



**PRODUCT INFORMATION**

# Chemical exhaust Air Scrubber for CompoLiner

The CompoLiner Air Scrubber module is developed for the Big Dutchman CompoLiner composting concept. These modules are completely prefabricated Air Scrubbers in a plastic housing, dimensioned such that one module can clean the exhaust air from one CompoLiner system.



		<b>NUMBER OF PUBLICATION</b> <b>01-0537</b> (per region) <b>PUBLISHED ON</b> <b>11.11.2020</b> (date)		<b>NO. OF PAGES</b> <b>INCL. COVER</b>  <b>7</b>
<b>BUSINESS UNIT</b> <input checked="" type="checkbox"/> Egg <input checked="" type="checkbox"/> Poultry <input checked="" type="checkbox"/> Pig		<b>RELEASED</b> <input type="checkbox"/> Regionally <input checked="" type="checkbox"/> Internationally		
<b>REGION OF APPLICATION</b> <input checked="" type="checkbox"/> Asia <input checked="" type="checkbox"/> China <input checked="" type="checkbox"/> Europe <input checked="" type="checkbox"/> India <input checked="" type="checkbox"/> Latin America <input checked="" type="checkbox"/> MEA <input checked="" type="checkbox"/> North America <input checked="" type="checkbox"/> Russia Further limitations/exceptions of countries:				
<b>LANGUAGES</b> <input checked="" type="checkbox"/> English <input checked="" type="checkbox"/> Chinese <input checked="" type="checkbox"/> French <input checked="" type="checkbox"/> German <input checked="" type="checkbox"/> Russian <input checked="" type="checkbox"/> Spanish <input type="checkbox"/> Others				
<b>RELEASED BY</b>  NAME 1: Julius Hamelmann Engineering Residue Treatment  NAME 2: Ron Doeze Product Management Inno+  NAME 3: Simon Lague Business Development Inno+  NAME 4:				
<b>SIGNATORY RULES</b> <b>Regional product</b> (only for one region) Name 1: Chief Engineer of BU (global) Name 2: Employee Customer Engineering (region) <b>International product</b> (only more than one region) Name 1: Product Manager (global) Name 2: Employee Engineering (global or regional) <b>Products Central Technologies</b> Name 1: Product Manager CT or 1-3 Product Manager(s) BU (global)* Name 2: Product Owner CT *only if there is no Product Manger CT in charge				



### Schematic view of the Air Scrubber



Figure 1: Schematic view of the Air Scrubber

The module is fitted with a technical room on the side in which all the technical parts are mounted. This makes on-site placement as quick and easy as possible. Next to the technical room is a room for placement of the acid container and fitted with the acid pump, safety provisions and an emergency shower.

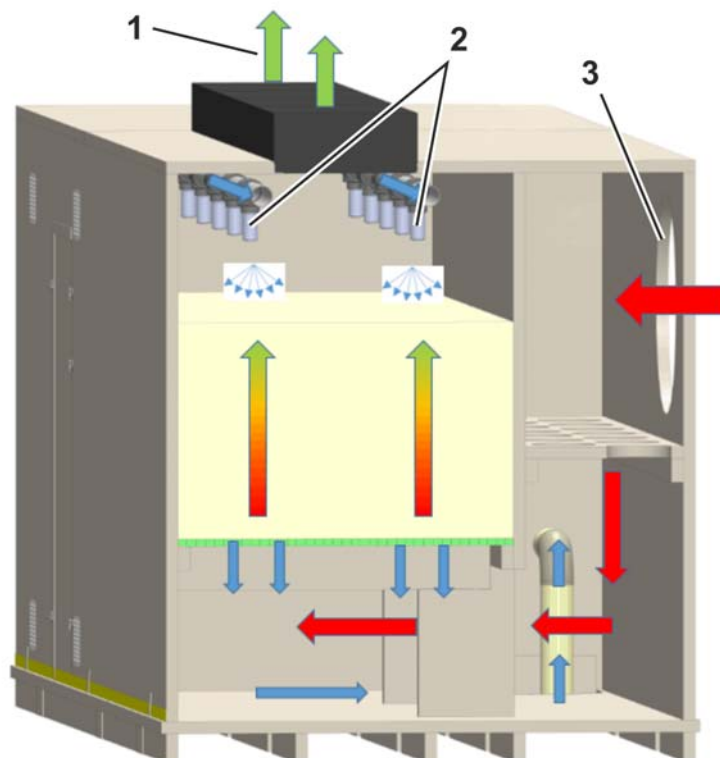


Figure 2: Schematic view of the process

Position	Description
1	Cleaned air
2	Sprinklers
3	Inlet air

Overview of the installation connections inside the air scrubber

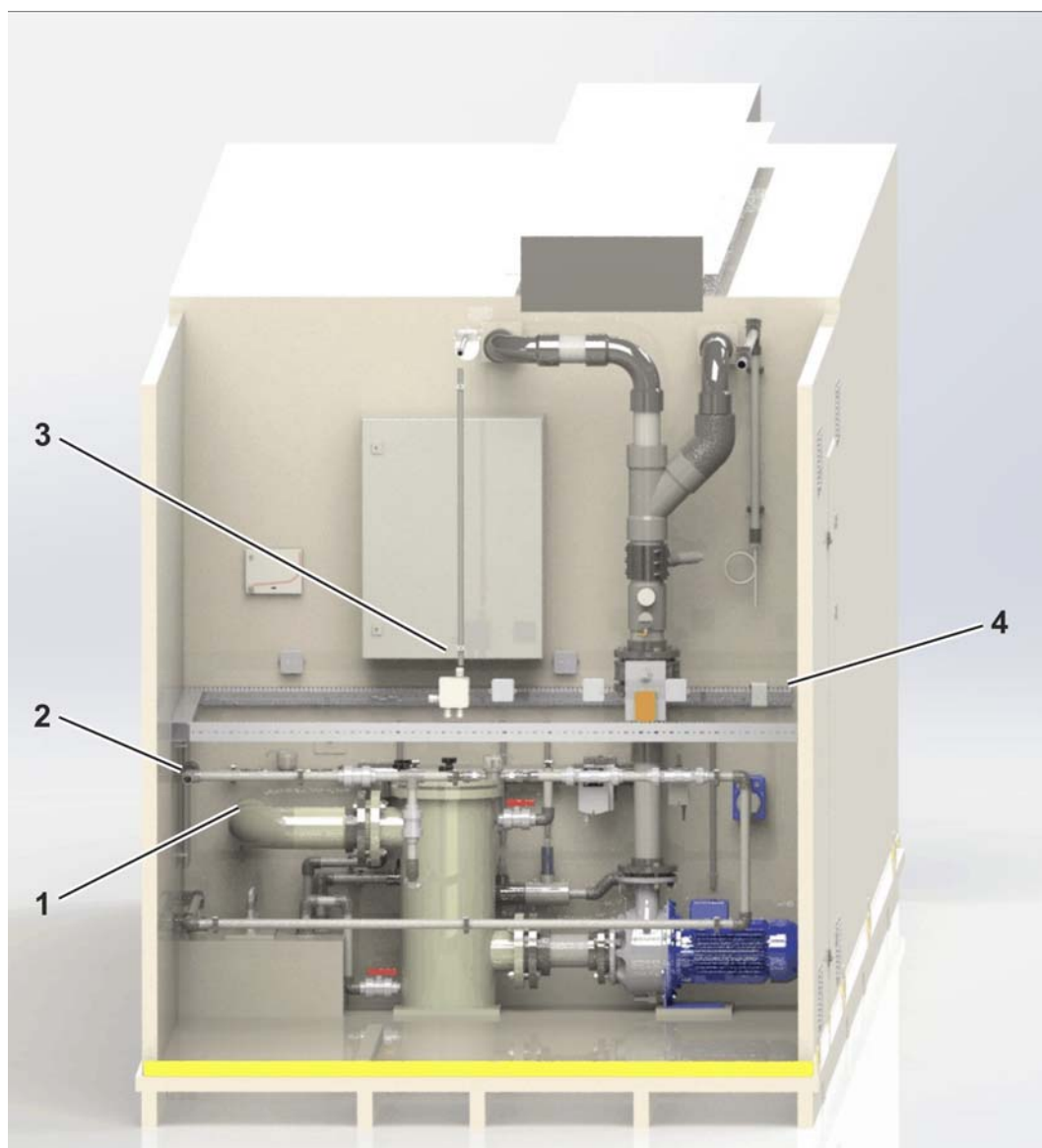


Figure 3: Overview of the installation connections inside the air scrubber

Position	Description
1	Waste water connection PVC Ø 32 mm, enlarge to Ø 63 mm
2	Fresh water connection PVC Ø 32 mm, 90 l/min, 3 bar
3	Main electrical connection control panel
4	Electrical connection 200/230 V for lighting and heater



Overview of the acid room

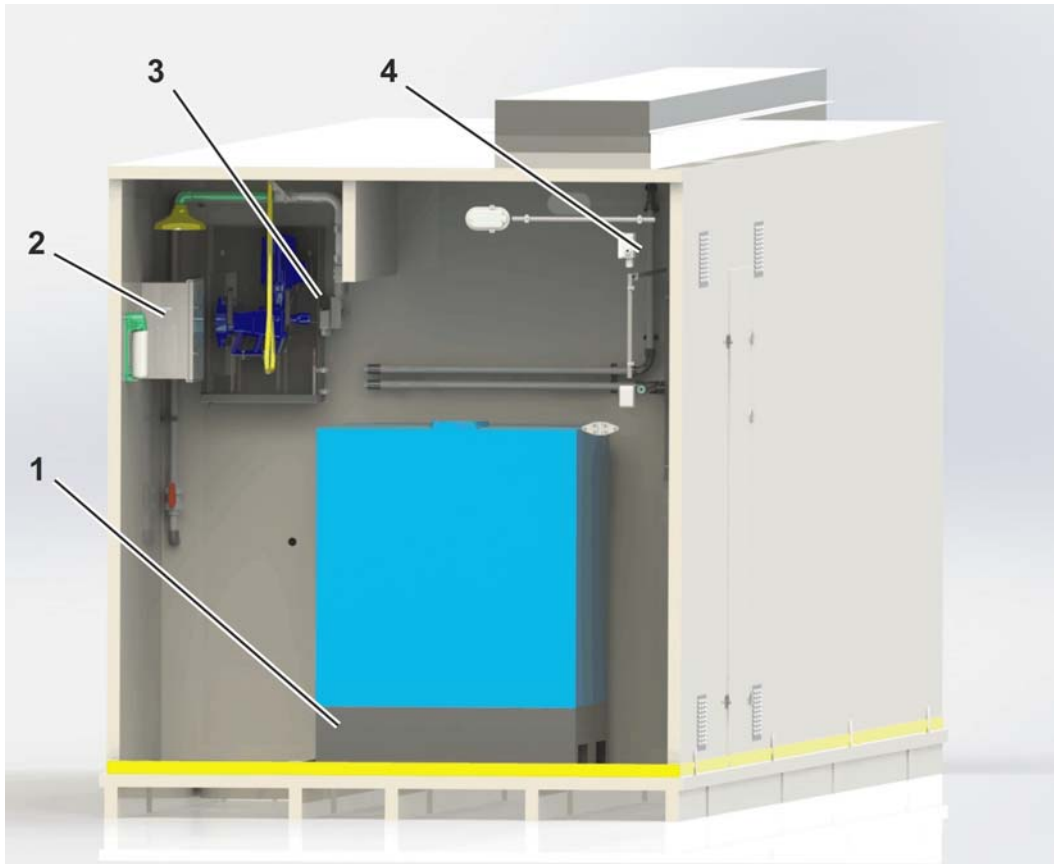


Figure 4: Overview of the acid room

Position	Description
1	Placement of the acid container
2	Emergency shower and safety equipment
3	Acid pump
4	Electrical connection 200/230V for lighting and heater

## Working of the Air Scrubber

- Entry of exhaust air from the CompoLiner system at a central point in the front of the scrubber through the attachment of the air duct from the CompoLiner.
- In the front compartment the air is guided to both sides and diffused before it enters the scrubber compartment.
- Horizontal filter package that is sprinkled from above to clean the air based on the countercurrent principle (trickling filter). Ammonia, dust, particulate matter and odour components are dissolved in the process water. The ammonia (gas) is thereby converted to ammonium (dissolved).
- The process water is recirculated until it reaches a certain pollution level. This is measured with a conductivity sensor which represents the Nitrogen content of the process water.
- Some of the process water is then pumped to the waste water tank (handled through automated valves) and fresh water is added to the process water.
- The pH value of the process water is automatically measured and regulated.
- Demister / droplet separator above the filter package to remove as much of the water from the air as possible to retain it in the scrubber.

## Schematic representation of the scrubbing process

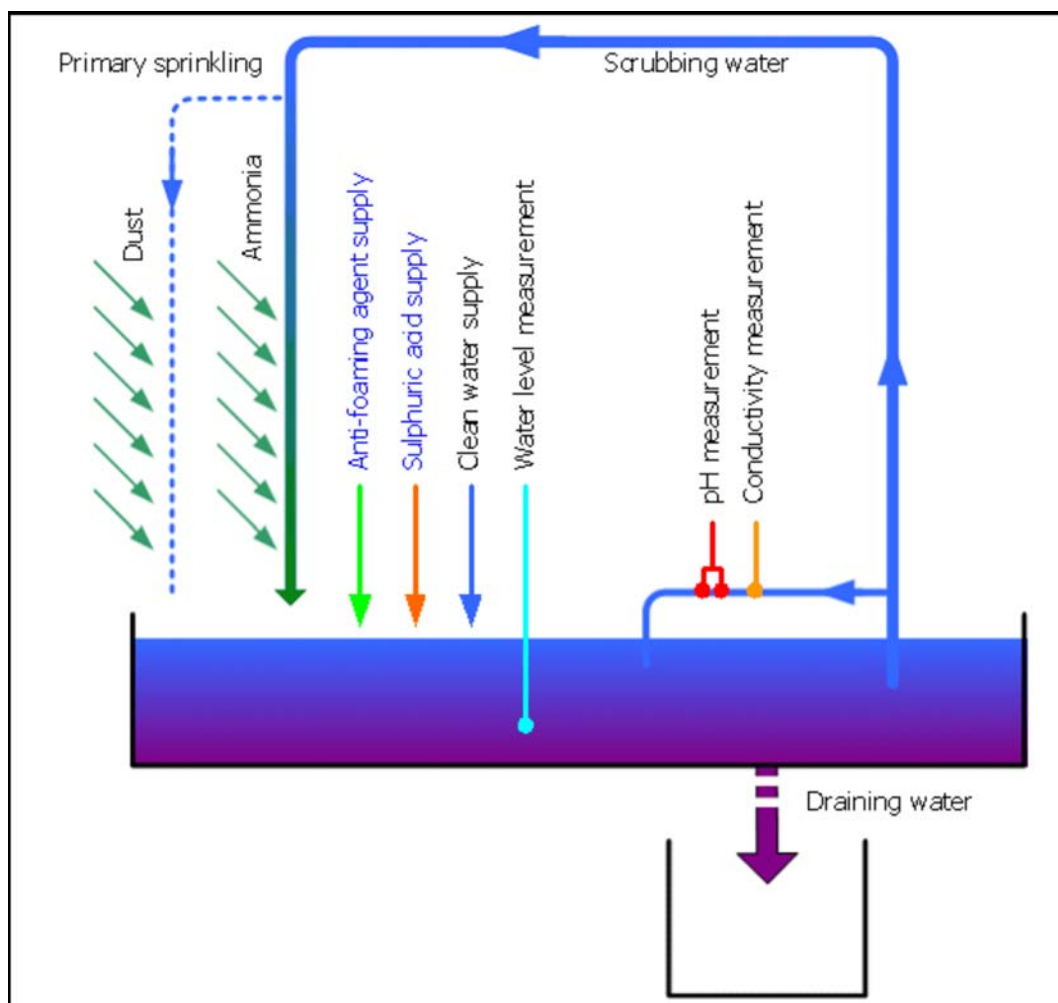


Figure 5: Schematic representation of the scrubbing process:

**Conditions with regard to performance**Conditions

- Intake gas concentrations: Up to 300 ppm NH<sup>3</sup> (Ammonia), up to 20 mg/m<sup>3</sup> dust
- Maximum ventilation: 30.000 m<sup>3</sup>/h

Performance

- Max. concentration after the scrubber: 15 - 30 ppm NH<sup>3</sup> (Ammonia)
- Ammonia reduction: 90 - 95 %
- Dust reduction: > 70 %

**Dimensioning**

- Dimensions module: 9,54 x 2,25 x 2,7 m (L x W x H)
- Dimensions filter package: 6,3 x 1,4 x 0,9 m (L x W x H)
- pH setting: 2,5
- Set point waste water drain: 250 mS
- Pump: 4 kW, approx. 110 m<sup>3</sup>/h
- Electrical heaters: 2 x 2 kW, 230/200 V

**Scope of delivery**

Complete plastic housing containing the Air Scrubber, prefabricated, fully installed technical room with all the technical components and an acid room with an emergency shower, safety equipment, acid pump and room for the acid container (delivery acid container excluded). In both the technical room and the acid room is an electrical heater (2 kW) installed, to prevent freezing of the equipment with low temperatures or when the Air Scrubber is switched off. The droplet separators and the profiles to place them in are placed on the package material and have to be installed on site as described in the construction manual.

Table 1: Scope of delivery

Art. No.	Voltage	Power (kW)	Max. air rate (m <sup>3</sup> /h)	Max. Ammonia (ppm)	Max. negative pressure (Pa)
60-63-0158	3 x 230/400 V 50 Hz 3 ph + 0	4 (+ 4 heating)	30.000	300	150

### Items to be supplied by the customer

- Ventilation duct from the CompoLiner manure treatment system, attached airtight to the front of the air scrubber.
- Fans that are able to cope with the extra negative pressure over the air scrubber of max. 150 Pa.
- Concrete floor under the air scrubber suitable for a load of at least 400 kg/m<sup>2</sup>.
- Or when placed at height a steel frame with a concrete floor.
- Waste water storage.
- PVC piping Ø 63 mm from the air scrubber to the wastewater storage; enlarge to Ø 63 mm from the Ø 32 mm connection at the scrubber.
- The supply of sulphuric acid (96% concentration), and anti-foaming agent.
- Fresh water supply in the technical room: PVC Ø 32 mm, 90 l/min, min. 3 bar.
- Electrical power supply in the air scrubber (4 kW), connected to the switch board. See the dimensioning lists for the type of connection.
- 2x Electrical power supply 200/230 Volt in the air scrubber, connected to the junction boxes in the technical room and the acid room. These are for the lights and the electrical heaters in both rooms



Make sure to comply with additional regulations and provisions of local authorities. Especially regulations regarding the protection of groundwater and conditions in the building permit can lead to additional requirements.

### Consumption values

#### Electricity

Electrical capacity of the pump of the air scrubber is 4 kW. When used fulltime this means 35.040 kWh per year. This doesn't include the power for the electrical heaters, as this is dependent on the local temperatures and whether the air scrubber is running.

#### Water

Depending on the moisture content and temperature of the air from the CompoLiner. Estimate 800 – 1.000 m<sup>3</sup>/year, this includes the waste water.

#### Acid consumption with 300 ppm in and 15 ppm out at 30.000 m<sup>3</sup>/h

- $(300 - 15) \times 0.74 = 211 \text{ mg NH}_3/\text{m}^3$
- $211 \times 30.000 \text{ m}^3/\text{h} = 6,33 \text{ kg NH}_3/\text{h}$  (reduction)
- $6,33 \times 1.63 \text{ liter Sulphuric Acid} = 10,32 \text{ liter/h}$  (Sulphuric Acid 96 %)
- $10,32 \text{ liter/h} = 248 \text{ liter/day} = 90.403 \text{ liter/year}$  (Sulphuric Acid 96 %)

#### Waste water production

- Removing the water at a conductivity of 250 mS means approx. 58 kg N (Nitrogen)/m<sup>3</sup> water
- $6,33 \text{ kg NH}_3/\text{h} = 5,21 \text{ kg N/h}$
- $5,21 \text{ kg N/h} = 0,09 \text{ m}^3/\text{h} = 2,16 \text{ m}^3/\text{day} = 787 \text{ m}^3/\text{year}$  (waste water)