

MOSS

**MOSS TRAY
DEAERATOR**

**ECONOMICAL INDUSTRIAL
DEAERATOR SYSTEMS**

Type "TR" Tray Deaerator



MOSS TRAY DEAERATOR DESIGNS

WHY DEAERATE?

- Removal of corrosive oxygen and carbon dioxide from boiler feedwater
- Reduction in the use of oxygen scavengers and other additives
- Opportunity to reclaim heat by recovering exhaust and flash steam
- Improved heat transfer by eliminating non-condensable gases
- Reduction of thermal shock to the boiler by feeding water closer to the boiler operating temperature

FEATURES

- Guaranteed oxygen removal to .005 cc/liter (7 PPB)
- Guaranteed to eliminate titratable free carbon dioxide to 0
- Guaranteed to heat water to the corresponding temperature of the saturated steam contained within the vessel
- Turndown is 20-1
- Capacities from 5,000 lbs./hr. to 1,000,000 lbs./hr.
- 10 minutes of storage capacity is minimum
- #430 stainless steel riveted trays
- #304 stainless steel internal vent condenser (direct contact on units greater than 30,000 lbs./hr.)
- #316 stainless steel spray valves
- #304 stainless steel tray enclosure
- Moss exclusive gliding tray door system for ease of tray inspection and removal
- All deaerator are designed for the exact job conditions with no over or under sizing
- Systems can be completely packaged and ready for immediate installation
- All vessels are designed, built and stamped in accordance with the ASME code for 50 PSIG

STANDARD EQUIPMENT & CONNECTIONS

- ASME deaerator and storage vessels (50 PSIG design)
- Structural steel stand
- Motor driven feedwater pumps each with bypass orifice or relief valve, suction vortex breaker, suction piping with stop valve, strainer and flexible connector
- Steam inlet flange
- Manual vent valve with orifice
- Direct contact vent condenser (units >30,000 Lbs./hr.)
- High temperature return connection (>227° F.)
- Low temperature return connection (<227 F.)
- Overflow drainer
- Self operating steam pressure reducing valve
- Mechanical level control with external float cage & mechanical modulating water inlet valve
- Storage section thermometer
- Steam section pressure gauge
- Full height water sight gauge
- High & low level alarm switches
- Sampling valve
- Sentinel relief valve
- Vacuum breaker
- Vessel drain valve
- Underwriters Laboratories NEMA 1 relay or PLC based control panel

OPTIONAL EQUIPMENT & CONNECTIONS

- Pump discharge piping
- Pump discharge automatic recirculation valves
- Full capacity (based on PRV capacity) safety relief valves
- Electric or pneumatic proportional level control with valve
- Electric or pneumatic relief pressure control
- Liquid filled gauges
- Chemical injection quill
- Insulation and lagging of pressure vessels
- Panel mounted gauges (standard with stand over 72" in height)
- Steam section thermometer
- Anode(s)
- Automatic vent valve
- 3 valve by-pass for PRV and/or water inlet control valve
- Stress relieving of pressure vessel
- Weld non—destructive examination
- Oxygen test kit

MOSS TRAY DEAERATOR

Dimension and Sizing Information

All Dimensions in Inches

Model	A	B	C	D	E	F	G	H	J	K	L	N
TR5M	24	60	71	48	42	28	42	18	48	58	30	6
TR7M	24	96	107	72	66	28	42	18	48	58	48	6
TR9M	30	60	73	48	42	36	42	18	48	58	30	6
TR11M	30	84	97	60	54	36	42	18	48	58	42	6
TR15M	36	84	99	60	54	40	49	24	54	68	42	6
TR20M	36	96	111	72	66	40	49	30	54	68	48	6
TR25M	42	84	101	60	54	45	50	36	54	70	42	6
TR30M	42	96	113	72	66	45	50	36	54	70	48	6
TR35M	48	84	103	60	54	48	52	36	54	74	42	6
TR40M	48	96	115	72	66	48	52	36	54	74	48	6
TR50M	60	72	95	48	42	54	54	42	54	78	36	6
TR60M	60	96	119	72	66	54	54	48	54	78	48	6
TR70M	60	120	143	96	90	54	54	48	54	78	60	6
TR80M	72	84	111	60	54	66	56	60	54	82	42	6
TR90M	72	96	123	72	66	66	56	60	54	82	48	6
TR100M	72	120	147	96	90	66	56	60	54	82	60	6
TR125M	84	96	127	72	66	78	58	72	54	84	48	6
TR150M	84	120	151	96	90	78	58	72	54	84	60	6
TR175M	84	132	164	108	102	78	76	72	72	104	66	6
TR200M	96	120	165	96	90	90	90	72	84	110	60	9
TR225M	96	132	177	108	100	90	90	72	96	110	66	9
TR250M	96	144	189	120	112	90	90	72	96	110	72	9
TR300M	108	132	180	108	100	100	48	72	102	84	90	12
TR400M	108	192	240	168	160	100	48	72	120	84	120	12
TR500M	108	264	312	240	232	100	48	72	132	84	132	12

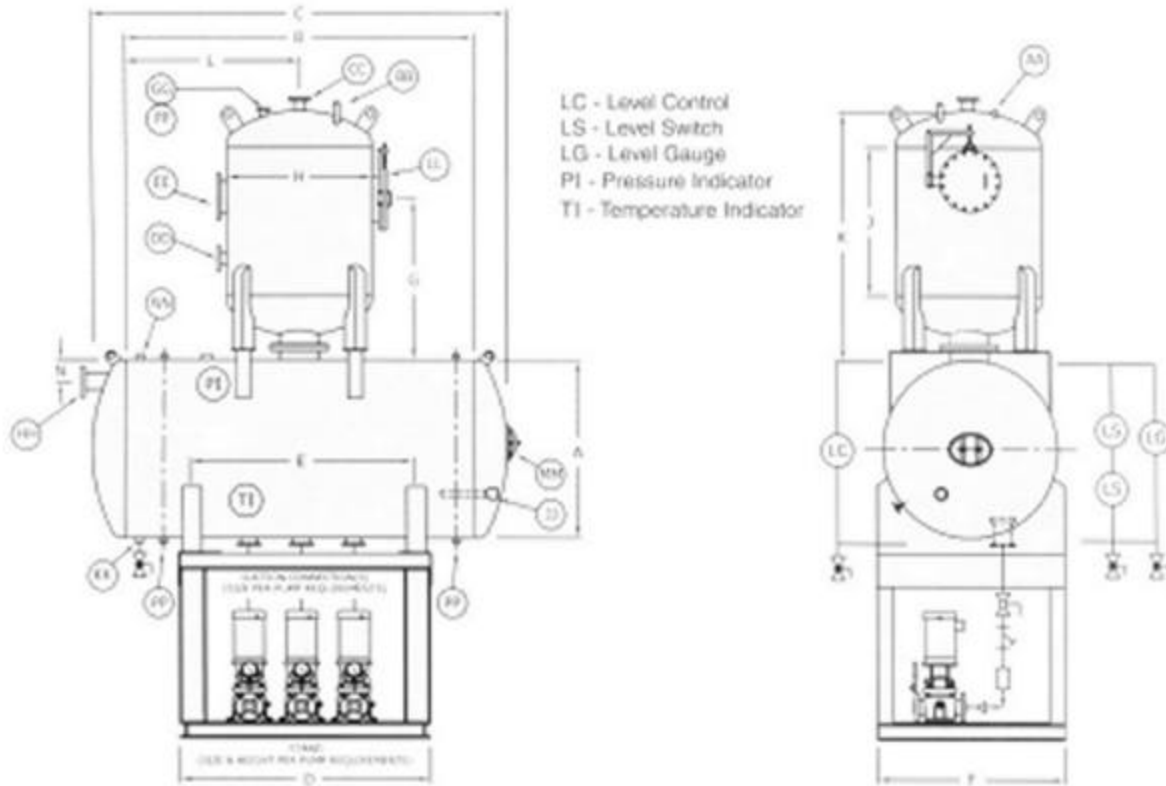
Dimensions are for a horizontal deaerator section: "J" = shell length - "K" = height of deaerator section

Connections & Components

ITEM	DESCRIPTION	ITEM	DESCRIPTION
AA	Automatic Air Vent	HH	Overflow
BB	Continuous Vent	JJ	Chemical Quill Provision
CC	Water Inlet	KK	Vessel Drain
DD	High Temperature Return	LL	Manway for Tray Access
EE	Steam Inlet (Flange Size)	MM	Manway (12" x 16")
FF	Relief Valve (Sentinel Only)	NN	Pump By -Pass/Relief (Sized as Required)
GG	Vacuum Breaker	PP	Level Instrument Equalizing (Qty. 4)

Model	AA	BB	CC	DD	EE	FF	GG	HH	JJ	KK	LL	PP
TR5M	0.5	0.75	1.5	1.25	4	1 X 1.5	1.5	1.5	1	1.5	12	1.5
TR7M	0.5	0.75	1.5	1.25	4	1 X 1.5	1.5	2	1	1.5	12	1.5
TR9M	0.5	0.75	1.5	1.25	4	1 X 1.5	1.5	2	1	1.5	12	1.5
TR11M	0.5	0.75	1.5	1.25	4	1 X 1.5	1.5	2	1	1.5	12	1.5
TR15M	0.5	0.75	2	1.25	6	1 X 1.5	2	2	1	2	16	1.5
TR20M	0.5	0.75	2	1.25	6	1 X 1.5	2	2	1	2	16	1.5
TR25M	0.5	0.75	3	1.25	6	1 X 1.5	2	2	1	2	16	1.5
TR30M	0.5	0.75	3	1.25	8	1 X 1.5	2	2	1	2	16	1.5
TR35M	0.5	1.5	3	1.5	8	1 X 1.5	2.5	2	1	2.5	16	1.5
TR40M	0.5	1.5	3	1.5	8	1 X 1.5	2.5	2	1	2.5	18	1.5
TR50M	0.5	1.5	3	1.5	8	1 X 1.5	2.5	3	1	2.5	18	1.5
TR60M	0.5	1.5	3	1.5	8	1 X 1.5	2.5	3	1	2.5	18	1.5
TR70M	0.5	1.5	3	1.5	8	1 X 1.5	2.5	3	1	2.5	18	1.5
TR80M	0.5	1.5	3	1.5	10	1 X 1.5	2.5	3	1	2.5	18	1.5
TR90M	0.5	1.5	3	2	10	1 X 1.5	3	4	1	2.5	18	1.5
TR100M	0.75	2	2	2	10	1 X 1.5	3	4	1	2.5	18	1.5
TR125M	0.75	2	2	2	10	1 X 1.5	3	4	1	2.5	18	1.5
TR150M	0.75	2	2	3	12	1 X 1.5	3	6	1	3	20	1.5
TR175M	0.75	2.5	2.5	3	14	1 X 1.5	4	6	1	3	20	1.5
TR200M	0.75	2.5	2.5	3	14	1 X 1.5	4	6	1	3	20	1.5
TR225M	1	2.5	2.5	3	16	1 X 1.5	4	6	1	3	20	1.5
TR250M	1	2.5	2.5	3	16	1 X 1.5	4	6	1	3	24	1.5
TR300M	1	3	3	3	18	1 X 1.5	6	6	1	3	24	1.5
TR400M	1	3	3	3	24	1 X 1.5	6	6	1	3	24	1.5
TR500M	1	3	3	3	24	1 X 1.5	6	6	1	3	24	1.5

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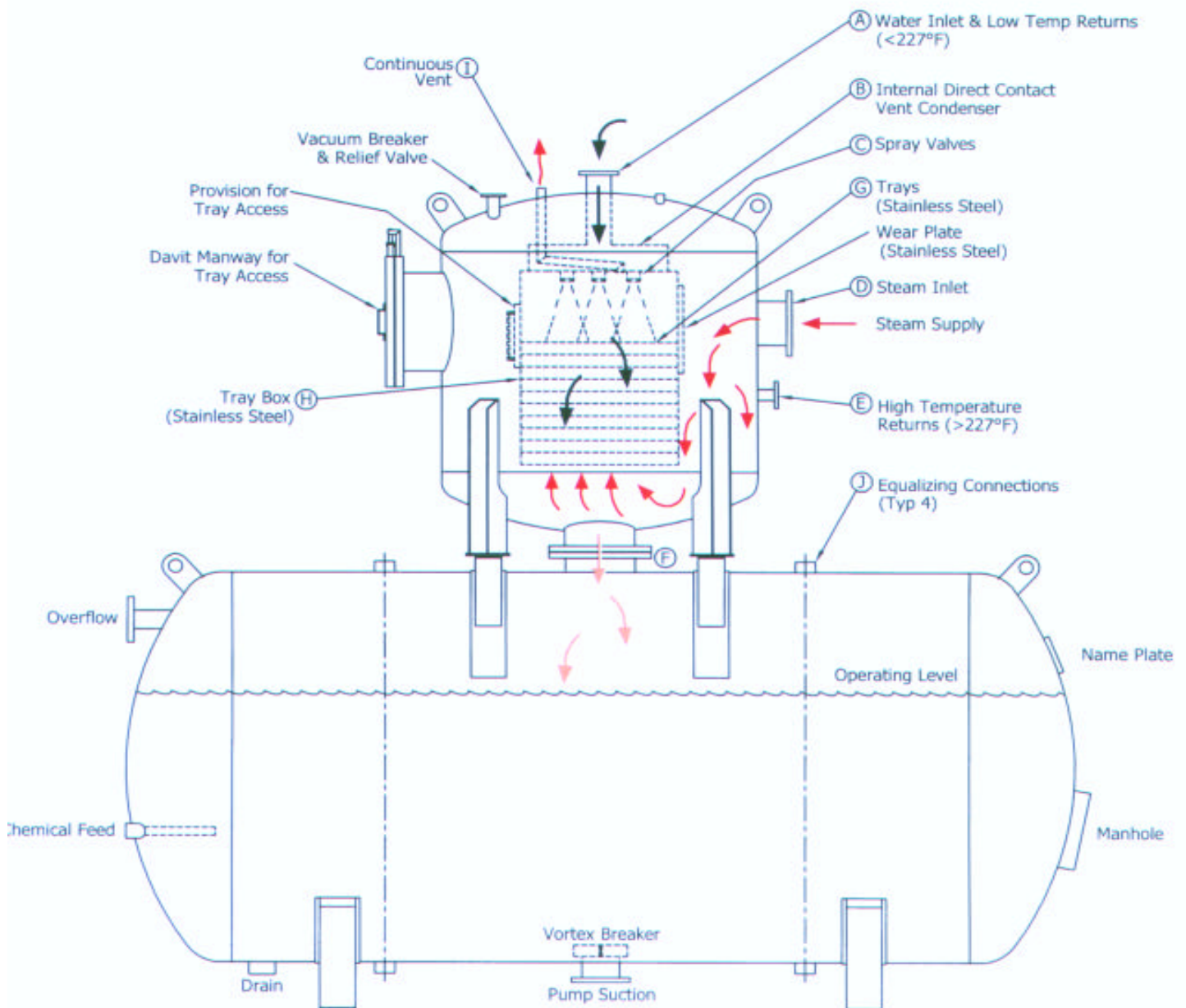
MODEL	CAPACITY	STORAGE (A X B)	DEAERATOR (H X J)	GALLONS	MINUTES **
TR5M	5,000 PPH	24" x 60"	18" x 48"	110	10
TR7M	7,000 PPH	24" x 96"	18" x 48"	160	11
TR9M	9,000 PPH	30" x 60"	18" x 48"	180	10
TR11M	11,000 PPH	30" x 84"	18" x 48"	250	11
TR15M	15,000 PPH	36" x 84"	24" x 54"	370	12
TR20M	20,000 PPH	36" x 96"	30" x 54"	420	10
TR25M	25,000 PPH	42" x 84"	36" x 54"	530	10
TR30M	30,000 PPH	42" x 96"	36" x 54"	600	10
TR35M	35,000 PPH	48" x 84"	36" x 54"	700	10
TR40M	40,000 PPH	48" x 96"	36" x 54"	800	10
TR50M	50,000 PPH	60" x 72"	42" x 96"	1,020	10
TR60M	60,000 PPH	60" x 96"	48" x 54"	1,300	10
TR70M	70,000 PPH	60" x 120"	48" x 54"	1,570	11
TR80M	80,000 PPH	72" x 84"	60" x 54"	1,720	10
TR90M	90,000 PPH	72" x 96"	60" x 54"	1,930	10
TR100M	100,000 PPH	72" x 120"	60" x 54"	2,070	10
TR125M	125,000 PPH	84" x 96"	72" x 54"	2,470	10
TR150M	150,000 PPH	84" x 120"	72" x 54"	2,970	10
TR175M	175,000 PPH	84" x 132"	72" x 72"	3,520	10
TR200M	200,000 PPH	96" x 120"	72" x 84"	4,020	10
TR225M	225,000 PPH	96" x 132"	72" x 96"	4,520	10
TR250M	250,000 PPH	96" x 144"	72" x 96"	5,020	10
TR300M	300,000 PPH	108" x 132"	72" x 102"	6,025	10
TR400M	400,000 PPH	108" x 192"	72" x 120"	8,000	10
TR500M	500,000 PPH	108" x 264"	72" x 132"	10,000	10

* Approximate gallons to overflow.

** Minutes of storage based on rated capacity.

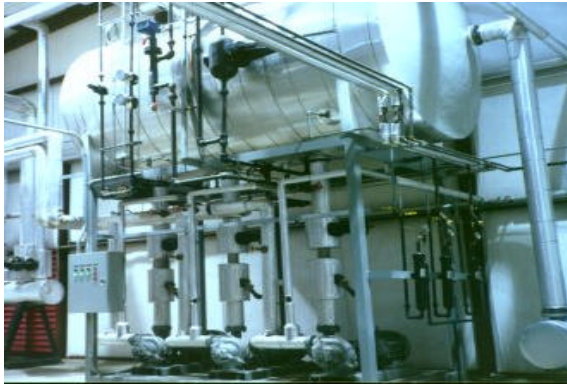
Operation of the Type "TR" Tray Deaerator

Water ($<180^{\circ}\text{F}$) enters the internal direct contact vent condenser (B) thru (A) water inlet. Water flows thru spray valves (C) into a thin hollow cone pattern thru the steam atmosphere of the tray box (H). The now preheated and partially deaerated water is directed over the trays (G) and cascades thru the tray stack. Steam enters thru (D) and flows upward thru the trays (G) as the water flows downward (this is called a counterflow design). In this final stage of deaeration the steam, while moving upward thru the trays, is scrubbing the water flowing downward. The deaerated water then exits the tray box (H), passes thru the downcomer (F) and enters the storage section. All non-condensable gases are omitted thru the vent (I).



MOSS TRAY DEAERATOR DESIGNS

MOSS DEAERATOR INSTALLATIONS



Above: Moss 100,000 lb./hr. spray deaerator at a large industrial textile company. Below: Moss 41,000 lb./hr. high pressure condensate return/deaerator system being installed at a large sawmill operation in the western US.



Below: Moss 105,000 lb./hr. high pressure condensate return/deaerator system with high temperature pumps designed to pump 126 GPM each @ 300° F. Also shown, just prior to system startup, is a Moss PLC control panel with touchscreen that displays deaerator operation and any system alarms. Control system automatically switches the pumps so that each pump will operate equally. In addition, the control system will sense pump discharge pressure and will automatically bring on a standby pump to ensure that the required water gets into the boiler .



HIGH PRESSURE CONDENSATE RETURN SYSTEM

George K. Moss Co., Inc. provides a packaged engineered high - pressure condensate return system that is designed for plants using process pressures from 75 – 300 PSIG. The high - pressure condensate return system is a closed system that is designed to thoroughly drain all of the condensate from the process equipment and return it directly back into the boiler with a minimum drop in temperature and pressure. This equipment can save steam users a significant amount of money yearly and generally has a return on investment of less than 18 months. The high - pressure condensate system can be designed with deaerator internals and controls so that make-up water is sprayed inside the high pressure tank and all gases are removed thru our vent pipe design. High temperature pumps are provided so that feedwater can be pumped back into the boiler maintaining proper water level inside the boiler at all times.

The Moss system works based on the pressure drop across the process equipment - using steam to drain the equipment. The pressure drop ensures the complete removal of condensate from the equipment while allowing steam into the equipment. This process increases heat transfer in the equipment and allows the process equipment to be more efficient. Once the condensate is collected in the ASME code receiver, the high temperature water is forced into the pump suction and pumped directly into the boiler. The high - pressure condensate receiver maintains a certain differential pressure with the use of a back - pressure regulating valve that is designed to drain the condensate from the process equipment at the highest back pressure possible. The back - pressure control valve maintains the differential pressure regardless of any variations in process steam pressure. Other controls are provided with the system to ensure proper operation and safety.

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