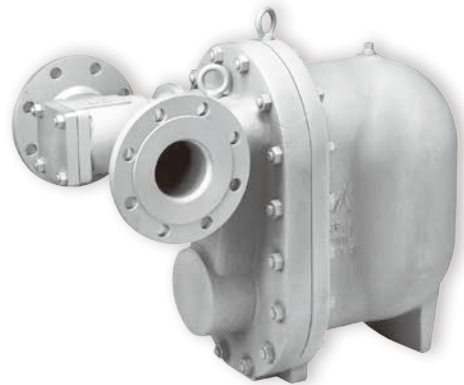
Depending on the flange standard the dimensions and the weight may differ.

Stainless Steel as body material is available as special design. For more details, please contact MIYAWAKI Inc. or an authorized representative.

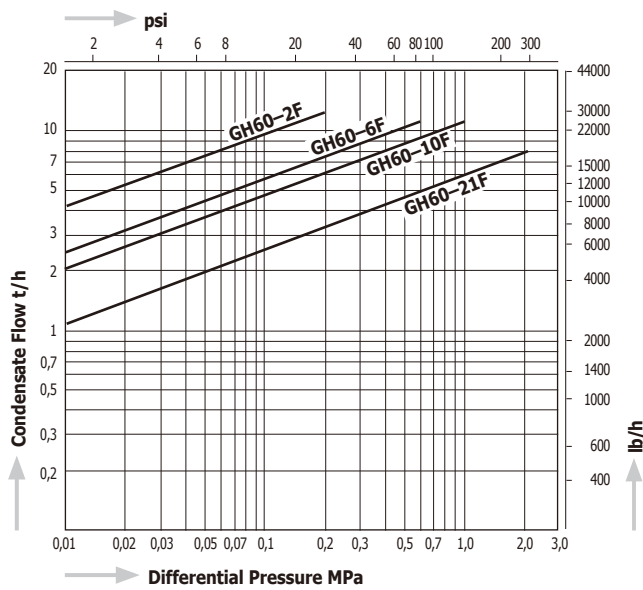
# GH60



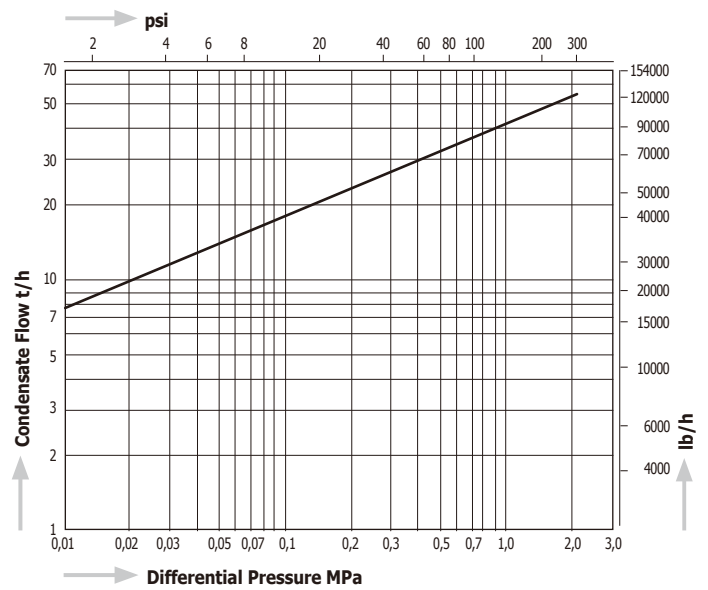
# GH70



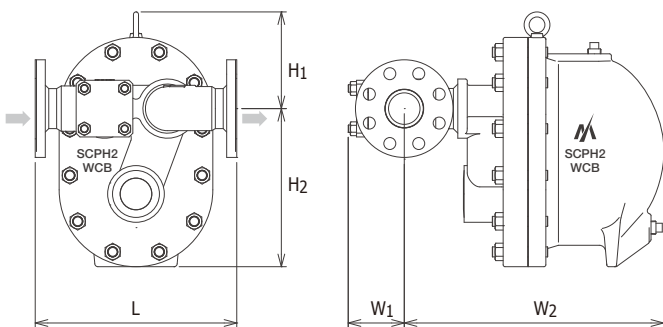
Capacity Chart GH60



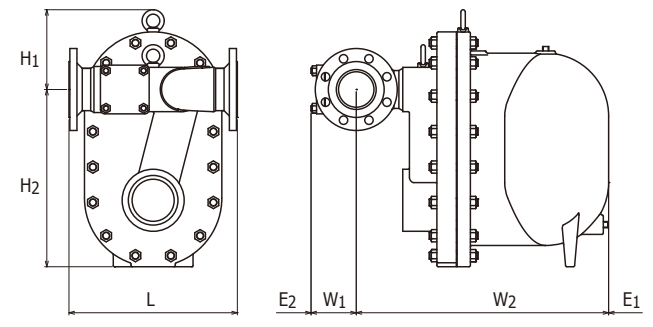
Capacity Chart GH70



Dimensions GH60



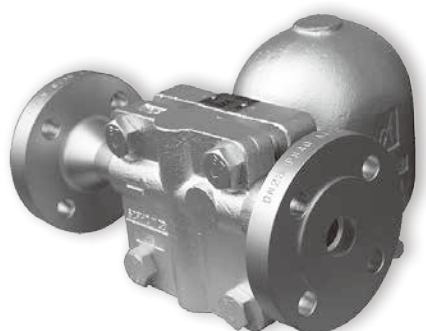
Dimensions GH70



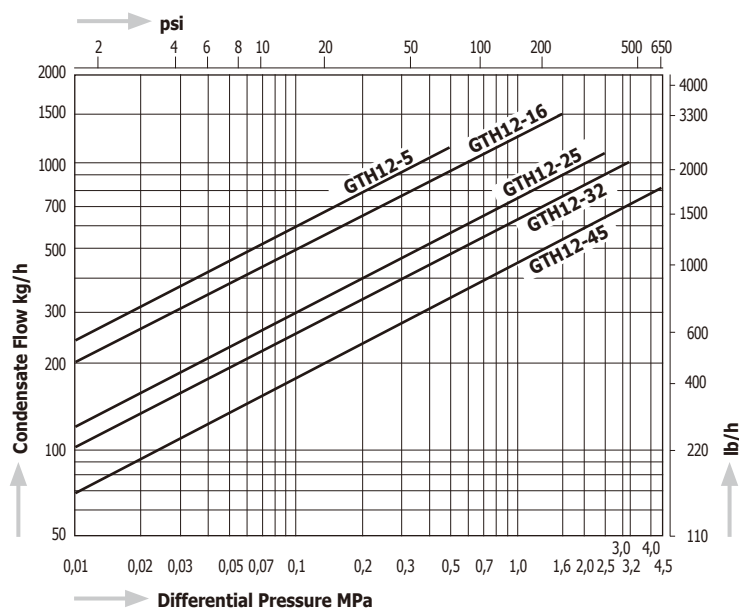
Model	Connect.	Size	Max. Operating Pressure		Max. Differential Pressure, PMX		Max. Operating Temperature, TMO		Dimensions (mm)								Dimensions (in)					Body Material	Weight	
			MPa	psig	MPa	psig	°C	°F	L	H1	H2	W1	W2	E1	E2	L	H1	H2	W1	W2	kg		lb	
GH60 -2F	Flanged JIS, ASME, DIN	2" - 2½"	0,2	29	0,2	29	400	752	320	155	250	90	410			12.6	6.1	9.8	3.5	16.1	Cast Steel SCPH2	75	165	
GH60 -6F			0,6	87	0,6	87																		
GH60 -10F			1,0	145	1,0	145																		
GH60 -21F			2,1	305	2,1	305																		
GH70 -21F	Flanged JIS, ASME, DIN	3"	2,1	305	2,1	305	400	752	380	180	400	105	570	330	120	15.0	7.1	15.7	4.1	22.4	Cast Steel SCPH2	160	352	
		4"																				164	352	

Stainless Steel as body material is available as special design. For more details, please contact MIYAWAKI Inc. or an authorized representative.

# GTH12

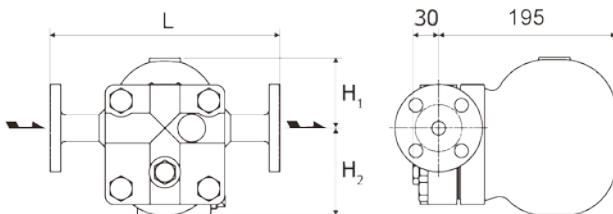


Capacity Chart GTH12

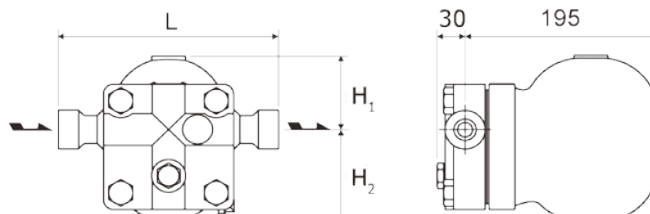


## Dimensions

**GTH12-F** Flanged



**GTH12** Screwed  
**GTH12-W** Socket Weld



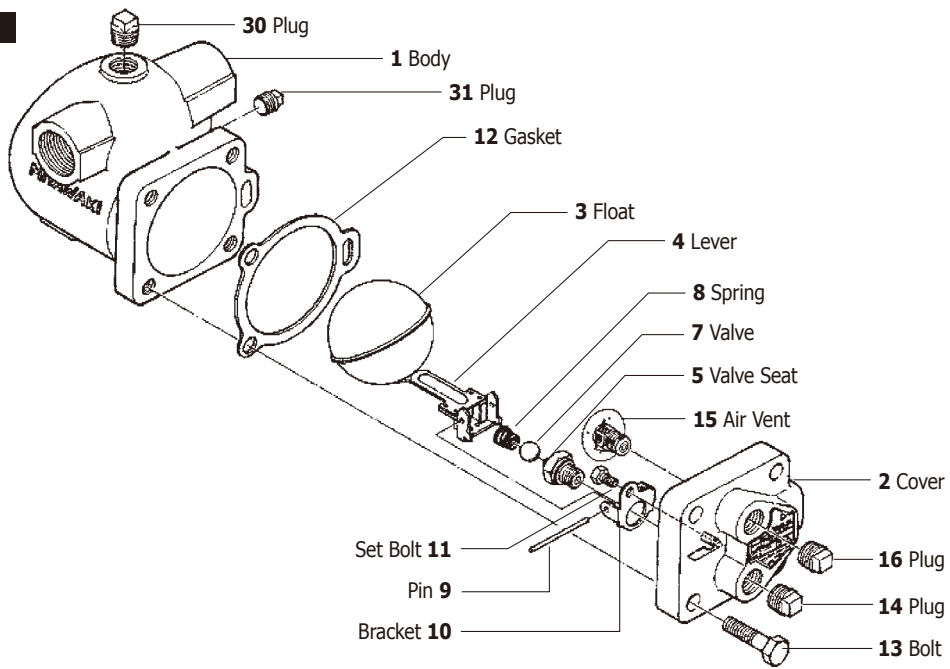
Model	Connections	Size	Max. Operating Pressure		Max. Differential Pressure, PMX		Max. Operating Temperature, TMO		Dimensions (mm)			Dimensions (in)			Body Material	Weight	
			MPa	psig	MPa	psig	°C	°F	L	H <sub>1</sub>	H <sub>2</sub>	L	H <sub>1</sub>	H <sub>2</sub>		kg	lb
<b>GTH12- 5</b>	Screwed Rc, NPT	½" - 1"	3,2 *	464 *	0,5	73	400 *	752 *	220	75	95	8.7	3.0	3.7	Cast Steel SCPH2	~ 11,7	~ 25.8
<b>GTH12- 16</b>					1,6	230											
<b>GTH12- 25</b>					2,5	363											
<b>GTH12- 32</b>					3,2	464											
<b>GTH12- 45</b>			5,0	725	4,5	652	425	800									
<b>GTH12- 5F</b>	Flanged JIS, ASME, DIN	½" - 1"	3,2 *	464 *	0,5	73	400 *	752 *	250	75	95	9.8	3.0	3.7		~ 15,2	~ 33.5
<b>GTH12- 16F</b>					1,6	230											
<b>GTH12- 25F</b>					2,5	360											
<b>GTH12- 32F</b>					3,2	464											
<b>GTH12- 45F</b>			5,0	725	4,5	652	425	800									
<b>GTH12- 5W</b>	Socket Weld JIS, ASME, DIN	½" - 1"	3,2 *	464 *	0,5	73	400 *	752 *	220	75	95	8.7	3.0	3.7	~ 11,7	~ 25.8	
<b>GTH12- 16W</b>					1,6	230											
<b>GTH12- 25W</b>					2,5	360											
<b>GTH12- 32W</b>					3,2	464											
<b>GTH12- 45W</b>			5,0	725	4,5	652	425	800									

\*PMO 5,0 MPa and TMO 425 °C is available as special design.

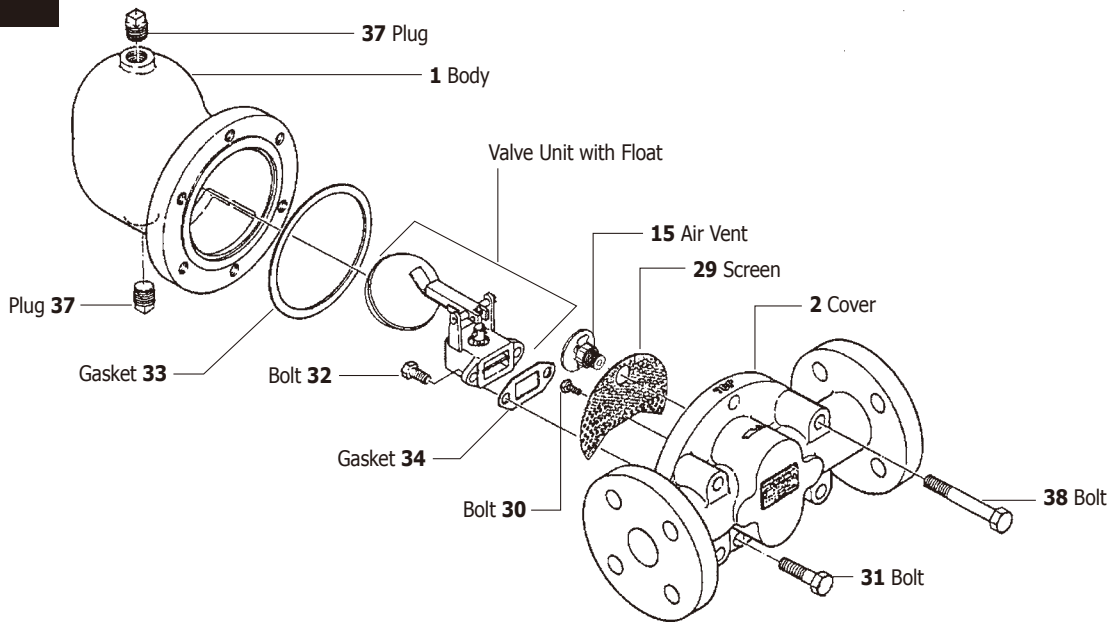
A vertical version and Stainless Steel as body material are available as special design.

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

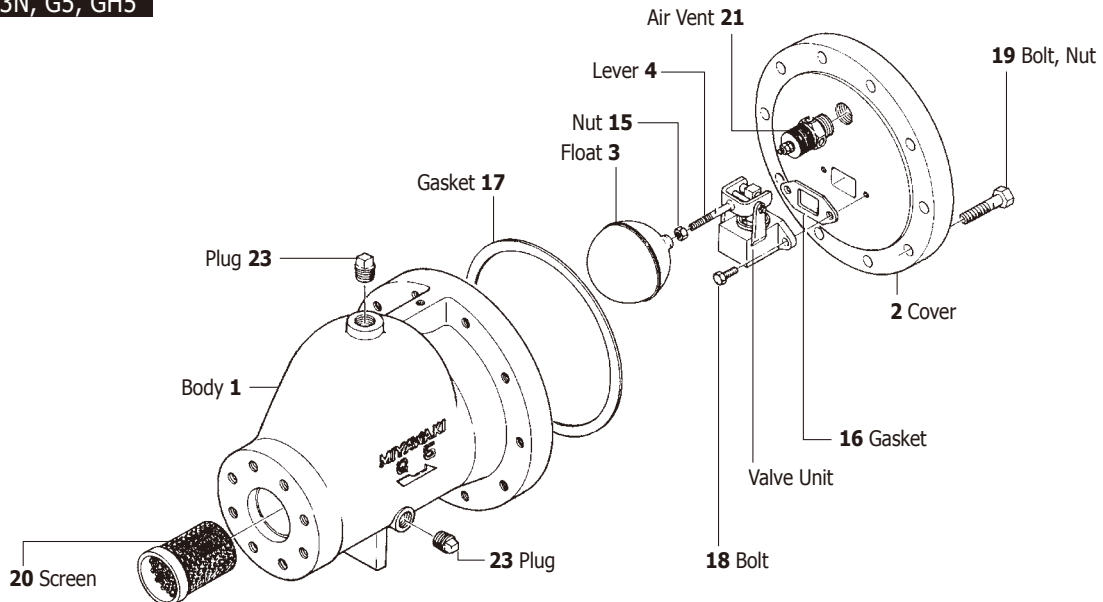
**G11N/G12N**



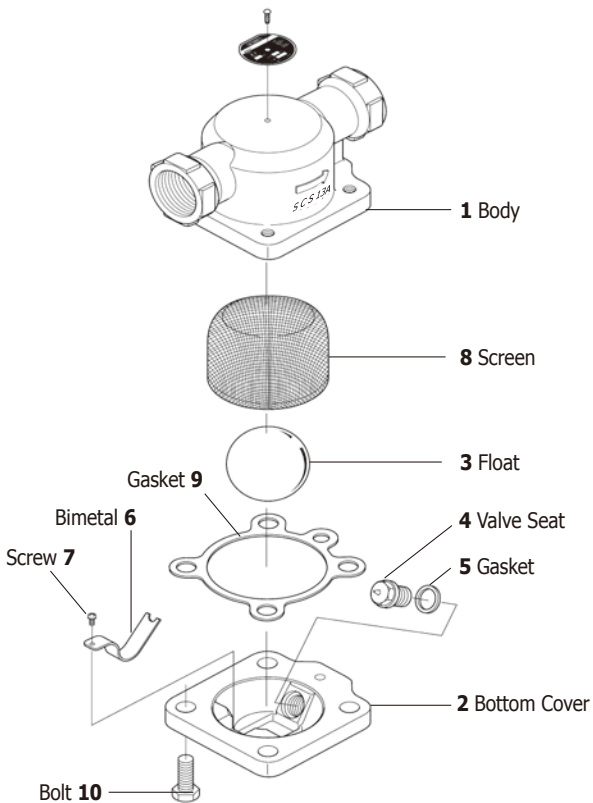
**G15N**



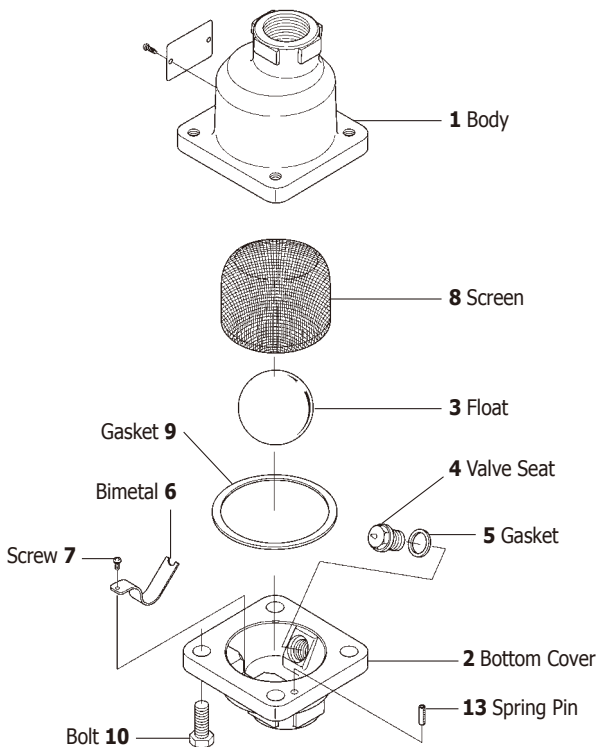
**G3N, GH3N, G5, GH5**



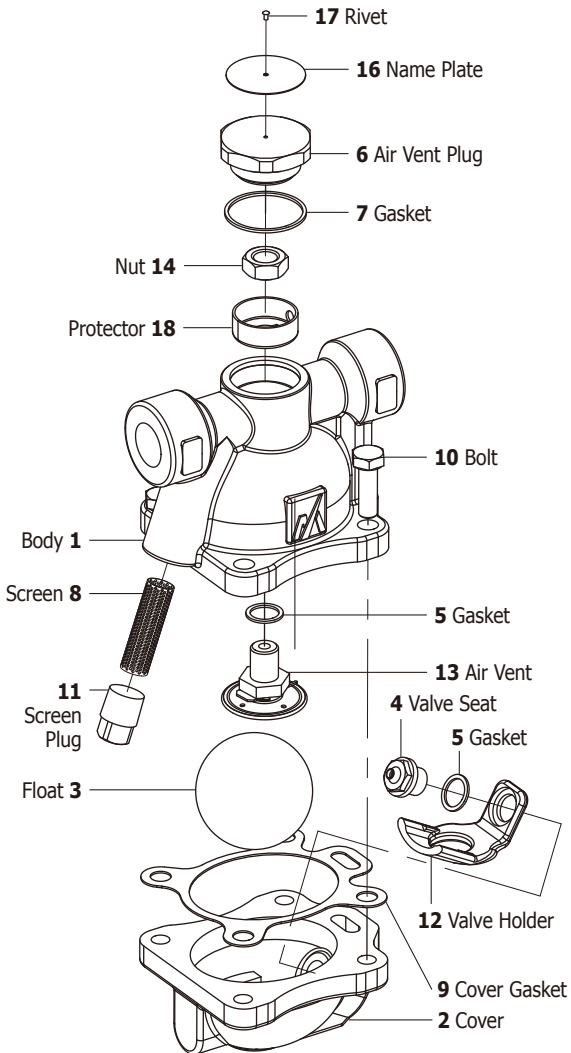
GC1



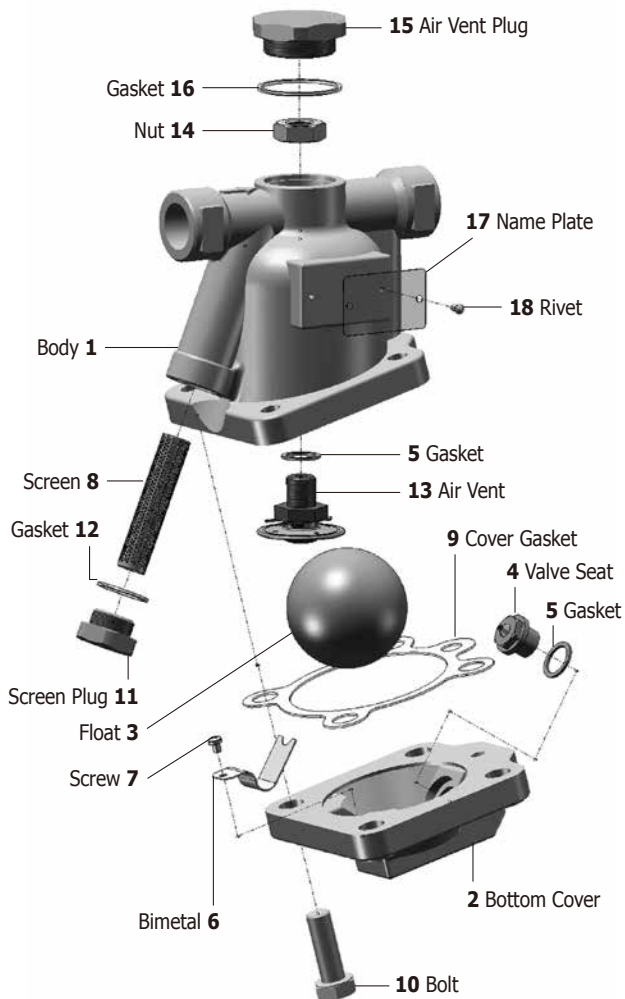
GC1V



G20N



GC20

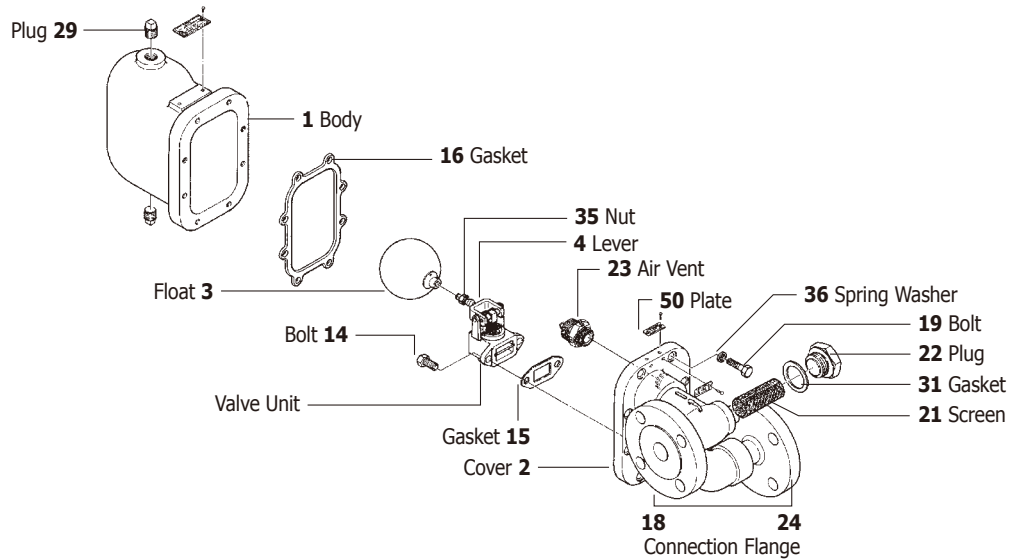




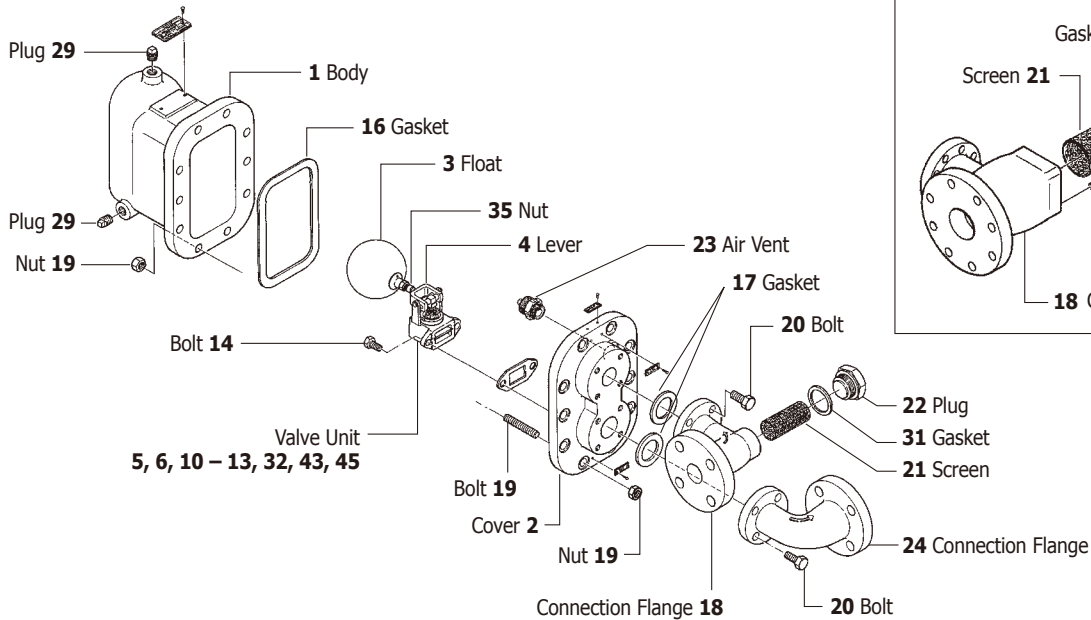
**GH2**

**Valve Unit**

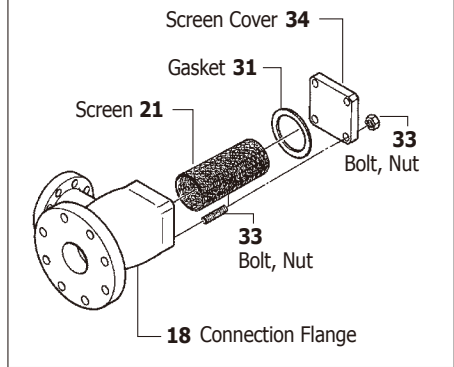
- 5 Valve Seat
- 6 Valve
- 7 Holder
- 8 Lever Nut
- 9 Nut
- 10 Connector
- 11 Nut
- 12 Guide Wing
- 13 Pin
- 32 Baffle Plate
- 39 Pin
- 43 Shaft
- 44 Collar
- 45 Split Pin
- 47 Spring Pin



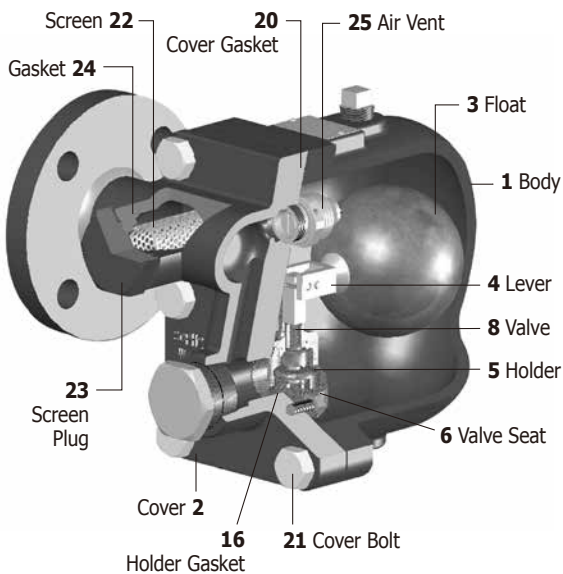
**GH4, GH6, GH8**



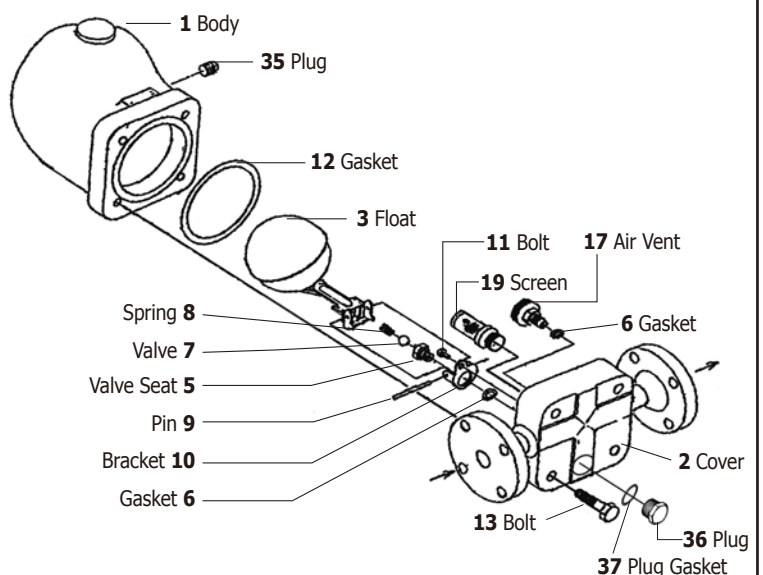
**GH8 only**



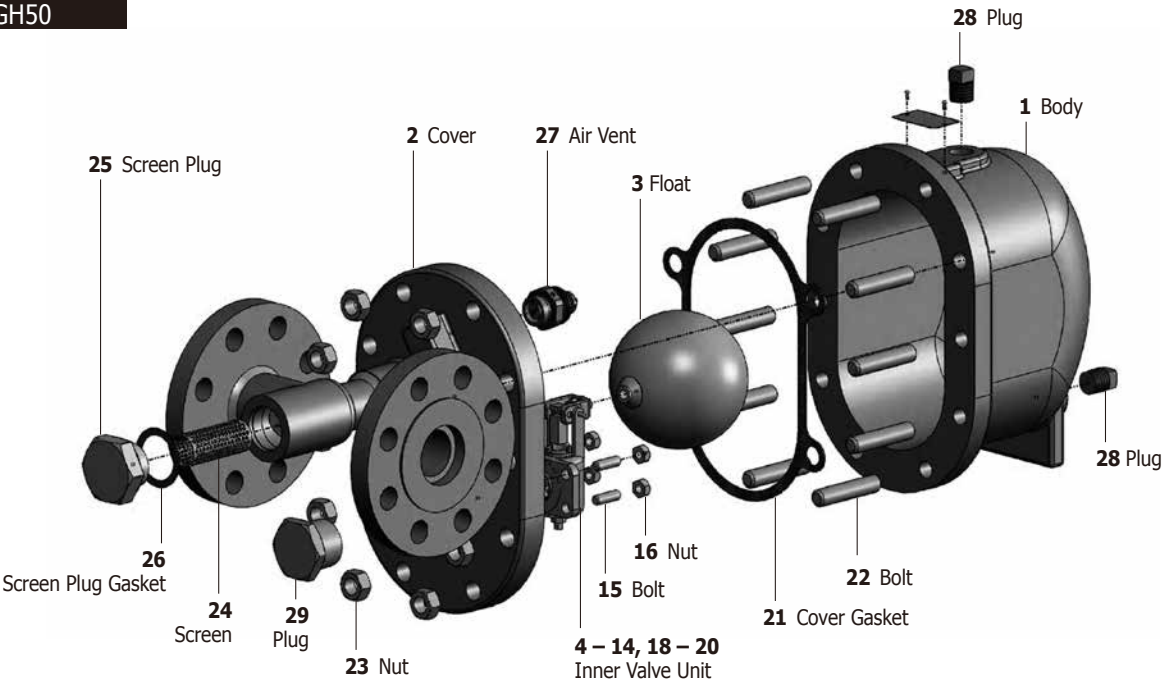
**GH40**



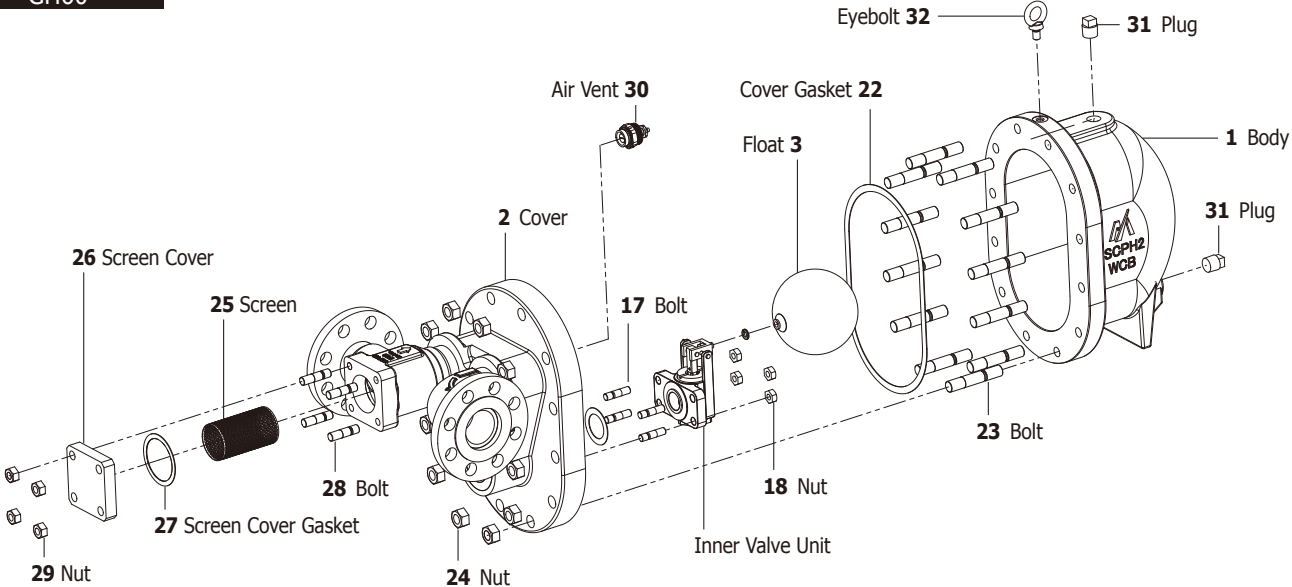
**GTH12**



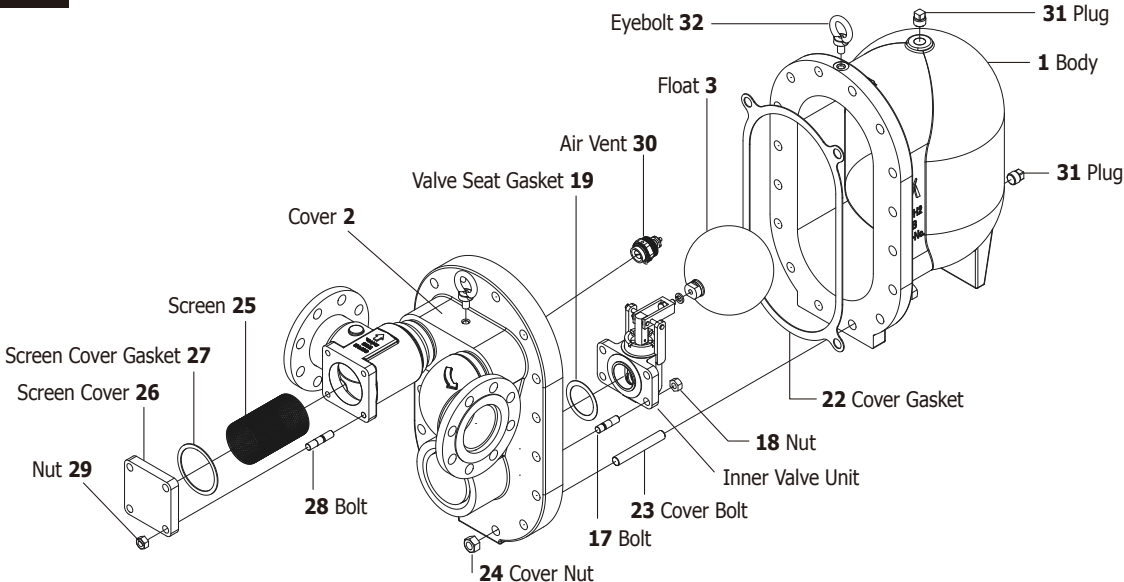
**GH50**



**GH60**



**GH70**



# 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 CO<sub>2</sub> 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><b>1 Tagging of Steam Traps</b></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><b>2 Survey List set-up</b></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><b>3 Traps inspection</b></p> <p>Diagnose each trap on site using the checker PM11. Write down the vibration data measured for each trap.</p>
<p><b>4 Filling out of Survey List</b></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><b>5 Analysis</b></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 CO<sub>2</sub> emission, or an analysis for kind of application (process, tracing, etc.), with the possibility of showing the results by areas or groups.</p>	<p><b>6 Trend Analysis</b></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"> <li>- the failure rate</li> <li>- the steam loss</li> <li>- and money loss tendencies</li> </ul> <p>will be shown.</p>

### Technical Specification

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

# Steam Trap Survey Assistant

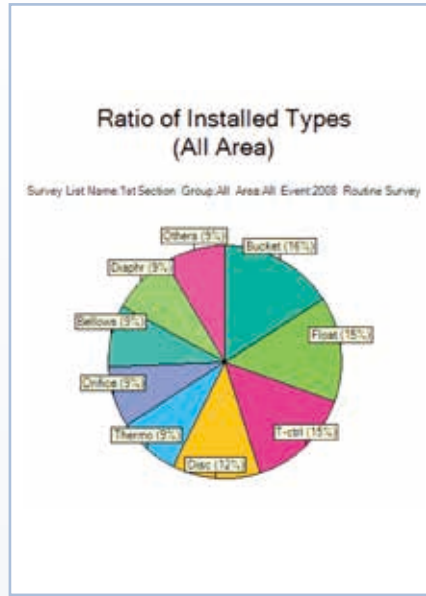
Dr. Trap® Jr.

## SurveyPro Light PM150 V2.0

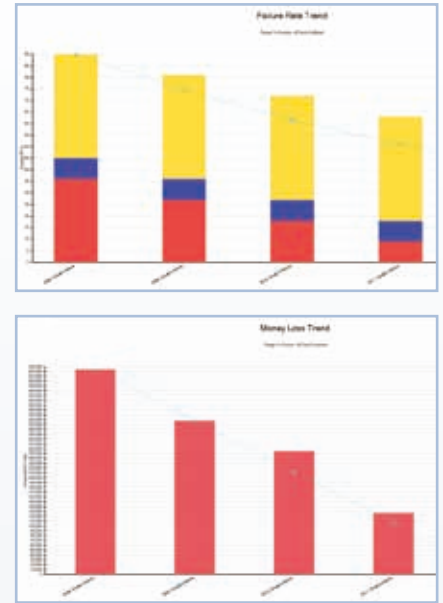
### Main Functions – Standard Version

#### Survey List

#### Analysis



#### Trend Analysis



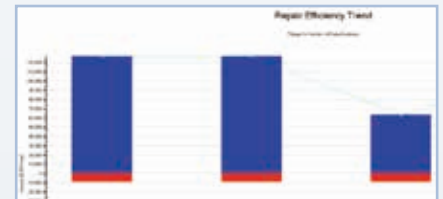
### Additional Functions – Special Version

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



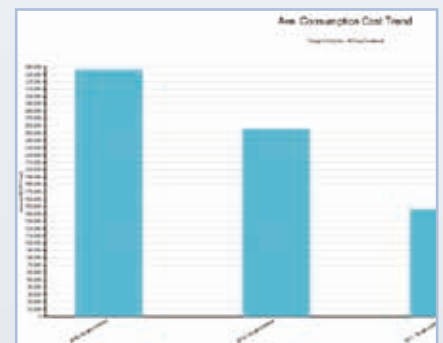
#### Management of other kind of failures

- 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)



Trap Survey App (PM510)

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

#### 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 CO<sub>2</sub> emissions**

The software can estimate CO<sub>2</sub> 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
<b>Checker PM520</b>	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)		
<b>Trap Survey App PM510*</b>	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	
<b>SurveyPro PM530 V4.0</b>			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®

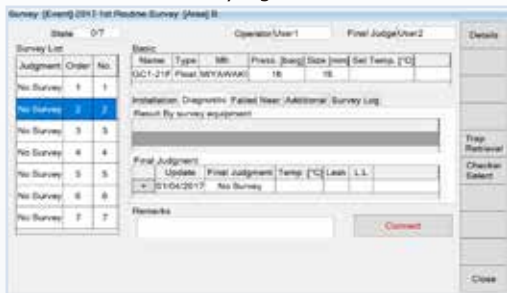
## Trap Survey App PM510

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

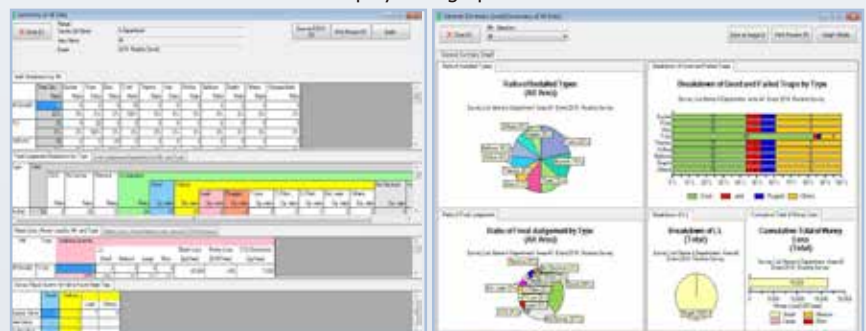
#### Single Sheet

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

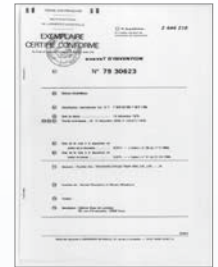
Different from the previous version, SurveyPro V3.1, the data summary sheets will be displayed as one sheet. Consequently, it is easier to use various analysis functions to create summary sheets such as by Manufacturer and by Type. The summaries of all data can be displayed in graphical form same as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

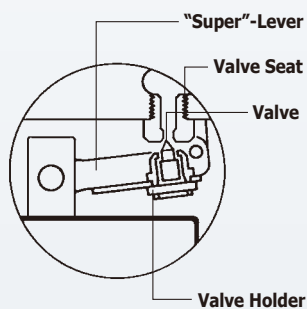


### The MIYAWAKI SCCV®-System: variable adjusted to various types

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.

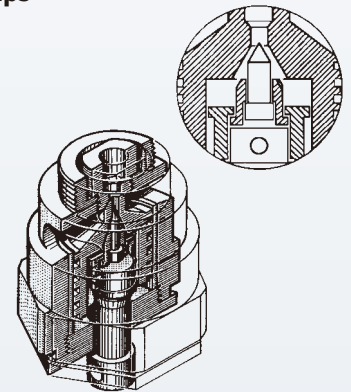
#### Inverted Bucket Steam Traps Series ES

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.



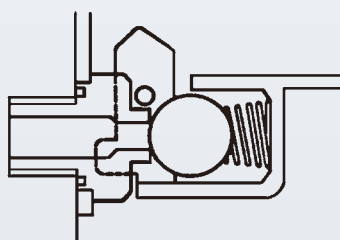
#### Inverted Bucket Steam Traps Series ER

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.



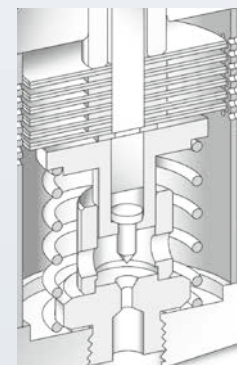
#### Ball Float Steam Trap G11N, G12N

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 bimetals 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<sup>®</sup>-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.

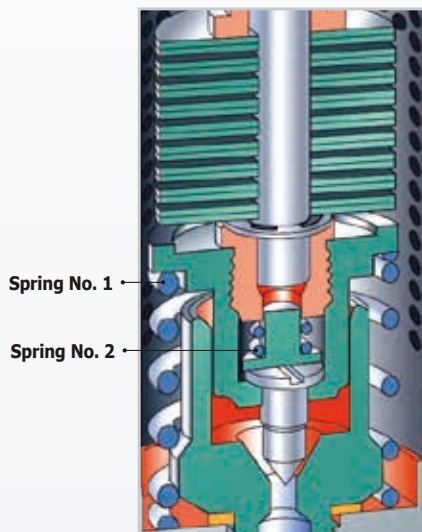
#### Centering and Soft Closing

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.

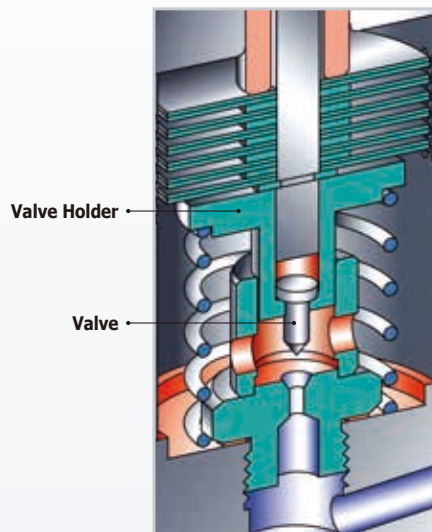
#### No Steam Loss

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

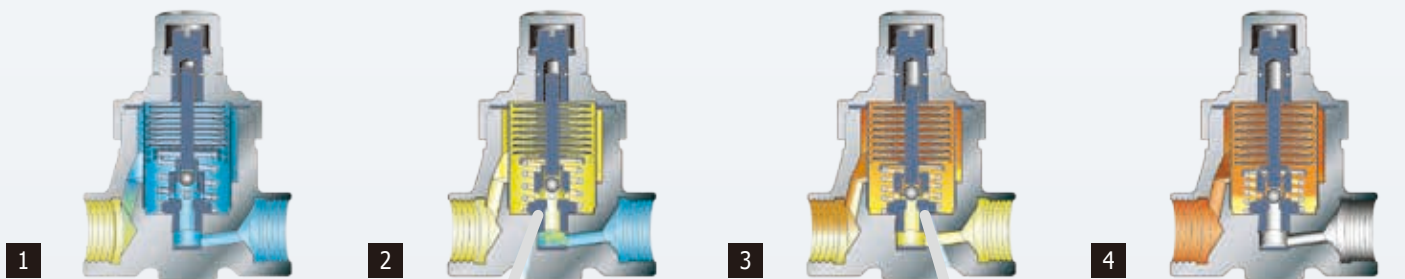
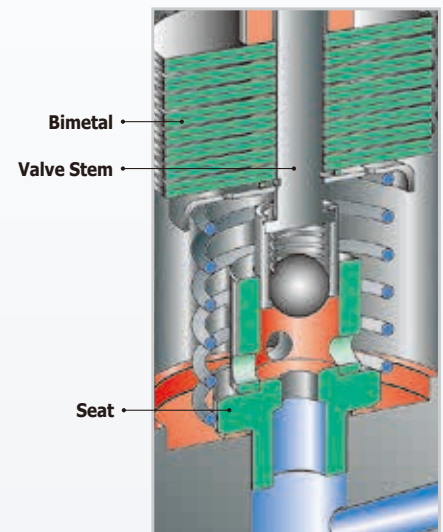
TB51



TB7N



TB9N



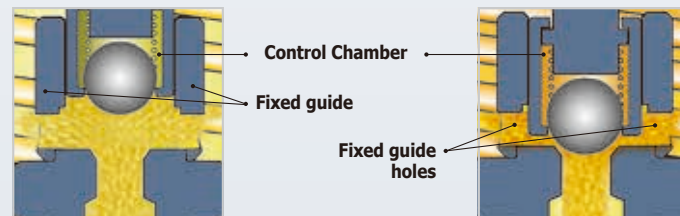
1 On start-up, the bimetal discs are all flat and the valve shaft is up with the valve fully open. Virtually all cold condensate and air are discharged.

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)

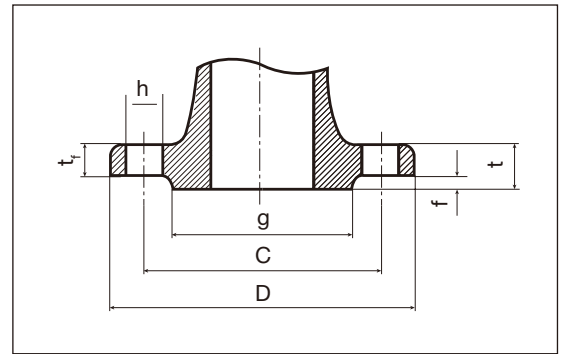
#### 3. Stainless and Heat Resisting Steels

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			



**Pressure**

**Conversion Table from psi to bar**

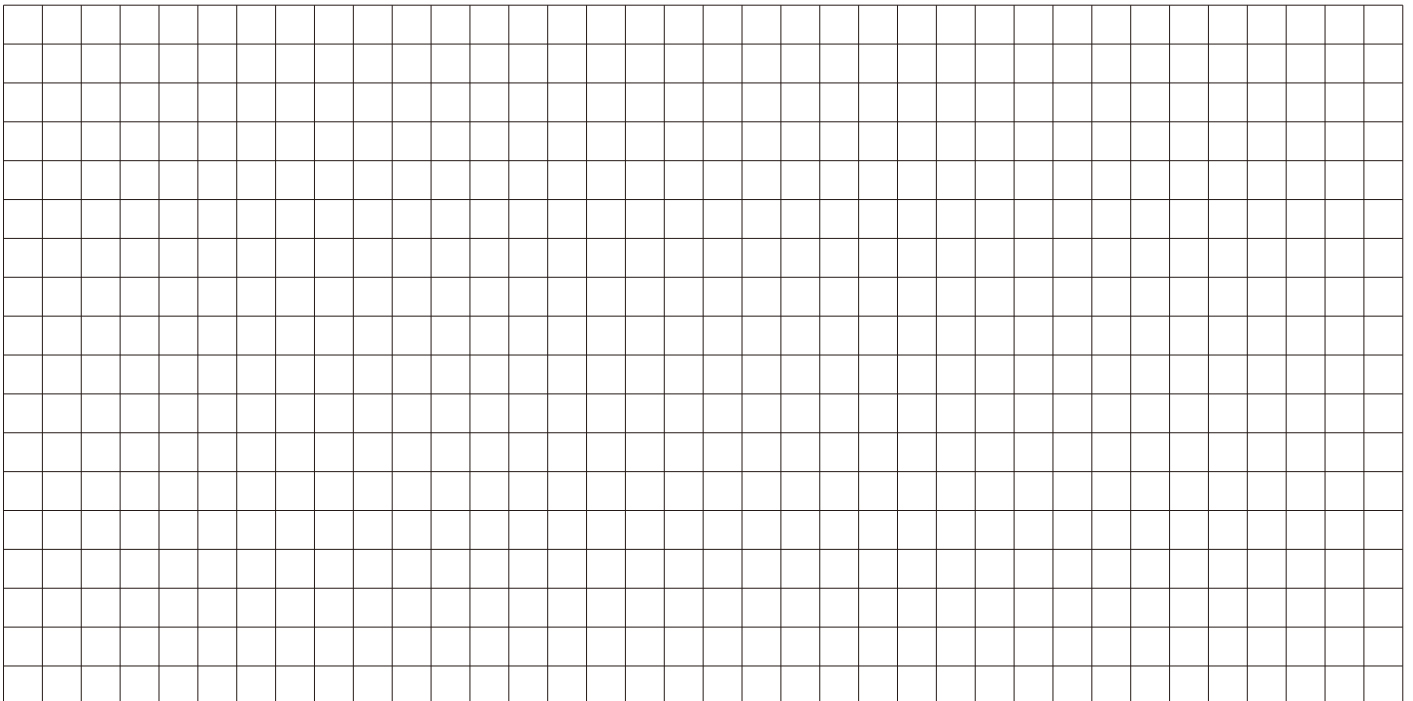
psi	bar	psi	bar	psi	bar	psi	bar	psi	bar	psi	bar	psi	bar	psi	bar
1		0,07		105		7,24		310		21,37		510		35,17	
	1,5	0,1			108,8		7,5		319,0		22,0		514,8		35,5
5		0,34		110		7,58		320		22,06		520		35,86	
	7,3	0,5			116,0		8,0		326,3		22,5		522,0		36,0
10		0,69		120		8,27		330		22,75		530		36,55	
	14,5	1,0			123,3		8,5		333,5		23,0		536,5		37,0
15		1,03		130		8,96		340		23,44		540		37,24	
	18,9	1,3			130,5		9,0		348,0		24,00		543,8		37,5
20		1,38		140		9,65		350		24,13		550		37,92	
	21,8	1,5			145,0		10,00		355,3		24,5		551,0		38,0
25		1,72		150		10,34		360		24,82		560		38,62	
	29,0	2,0			159,5		11,0		362,5		25,0		565,5		39,0
30		2,07		160		11,03		370		25,51		570		39,31	
	33,4	2,3			166,8		11,5		377,0		26,00		572,8		39,5
35		2,41		170		11,72		380		26,20		580		40,00	
	36,3	2,5			174,0		12,0		384,3		26,5		587,3		40,5
40		2,76		180		22,41		390		26,89		590		40,69	
	43,5	3,0			188,5		13,0		391,5		27,0		594,5		41,0
45		3,10		190		13,10		400		27,85		600		41,37	
	47,9	3,3			195,8		13,5		406,0		28,0		609,0		42,0
50		3,45		200		13,79		410		28,27		620		42,76	
	50,8	3,5			203,0		14,0		413,3		28,5		623,5		43,0
55		3,79		210		14,48		420		28,96		640		44,14	
	58,0	4,0			217,5		15,0		420,5		29,0		652,5		45,0
60		4,14		220		15,17		430		29,65		660		45,52	
	62,4	4,3			224,8		15,5		435,0		30,0		667,0		46,0
65		4,48		230		15,86		440		30,34		680		46,90	
	65,3	4,5			232,0		16,0		449,5		31,0		696,0		48,0
70		4,83		240		16,55		450		31,03		700		48,27	
	72,5	5,0			246,5		17,0		456,8		31,5		710,5		49,0
75		5,17		250		17,24		460		31,72		720		49,66	
	79,8	5,5			253,8		17,5		464,0		32,0		725,0		50,0
80		5,52		260		17,93		470		32,41		740		51,03	
	82,7	5,7			261,0		18,0		478,5		33,0		754,0		52,0
85		5,86		270		18,62		480		33,10		760		52,41	
	87,0	6,0			275,5		19,0		485,8		33,5		768,5		53,0
90		6,21		280		19,31		490		33,79		780		53,79	
	94,3	6,5			282,8		19,5		493,0		34,0		797,5		55,0
95		6,55		290		20,00		500		34,48		800		55,16	
	97,2	6,7			297,3		20,5		507,5		35,0		812		56,0
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 <sup>2</sup>	atm	mm H2O	mm Hg (Torr)	lbf/in <sup>2</sup> (psi)
1	0,001	1 x 10 <sup>-6</sup>	1 x 10 <sup>-5</sup>	1,01972 x 10 <sup>-5</sup>	9,86923 x 10 <sup>-6</sup>	0,101972	7,50062 x 10 <sup>-3</sup>	1,450377 x 10 <sup>-4</sup>
1000	1	0,001	0,01	0,0101972	9,86923 x 10 <sup>-3</sup>	101,972	7,50062	0,1450377
1 x 10 <sup>6</sup>	1000	1	10	10,1972	9,86923	1,01972 x 10 <sup>5</sup>	7500,62	145,0377
1 x 10 <sup>5</sup>	100	0,1	1	1,01972	0,986923	1,01972 x 10 <sup>4</sup>	750,062	14,50377
9,80665 x 10 <sup>4</sup>	98,0665	0,0980665	0,980665	1	0,967841	10000	735,559	14,22334
1,01325 x 10 <sup>5</sup>	101,325	0,101325	1,01325	1,03323	1	10332,3	760,000	14,69595
9,80665	9,80665 x 10 <sup>-3</sup>	9,80665 x 10 <sup>-6</sup>	9,80665 x 10 <sup>-5</sup>	0,0001	9,67841 x 10 <sup>-5</sup>	1	0,0735559	0,001422334
133,322	0,133322	1,33222 x 10 <sup>-4</sup>	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

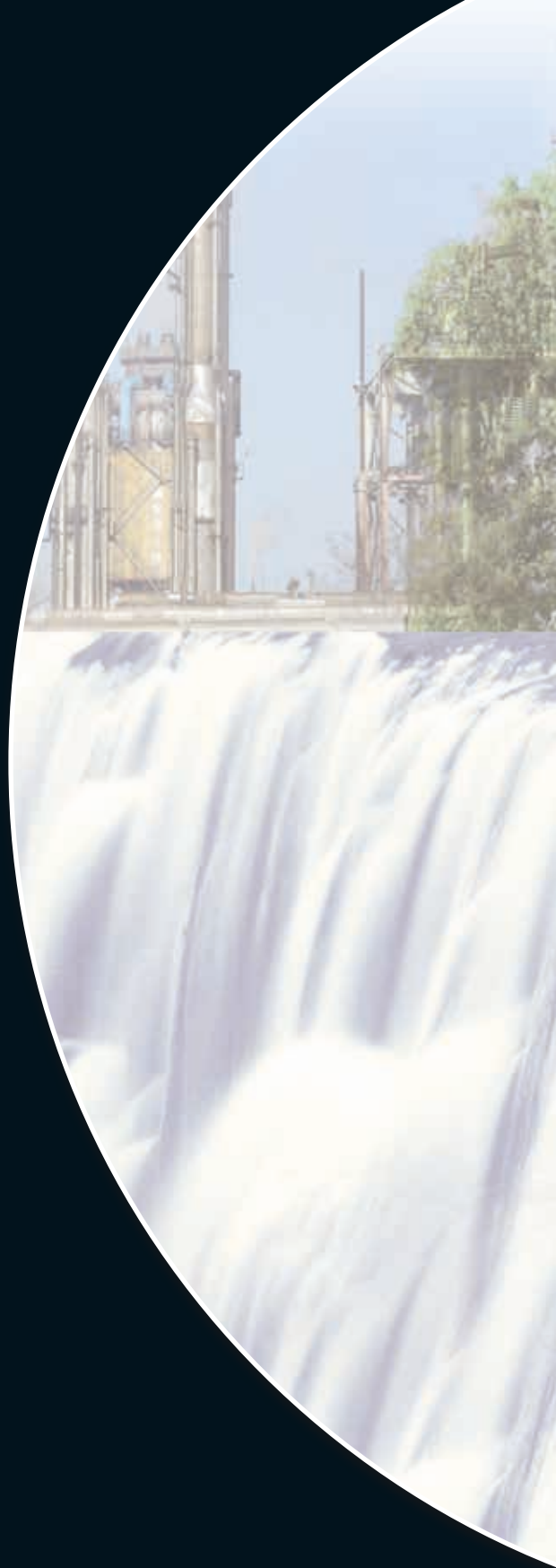
## Properties of Saturated Steam

Absolute Pressure	Saturation Temperature	Steam Volume	Steam Density	Sensible Heat	Total Steam Heat	Latent Heat
p MPa	t <sub>s</sub> °C	v <sup>''</sup> m <sup>3</sup> /kg	ρ <sup>''</sup> kg/m <sup>3</sup>	h <sup>'</sup> kJ/kg	h <sup>''</sup> kJ/kg	r = h <sup>''</sup> - h <sup>'</sup> 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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