

Specification Sheet

ULTRA HIGH EFFICIENCY

Biosolids BioDryer

The Bioforcetech

BIODRYER

BIOFORCETECH

Introduction

BioDrying is the process by which biodegradable material is rapidly heated through initial stages of composting to reduce moisture and consequently reduce its overall weight and it's the most efficient way to remove water form biosolids and organic waste.

What is the BioDryer

Utilizing controlled air and bacteria, the BioDryer dries biosolids through a three-phase process. Remarkably, it can dry 8 wet tons of biosolids in as little as 56 hours. When compared to belt and drum drying methods, the BioDryer requires only 50% of the thermal energy and 30% of the electricity, making it highly efficient.

BioDryer is designed to be modular. Each machine can work independently or together as a system, we can meet the drying capacity that you need. This type of solution allows for easier plant design and guarantees a quicker installation.

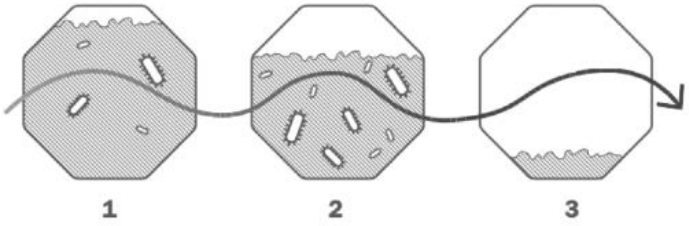


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Built with Biology

Much like the control of oxygen, heat, and bacteria for sludge digestion, the Bioforcetech BioDryer uses air and bacteria to dry biosolids in a three phase process. The BioDryer is specifically designed for biosolids, but it can also efficiently dry other similar organic waste streams from various industries by utilizing the energy generated by bacterial activity.



Phase 1

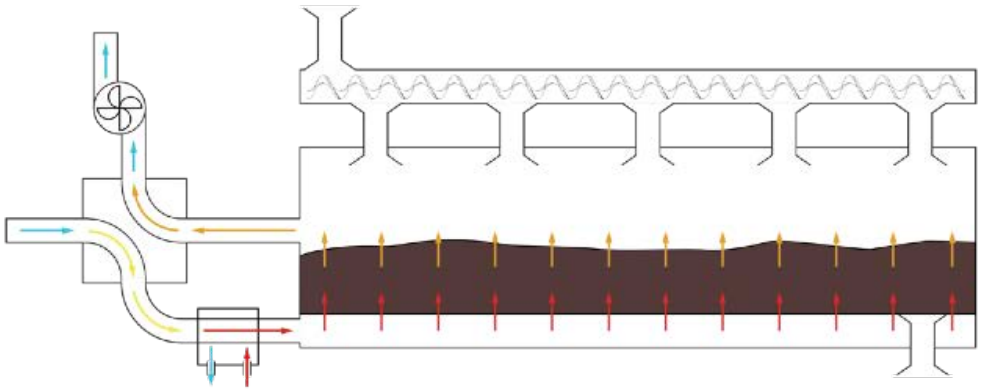
Air is pushed through the biosolids to cultivate thermophilic bacteria, microorganisms that create heat. As these microbes release heat into their environment, the BioDryer chamber increases in temperature to 150°F and the water in the biosolids begins to evaporate.

Phase 2

The thermophilic bacteria flourish, generating large amounts of heat. This causes the bulk of the moisture in the chamber to evaporate without any external heat source. The BioDryer unit continues to modulate airflow in order to maximize this process. What is normally the largest energy toll on other dryers is completely passive in the BioDryer.

Phase 3

The passive heat has evaporated so much moisture that the bacteria are not able to proliferate further, reducing their energy output. To compensate, the BioDryer introduces an external hot airflow to finish off the drying process.



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Outstanding Performance

>17%
Can manage as low as 17% solid content

Scalable
Up to 12,000 wet tons per year

<1.2MMBtu
Per wet ton of biosolids

The BioDryer is expertly designed to maximize energy efficiency, saving both electrical and heat energy while effectively drying a significant volume of biosolids annually. The table below illustrates the BioDryer's throughput (for a single module) and energy performance, showcasing its efficiency in relation to the solid content of the input biosolids*.

Biosolids Solids Content (%)	Wet Tons / Year	kWhe / Wet Ton	MMBtu / Wet Ton
17	936	38	1.31
19	964	37	1.27
21	994	36	1.23
23	1026	35	1.19
25	1059	34	1.16
27	1095	33	1.12

*This data is an estimate based on digested municipal biosolids, considering 8,300 hours per year of automated operation





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Modularity

The BioDryer is engineered with modularity at its core. Every unit is standardized, capable of treating around 1,000 wet tons of input material annually. To scale up the treatment of biosolids, additional BioDryer units can be effortlessly installed in parallel. This modular approach allows for a cumulative capacity increase of up to 12,000 wet tons per year.



Feedstock and Process Information

Process Type	Batch
Biosolids Input Solid Content	≥ 17%
Input material Characteristics	Material must "flow," with particle size ≤ 1 inch
Bisoolids Output Solids Content	≤ 95%
Max Batch Capacity	16,000 lbs

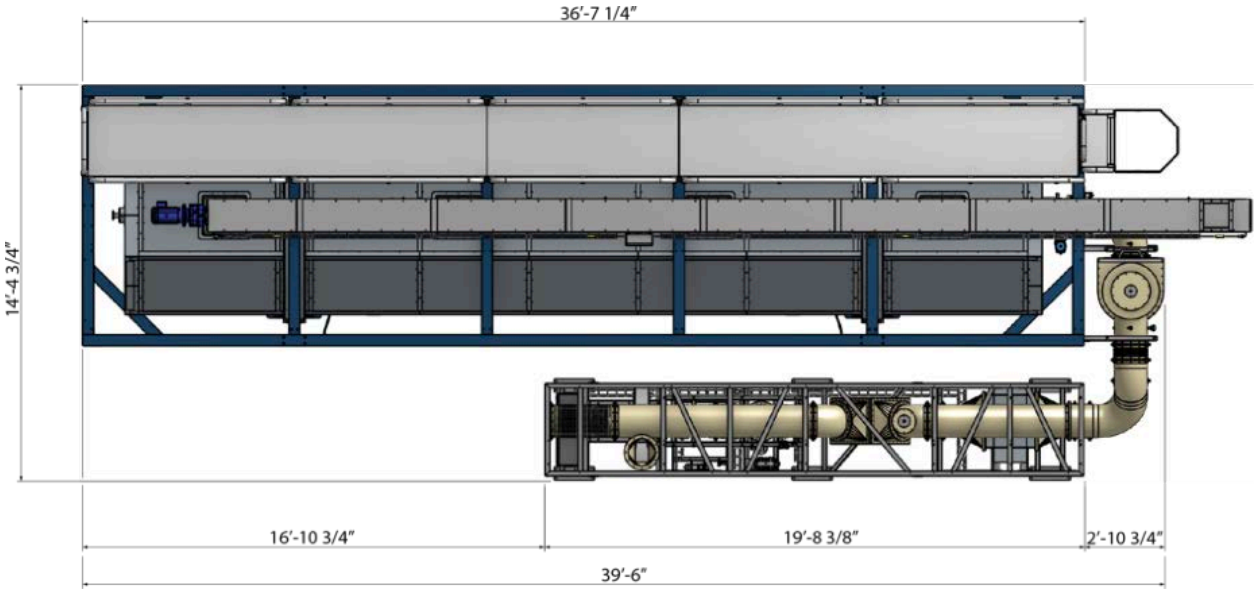
Utilities Required

Potable Water	1/2" NPT, between 35 and 50 PSI, max instant peak of 20 gpm
Pneumatic Air	1/2" NPT, between 100 and 115 PSI, max instant flow 3.28 cfm @ 115 PSI
Compressed Air	1" NPT. Max instant flow 2 gpm
Waste Water Discharge	1 1/2" flange ASME B16.5, class 150, 40 gpm @70 PSI and 205 °F
Natural Gas or Propane Connection	3 Ph, 480 V, 60 Hz, 125 A breaker, max contemporaneous load 45 A

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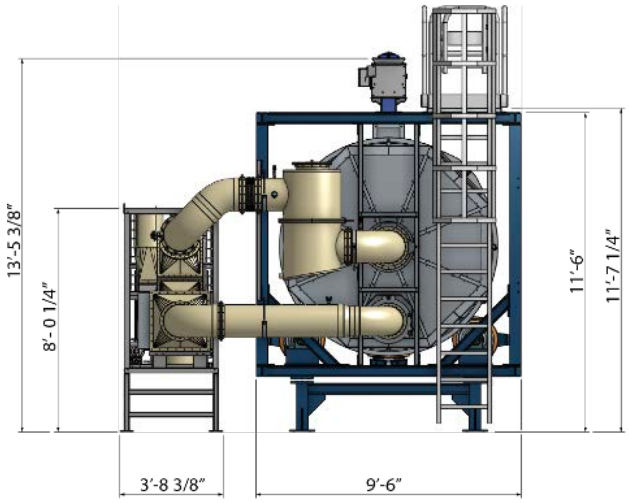
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Dimensions and Weight



Gross Weight

30,000 lbs



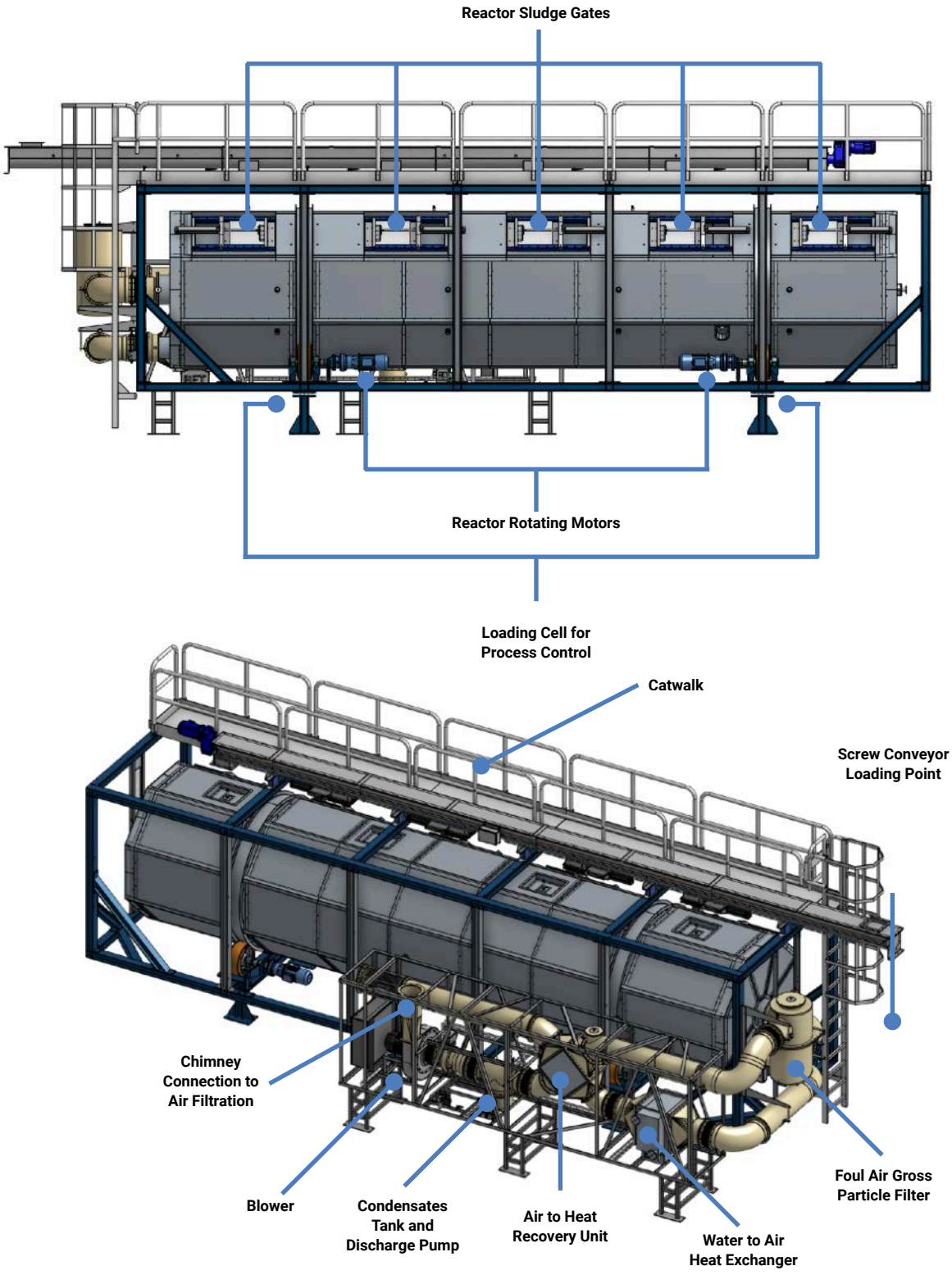
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Main Components Overview

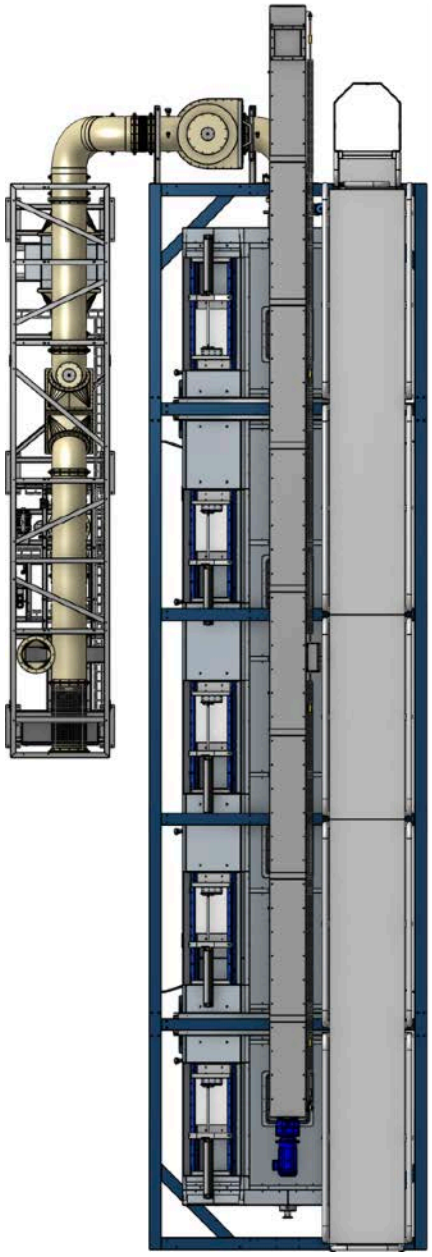


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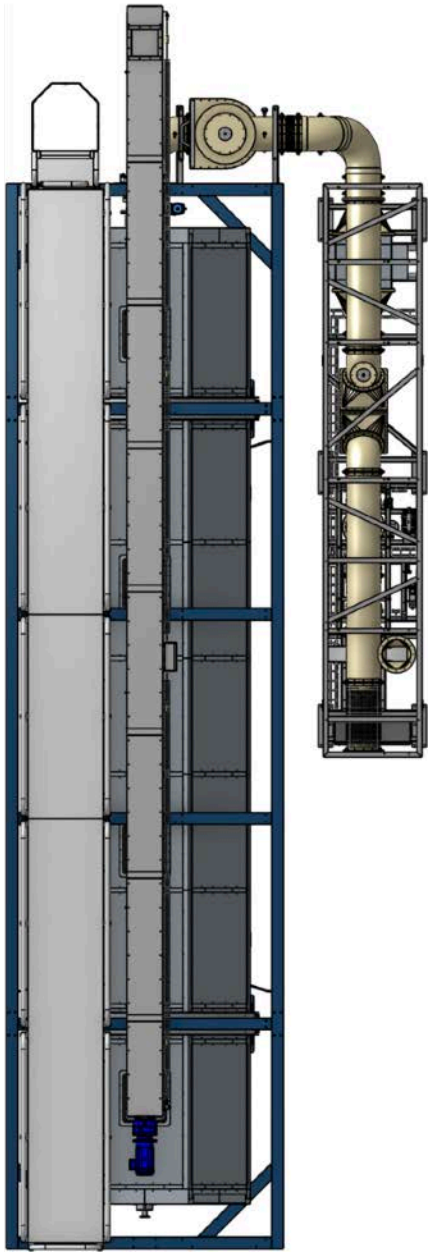
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Standard Configurations

The BioDryer is available in two configurations: Right or Left. Although the main rotating body skid is identical in both models, the air-skid can be positioned on either the right or left side to suit different plant layouts. Additionally, the loading point on top of the unit is adjustable, allowing customization for each specific project and plant layout.



Left Configuration



Right Configuration

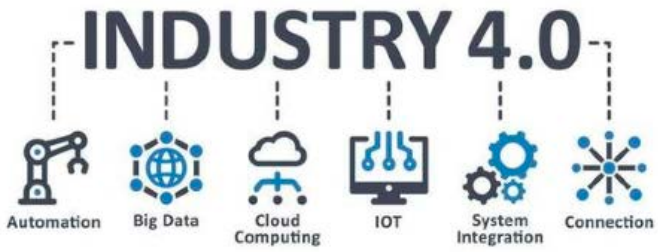
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Automation and Process Control

Th BioDryer machine integrates advanced industry 4.0 automation with IIoT. With more than 40 sensors, the process is controlled with scientific precision in order to deliver maximum performance. The BioDryer's automation HMI can be accessed by a web-browser with secure local and remote access, allowing process control from any device like a smartphone, tablet, PC or Mac. The integrated data logging system records process data every second, generating charts and reports which can be used to analyze efficiency and perform predictive maintenance.

To facilitate integration with existing facilities, the BioDryer control system allows for SCADA connections with the most common protocols like ModBus and Profinet while also providing advanced and modern Restful API with JSON format.





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