



# Instruction Manual

Cyclone Separator Trap (for Steam)

**DC3S**

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### Introduction

Thank you for purchasing the **TLV** cyclone separator trap for steam.

This product has been thoroughly inspected before being shipped from the factory. When the separator trap is delivered, before doing anything else, check the specifications and external appearance to make sure nothing is out of the ordinary. Also be sure to read this manual carefully before use and follow the instructions to be sure of using the separator trap properly.

For use on steam mains and branches, the cyclone separator traps use centrifugal force to separate condensate from steam, and feature a built-in free float steam trap for the automatic discharge of the collected condensate.

The combination of separator and built-in trap makes this product suitable for use in locations where a separator would be installed together with a trap.









If detailed instructions for special order specifications or options not contained in this manual are required, please contact **TLV** for full details.

This instruction manual is for the models listed on the front cover. It is needed not only for installation but for subsequent maintenance, disassembly/reassembly and troubleshooting. Please keep it in a safe place for future reference.


## Safety Considerations

- Read this section carefully before use and be sure to follow the instructions.
- Installation, inspection, maintenance, repairs, disassembly, adjustment and valve opening/closing should be carried out only by trained maintenance personnel.
- The precautions listed in this manual are designed to ensure safety and prevent equipment damage and personal injury. For situations that may occur as a result of erroneous handling, three different types of cautionary items are used to indicate the degree of urgency and the scale of potential damage and danger: DANGER, WARNING and CAUTION.
- The three types of cautionary items above are very important for safety: be sure to observe all of them as they relate to installation, use, maintenance, and repair. Furthermore, TLV accepts no responsibility for any accidents or damage occurring as a result of failure to observe these precautions.

### Symbols

	<p>Indicates a <b>DANGER, WARNING or CAUTION</b> item.</p>
	<p>Indicates an urgent situation which poses a threat of death or serious injury</p>
	<p>Indicates that there is a potential threat of death or serious injury</p>
	<p>Indicates that there is a possibility of injury or equipment / product damage</p>
	<p><b>DO NOT use for toxic, flammable or otherwise hazardous fluids.</b></p>
	<p>This product is a separator trap for steam that separates and discharges condensate from steam piping systems. Use only for steam and/or steam condensate. This product is for intended use only. Improper use may result in such hazards as damage to the product or malfunctions that may lead to serious accidents.</p>
	<p><b>NEVER apply direct heat to the float.</b></p>
	<p>The float may explode due to increased internal pressure, causing accidents leading to serious injury or damage to property and equipment.</p>
	<p><b>Install properly and DO NOT use this product outside the recommended operating pressure, temperature and other specification ranges.</b></p>
	<p>Improper use may result in such hazards as damage to the product or malfunctions that may lead to serious accidents. Local regulations may restrict the use of this product to below the conditions quoted.</p>
	<p><b>DO NOT use this product in excess of the maximum operating pressure differential.</b></p>
	<p>Such use could make discharge impossible (blocked).</p>

Safety cautions continued on next page.

 <b>CAUTION</b>	<p><b>Use hoisting equipment for heavy objects (weighing approximately 20 kg (44 lb) or more).</b> Failure to do so may result in back strain or other injury if the object should fall.</p>
	<p><b>Take measures to prevent people from coming into direct contact with product outlets.</b> Failure to do so may result in burns or other injury from the discharge of fluids.</p>
	<p><b>When disassembling or removing the product, wait until the internal pressure equals atmospheric pressure and the surface of the product has cooled to room temperature.</b> Disassembling or removing the product when it is hot or under pressure may lead to discharge of fluids, causing burns, other injuries or damage.</p>
	<p><b>Be sure to use only the recommended components when repairing the product, and NEVER attempt to modify the product in any way.</b> Failure to observe these precautions may result in damage to the product and burns or other injury due to malfunction or the discharge of fluids.</p>
	<p><b>Do not use excessive force when connecting threaded pipes to the product.</b> Over-tightening may cause breakage leading to fluid discharge, which may cause burns or other injury.</p>
	<p><b>Use only under conditions in which no freeze-up will occur.</b> Freezing may damage the product, leading to fluid discharge, which may cause burns or other injury.</p>
	<p><b>Use only under conditions in which no water hammer will occur.</b> The impact of water hammer may damage the product, leading to fluid discharge, which may cause burns or other injury.</p>

## Specifications



### WARNING

DO NOT use for toxic, flammable or otherwise hazardous fluids. This product is a separator for steam that separates and discharges condensate from steam piping systems. Use only for steam and/or steam condensate. This product is for intended use only. Improper use may result in such hazards as damage to the product or malfunctions that may lead to serious accidents.



### CAUTION

Install properly and DO NOT use this product outside the recommended operating pressure, temperature and other specification ranges. Improper use may result in such hazards as damage to the product or malfunctions which may lead to serious accidents. Local regulations may restrict the use of this product to below the conditions quoted.



### CAUTION

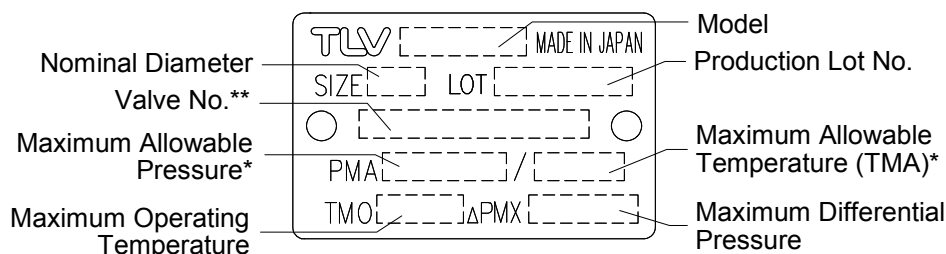
DO NOT use this product in excess of the maximum operating pressure differential; such use could make discharge impossible (blocked).



### CAUTION

Use only under conditions in which no freeze-up will occur. Freezing may damage the product, leading to fluid discharge, which may cause burns or other injury.

Refer to the product nameplate for detailed specifications.

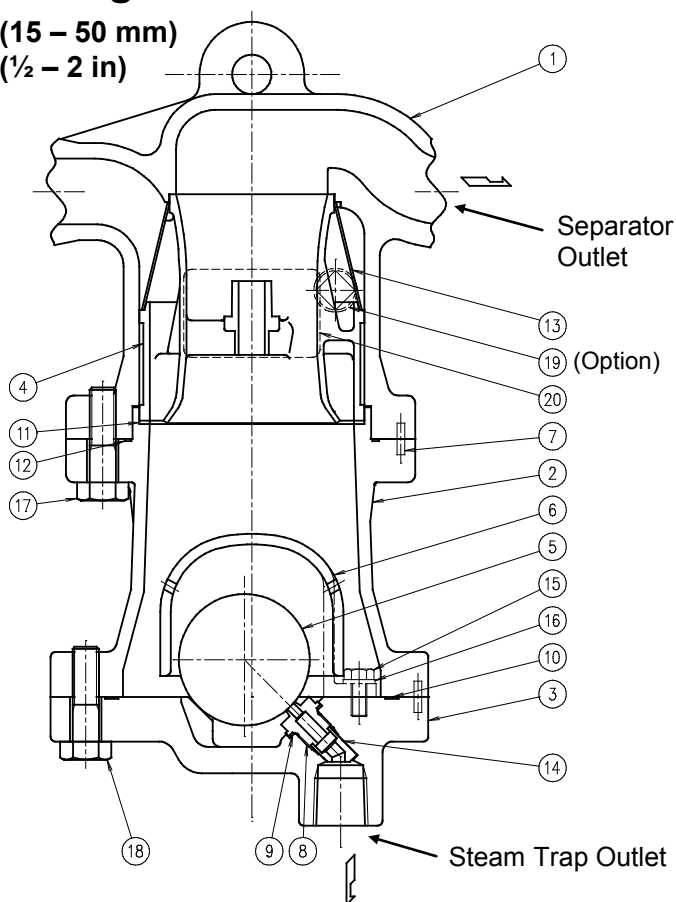


\* Maximum allowable pressure (PMA) and maximum allowable temperature (TMA) are PRESSURE SHELL DESIGN CONDITIONS, **NOT** OPERATING CONDITIONS.

\*\* Valve No. is displayed for products with options. This item is omitted from the nameplate when there are no options.

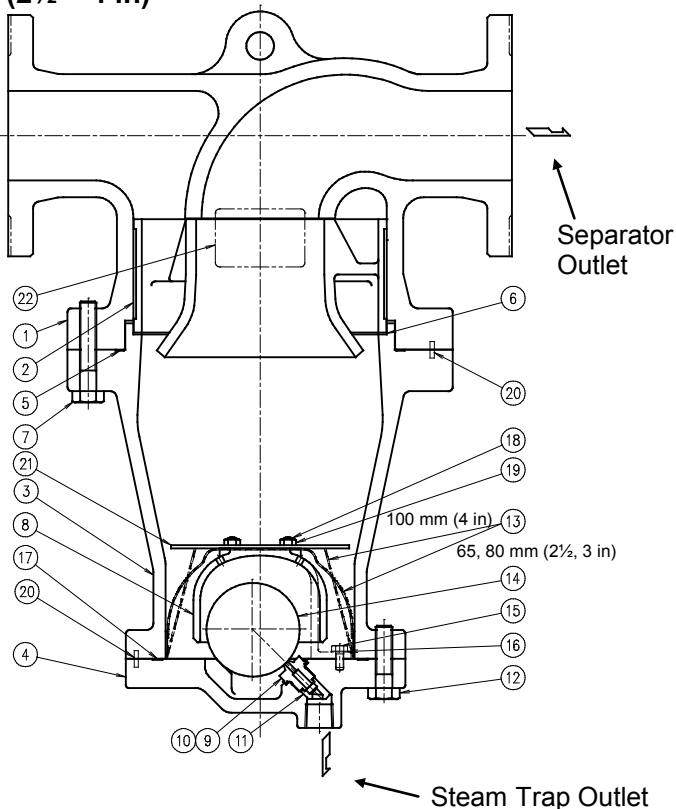
### Configuration

(15 – 50 mm)  
(½ – 2 in)



NO.	Name
1	Body
2	Separator Body
3	Trap Cover
4	Separator
5	Float
6	Float Cover
7	Guide Pin
8	Trap Valve Seat
9	Valve Seat Gasket
10	Trap Cover Gasket
11	Wave Spring
12	Body Gasket
13	Screen
14	Bushing
15	Float Cover Bolt
16	Spring Washer
17	Body Bolt
18	Trap Cover Bolt
19	Plug (Option)
20	Nameplate

(65 – 100 mm)  
(2½ – 4 in)



NO.	Name
1	Body
2	Separator
3	Separator Body
4	Trap Cover
5	Body Gasket
6	Wave Spring
7	Body Bolt
8	Float Cover
9	Trap Valve Seat
10	Valve Seat Gasket
11	Bushing
12	Trap Cover Bolt
13	Screen
14	Float
15	Float Cover Bolt
16	Spring Washer
17	Trap Cover Gasket
18	Baffle Bolt
19	Baffle Nut
20	Guide Pin
21	Baffle
22	Nameplate

## Installation



### WARNING

DO NOT use for toxic, flammable or otherwise hazardous fluids. This product is a separator for steam that separates and discharges condensate from steam piping systems. Use only for steam and/or steam condensate. This product is for intended use only. Improper use may result in such hazards as damage to the product or malfunctions that may lead to serious accidents.



### CAUTION

Install properly and DO NOT use this product outside the recommended operating pressure, temperature and other specification ranges. Improper use may result in such hazards as damage to the product or malfunctions which may lead to serious accidents. Local regulations may restrict the use of this product to below the conditions quoted.



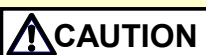
### CAUTION

Use hoisting equipment for heavy objects (weighing approximately 20 kg (44 lb) or more). Failure to do so may result in back strain or other injury if the object should fall.



### CAUTION

Take measures to prevent people from coming into direct contact with product outlets. Failure to do so may result in burns or other injury from the discharge of fluids.



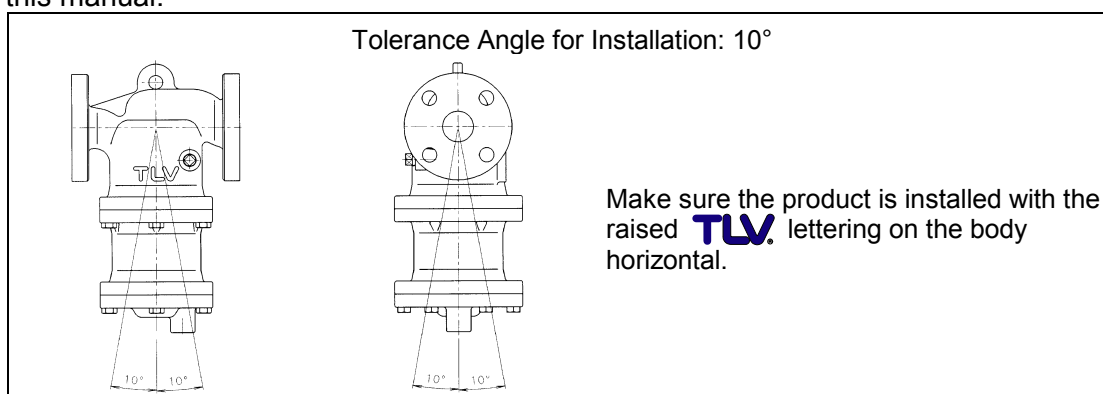
### CAUTION

Do not use excessive force when connecting threaded pipes to the product. Over-tightening may cause breakage leading to fluid discharge, which may cause burns or other injury.

Installation, inspection, maintenance, repairs, disassembly, adjustment and valve opening/closing should be carried out only by trained maintenance personnel.

1. Before installation, be sure to remove all protective seals.
2. Before installing the product, blow out the inlet piping to remove any piping scraps, dirt and oil. Close the inlet valve after blowdown.
3. Install the product at the point on the piping where the separation of condensate will have the greatest effect on efficiency. For example, on a steam main or branch at the inlet of equipment requiring high-quality dry steam.
4. Install the product so the arrow on the product is pointing in the direction of flow.
5. The product should be inclined no more than 10° horizontally and front-to-back.
6. Install a separator outlet valve and separator outlet piping, and steam trap outlet fittings and steam trap outlet piping.
7. To facilitate inspection and maintenance, install a union at the steam trap outlet if threaded connections are used, and ensure that there is sufficient space for maintenance.
8. Open the inlet valve and check to make sure that the product functions properly.

If there is a problem, determine the cause by using the “Troubleshooting” guide in this manual.



## Maintenance



Take measures to prevent people from coming into direct contact with product outlets. Failure to do so may result in burns or other injury from the discharge of fluids.



Be sure to use only the recommended components when repairing the product, and NEVER attempt to modify the product in any way. Failure to observe these precautions may result in damage to the product or burns or other injury due to malfunction or the discharge of fluids.

## Operational Check

A visual inspection of the following items should be done on a daily basis to determine whether the product is operating properly or has failed. Periodically (at least biannually) the operation should also be checked by using diagnostic equipment, such as a stethoscope or thermometer. (Inspection, installation, maintenance, repairs, disassembly, adjustment and valve opening/closing should be carried out only by trained maintenance personnel.)

Check to see if steam is flowing from the separator outlet. Check all flowmeters and check the differential pressure. If there is insufficient flow or differential pressure is too large, disassemble and check for clogging of the screen.

If the built-in steam trap should fail, it may cause damage to piping and equipment, resulting in faulty or low quality products or losses due to steam leakage.

### (Steam Trap Operational Check)

- Normal** : Condensate is discharged continuously from the trap outlet with flash steam and the sound of flow can be heard. If there is very little condensate, there is almost no sound of flow.
- Blocked (Discharge Impossible)** : No condensate is discharged from the trap outlet. The trap is quiet and makes no noise, and the surface temperature of the trap is low.
- Blowing** : Live steam continuously flows from the trap outlet and there is a continuous metallic sound.
- Steam Leakage** : Live steam is discharged through the trap outlet together with the condensate and there is a high-pitched sound.

## Parts Inspection

When parts have been removed, or during periodic inspections, use the following table to inspect the parts and replace any that are found to be defective.

	Procedure
Screen:	Check for clogging or corrosion
Gaskets:	Check for warping or damage
Float:	Check for scratches or dents
Trap Valve Seat:	Check for the wear or scratches
Body Interior:	Check for build-up



## Disassembly/Reassembly



NEVER apply direct heat to the float. The float may explode due to increased internal pressure, causing accidents leading to serious injury or damage to property and equipment.



Use hoisting equipment for heavy objects (weighing approximately 20 kg (44 lb) or more). Failure to do so may result in back strain or other injury if the object should fall.



When disassembling or removing the product, wait until the internal pressure equals atmospheric pressure and the surface of the product has cooled to room temperature. Disassembling or removing the product when it is hot or under pressure may lead to discharge of fluids, causing burns, other injuries or damage.

Use the following procedures to remove components. Use the same procedures in reverse to reassemble. (Installation, maintenance, repairs, disassembly, adjustment and valve opening/closing should be done only by trained maintenance personnel.)

### Removing/Reattaching the Trap Cover

Part	During Disassembly	During Reassembly
Trap Cover Bolt	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Trap Cover	Remove the trap cover by pulling it down, being careful not to scratch the seating surface	Make sure there are no pieces of the old gasket left on the sealing surfaces of the separator body and trap cover, align the guide pin on the separator body with the guide pin hole on the trap cover and reattach
Trap Cover Gasket	Remove, being careful not to scratch the surfaces	Replace with a new gasket

### Removing/Reinserting Parts inside the Trap Cover

Part	During Disassembly	During Reassembly
Baffle Nut, Baffle Bolt (for 65 – 100 mm, 2½ – 4 in)	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Baffle (for 65 – 100 mm, 2½ – 4 in)	Lift off of bolts	Align with bolts and set on the float cover
Screen (for 65 – 100 mm, 2½ – 4 in)	Remove, being careful not to bend	Place on top of the float cover, being careful not to bend
Float Cover Bolt (Spring Washer)	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Float Cover	Remove by lifting up and off	Place into position
Float	Remove, being careful not to scratch the polished surface	Insert, being careful not to scratch the polished surface
Trap Valve Seat	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Valve Seat Gasket	Remove, being careful not to scratch the surfaces	Replace with a new gasket

### Separating/Reattaching Body and Separator Body

Part	During Disassembly	During Reassembly
Body Bolt	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Separator Body	Pull down and out from the body, being careful not to let the separator and wave spring fall as they come out with the separator body	Make sure there are no pieces of the old gasket left on the sealing surfaces of the separator body and body, align the guide pin on the separator body with the guide pin hole on the body and reattach
Separator	Remove when detaching the separator body	Insert into the groove in the separator body
Wave Spring	Remove from its groove	Insert into the groove in the separator body
Screen (for 15 – 50 mm, $\frac{1}{2}$ – 2 in)	Remove, being careful not to bend	Place on top of the separator, being careful not to bend
Body Gasket	Remove, being careful not to scratch the surfaces	Replace with a new gasket

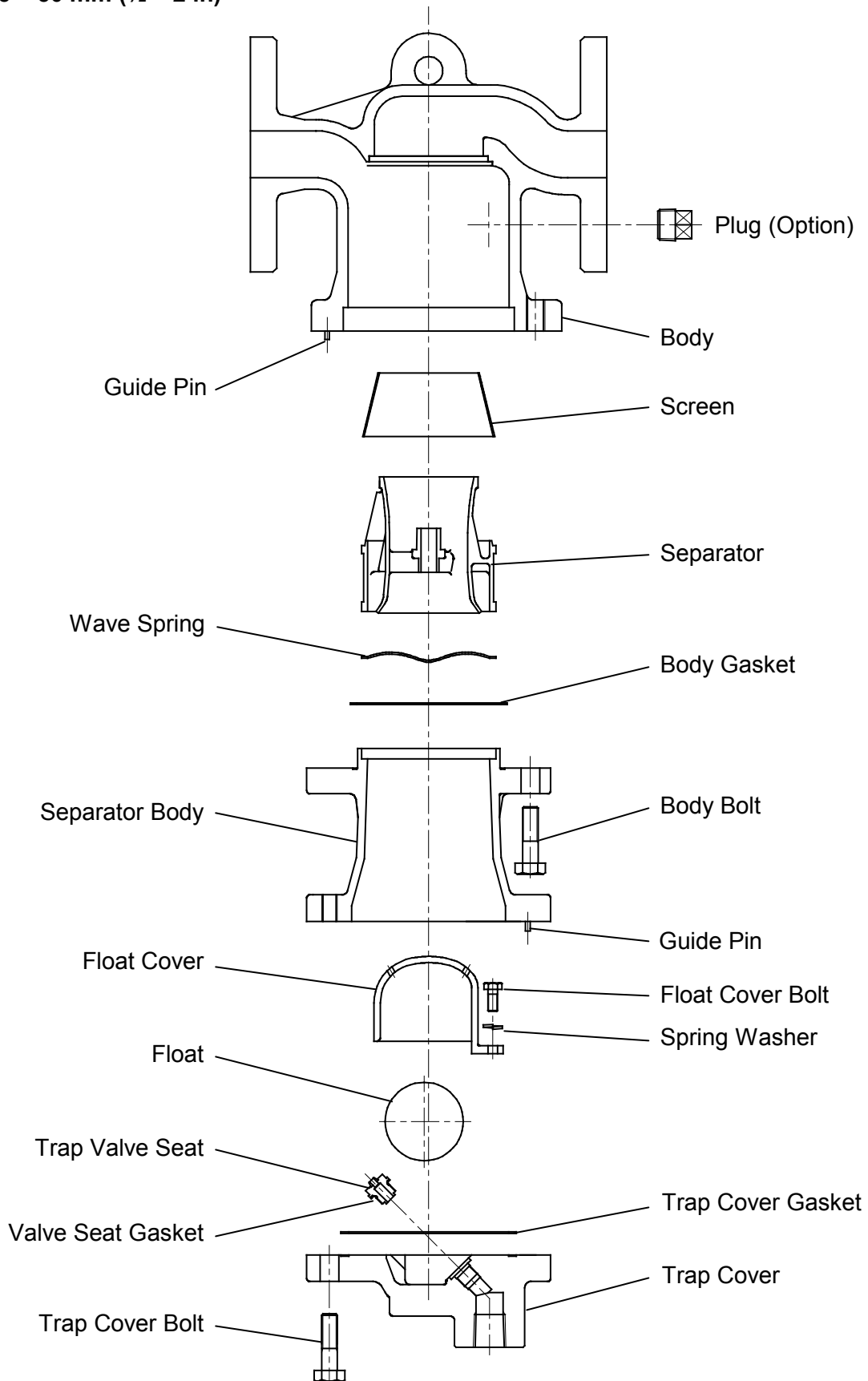
### Table of Tightening Torques

Part	Size		Torque		Distance Across Flats	
	mm	(in)	N·m	(ft·lb)	mm	(in)
Body Bolt	15 – 40	( $\frac{1}{2}$ – $1\frac{1}{2}$ )	60	(44)	17	( $\frac{21}{32}$ )
	50 – 80	(2 – 3)	70	(51)	19	( $\frac{3}{4}$ )
	100	(4)	160	(115)	24	( $\frac{15}{16}$ )
Trap Cover Bolt	15 – 40	( $\frac{1}{2}$ – $1\frac{1}{2}$ )	60	(44)	17	( $\frac{21}{32}$ )
	50 – 80	(2 – 3)	70	(51)	19	( $\frac{3}{4}$ )
	100	(4)	160	(115)	24	( $\frac{15}{16}$ )
Trap Valve Seat	15, 20	( $\frac{1}{2}$ , $\frac{3}{4}$ )	10	(7)	11	( $\frac{7}{16}$ )
	25, 40	(1, $1\frac{1}{2}$ )	15	(11)	13	( $\frac{1}{2}$ )
	50 – 80	(2 – 3)	40	(29)	17	( $\frac{21}{32}$ )
	100	(4)	50	(37)	19	( $\frac{3}{4}$ )
Float Cover Bolt	15, 20	( $\frac{1}{2}$ , $\frac{3}{4}$ )	7	(5)	8	( $\frac{5}{16}$ )
	25, 40	(1, $1\frac{1}{2}$ )	10	(7)	10	( $\frac{3}{8}$ )
	50 – 100	(2 – 4)	20	(15)	13	( $\frac{1}{2}$ )
Baffle Nut	65, 80	( $2\frac{1}{2}$ – 3)	10	(7)	10	( $\frac{3}{8}$ )
	100	(4)	20	(15)	13	( $\frac{1}{2}$ )

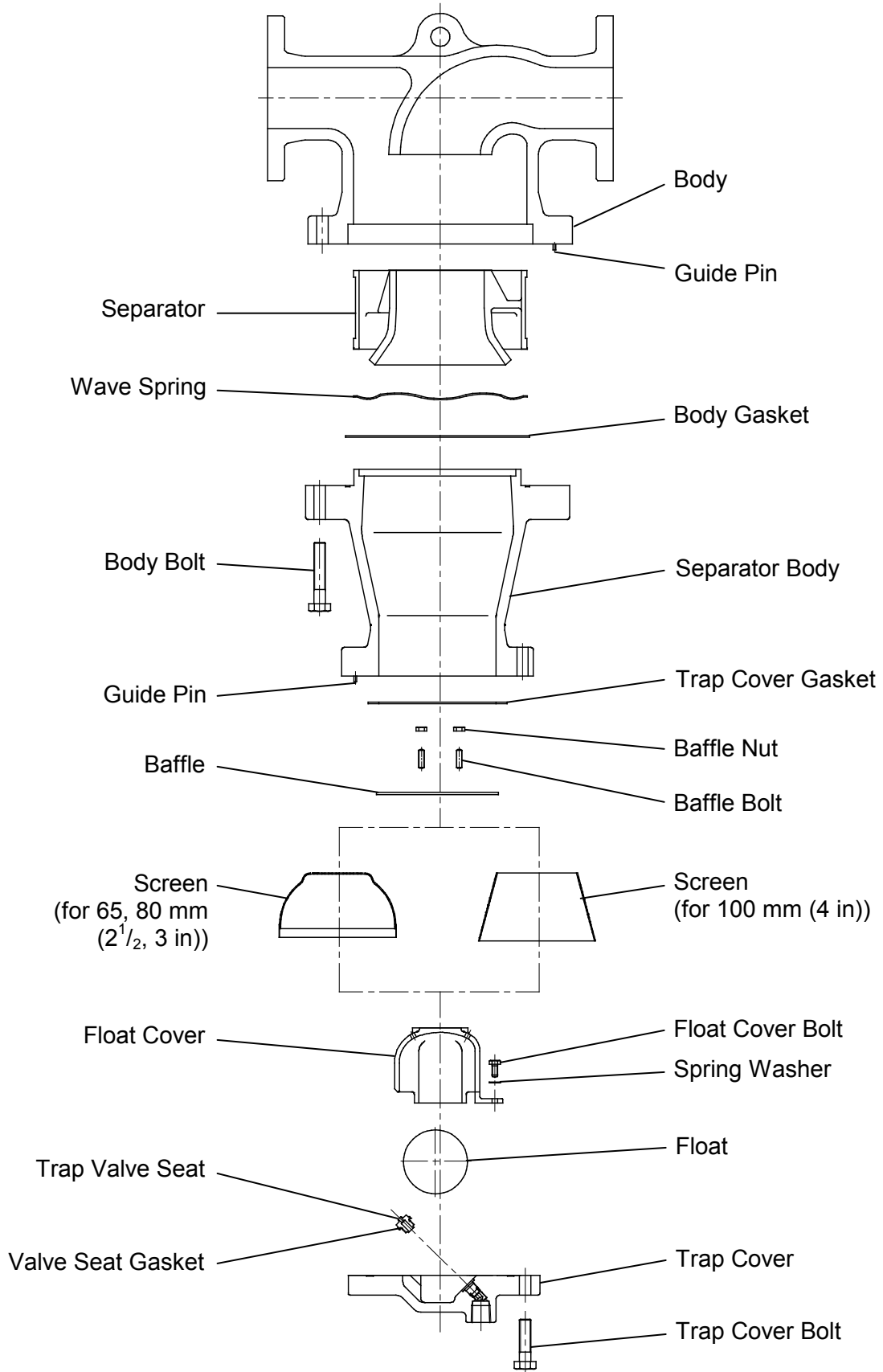
NOTE: -Coat all threaded portions with anti-seize. (1 N·m  $\approx$  10 kg·cm)  
 -If drawings or other special documentation were supplied for the product, any torque given there takes precedence over values shown here.

**Exploded View**

15 – 50 mm (½ – 2 in)



65 – 100 mm (2½ – 4 in)



## Troubleshooting



**NEVER** apply direct heat to the float. The float may explode due to increased internal pressure, causing accidents leading to serious injury or damage to property and equipment.



When disassembling or removing the product, wait until the internal pressure equals atmospheric pressure and the surface of the product has cooled to room temperature. Disassembling or removing the product when it is hot or under pressure may lead to discharge of fluids, causing burns, other injuries or damage.

When the product fails to operate properly, use the following table to locate the cause and remedy.

Problem	Cause	Remedy
No condensate is discharged (blocked) or discharge is poor	The float is damaged or filled with condensate	Replace with a new float
	The trap valve seat port, screen or piping is clogged with rust or scale	Clean parts
	The trap operating pressure exceeds the maximum specified pressure, or there is insufficient pressure differential between the trap inlet and outlet	Compare specifications and actual operating conditions
Steam is discharged or leaks from the trap outlet (blowing) (steam leakage)	Rust and scale have accumulated around the trap valve seat or beneath the float	Clean parts
	The trap valve seat is damaged	Replace with a new trap valve seat
	The float is deformed or coated with scale	Clean or replace with a new float
	The separator is installed above the maximum allowable inclination	Correct the installation
Steam is leaking from sealing surfaces	Gasket deterioration or damage	Replace with a new gasket
	Improper tightening torques were used	Tighten to the proper torque
Water is mixed in with the steam from the separator outlet	Steam flow velocity is too high	Take steps necessary to lower the steam flow velocity
	Review causes listed above in "No condensate is discharged..." and follow the appropriate remedy	
Separator outlet pressure drops or desired flow rate is unachievable	The screen (for 15 – 50 mm ( $1/2$ – 2 in)) is clogged with rust and scale	Clean or replace with a new screen

## Product Warranty

1. Warranty Period  
One year following product delivery.
2. Warranty Coverage  
TLV CO., LTD. warrants this product to the original purchaser to be free from defective materials and workmanship. Under this warranty, the product will be repaired or replaced at our option, without charge for parts or labor.
3. This product warranty will not apply to cosmetic defects, nor to any product whose exterior has been damaged or defaced; nor does it apply in the following cases:
  - 1) Malfunctions due to improper installation, use, handling, etc., by other than TLV CO., LTD. authorized service representatives.
  - 2) Malfunctions due to dirt, scale, rust, etc.
  - 3) Malfunctions due to improper disassembly and reassembly, or inadequate inspection and maintenance by other than TLV CO., LTD. authorized service representatives.
  - 4) Malfunctions due to disasters or forces of nature.
  - 5) Accidents or malfunctions due to any other cause beyond the control of TLV CO., LTD.
4. Under no circumstances will TLV CO., LTD. be liable for consequential economic loss damage or consequential damage to property.

\* \* \* \* \*

For Service or Technical Assistance:

Contact your **TLV** representative or your regional **TLV** office.

### Manufacturer

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