

# Interference free future

NFO Drives unique frequency inverter



SIMPLE



SILENT



SAFE

**NFO**  
DRIVES

# Energy saving

By controlling motors with frequency inverters, you can save up to 70% energy - sometimes more.

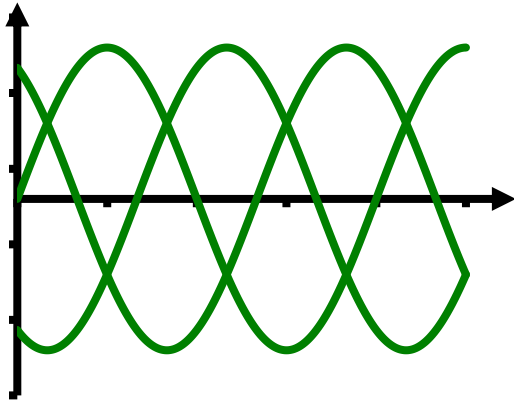


# Electrical **motors**

Motors have always been fed with sinusoidal voltages until variable frequency drives started to be used

Variable frequency drives are used to control the speed of the motor. The benefits are:

- Energy savings
- Control performance



Hear the difference between NFO Sinus and PWM (video in Swedish)



**NFO**  
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# Pure sinus:

- Cost effective and simple electrical installation

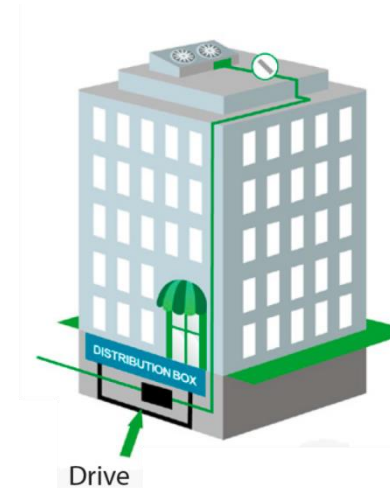
- Installed with unshielded cables
- No special requirements for an electrical installer
- Easy to install
- Plug and play

- Possibility of free position

NFO Sinus can be placed at an unlimited distance from the electric motor.

It can be placed where it belongs - in the power station.

Unshielded cables and easy installation save large costs.



# Pure sinus:

- Healthy motor

No bearing currents – no bearing damage.

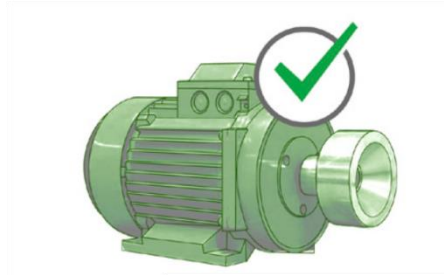
- Interference-free

NFO's frequency inverter is interference-free, which means major benefits primarily for the end customer.

- Residual-current device (RCD) can be used

NFO Sinus does not generate ground currents (max. 2 mA).

NFO Sinus can be used wherever there is a requirement for ground- / earth-fault breakers or monitoring (e.g. hospitals, farms).



Clean sinus makes a big difference for you





# Consequences of PWM technology:

## Electrical installation

- Requires expensive EMC rated shielded cable
- Requires filter
- Installer with EMC competence required
- Complicated rules make installation difficult

### • Fixed positions

Requirements for short motor cables mean that the inverter must be placed close to or on the electric motor.

### • Bearing damage

Bearing currents lead to bearing damage

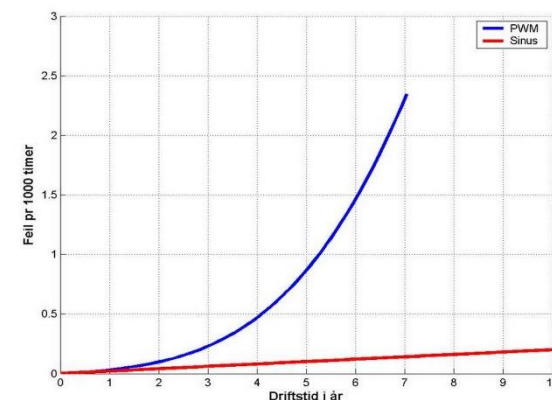
### • Impaired personal and fire safety

PWM technology generates high ground currents, generally between 50 and 500 mA.

As a rule, RCD's cannot be used.

In many industries, RCD's or monitoring are often required (e.g. hospitals, agriculture, defence).

RCD's may be required by insurance companies.



Error statistics

Motors fed with sine voltages (red)

Motors fed from PWM inverter (blue)

Source: Teknisk Ukeblad Image: SKF



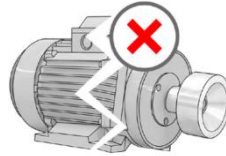
# PWM-technique:



Expensive and complicated electrical installation



Fixed position



Bearing failure



Interferences



Impaired personal and fire safety

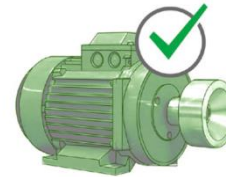
# Sinus-technique:



Cost effective and simple electrical installation



Free position



Healthy motor



Interference-free



RCD, ground-fault circuit breaker, can be used



# Our customers:



# SAAB Kockums

- NFO Sinus is the first inverter approved for naval vessels.
- The use of frequency inverters has not previously been allowed at all. Inverters interfered with the sensitive equipment on board and were therefore banned within the Navy.

*"We tested NFO Sinus frequency inverter in our own EMC lab and were impressed with the results. We have also carried out extensive tests at sea. NFO Sinus fulfils all our requirements for interference-free motor control at a very moderate price."*



# Oslo Rikshospital

Ventilation and pump control.

- Oslo University Hospital HF, the National Hospital, have replaced more than 600 conventional PWM-type inverters with interference-free NFO Sinus inverters.

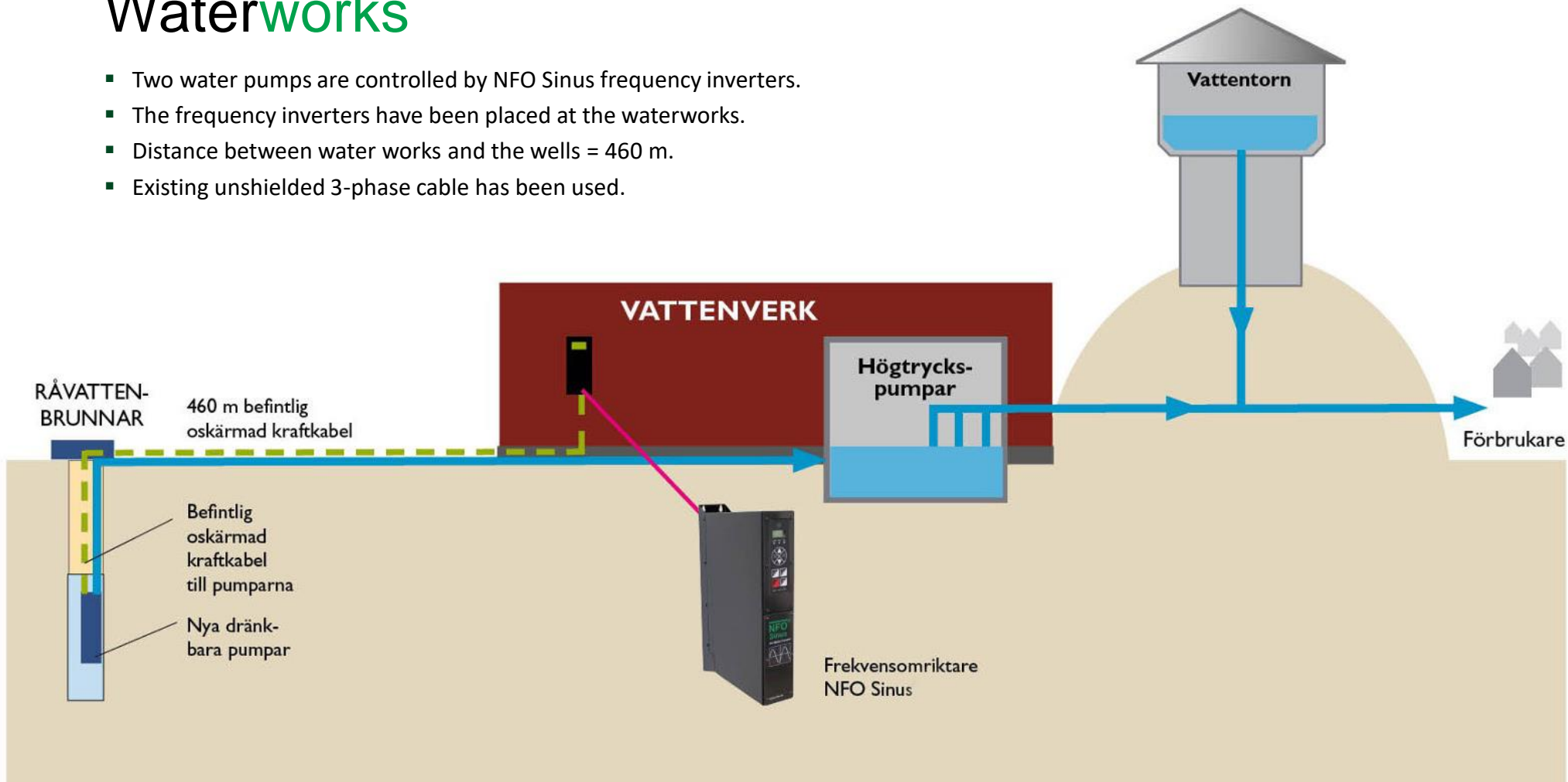
*“Since we switched over, we have had none of the problems involved with PWM inverters. The motors run quieter and there are no earth leakage currents”*





# Waterworks

- Two water pumps are controlled by NFO Sinus frequency inverters.
- The frequency inverters have been placed at the waterworks.
- Distance between water works and the wells = 460 m.
- Existing unshielded 3-phase cable has been used.



# Melotte – Pump technology

Melotte produces an extensive range of submersible pump units and submersible motors.

## Why NFO Sinus was chosen:

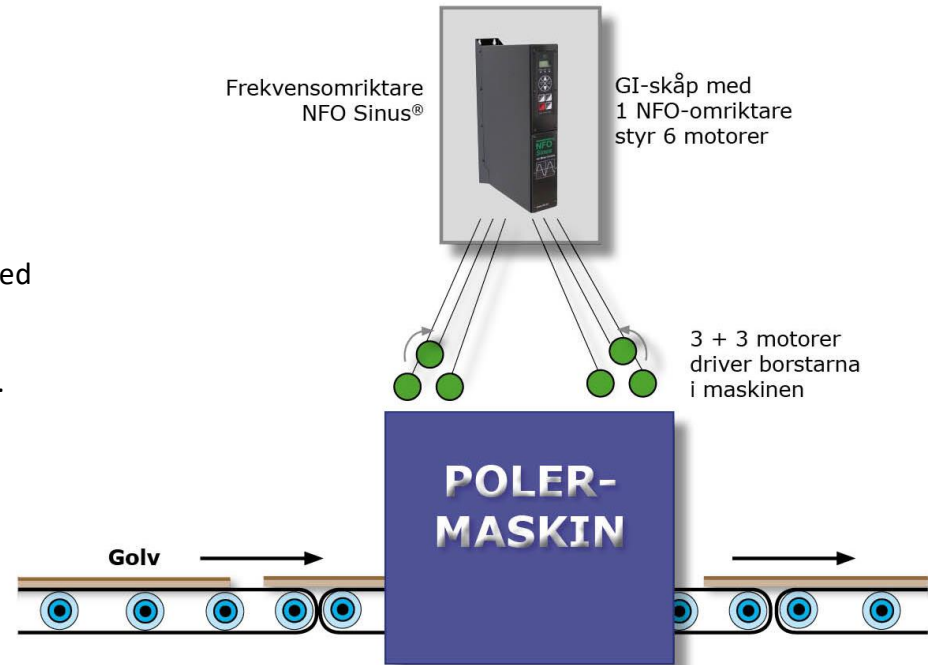
- Possibility to use long cables.
- Safety aspect - as pumps/motors are under water.
- Healthy motors.



# Kährs Nybro

- Kährs in Nybro manufactures 6 million m<sup>2</sup> of flooring per year.
- Brush machines for surface treatment of various floors are controlled by NFO Sinus frequency inverters.
- The motors can be run with full torque even at low rpm (15-18 Hz).
- The motors do not overheat.
- Low heat losses.
- Several motors are controlled by a single inverter.
- No tripped motor protectors.

*"Thanks to NFO's interference-free technology, our plant has become more operationally reliable and it is also future-proofed in terms of EMC"*





# Guldfågeln- Mörbylånga

Changes in production required the speed of the conveyor belt to be regulated by frequency inverters. Conventional inverters had required extensive remodelling and rebuilding of the production line.

One NFO Sinus inverter could control all 8 motors and:

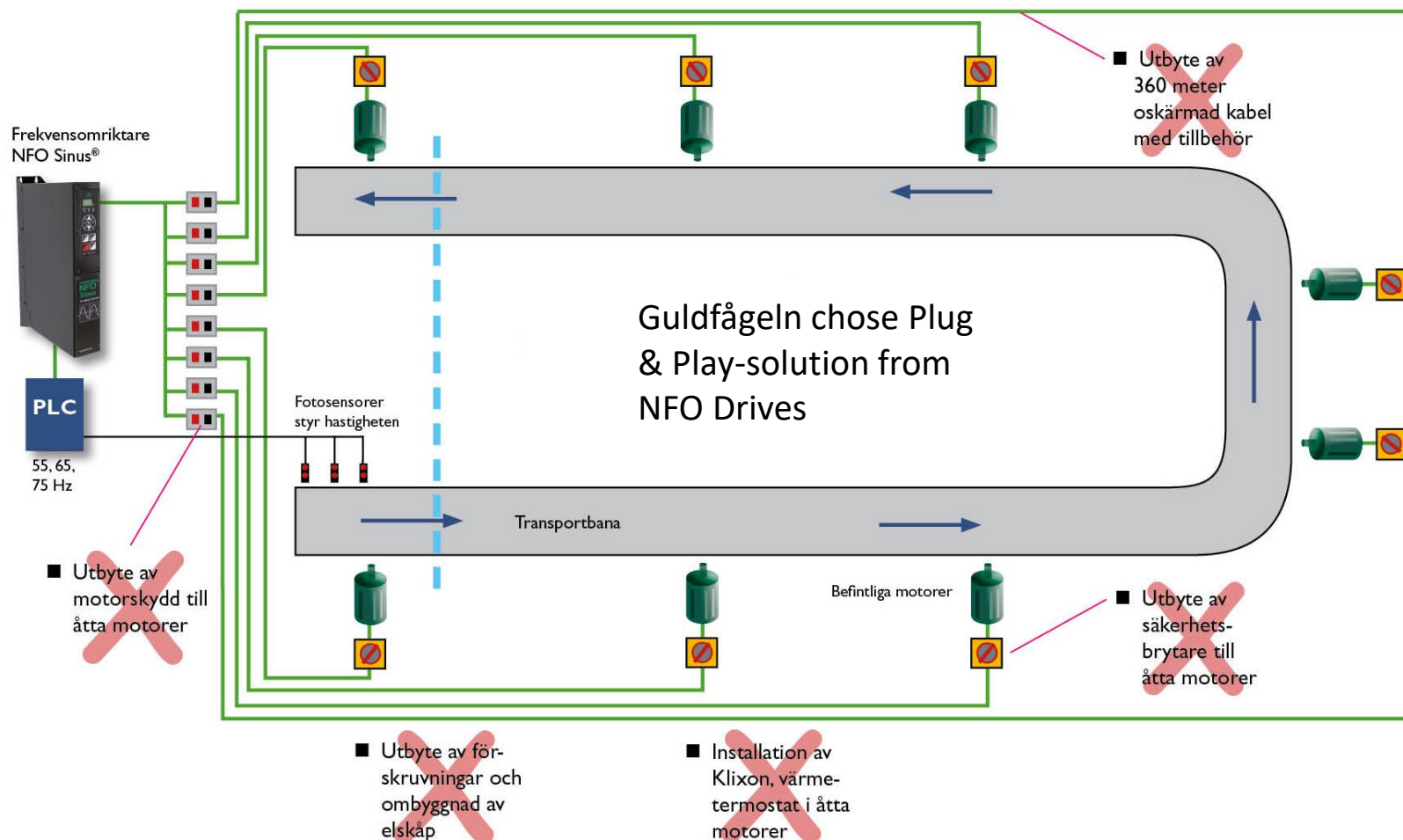
- 360 m unshielded cable with accessories, did not need to be changed
- Motor protection for 8 motors, did not need to be replaced
- Safety switches for 8 motors, did not need to be replaced
- Klixon heating thermostat for 8 motors, did not need to be installed
- Screw connections and electrical cabinets did not need to be replaced or rebuilt

*"With the interference-free inverter from NFO, the total cost of the entire installation was significantly lower than the other alternatives," says Per-Olof Nilsson, shift electrician at Guldfågeln.*

*- In addition, the facility is future-proofed in terms of EMI"*



# Guldfågeln- Mörbylånga



# DeLaval - a part of Tetra Laval Group

## Why NFO Sinus was chosen:

- No interference on all other farm equipment
- Reliable automatic identification of the animals
- No earth leakage currents which affect the animals
- No ball-bearing damages

## Result:

- High operating reliability
- High product quality



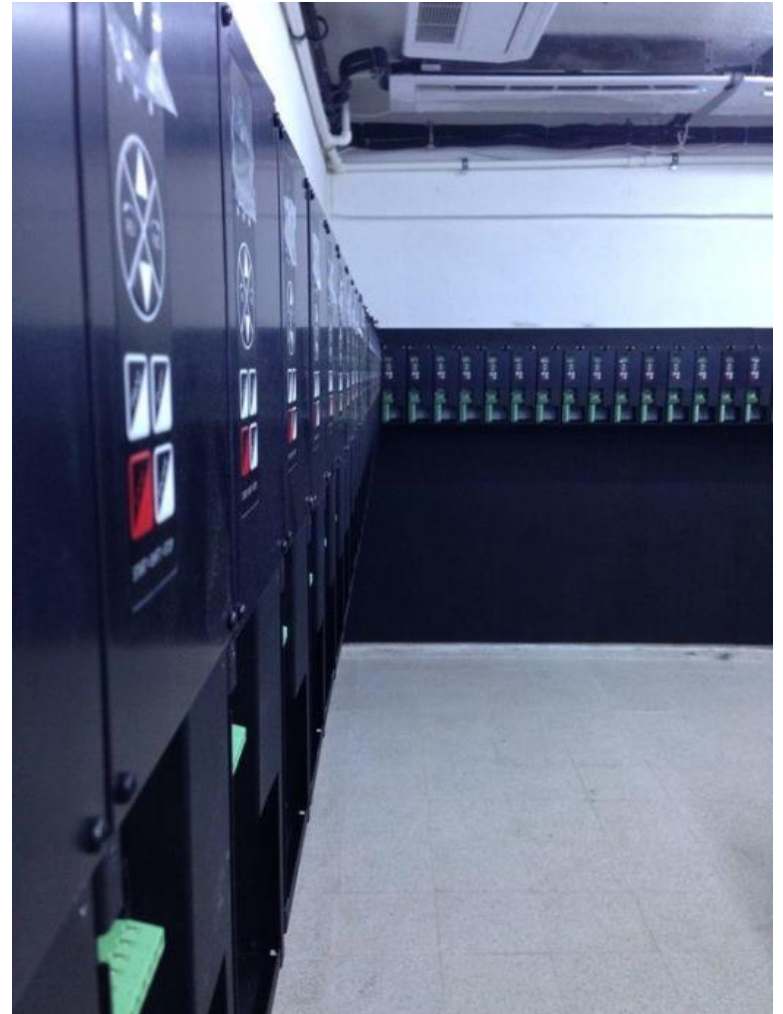


# Dancing Water system

Photos: Bucharest, Romania

Design and installation: Oase GmbH

- Long motor cables.
- Earth fault breakers, RCD's, required.





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# Upgrading **the future**



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