

C & H SERVICE SBU



Thermax Condensate Recovery System

Why condensate recovery system?

When steam is used for indirect heat transfers in heat exchangers, reactors and other indirect heating equipment, it gives off its latent (useful) heat to the process and converts itself into a liquid form known as condensate.

High pressure condensate is at almost the same pressure as steam and still contains around 15 to 20% heat of the fuel. This heat, if recovered, can reduce fuel consumption to the extent of 20%.

Improving your business is our business

Thermax offers products, systems and solutions in energy and environment engineering to industrial and commercial establishments around the world. Its business expertise covers heating, cooling, waste heat recovery, captive power, water treatment & recycling, air pollution control & waste management and performance chemicals. Thermax brings to customers extensive experience in industrial applications, and expertise through technology partnerships and strategic alliances.

Operating from its headquarters in Pune (Western India), Thermax has built an international sales & service network spread over South East Asia, Middle East, Africa, Russia, UK and the US. It has a full fledged manufacturing set up that is certified for ISO 9001:2000, ISO 14001 and safety management according to OSHAS (ISO 18000).

In **process heat**, Thermax offers a wide range of steam boilers, thermal oil heaters and hot water generators. It has expertise in a wide range of fuels - oil, gas, solid and agro-waste/ biomass. Supporting a broad array of industries in generating, transferring and conserving heat across a host of applications, Thermax process heat products and systems are exported to North and South America, South East Asia, Middle East, Africa, Europe, CIS, Australia, Antarctica and SAARC.

What efficient condensate recovery system ensures

- High temperature feed water
- Lower blowdown losses
- Good quality boiler feed water
- Lower water treatment losses

The Thermax Condensate Recovery System (TCRS) is an integrated system comprising a flash steam generator, steam operated condensate transfer pump and deaerator unit with immersion tube.

This system efficiently recovers flash steam and hot condensate, and feeds them to the feed water tank through a well designed deaerator unit with immersion tube.



What is TAFS?

When high pressure condensate is discharged from steam traps into low pressure condensate return lines, the excess energy is released in the form of flash steam. This flash steam can be used to heat boiler feed water or for low pressure steam applications.

Selection Table

Condensate (Kg/hr)	Flash (kg/hr)	Model	Size (mm NB)
850	200	TAFS 150	150
2200	450	TAFS 200	200
4500	900	TAFS 300	300
7000	1150	TAFS 350	350

Technical Specifications

Material of Construction

Body & Nozzles ASTMA 106
Dished Ends IS2062 Gr.B/SA285

Design Specifications

Design Code ASME BPVC Sec VIII Div I
Design Pressure 14kg/cm²(g)
Design Temperature 200°C
Higher design/ operating pressure available on request

Models & Dimensions

	TAFS 150	TAFS 200	TAFS 300	TAFS 350
A	1510	1610	1660	1810
B	1250	1335	1365	1505
C	880	940	855	1075
N1	50	80	100	150
N2	65	100	150	150
N3	40	40	50	50
N4	25	25	25	25
N5	15	15	15	15
N6	25	25	40	40

End Connections

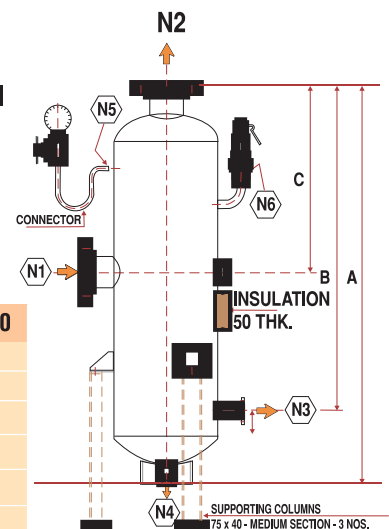
N1, N2, N3 flanged to ANSI B 16.5 Class# 150
N4, N5, Screwed BSP

Installation

The flash vessel should be installed in vertical position only, with flash steam outlet at the top.

Features & Benefits

- Generates low pressure flash steam
- Not covered under IBR
- A dequately sized to minimize pressure drop
- Steam trap sized to handle condensate at low sure difference to be fitted at condensate outlet
- Designed with optimum separation velocity to get dry steam





What is TADIT?

It is an atmospheric de-aerator head designed to remove dissolved gases and oxygen from the feed water, by properly mixing condensate, flash steam and cold make up water. Solubility of oxygen and other dissolved gases decreases with rise in temperature, and when they are released from the solution they exit through the air vent fitted on the de-aerator head.

Selection Table

Condensate W/o flash (Steam Kg/hr)	Condensate with flash (Steam Kg/hr)	TADIT (Model)
5000		150
10000		200
20000	Refer to Thermax for details	250
30000		300

Technical Specifications

Material of Construction

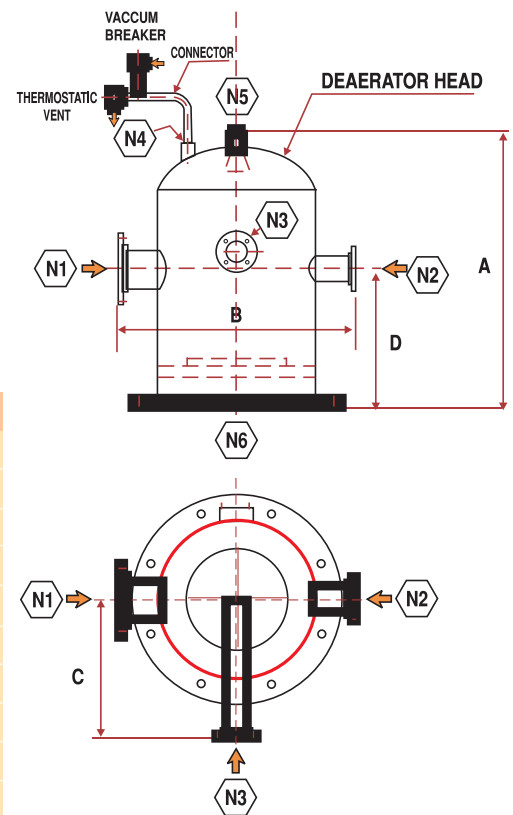
Atmospheric De-aerator Head	SS 304
Immersion Tube	SS 304

Design Specifications

Design Pressure	5 kg/cm ² (g)
Design Temperature	158°C

Models & Dimensions

	TADIT 150	TADIT 200	TADIT 250	TADIT 300
A	440	490	500	500
B	370	420	475	525
C	185	210	235	265
D	175	200	210	225
N1	65	100	150	150
N2	50	80	80	100
N3	25	40	50	65
N4	15	15	15	15
N5	15	25	25	25
N6	150	200	250	300



End connections

TADIT and nozzles N1, N2, N3 are provided with flanged end connection conforming to ANSI-B16.5 Class# 150, N4, N5 screwed BSP for airvent and recirculation.

Installation

The de-aerator head is mounted on the feed water tank on a flanged nozzle. Sealing gaskets are used above and below the immersion tube flange.

Piping should preferably be of the same size as that of nozzles.

The flanged nozzle, supplied loose, is to be welded on the top of the FW Tank at a suitable location (refer GA drawing).

Features & Benefits

- Facilitates mixing of condensate, flash steam and cold make-up water
- Liberates dissolved gases and oxygen
- SS de-aerator head with SS immersion tube



What is TACTS?

Thermax Automatic Condensate Transfer Pump - TACTSplus and TACTSultra

This pump is capable of pumping huge quantities of condensate effectively, by utilizing motive steam and consuming approximately 3 kg per 1000 kg of condensate. The condensate is one of the purest forms of water, with conductivity of the order of 3.5 ppm of TDS (5 s/cm).

The conductivity based level controller used in TACTS and TACTS is capable of sensing very low conductivity, even up to 0.35 ppm of TDS (0.5 s/cm). This controller makes TACTSplus and TACTSultra, FIT and FORGET pumps with no moving parts - thus ensuring zero maintenance.

Technical Specifications

Material of construction

Receiver	IS-2062 GR-B/ SA 285
Pump Body	IS-2062 GR-B/ SA 285
Dished Ends	IS-2062 GR-B/ SA 285
Nozzles (seamless)	ASTM 106

Utilities requirement

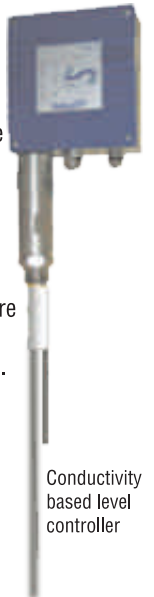
Motive Steam	TACTSplus 2-6 kg/cm ² (g) TACTSultra 2-10 kg/cm ² (g)
Compressed Air	4-6 kg/cm ² (g)
Electricity	230 Volts +5% 1 phase, AC 50 Hz

Design specifications

Design code	ASME, BPVC Sec VIII Div 1
Design code	11 kg/cm ² (g)
Design temperature	187°C
Discharge volume per stroke	25 litres
Steam consumption	3 kg/1000 kg of condensate

Features & Benefits

- Highest reliability and availability due to zero moving parts
- High motive inlet pressure up to 10 kg/cm² for TACTS. No need for pressure reducing till 10 kg/cm² when steam at low pressure is not available, hence saving installation cost.
- High discharge of 50 litres (135 litres for model TACTS 600) per stroke - means discharge of more volume/ stroke and hence less wear and tear of parts.
- High condensate temperature return - no cavitation problem like in electrical pumps.
- Solid mounted system - easy to install
- CE approved level controller - based on stringent quality and design process followed in European markets to ensure safe operation.
- Weather proof IP design- suitable for outdoor installations.
- Large LED display, with 8 digit flow totalizer to display volume displaced up to 99,999 m., which means resetting the totalizer not required for 2 to 3 years at a stretch.
- Flow totalizer designed with SMPS power supply - allows working with wide voltage variation from 90 - 270 V.
- Energy efficient pump - steam trap drain and pump vent taken back to the receiver tank minimizes vent losses and saves precious fuel.

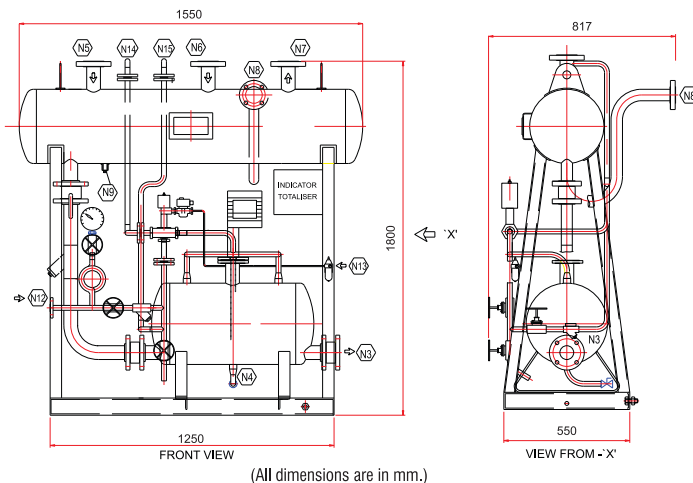


Conductivity based level controller

Models & End Connections

Model	Condensate Inlet to receiver (N5, N6)	Condensate Outlet from pump (N3) (N12)	Motive Steam inlet (N7)	Receiver Vent (N4)	Pump Drain (N8)	Over (N15)	Trap line Vent (N14)	Pump
TACTS 100i	50 NB x 2	25 NB	15 NB	50 NB	25 NB. Scr BSP	40 NB	15 NB	15 NB
TACTS 200i	50 NB x 2	25 NB	15 NB	50 NB	25 NB. Scr BSP	40 NB	15 NB	15 NB
TACTS 300i	50 NB x 2	40 NB	15 NB	50 NB	25 NB. Scr BSP	40 NB	15 NB	15 NB
TACTS 400i	50 NB x 2	50 NB	15 NB	80 NB	25 NB. Scr BSP	40 NB	15 NB	15 NB
TACTS 500i	50 NB x 2	80 NB	15 NB	80 NB	25 NB. Scr BSP	40 NB	15 NB	15 NB
TACTS 600i	80 NB x 2	100 NB	25 NB	100 NB	25 NB. Scr BSP	40 NB	15 NB	25 NB

End Connections: Ranged To ANSI B 165 class # 150



Capacity chart for TACTS^{plus} and TACTS^{ultra}

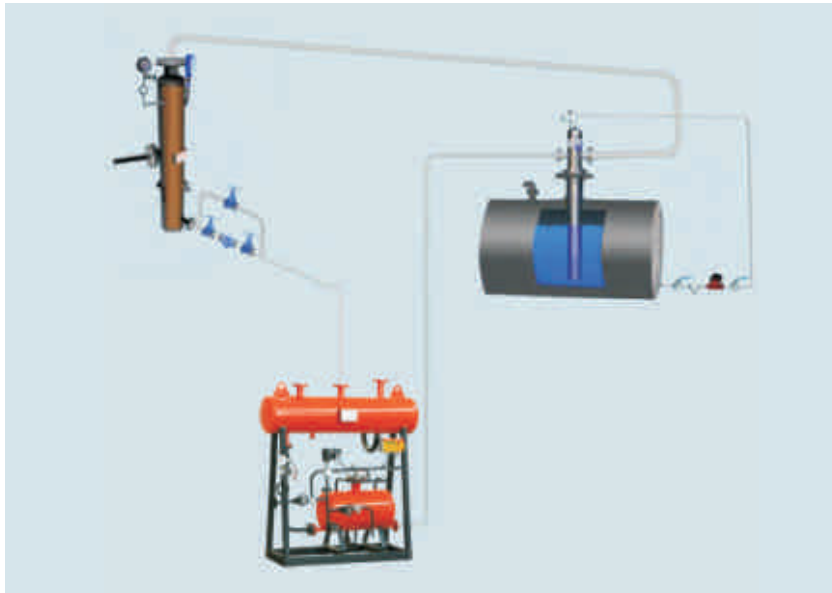
	Operating Inlet motive Pressure	Total Lift/ back pressure	TACTS 100i	TACTS 200i		TACTS 300i		TACTS 400i		TACTS 500i		TACTS 600i	
				Plus	Ultra	Plus	Ultra	Plus	Ultra	Plus	Ultra	Plus	Ultra
			Kg/cm ²	kg/cm ²	LPH	LPH	LPH	LPH	LPH	LPH	LPH	LPH	LPH
TACTS ^{plus}	2	0.5	600	1100	1190	2380	2860	3315	3790	5150	2400	9180	12285
		10	550	1035	1150	2075	2550	2910	3460	4355	4520	8370	11070
	3	0.5	650	1180	1260	2500	3000	3505	4080	5655	5980	10260	13770
		10	625	1140	1200	2335	2770	3335	3830	4850	51000	931	12555
		10	600	1110	1170	2170	2560	3130	3600	4670	4840	8775	11745
	4	20	570	1030	1050	1920	2320	2905	3410	4250	4350	7695	10260
		0.5	680	1240	1300	2625	3100	3995	4290	5915	6390	11070	14850
		10	640	1170	1240	2480	2920	3800	4090	5275	5510	10125	13500
		1.5	620	1135	1200	2240	2670	3455	3790	4905	5200	9180	12285
		20	600	1060	1090	2040	2460	3145	3520	4160	4170	8370	11205
	5	30	580	890	940	1765	2090	2670	2880	2530	2810	7560	10125
		10	770	1215	1270	2560	3030	4040	4290	5570	5830	10665	14175
		1.5	645	1165	1230	2285	2760	3815	3950	5190	5480	8910	12015
		20	625	1095	1130	2170	2560	3385	3600	4342	4743	8100	10935
	6	30	600	955	980	1940	2230	2945	3040	3140	3260	8100	10800
10		700	1240	1300	2665	3130	4235	4460	5745	6090	11070	14850	
1.5		665	1190	1250	2430	2830	3900	4070	5415	5700	10530	14040	
20		630	1100	1150	2260	2650	3479	3670	4600	4880	9450	12555	
30		605	970	1020	1995	2340	309	3170	3430	3620	8640	11475	
TACTS ^{ultra}	7	40	580	960	990	1710	1980	2520	2630	3300	3530	8505	11340
		10	720		1320		3210		4210		6310		15255
		1.5	690		1270		2890		4170		5900		14445
		20	650		1180		2720		3720		5000		13095
		30	625		1050		2440		3280		3930		12015
	8	40	600		1020		2030		2680		3630		11880
		10	740		1340		3280		4320		6400		15795
		1.5	720		1280		2940		4260		6070		14985
		20	680		1200		2780		3770		5100		13500
		30	640		1070		2520		3380		4200		12420
	9	40	620		1040		2080		2720		3710		12285
		10	760		1350		3340		4420		6510		16200
		1.5	745		1290		2980		4340		6210		15390
		20	700		1220		2840		3820		5190		13905
		30	670		1100		2600		3460		4440		12825
10	40	640		1060		2120		2760		3780		12690	
	10	775		1370		3400		4510		6620		16470	
	1.5	750		1310		3020		4410		6340		15795	
	20	725		1230		2890		3850		5270		14310	
	30	690		1120		2660		3540		4647		13230	
	40	650		1080		2150		2800		3850		13095	

NOTES : Light Oil NCV = 10,500 kcal/kg, Heavy Oil NCV = 9,650 kcal/kg, Natural Gas NCV = 8,500 kcal/nm³, LPG NCV = 24,940 kcal/nm³

Lengths/ heights mentioned are only for main heater without burner.

Larger capacity models available on request. For more details, please refer to G.A.T.P & foundation plan drawing. Line sizes are just indicative and may change during detailing.

CRS scheme



Advantages of CRS

- Pure form of condensate
- Less blowdown
- Less chemical
- Less fuel consumption

Case study

Savings Calculations		
FLASH STEAM GENERATION		
Steam generation	(kg/hr)	4000
Total condensate load	(kg/hr)	3500
Pressure of condensate	(kg/cm ²)	8
Pressure of flash steam required	(kg/cm ²)	1
Fuel used		FO (Liquid)
CV of fuel		9650
Flash steam generated (kg/hr)		376.22
Effective temperature of feed water		
Temperature of feed water	(Deg C)	30
Temperature of condensate	(Deg C)	90
Effective temperature of feed water	(Deg C)	83.40
ANNUAL SAVING		
Boiler efficiency	%	80.00
Saving in fuel/hr	₹	27.67
Saving in fuel/ annum	₹	215829.12
Rate of fuel	₹	20.00
Annual saving (Lac)	₹	43.17

For more information, please get in touch with your nearest Thermax representative. You can also mail us at info.c&hservices@thermaxindia.com or visit us at : www.thermaxindia.com.

In view of our constant endeavour to improve the quality of our products, we reserve the right to alter or change specifications without prior notice. All photographs shown in this publication are representative in purpose, and to be used for reference only. For actual details and specifications, please refer to Thermax offer document.



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