Liquid Level Relays

Dual-Sinker Liquid Level Relay — TBL Series

Overview

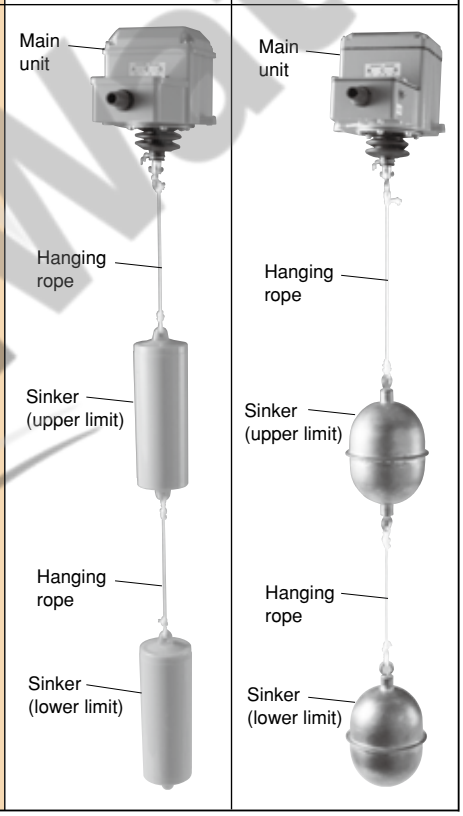
TBL series - familiar to many by the name of dual-sinker liquid level relays - is a breakthrough product that is completely different from the conventional liquid level relays applying the mechanism of floats within liquid.
Conventional liquid level relays require 2 float switches for upper and lower limit controls of the liquid surface.
Kasuga's dual-sinker liquid level relay allows both upper and lower limit controls of the liquid surface using a single unit.

Features

- Operates regardless of the liquid resistivity. Not only in seawater and sewage water, the relay can also be used in liquids that do not conduct electricity (such as distilled water, oil, etc.).
- Control range can be set and changed by varying the length of the handling rope.
- Allows remote installation of control devices and alarm devices as the relay is unaffected by external induction or static electricity between electric wires.
- Protection Code IP33 (rainproof type)

Caution
TBL 13FC (for oil) is not explosion-proof. Observe laws and regulations for use.

Basic type list

		TBL 12 (for water)	TBL 13FC (for oil)
Application		Treatment water, sewage water, seawater, etc.	Heavy oil, light oil, kerosene oil
Applied specific gravity range		0.85 to 1.05	0.7 to 0.9
Material	Main unit	TBLP2: polycarbonate	TBLF3: aluminum casting
	Sinker	TBLS: hard vinyl chloride	TBLC208: copper
	Hanging rope	TBLR: tetron 3m	TBLR: tetron 3m
Exterior			

Standard specifications

Item	Standard type (1c)		Minute load type (1c)	
Rating (Coil load)	AC	DC	AC	DC
	250V 1.5A	24V 3A	125V 0.1A	24V 0.1A
Minimum load	DC5V 160mA (reference value)		DC5V 1mA (reference value)	
Control range	0.18～10m			
Air pressure inside tank	One atmosphere			
Durability	Mechanical more than 50 million times Electrical more than 50 million times			
Compliance standards	Electrical Appliance and Material Safety Law (compliant product)			

Product list

TBL (standard set)

TBL 12 is a set of main unit (**TBLP2**), sinkers (**TBLS**) and hanging ropes (**TBLR**).
TBL 13FC is a set of main unit (**TBLF3**), sinkers (**TBLC208**) and hanging ropes (**TBLR**).

Exterior	Type name	Main unit [Material]	Sinker [Material]	Hanging rope [Material]	Application Specific gravity range	General mass (g)
	**TBL 12**	TBLP2 [Polycarbonate]	TBLS [Hard vinyl chloride]	TBLR (3m) [Tetron]	Treatment water, sewage water, seawater, etc. (0.85 to 1.05)	930
	TBL 12B	TBLP2B [Polycarbonate] (Micro-load compatible)				
	**TBL 13 FC**	TBLF3 [Aluminum casting]	TBLC208 [Copper]		Heavy oil, light oil, kerosene oil, etc. (0.70 to 0.90)	1310
	TBL 13 FCB	TBLF3B [Aluminum casting] (Micro-load compatible)				

Main unit

Application	Material	Usage temperature	Description	Type name	General mass (g)
For water	Polycarbonate	−10 to +50℃	—	**TBLP2**	325
			Micro-load compatible(5V DC 1mA)	**TBLP2B**	
For oil	Aluminum casting	−10 to +80℃	—	**TBLF3**	670
			Micro-load compatible(5V DC 1mA)	**TBLF3B**	
For hot water	Aluminum casting	−10 to +80℃	—	**TBLF3H**	670
			Micro-load compatible(5V DC 1mA)	**TBLF3BH**	

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Sinker

Series name	Material	Specific gravity	Usage temperature (℃)	Application	Type name	General mass (g)
TBLS series (for upper/lower limit operation)	Hard vinyl chloride	0.85 to 1.05	−10 to 50	TBL12 standard accessories, for water	**TBLS**	500 (2 units)
		1.00 to 1.064		For special specific gravity (Standard upper limit sinker + special lower limit sinker)	**TBLS2103**	512 (2 units)
		1.05 to 1.15			**TBLS211**	528 (2 units)
		1.15 to 1.25			**TBLS212**	551 (2 units)
		1.25 to 1.35			**TBLS213**	574 (2 units)
		1.35 to 1.45			**TBLS214**	597 (2 units)
		1.45 to 1.55			**TBLS215**	620 (2 units)
TBLC1 series (for alarm operation)	Copper	0.70 to	−10 to 80	Upper limit alarm, for water/oil	**TBLC108**	500 (1 unit)
	Stainless steel	0.85 to 1.05		Lower limit alarm, for water/oil	**TBLC1SL10**	
		0.70 to		Upper limit alarm, for water/oil	**TBLC1SU08**	
		0.85 to 1.05		Lower limit alarm, 1.5 inch pipe, for water	**TBLC1SX10**	480 (1 unit)
TBLC2 series (for upper/lower limit operation)	Copper	0.70 to 0.90	−10 to 80	TBL13FC standard accessories, for oil	**TBLC208**	500 (2 units)
	Stainless steel	0.85 to 1.05		For water, 温水用	**TBLC2S10**	
		0.70 to 0.90		For oil	**TBLC2S08**	
		1.45 to 1.55		For special specific gravity	**TBLC2S15**	620 (2 units)
		0.85 to 1.05		2 inch pipe, for water	**TBLC2SX10**	500 (2 units)
		0.70 to 0.90		2 inch pipe, for oil	**TBLC2SX08**	
		1.20 to 1.30		Special specific gravity	**TBLC2S125**	564 (2 units)

Remark: Sinker includes hanging rope (TBLR 3m).

Hanging rope

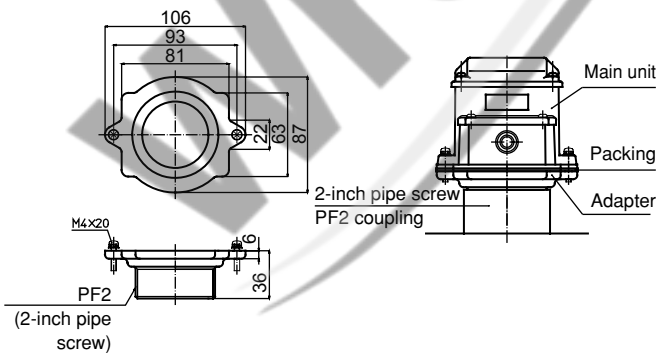
Material	Application	Sales unit	Type name	General mass (g)	Remarks
Tetron	For water/oil	10m ϕ3	**TBLR**	—	Avoid freezing when using in an environment with ambient temperature of 0℃ or less. When using TBLK, make sure the total length is 1m or less. (Using length of 1m or more may affect operation)
		200m ϕ3	**TBLR200M**	—	
Brass (cut-out chain) + ring (stainless)		1m	**TBLK**	11	

Option

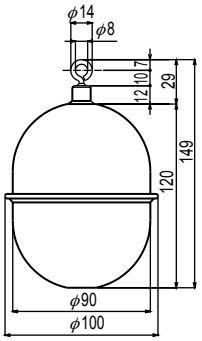
Use when installing main unit to 2-inch pipe coupling.

Product name	Type name	General mass (g)
Adapter	**TBLA2**	110

TBLA2 (adapter)



TBLC108 (upper-limit alarm copper sinker)



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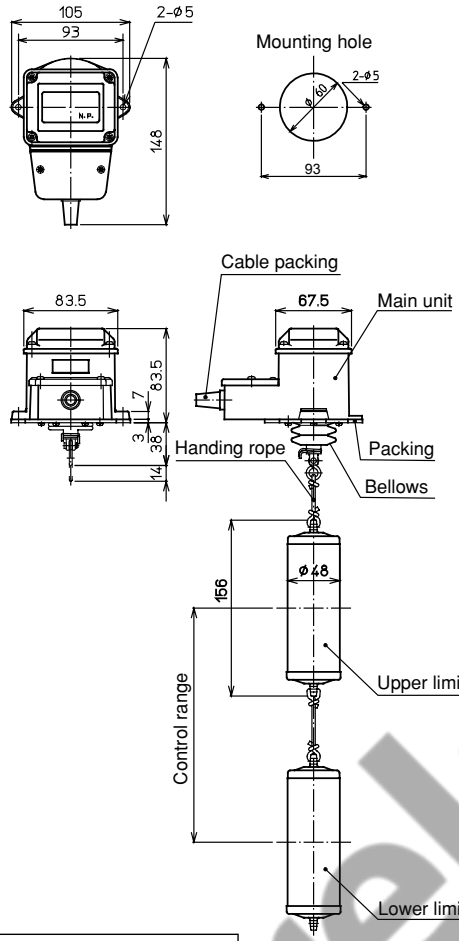
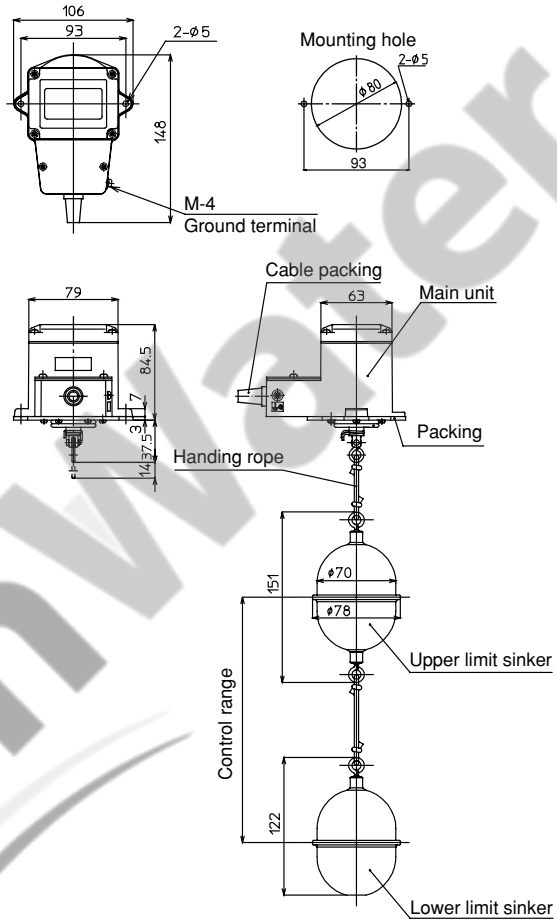
Dimensions (Unit:mm)

TBL 12
Main unit: TBLP2 Sinkers: TBLS

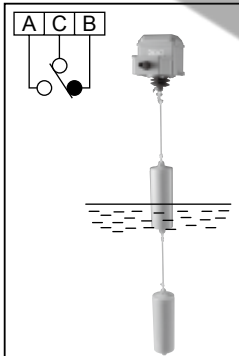
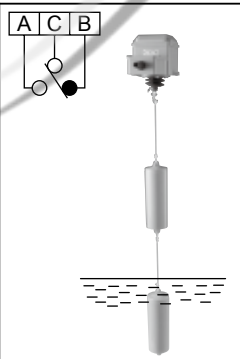
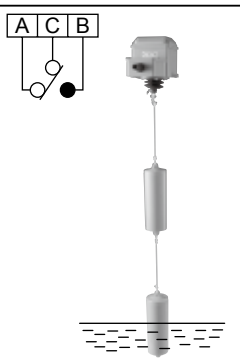
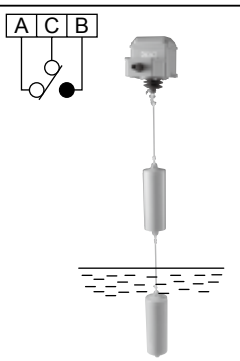


TBL 13FC
Main unit: TBLF3 Sinkers: TBLC208



Operation

The micro-switch within the main unit opens/closes when the sinkers move up/down by detecting the liquid surface changes. Operation flow of automatic water-supply operation using the dual-sinker liquid level relay is explained below.

① When the water surface rises to the middle of the upper limit sinker.	② When the water surface is in the middle of the upper and lower limit sinkers.	③ When the water surface drops to the middle of the lower limit sinker.	④ When the water surface is in the middle of the upper and lower limit sinkers.
			
Sinkers are rising due to buoyancy, assuming the 2 sinkers as a single sinker.	Sinkers are rising due to buoyancy, assuming the 2 sinkers as a single sinker.	Sinkers are dropping, assuming the 2 sinkers as a single sinker.	Sinkers are dropping, assuming the 2 sinkers as a single sinker.
↓	↓	↓	↓
Micro-switch within TBL unit is OFF (connection to B) Pump is stopped	Micro-switch within TBL unit is OFF (connection to B) Pump is stopping	Micro-switch within TBL unit is ON (connection to A) Pump is starting operation (water-supply start)	Micro-switch within TBL unit is ON (connection to A) Pump is in operation (continuous water supply)

⑤ Operations ① to ④ are repeated by opening/closing of the micro-switch within the liquid level relay to perform automatic water-supply operation. To perform water-discharge operation, replace terminals A and B of the liquid level relay.

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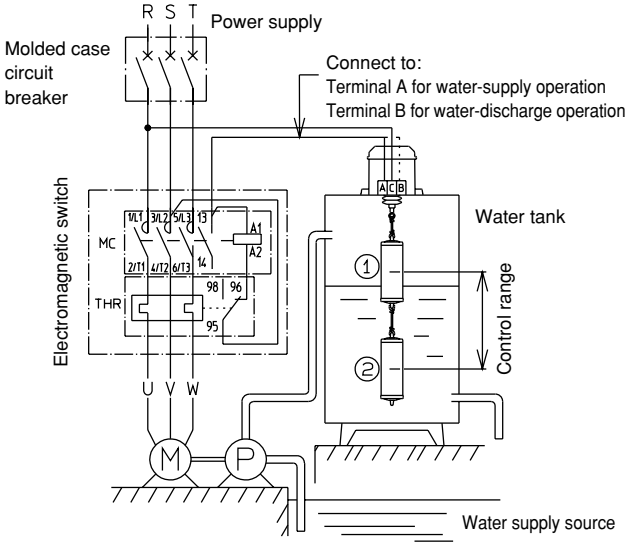
Connection diagrams

Standard automatic water-supply/water-discharge operation



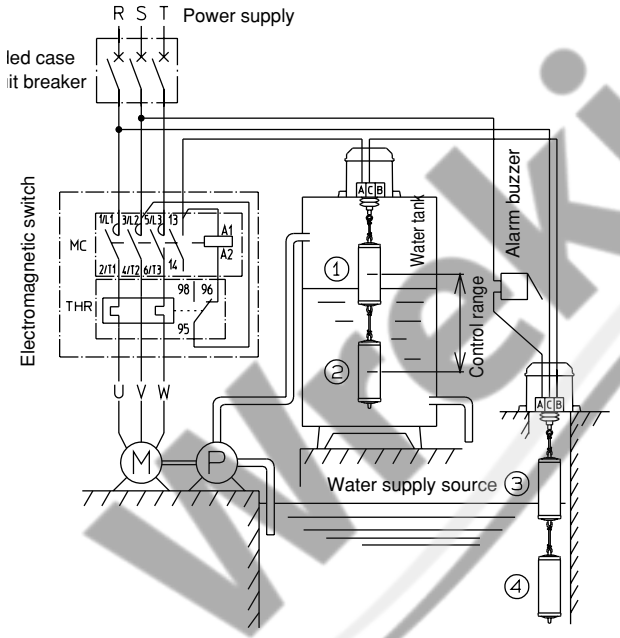
Overview of operation

- Water-supply operation
  The pump stops when the water surface rises near the middle of upper limit sinker ①, and the pump operates when the water surface drops near the middle of lower limit sinker ②. This operation is repeated.
- Water-discharge operation
  The pump operates when the water surface rises near the middle of upper limit sinker ①, and the pump stops when the water surface drops near the middle of lower limit sinker ②. This operation is repeated.

Use terminals A to C for water-supply operation and terminals B to C for water-discharge operation to connect to the electromagnetic switch as shown in the diagram.

Caution: Make sure to ground when using an aluminum casing unit.

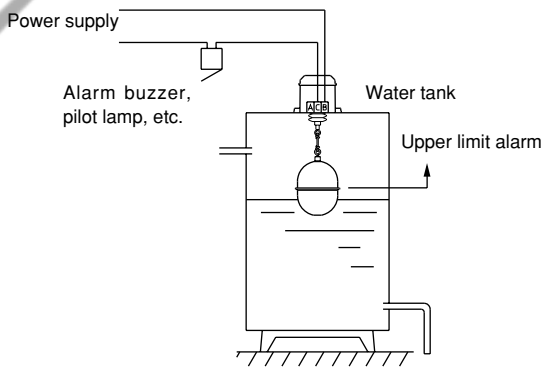
Automatic water-supply operation combined with pump idle prevention



Overview of operation

- The pump stops and alarm sounds when the water surface of the water supply source drops near the middle of lower limit sinker ④. Normal water-supply operation resumes when the water surface rises near the middle of upper limit sinker ③. In addition, a copper bell can be used for the alarm relay as shown below.

Upper limit alarm using alarm copper bell



Cautions concerning usage

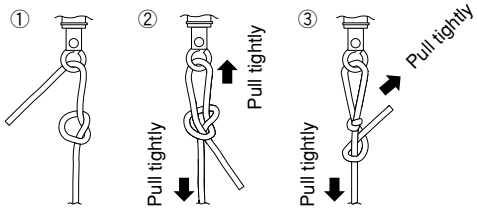
①Tying the hanging rope
Always use the supplied tetron ropes for the sinkers and tie using the method shown on the right. The length from the middle of the upper limit sinker to the middle of the lower limit sinker will be the control range.

②Installation location of main unit
Set the main unit so that it is level to the tank exterior. Do not install where there is corrosive gas, combustible gas or extreme humidity.

③TBL12 and TBL13FC set sinkers must be used as a set. Do not use just 1 sinker.

④TBL13FC (for oil) is not explosion-proof. Observe laws and regulation for use.

⑤Malfunction may occur when foreign substances adhere to the detection sinkers. Perform inspection once a month and remove any adhered foreign substances.



Melting the knot using flame is effective for preventing loosening.

⑥Some liquids and environments may affect hanging ropes, etc., causing malfunction as a result. Perform inspection once every 3 months and replace with new Dual-Sinker Liquid Level Relay in the case exterior deterioration or damage is noticed.

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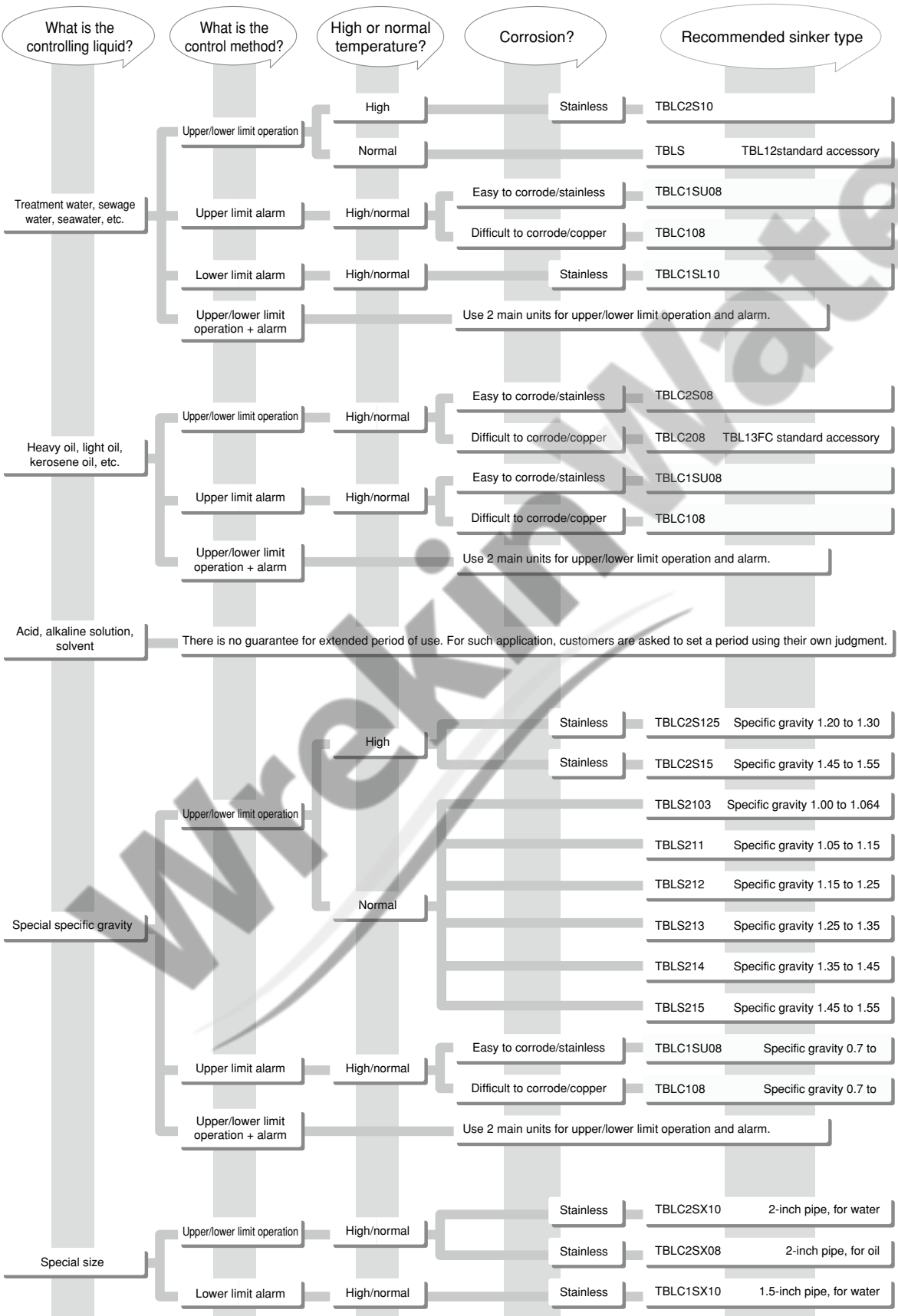
Selection of sinkers



Remarks:

1. This product is not explosion-proof. Observe laws and regulations for use.
2. Liquids of high viscosity may affect the operation of the unit.
3. High-temperature model may be used up to 80℃ and normal-temperature model may be used up to 50℃.
4. Anticorrosive performance is realized by stainless steel (SUS304).