



PENBERTHY SERIES TSL/TSM LIQUID LEVEL GAUGES

Armored transparent flat glass liquid level gauges suitable for steam service on boiler drum, feedwater heater and other vessel level indication applications



Series TSL



Series TSM

FEATURES

- Suitable for indoor or outdoor installation.
- For use with low maintenance stuffing box gauge valves (nipple connected models).
- Through bolt design allows easy servicing.
- Cover enclosed glass resists breakage.
- Thermally induced linear expansion absorbed within the stuffing box on nipple connected models or by the expansion loop on flange connected models.
- Live loaded cover bolting to withstand cyclic service.
- Mica shield protection to prevent gauge glass erosion.
- Tempered borosilicate glass for high strength and thermal shock resistance.
- Series TSL and TSM meet ASME Section I.
- PED 2014/68/EU conformance available.

GENERAL APPLICATION

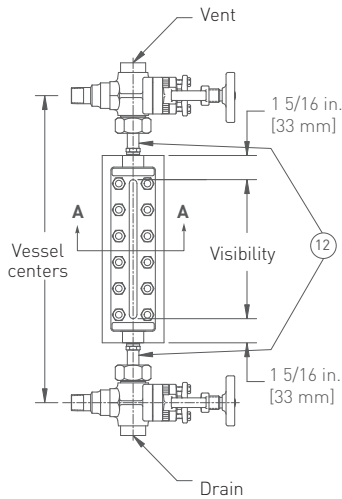
These level gauges are suitable for use in steam service for boiler drum, feedwater heater and other vessel level indication applications. Series TSL and TSM are especially suited to IP and LP combined cycle HRSGs.

TECHNICAL DATA

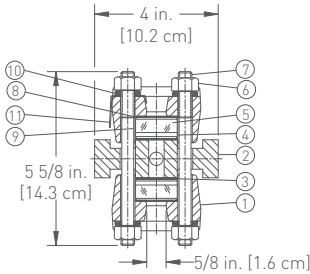
Sizes: 1/2" to 3/4" (12.5 to 19 mm)
 Max pressures
 TSL: 650 psi (45 bar)
 TSM: up to 1500 psi (103 bar)
 Max. temperatures
 TSL: 497°F (258°C)
 TSM: 596°F (313°C)
 Visibility
 TSL: 9" to 58 1/2" (228 to 1486 mm)
 TSM: 9" to 35 1/2" (228 to 902 mm)
 Visibilities up to 139" (3530 mm) possible.

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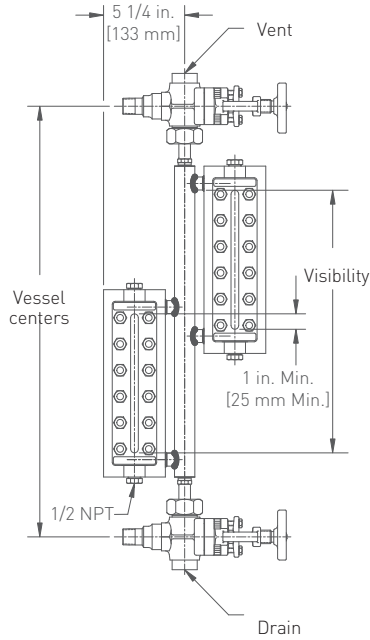
PARTS, MATERIALS AND DIMENSIONS SERIES TSL



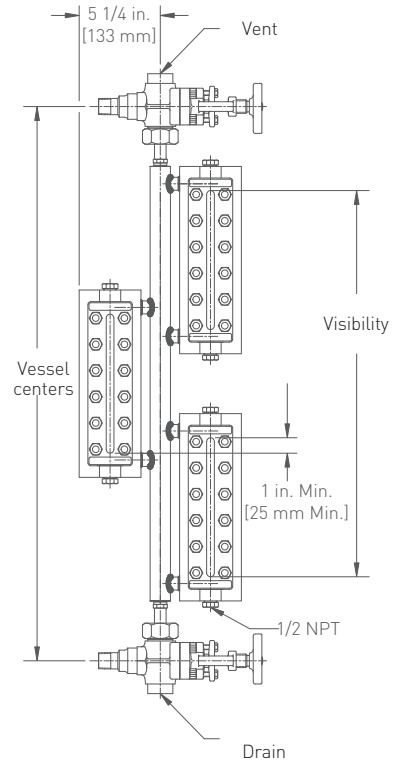
1TSL6 - 1TSL9
shown with nipples and gaugecocks



Section A-A



2TSL6 - 2TSL9
shown with nipples and gaugecocks



3TSL6 - 3TSL9
shown with nipples and gaugecocks

PARTS/MATERIALS

Item	Description	Material
1	Cover	ASME SA105 carbon steel
2	Chamber	ASME SA285 Gr. C carbon steel
3*	Gasket	Grafoil® w/STS insert
4*	Shield	Mica
5*	Glass	Tempered borosilicate
6*	Nut	ASTM A-194 Gr. 2 or 2H
7*	Stud	ASTM A-193 Gr. B-7
8*	Cushion	Grafoil® w/STS insert
9*	Band	Rubber
10*	Belleville washer	17-7 PH SS
11	Nameplate	Stainless steel
12	Nipples (stuffing box adapters)	ASME SA479 Gr. 316/316L

If applicable

Standpipe	SA106 Gr. B carbon steel
Cross	SA181 Cl. 60 or SA105 carbon steel
Tee	SA181 Cl. 60 or SA105 carbon steel
Flange	SA105 carbon steel
Loop	SA106 Gr. B carbon steel

* Recommended spare parts

DIMENSIONS, INCHES (mm) - Series TSL (up to 650 psig (45 bar))

Model #	Max. Visibility	Min. vessel centers* with		No. of sections
		780 gaugecocks		
1TSL6	9 [228]	19 1/8 [486]		1
1TSL7	10 1/8 [257]	20 1/4 [514]		1
1TSL9	12 1/2 [317]	22 3/8 [575]		1
2TSL6	17 [432]	27 3/8 [702]		2
2TSL7	19 1/4 [489]	29 7/8 [759]		2
2TSL9	24 [609]	34 3/8 [879]		2
3TSL6	25 [635]	35 5/8 [905]		3
3TSL7	28 3/8 [721]	39 [991]		3
3TSL9	35 1/2 [902]	46 1/8 [1172]		3
4TSL6	33 [838]	43 3/8 [1108]		4
4TSL7	37 1/2 [952]	48 1/8 [1222]		4
4TSL9	47 [1194]	57 3/8 [1464]		4
5TSL6	41 [1041]	51 3/8 [1311]		5
5TSL7	46 3/8 [1184]	57 1/4 [1454]		5
5TSL9	58 1/2 [1486]	69 1/8 [1756]		5

NOTE

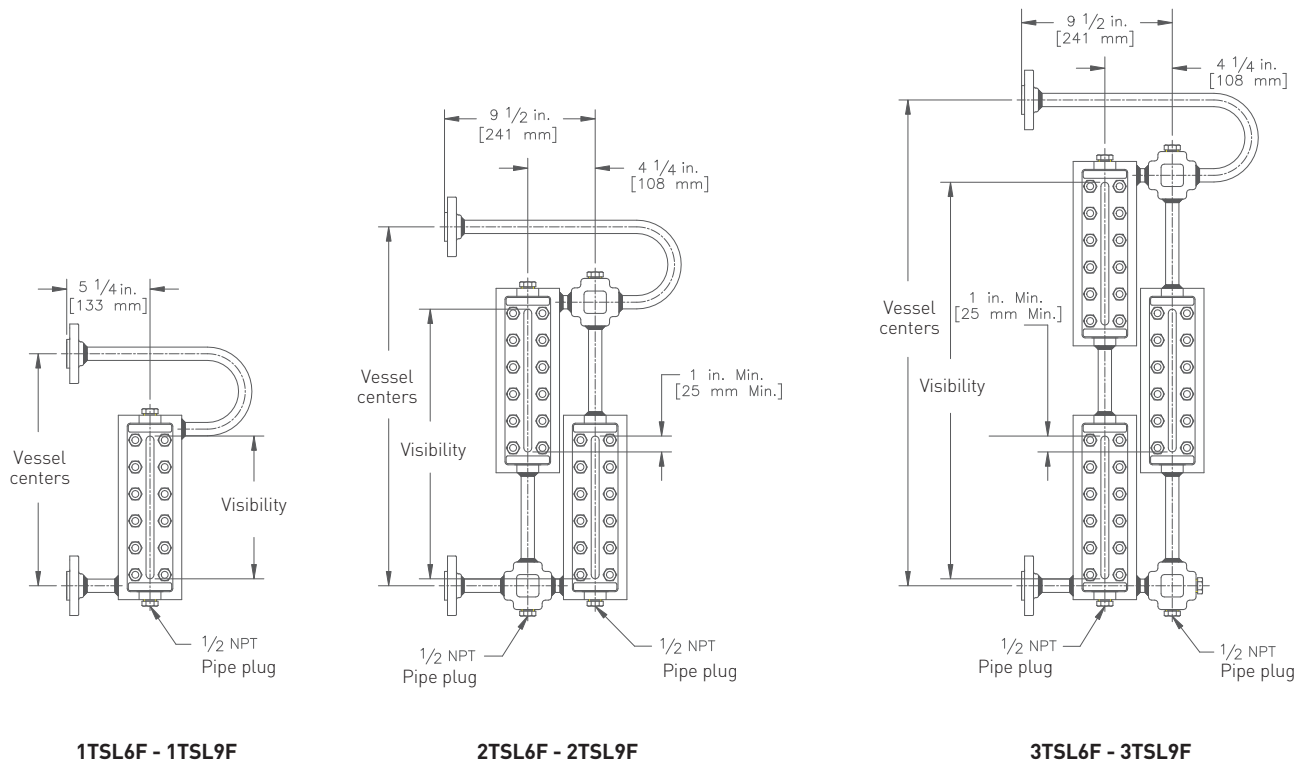
* 1/2" NPT connection, for 3/4" NPT connection add 1/2" to min. valve centers. For visibilities over 58 1/2" (1486 mm), consult factory.

How to interpret the numbers

TSL	Transparent steam gauge - Low pressure
1	Number of sections
7	Glass size (for different visibilities) 6, 7 or 9

PENBERTHY SERIES TSL/TSM LIQUID LEVEL GAUGES

PARTS, MATERIALS AND DIMENSIONS SERIES TSL-F



DIMENSIONS, INCHES (mm) - SERIES TSL-F (up to 650 psig (45 bar))

Model	Max. Visibility	Min. vessel centers*	No. of Sections
1TSL6F	9 [229]	14 ⁵ / ₈ [371]	1
1TSL7F	10 ¹ / ₈ [257]	15 ³ / ₄ [400]	1
1TSL9F	12 ¹ / ₂ [318]	18 ¹ / ₈ [460]	1
2TSL6F	17 [432]	22 ⁵ / ₈ [575]	2
2TSL7F	19 ¹ / ₄ [489]	24 ⁷ / ₈ [632]	2
2TSL9F	24 [610]	29 ⁵ / ₈ [752]	2
3TSL6F	25 [635]	30 ⁵ / ₈ [778]	3
3TSL7F	28 ³ / ₈ [721]	34 [864]	3
3TSL9F	35 ¹ / ₂ [902]	41 ¹ / ₈ [1045]	3

NOTES

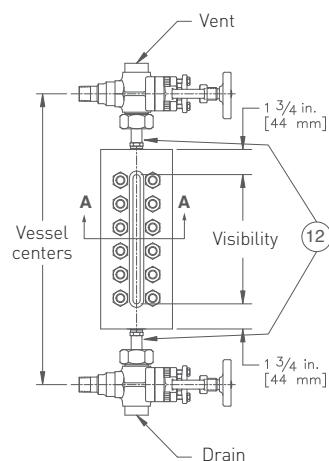
* 1/2" [12.5 mm] CL600 LG F SO vessel connection
 For visibilities over 35 1/2" [902 mm] consult factory

How to interpret the numbers

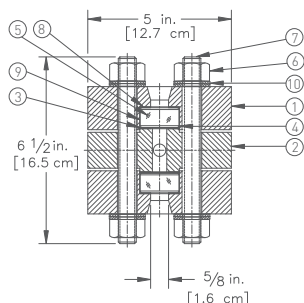
- TSL Transparent steam gauge - Low pressure
- 1 Number of sections
- 7 Glass size (for different visibilities) 6,7 or 9
- F Flange connection

PENBERTHY SERIES TSL/TSM LIQUID LEVEL GAUGES

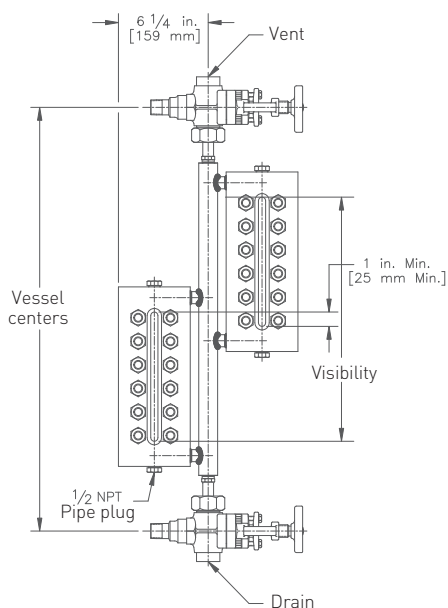
PARTS, MATERIALS AND DIMENSIONS SERIES TSM



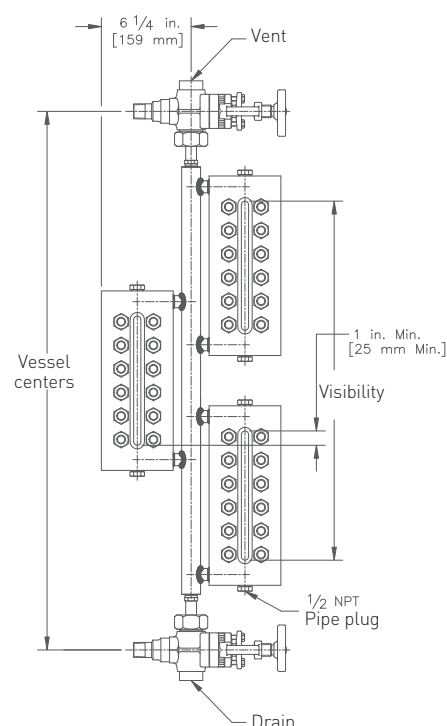
1TSM6 - 1TSM9
shown with nipples and gaugecocks



Section A-A



2TSM6 - 2TSM9
shown with nipples and gaugecocks



3TSM6 - 3TSM9
shown with nipples and gaugecocks

PARTS/MATERIALS

Item	Description	Material
1	Cover	ASME SA285 Gr. C Carbon Steel
2	Chamber	ASME SA285 Gr. C Carbon Steel
3*	Gasket	Grafoil® w/STS insert
4*	Shield	Mica
5*	Glass	Tempered borosilicate
6*	Nut	ASTM A-194 Gr. 2 or 2H
7*	Stud	ASTM A-193 Gr. B-7
8*	Cushion	Grafoil® w/STS insert
9*	Band	Rubber
10*	Belleville washer	Cad. Plated H11/H13 Carbon Steel
11	Nameplate	Stainless steel
12	Nipples	ASME SA479 Gr. 316/316L

(If Applicable)

Standpipe	SA106 Gr. B Carbon Steel
Cross	SA181 Cl. 60 or SA105 Carbon Steel
Tee	SA181 Cl. 60 or SA105 Carbon Steel
Flange	SA105 Carbon Steel
Loop	SA106 Gr. B Carbon Steel

* Recommended spare parts

DIMENSIONS, INCHES (mm) - SERIES TSM (up to 850 psig (59 bar) or 1500 psig (103 bar) using locking collar)

Model	Max. Visibility	Min. vessel centers* with		No. of Sections
		780 gaugecocks		
1TSM6	9 [229]	20 [508]		1
1TSM7	10 1/8 [257]	21 1/8 [537]		1
1TSM9	12 1/2 [318]	23 1/2 [597]		1
2TSM6	17 [432]	29 1/4 [743]		2
2TSM7	19 1/4 [489]	31 1/2 [800]		2
2TSM9	24 [610]	36 1/4 [921]		2
3TSM6	25 [635]	37 1/4 [946]		3
3TSM7	28 3/8 [721]	40 3/8 [1032]		3
3TSM9	35 1/2 [902]	47 3/4 [1213]		3

NOTES

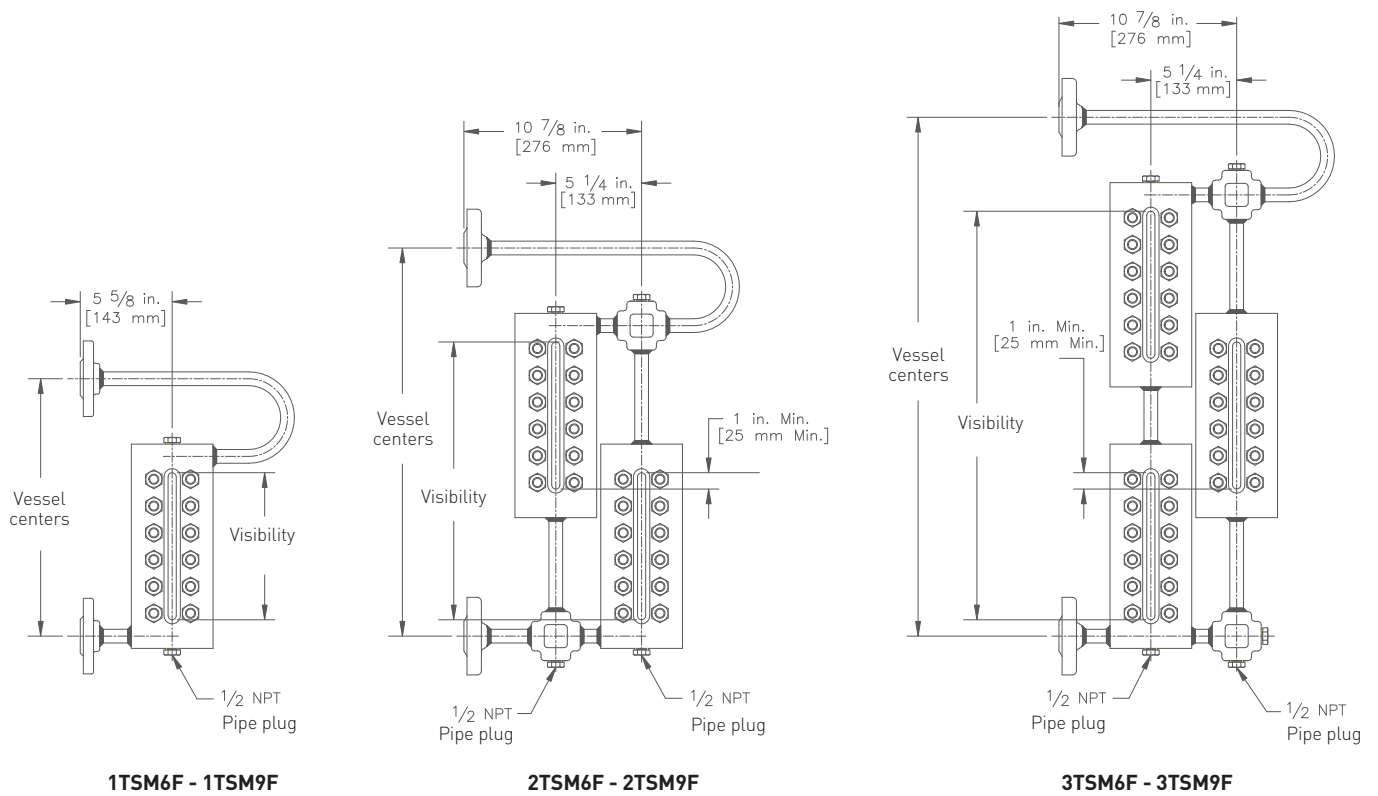
* Add 1" [25 mm] when using locking collar
For visibilities over 35 1/2" [902 mm] consult factory

How to interpret the numbers

TSM	Transparent steam gauge - Medium pressure
1	Number of sections
7	Glass size (for different visibilities) 6,7 or 9

PENBERTHY SERIES TSL/TSM LIQUID LEVEL GAUGES

PARTS, MATERIALS AND DIMENSIONS SERIES TSM-F



DIMENSIONS, INCHES (mm) - SERIES TSM-F (up to 1500 psig (103 bar))

Model	Max. Visibility	Min. vessel centers*	No. of Sections
1TSM6F	9 (229)	15 3/4 (400)	1
1TSM7F	10 1/8 (257)	16 7/8 (429)	1
1TSM9F	12 1/2 (318)	19 1/4 (489)	1
2TSM6F	17 (432)	23 3/4 (603)	2
2TSM7F	19 1/4 (489)	26 (660)	2
2TSM9F	24 (610)	30 3/4 (781)	2
3TSM6F	25 (635)	31 3/4 (806)	3
3TSM7F	28 3/8 (721)	35 1/8 (892)	3
3TSM9F	35 1/2 (902)	42 1/4 (1073)	3

NOTES

* 1/2" (12.5 mm) CL1500 LG F SO vessel connection
 For visibilities over 35 1/2" (902 mm) consult factory

How to interpret the numbers

TSM Transparent steam gauge - Medium pressure
 1 Number of sections
 7 Glass size (for different visibilities) 6,7 or 9
 F Flange connection

PENBERTHY SERIES TSL/TSM LIQUID LEVEL GAUGES

GAUGE ASSEMBLIES

Armored flat glass gauges are configurable to any practical length by staggering single section gauges on a bridge.

Series TSL and TSM gauges are frequently furnished as an assembly complete with a set of isolating gaugecocks and an illuminator for better visibility, as illustrated (right).

Model 780 gaugecocks (shown right, center)

Series 780 gaugecocks are supplied in pairs (upper and lower) and are designed specifically to be used with our gauge glasses to isolate the gauges from the pressure vessel when it becomes necessary to drain and service them. All gaugecocks are supplied with:

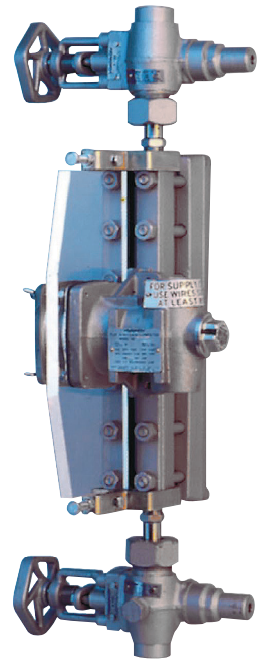
- outside screw and yoke.
- a vertical rising lower and horizontal leaky upper ball check shut-off.
- an offset pattern that allows the inside of the gauge glass to be cleaned easily with a minimum of disassembly.
- stuffing box gauge connections.
- solid shank vessel connection (NPT, socketwelding or flanged ends).
- threaded renewable seat and backseating stem.

Other options are available. Contact the factory for details.

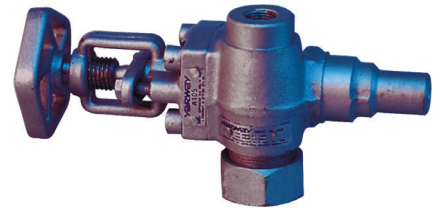
Illuminators (shown right, top and bottom)

Designed to improve liquid level observation by providing proper light distribution over the entire visible length of the transparent gauge when ambient light is insufficient. The illuminator is designed to be readily mounted on the TSL and TSM Series gauges.

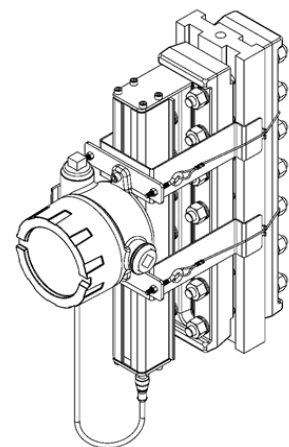
Continuous LED illuminators are available in lengths up to 74" (1880 mm). Multiple illumination sections can be chained to accommodate virtually any visible length.



Gauge assembly with gaugecocks and incandescent illuminator.



Series 780 gaugecock



LED illuminator

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