Reducing the Environmental Impacts in Broiler Production

Teagasc Broiler Conference 2023

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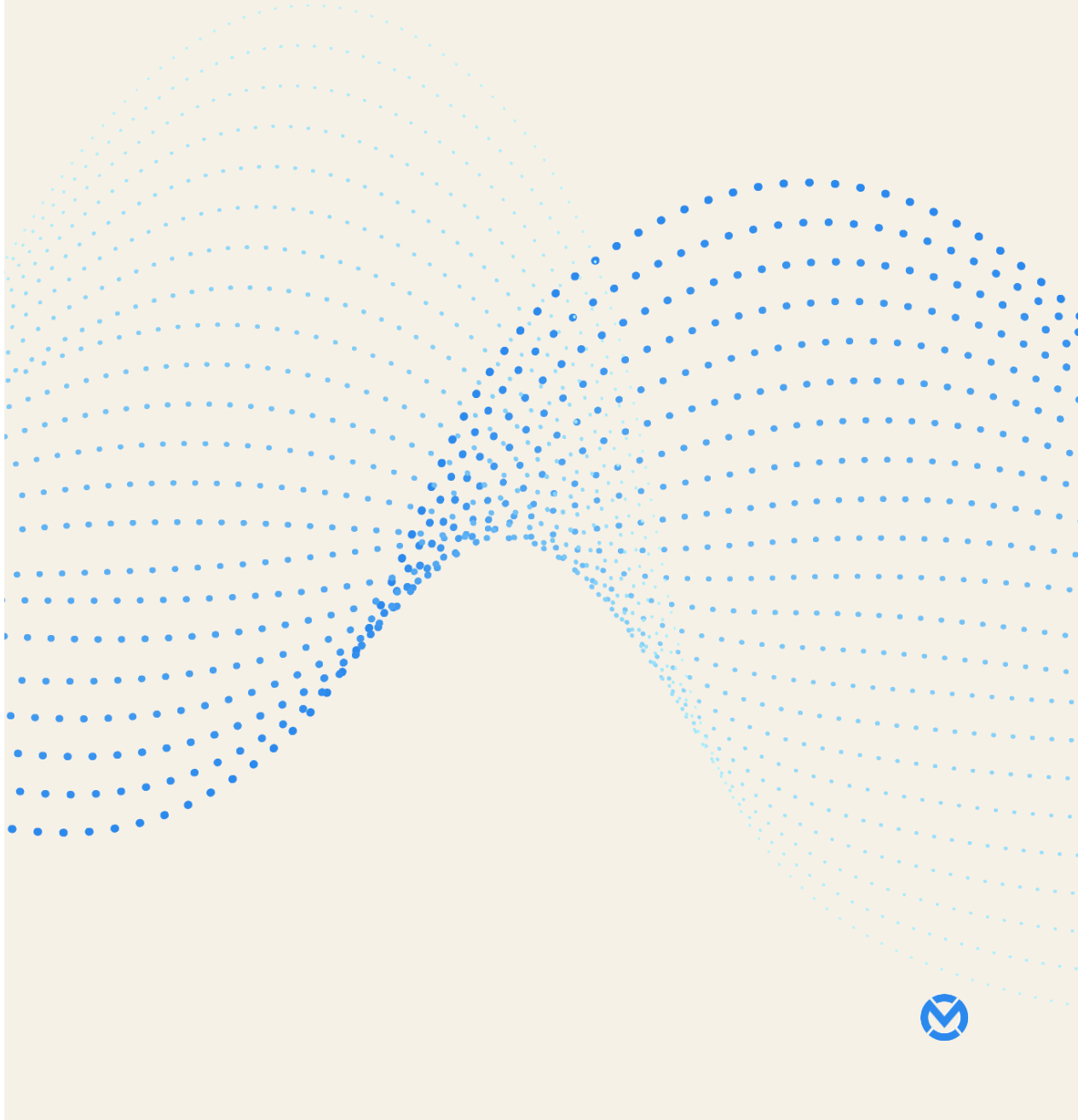
Munters

Agenda

- **Heat recovery HeatX-Rotate**
- Air scrubber Lavamatic
- High pressure cooling



How to reduce energy costs?

- Use indirect heaters instead of direct heaters to reduce CO_2 and humidity which have to be ventilated (≈ -20% energy costs)
  - Indirect heater like GpmP
  - Warm water heating with HeatX or Reval finned tubes

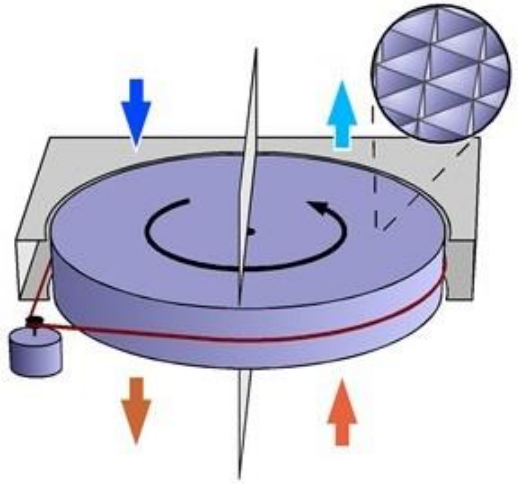
- Increase insulation of farm building
- Reduce leakages of building

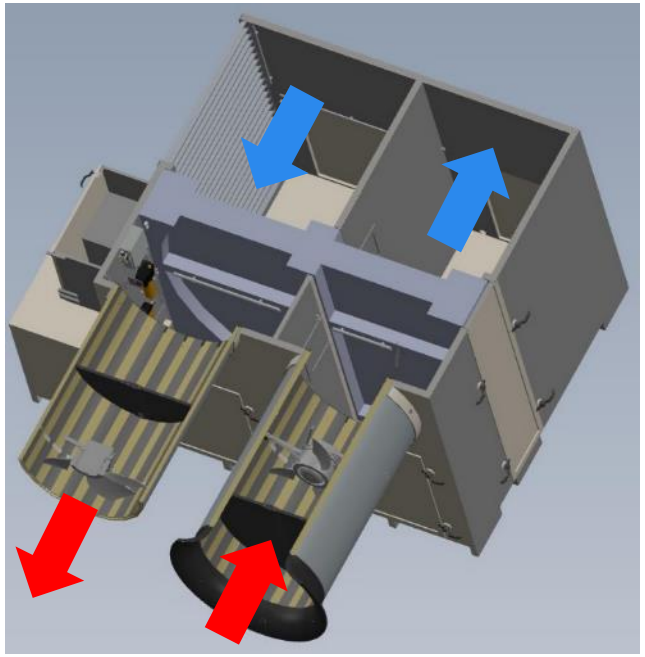
- Use alternative heating material like straw or woodchips instead of fossile energies (if available)

- **Install a heat recovery system!**

HeatX-Rotate - How it works?

- Warm exhaust air is pushed through rotating storage mass (coated aluminum to avoid water condensation)
- Storage mass collects heat
- The wheel moves to the compartment where fresh air is getting into the HeatX-Rotate
- Fresh air is heated up by the wheel and pulled into the house



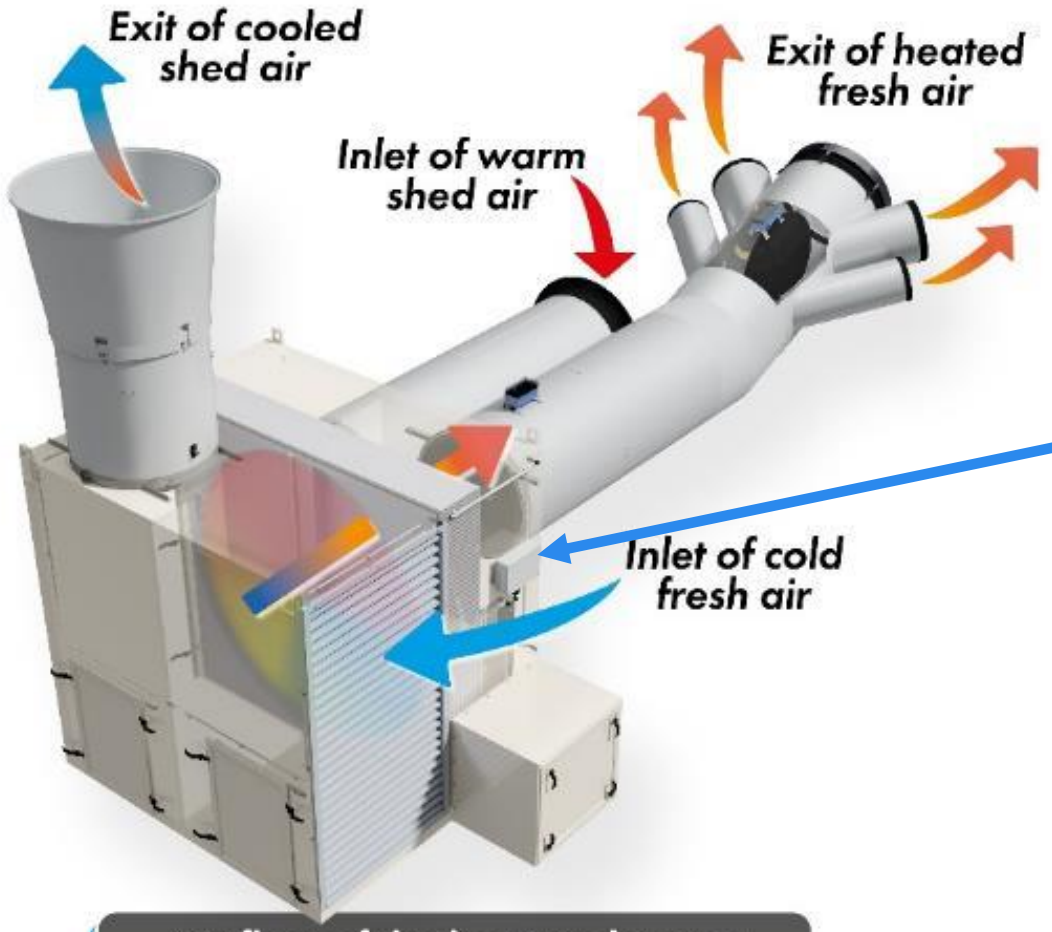


Heat-X Rotate – How it is controlled?

Exhaust fan controlled by climate computer

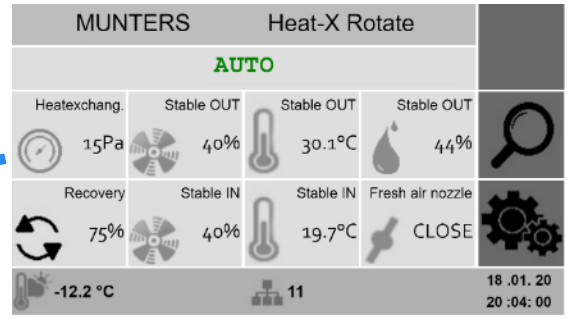
HeatX-Rotate control uses ventilation rate to control the system

- Fresh air intake
- Rotor speed
- automatic cleaning
- shutter of inlet nozzle



Air flow of the heat exchanger from approx. 30% (shutter open)

- 3 temperature sensors: exhaust air, outside, air intake,
- 1 humidity sensor in exhaust air duct



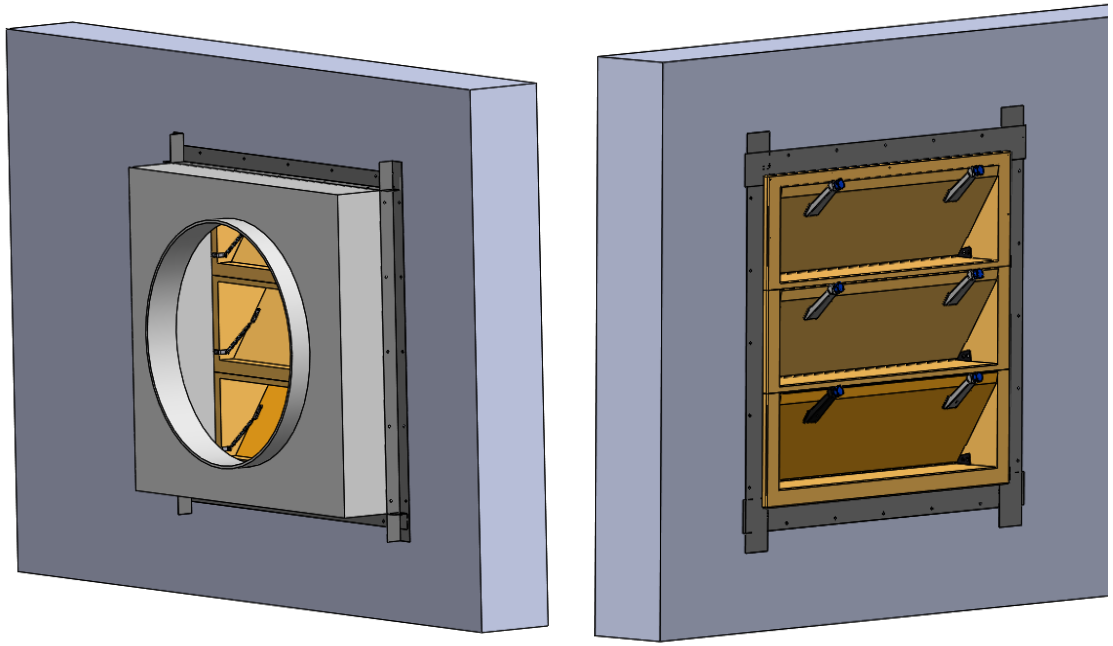
Remote access via Ethernet recommended

Air inlets for HeatX-Rotate

→ **Recommended Inlet nozzle**

→ Optional inlet with Airstep 3-fold (for low ceilings)

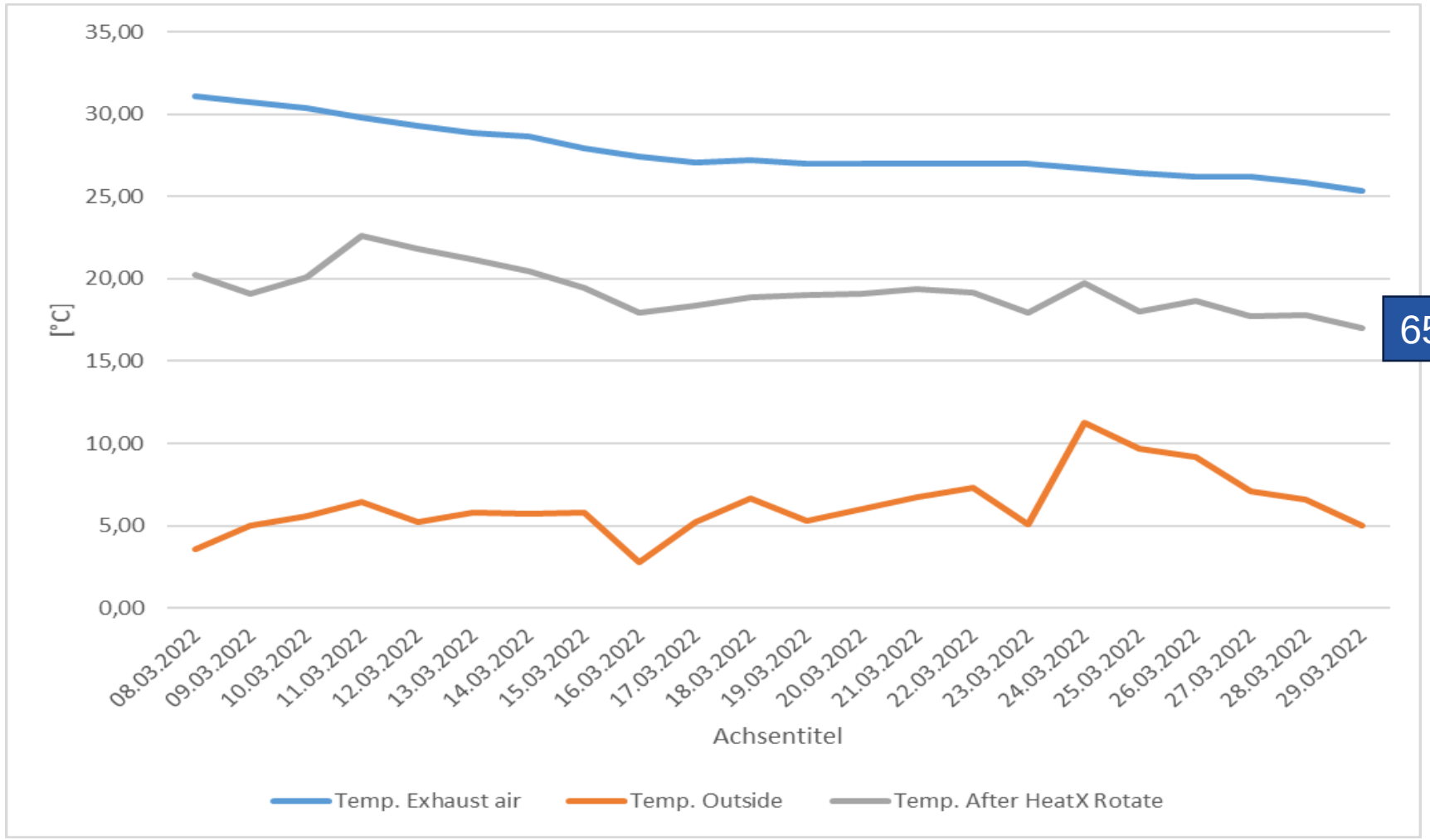
→ Circulation fans have to be used



HeatX-Rotate – soft- and hardware protection against icing

- The coating of the storage mass avoids condensation
- The HeatX-Rotate control has an automatic function to avoid icing in certain circumstances
  - By reducing the speed of the rotor
  - By reducing the speed of the fresh air fan
- Minimum outside temperatures:
  - Exhaust air 30°C, fresh air -25°C
  - Exhaust air 20°C, fresh air -15°C

Measurements (broiler farm in Denmark)



65 – 70% heat recovery

Savings – (Based on 130, 150 and 200 litre usage per 1000 birds, Gas Price 67 c/l and 6.5 Crops/year)

Number of birds Ø gas usage (l) /1,000 birds/Crop	**40,000 130l (0.67 €/l) Electricity 0.30 €/kWh**	**40,000 150l (0.67 €/l) Electricity 0.30 €/kWh**	**40,000 200l (0.67 €/l) Electricity 0.30 €/kWh**
Gas Usage/year 6.5 Crops	33,800 litres	39,000 litres	52,000 litre
Cost of Gas	€22,646	€26,130	€34,840
With Heat Recovery 65%	€7,926	€9,146	€12,194
Running Costs	€2,000	€2,000	€2,000
Total Running Costs	€9,926	€11,146	€14,194
Total Savings/year	**€12,720**	**€14,984**	**€20,646**
Invest Heat-X Rotate	€70,000	€70,000	€70,000
Expected Grant 1900m³ 35.50 € per m³ x 40%	€26,980	€26,980	€26,980
Nett Capital Costs	€43,020	€43,020	€43,020
Payback Years	**3.38**	**2.87**	**2.08**

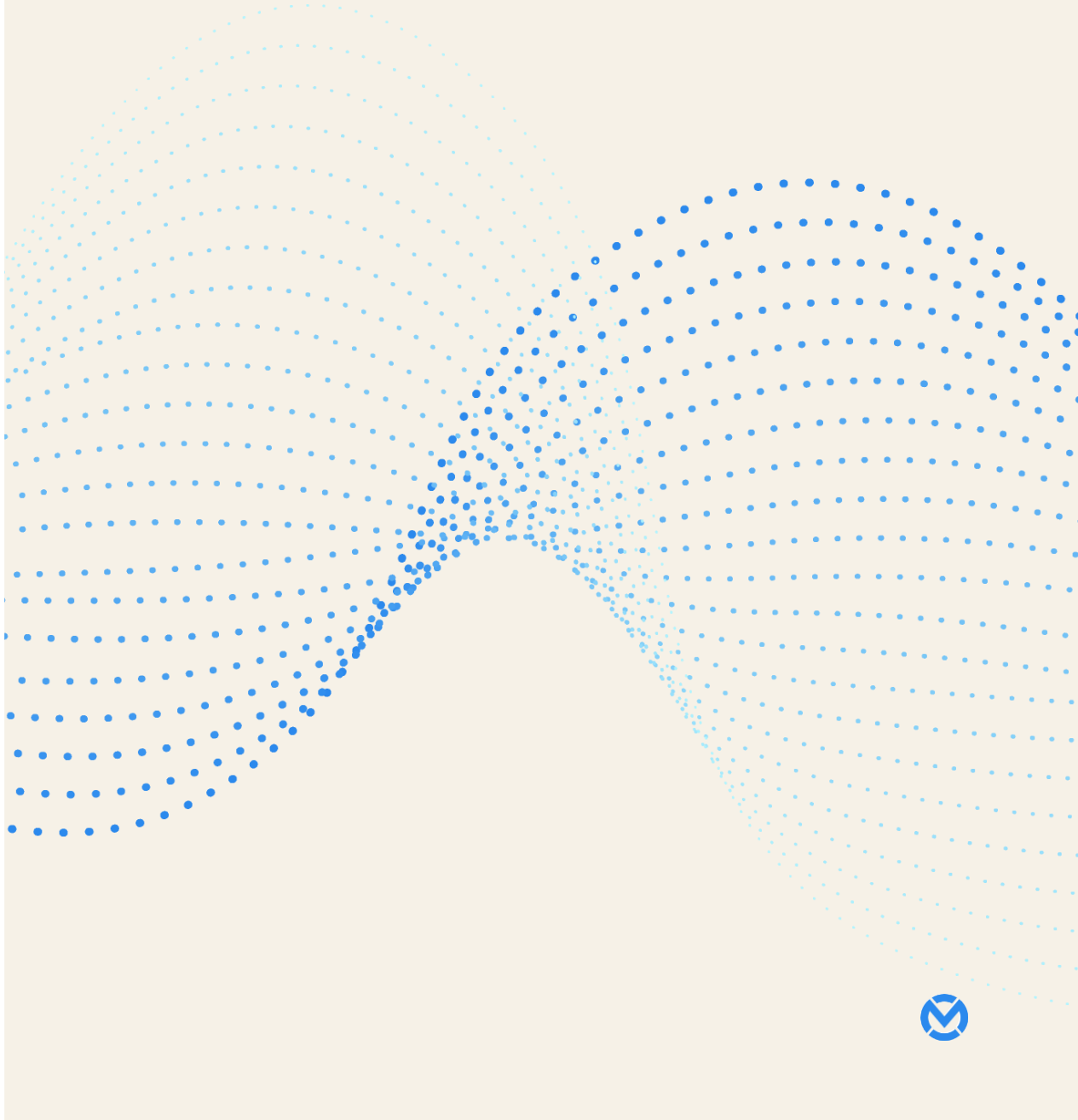
Advantages of HeatX-Rotate

- → Compact design, low transportation costs
- → High heat recovery (≈ 65 - 70%)
- → Condensation free
- → Low energy consumption due to low pressure loss + EC-fans
- → Easy maintenance and cleaning → high hygiene
- → Starting October 1st 2023 the HeatX-Rotate will be on the Danish BAT-list with 30% NH3-reduction. This will have a very positive effect on achieving planning in sensitive locations.

- → Reduction of CO_2-footprint by more than 45t CO_2 per year with one HeatX-Rotate (≈ 240,000 km by car ≈ 6 times around the earth)

Template

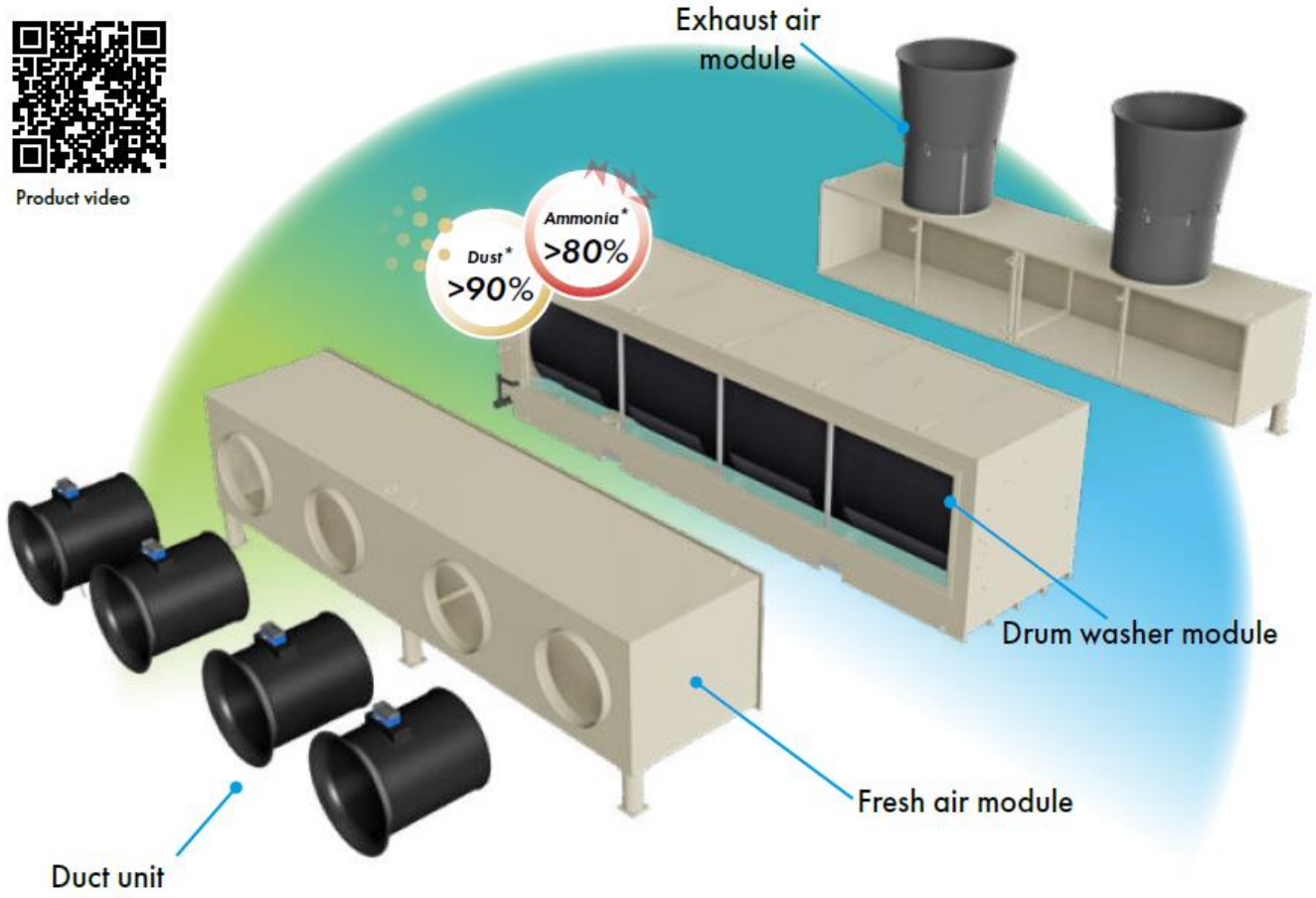
- Heat recovery HeatX-Rotate
- **Air scrubber Lavamatic**
- High pressure cooling



Air scrubber LAVAMATIC

Components of the LAVAMATIC®– Systems 100,000 m³/h

Product video



*Separation depends on the polluted concentration of the raw gas

- Reduction of ammonia and dust in exhaust air
- Low energy consumption (0.5kWh) of system
- Easy cleaning
- Modular system

Installations in the field

Certification in progress

Installation in England at 6 broiler houses

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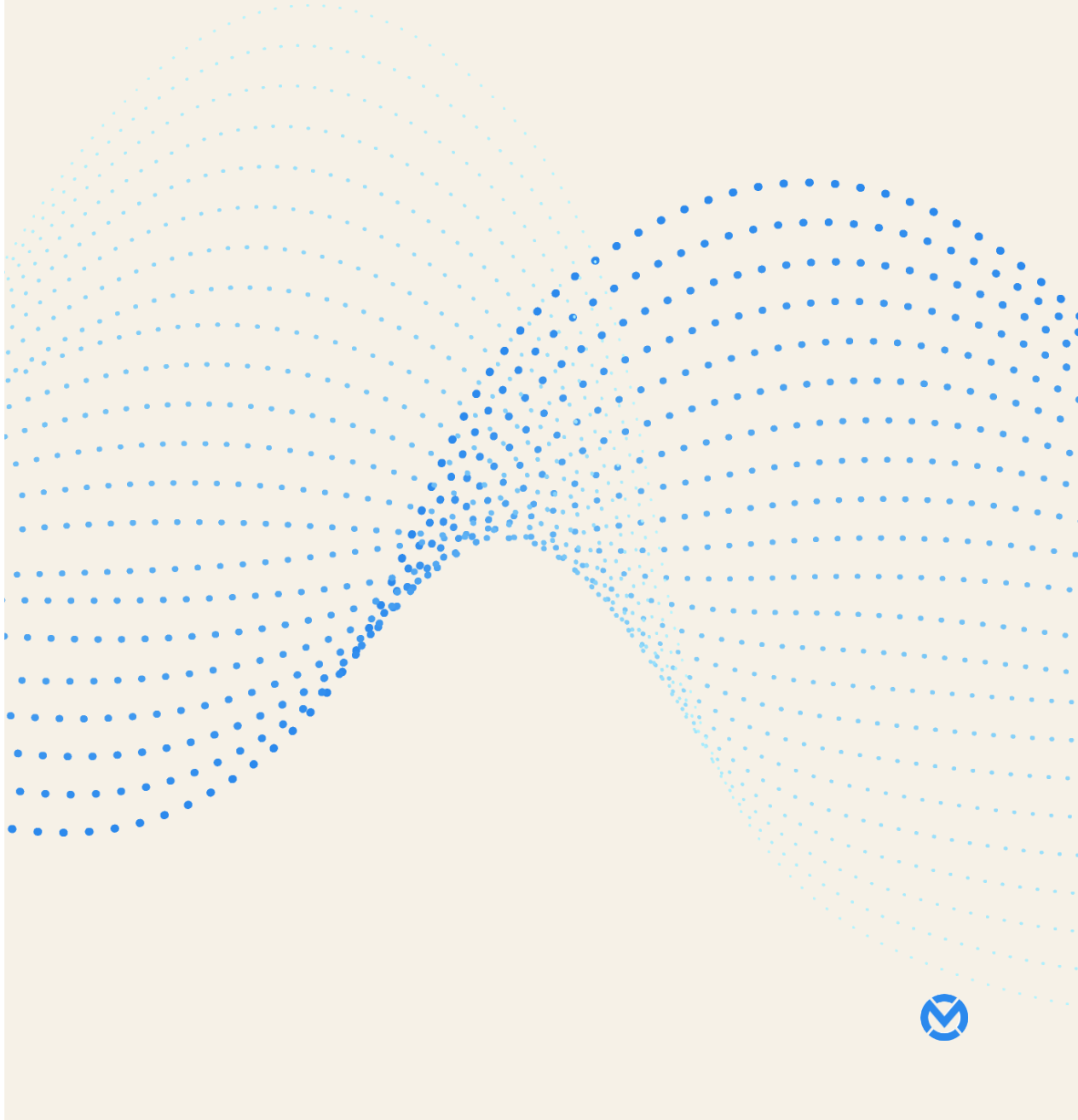
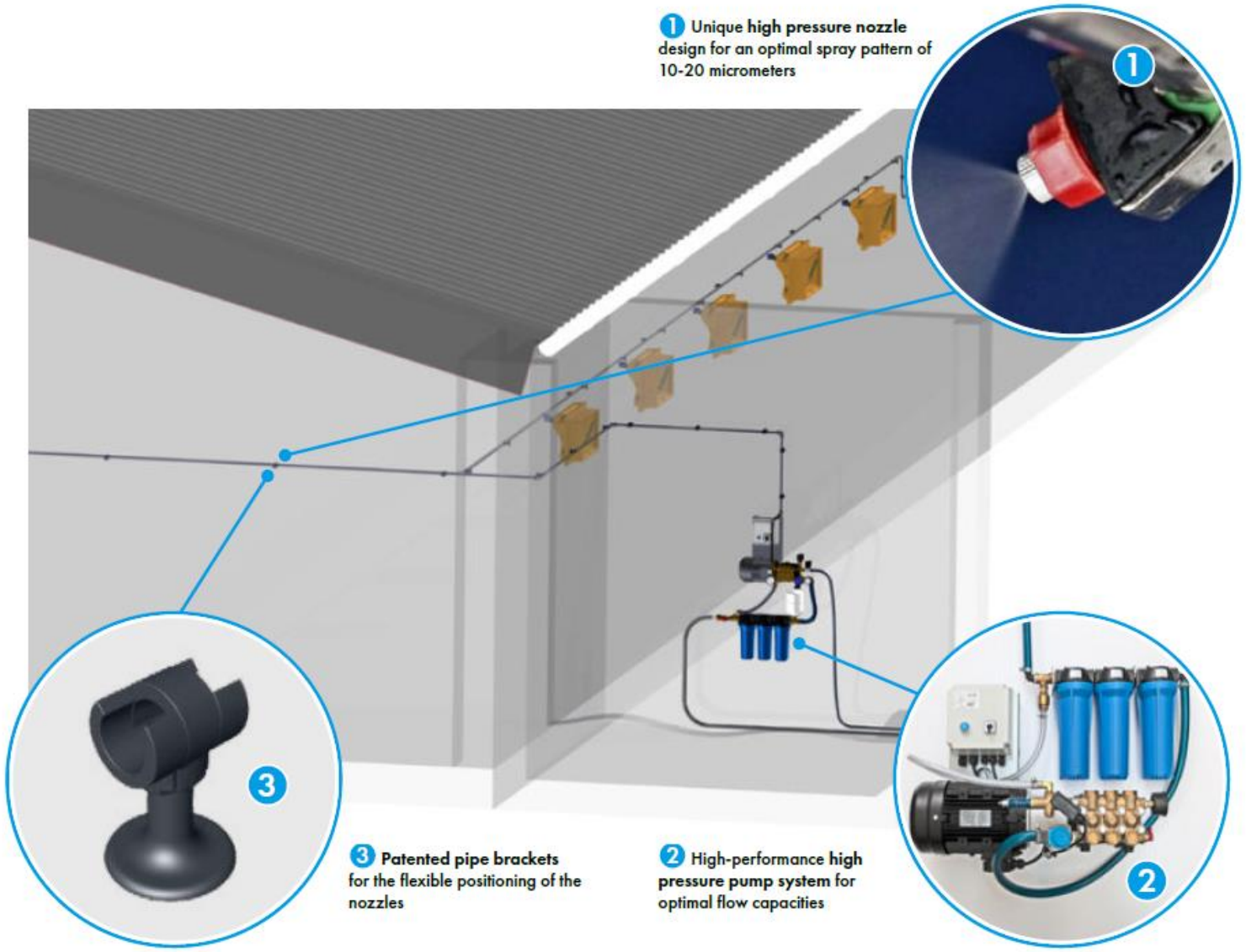


High Pressure Cooling



- 70 bar water pump
- No wettening of litter due to small water droplet size (0.01 – 0.02mm)
- System can be adapted to different house sizes
- Up to 7°K cooling can be achieved → lower max. ventilation