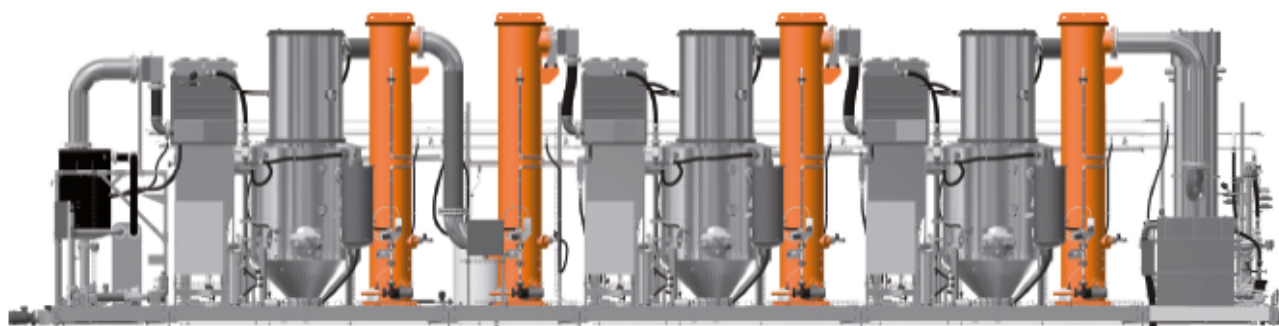


DV4000-4S thermal vacuum evaporator

Working principle

Multi-stage heat recovery under vacuum with vapour scrubber:

- At the heating module, heat is taken from the heating circuit, and evaporator stage 1 is heated under vacuum with vapour (65 °C).
- Digestate from the process vessel is circulated through the heat exchanger of stage 1. The energy supplied takes it past boiling point and generates water vapour.
- The vapour passes through the vapour scrubber for nitrogen fixation (ASL) and is fed to the heat exchanger of stage 2. There it heats the digestate of stage 2, condenses and is drawn off as distillate.
- The steps repeat through to the cooling module, where the vapour of the final stage condenses. The lower pressure at each stage allows the heat to be used several times over.



DV evaporator (example illustration): heating module, evaporator stages with vapour scrubber, cooling module

Performance data

Intake volume flow	4,300 l/h
Specific distillate output	4.3 l/kWh _{th} (design value)
Distillate flow	max. 2,300 l/h
Heat demand	max. 600 kW _{th}
Supply temperature	82 °C (operating range 65 to 85 °C)
Feed	liquid phase of digestate from waste, residues or energy crops
Dry matter in feed	max. 4.5 % DM
Concentrate	up to approx. 12 % DM
Particle size	< 250 µm
Dimensions L × W × H	27.0 m × 3.0 m × 5.5 m
Operating voltage	3/400 V N PE 50 Hz
Empty weight	approx. 38 t

Three usable output streams

- **Distillate:** water fraction; reusable as process or recirculation water, discharge quality only with additional site-specific finishing stages.
- **Ammonium sulphate solution (ASL):** from the vapour scrubber; mineral N/S fertiliser, 35 to 40 % solution, approx. 75 kg N/t.
- **Concentrate:** nutrient-rich organic fraction; volume reduction up to approx. 70 %.

Main components and makes

- **Vacuum generation:** Busch dry-running screw vacuum pump (COBRA series), oil-free and contact-free, with upstream condensate separation, water-cooled; low maintenance, no operating fluid carried into the distillate
- **Circulation pumps:** Calpeda or Salvatore Robuschi, with double mechanical seal and barrier pressure
- **Concentrate and special pumps:** Netzsch (progressive cavity) or Grundfos
- **Vapour scrubber:** PP; sulphuric acid dosing by ProMinent, designed for 96 % sulphuric acid; tank in PE, supply line in PVC-U or PTFE
- **Valves:** GEMÜ (plastic and diaphragm valves, acid and ASL side), Bürkert (stainless steel side)
- **Sensors and instrumentation:** Endress+Hauser and Bürkert
- **Control system:** Siemens (PLC and HMI)
- **Frequency converters:** Siemens, mounted outside the control cabinet; the cabinet stays closed (IP protection, no forced ventilation, no corrosive ambient air at the electronics)
- **CIP:** integrated cleaning in place, acidic and alkaline
- **Condensation and recooling:** condenser with recooling
- **Materials:** wetted parts stainless steel 1.4571 / 1.4301; acid and ASL side PE, PP, PVC-U, PTFE
- **Remote maintenance:** VPN via Ewon / Talk2M

Your benefits

- Stainless steel 1.4571 / 1.4301 for all wetted parts
- No moving parts or brushes in the digestate: low maintenance, high availability
- Integrated CIP (acidic and alkaline): automatic, preventive cleaning
- Closed control cabinet with converters mounted outside: no forced ventilation, electronics protected
- Modular: 1 to 4 evaporator stages per line, expandable to several lines with the same periphery
- Design value 4.3 litres of distillate per kWh thermal; 4.7 l/kWh measured in operation at a reference plant
- Nitrogen bound as ASL in the vapour scrubber; sulphuric acid and digestate stay separate
- Automatic 24/7 operation with low staffing, fault alerts and VPN remote maintenance

Conformity

The evaporator system meets the essential requirements of the following directives:

- Machinery Directive 2006/42/EC
- EMC Directive 2014/30/EU

With respect to electrical hazards, the safety objectives of the Low Voltage Directive 2014/35/EU are met in accordance with Annex I No. 1.5.1 of the Machinery Directive 2006/42/EC.

Harmonised standards applied (non-exhaustive): EN ISO 12100:2010, EN ISO 13850:2015, EN ISO 13732-1:2008, DIN EN IEC 61000-6-2:2019-11

Every project starts with a framework concept and budget offer; the binding design follows a laboratory trial evaporation with your own material.