

ENGINEERING  
TOMORROW

*Danfoss*

# The **Cost Effective Solution** to Air Handling

VLT® HVAC Drive

Up to  
**80%**

Greater Drive functionality. The comprehensive Drive's functionality can be used to simplify and cost reduce the overall HVAC system and reduce the total cost of ownership.

[www.danfoss.com/drives](http://www.danfoss.com/drives)

**VLT**®  
THE REAL DRIVE



# Improved air control with VLT® HVAC Drive

**The Drive's functionality can be used to simplify and cost reduce the overall HVAC system and reduce the total cost of ownership.**

Although variable speed control is universally recognised as the best solution for the control of HVAC systems, consistently, under-utilisation of the Drives restricts the savings possible both during installation, commissioning and ultimately the overall running costs of the HVAC system.

The ability of modern digital Drives to vary the speed of the motor accurately and responsively is almost the least of their capability. Thanks to the power of the microprocessors and highly developed software in Danfoss VLT Drives, they are adaptable programmable controllers in their own right.

## **Functionality saves cost**

By creatively utilising a greater proportion of the VLT® HVAC Drive's in-built abilities. Up to 80% of the Drives functionality could be used to greater benefit.

VLT® Drives have the inbuilt power to do much more than simply run the motor at reduced speed. They offer the intelligence to transform the control of your AHUs, converting the traditional BMS points into the Drive and reducing the number of BMS points in a typical HVAC system, savings of up to 50% could be achieved – saving more than the initial costs of the Drives themselves!

## **Greater Drive functionality will reduce external control costs**

The comprehensive Drive functionality eliminates the need for much of the external control complexity, dramatically reducing the initial system complexity in material purchase terms, installation time, equipment real-estate and initial cost.



Up to  
**50%**

savings on  
installation costs by  
applying VLT® HVAC  
Drive.



# Designed with air handling in mind

**Dedicated to fan operation**  
In addition to the extensive array of input and outputs, an impressive range of software functions enables you to tailor the VLT® HVAC Drive exactly to your HVAC system needs:

## Resonance monitoring

VLT® Drives can be set up to avoid selected frequency bands where ventilation system resonance could result in undue noise and potential damage to the ventilation system.

## Velocity-to-flow conversion

VLT® HVAC Drive is able to convert velocity pressure sensor values into flow values. Operators can therefore set the Drive up to provide a fixed flow or fixed differential flow, optimizing comfort and energy efficiency as well as saving money with lower cost pressure sensors.

## Stairwell pressurisation

In the event of fire, VLT® HVAC Drive can maintain a higher level of air pressure in stairwells than in other parts of the building; ensuring fire escape routes remain free of smoke.

## Fire Over-ride mode

The fire mode function ensures continued operation of the Drive to its destruction for applications such as stairwell pressurisation, car park exhaust fans, smoke exhaust and essential service functions and is clearly indicated when selected.

## Safe Stop

Safe-stop functionality is standard on all VLT® Drives. Approved for cat.3 installations in accordance with EN954-1, this feature prevents unintended starting of the Drive.

## Broken Belt Detection

A trip or warning is given by the Drive upon a broken belt or shaft being detected.

## Wide communications choice

VLT® HVAC Drive offers the widest choice of the fieldbus communications most favoured for HVAC installations, either embedded or as an option, including BACnet, Modbus, LonWorks and many more. VLT® Drive can also, as standard, be configured in any one of 27 languages.

## Lower AHU costs

The VLT® HVAC Drive comes as standard with a built-in Smart Logic Controller and four auto-tune PID controllers, simplifying and cost reducing the control of air handling functions with fans, valves and dampers.

## VLT® - enhanced AHU control

When integrated into the BMS network, all the HVAC Drive I/O points are available as remote I/O, extending the capacity of the BMS. For example, room temperature sensors (Pt1000/

Ni1000) can be directly connected. The integrated Smart Logic Controller and auto-tuned PID controllers can control air handling functions with fans, valves and dampers. The BMS's DDCs are thereby released and valuable data points (DP) are saved. BMS network traffic is dramatically reduced when controlling the AHU with the VLT® HVAC Drive.

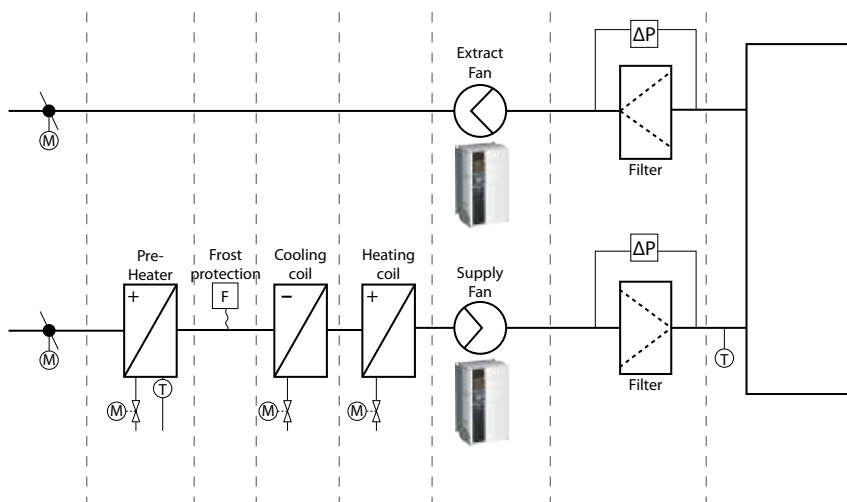
*The VLT® HVAC Drive is also available with a mains switch option. This switch interrupts the mains supply and has a free useable auxiliary contact.*



*An external watertight USB plug connected to the control card inside IP 55/66 enclosures makes USB access easy.*



# Simplify your system – reduce your costs

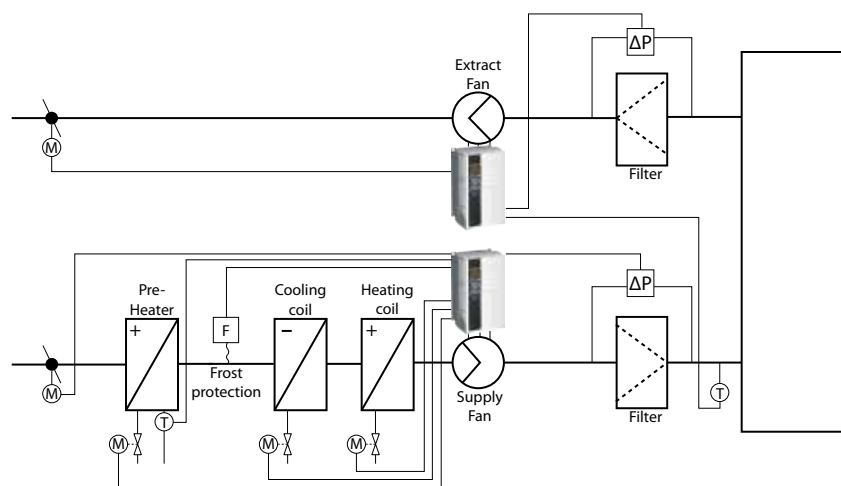


## The Conventional Method

The automated control of Air Handling Unit's for optimum efficiency and environmental comfort is among the most complex control strategies across the industrial and commercial spectra.

In the past, much of this complexity has been external to the Air Handling Unit Drives and the continuation of that tradition today results in a great deal of avoidable installation cost.

| BMS Points |   |   |   |   |   |   |   | Sum |
|------------|---|---|---|---|---|---|---|-----|
| AI         | v | 1 |   |   |   |   | 1 | 2   |
| DI         |   |   | 1 |   |   | 4 | 2 | 7   |
| AO         |   | 1 |   | 1 | 1 | 2 |   | 5   |
| DO         | 2 |   |   |   |   | 2 |   | 4   |
|            |   |   |   |   |   |   |   | 18  |



## The Danfoss Method

VLT® HVAC Drive offers an alternative control strategy to many Building Management Systems (BMS) and other third party controllers: simplifying and cost reducing the overall system. The Drive can for instance function as a straightforward Air Handling Unit controller, eliminating the need for an Air Handling Unit I/O substation.

| BMS Points |  |  |  |  |  |  |  | Sum |
|------------|--|--|--|--|--|--|--|-----|
| AI         |  |  |  |  |  |  |  | 0   |
| DI         |  |  |  |  |  |  |  | 0   |
| AO         |  |  |  |  |  |  |  | 0   |
| DO         |  |  |  |  |  |  |  | 0   |
|            |  |  |  |  |  |  |  | 0   |

# More control functionality – for less costs

## The Danfoss EC+ concept

allows PM motors to be used with Danfoss VLT® frequency converters. Danfoss has integrated the necessary control algorithm in the existing VLT® converter series. This means that there are no changes for the operator. After entering the relevant motor data, the user benefits from the high motor efficiency of EC technology.

## Advantages of the EC+ concept

- Free choice of motor technology: PM or asynchronous with the same frequency converter
- Device installation and operation remain unchanged
- Manufacturer independence in the choice of all components
- Superior system efficiency thanks to a combination of individual components with optimum efficiency
- Retrofitting of existing systems possible
- Wide range of rated powers for standard and PM motors



## Standard VLT® HVAC Drive features include:

- 2 Analog inputs
- 4 Digital inputs
- 2 Digital inputs/outputs
- 1 Analog output
- 2 Relay outputs

## And that's just for starters; you also get as standard:

- 1 Main PID controller for closed loop motor control
- 3 External PID controllers for heating / cooling / dampers
- 4 Set-ups selectable to operate different parameter states
- 1 Smart Logic Controller operable as a process sequencer.

## Built in communications as standard

- Modbus
- BACnet
- Embedded
- FC Protocol
- N2 Metasys
- FLN Apogee

## Optional expansion

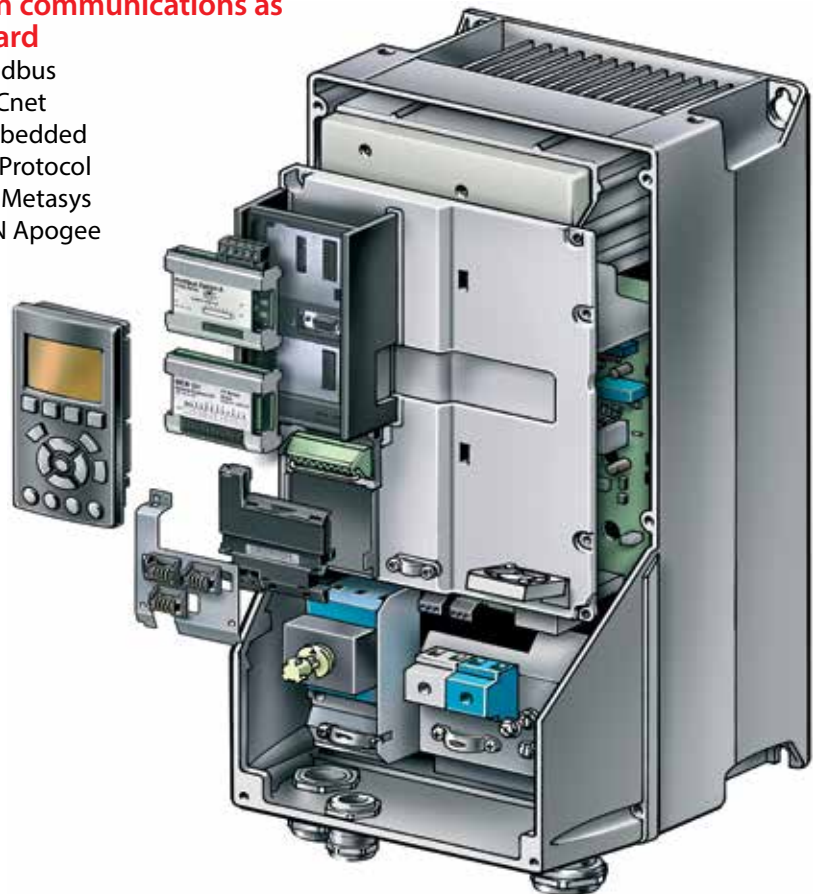
A range of plug-in option modules further expand and enhance the VLT® HVAC Drive's capabilities.

## Communication options:

- BACnet – Advanced
- PROFIBUS DP V1
- DeviceNet
- LonWorks

## I/O options:

- General Purpose I/O (3 DI, 2 AI, 2 DO, 1 AO)
- 3 Relays – 240V
- Analog I/O (3 AI 0–10V/PT 1000/ NI 1000, 3 AO 0–10V)





# Makes your buildings perform



## **Danfoss' commitment**

Danfoss' longstanding experience in applying drives in HVAC systems has enhanced its ability to offer technical expertise integrating the drive into the overall system design.

This extracts the maximum value from your initial investment and optimizes your operational savings performance.

The 21st Century focus on energy efficiency is not new with regard to energy savings. Emphasis on the consequences of wasted energy and over-use of fossil fuels to produce energy is at the top of the agenda.

Climate Change is seen as a cost to the human race not just simply a financial cost.

## **Save energy and CO<sub>2</sub> emission**

VLT® frequency converters save more than 20 million MWh energy globally each year. This is equivalent to the annual electricity consumption of 5 million homes.

This energy saving reduces annual CO<sub>2</sub> emissions by 12 million tons!

## **Building performance**

Today the prime focus is on overall building performance which includes design, construction, efficiency, sustainability and the environmental impact of buildings in the future.

Energy efficient products form part of this overall plan. In most countries around the world the evaluation of high performance buildings falls under the banner LEED.

## **A wealth of knowledge**

The various applications incorporated within high performance buildings are well understood by Danfoss. As a global market leader, we have built a wealth of knowledge and developed products and technology to ensure we meet and shape future trends in this industry.

Danfoss' application and industry knowledge will ensure that the investment made in VLT® drives provides a qualified return.

Financial incentives are just as important as moral incentives to make people choose energy-efficient solutions.

# What VLT<sup>®</sup> is all about

Danfoss VLT Drives is the world leader among dedicated Drives providers – and still gaining market share.

## Environmentally responsible

VLT<sup>®</sup> products are manufactured with respect for the safety and well-being of people and the environment.

All activities are planned and performed taking into account the individual employee, the work environment and the external environment. Production takes place with a minimum of noise, smoke or other pollution and environmentally safe disposal of the products is pre-prepared.

### UN Global Compact

Danfoss has signed the UN Global Compact on social and environmental responsibility and our companies act responsibly towards local societies.

### EU Directives

All factories are certified according to ISO 14001 standard. All products fulfil the EU Directives for General Product Safety and the Machinery directive. Danfoss VLT Drives is, in all product series, implementing the EU Directive concerning Hazardous Substances in Electrical and Electrical Equipment (RoHS) and is designing all new product series according to the EU Directive on Waste Electrical and Electronic Equipment (WEEE).

### Impact on energy savings

One year's energy savings from our annual production of VLT<sup>®</sup> Drives will save the energy equivalent to the energy production from a major power plant. Better process control at the same time improves product quality and reduces waste and wear on equipment.

## Dedicated to Drives

Dedication has been a key word since 1968, when Danfoss introduced the world's first mass produced variable speed Drive for AC motors – and named it VLT<sup>®</sup>.

Twenty five hundred employees develop, manufacture, sell and service Drives and soft starters in more than one hundred countries, focused only on Drives and soft starters.

## Intelligent and innovative

Developers at Danfoss VLT Drives have fully adopted modular principles in development as well as design, production and configuration.

Tomorrow's features are developed in parallel using dedicated technology platforms. This allows the development of all elements to take place in parallel, at the same time reducing time to market and ensuring that customers always enjoy the benefits of the latest features.

## Rely on the experts

We take responsibility for every element of our products. The fact that we develop and produce our own features, hardware, software, power modules, printed circuit boards, and accessories is your guarantee of reliable products.

## Local backup – globally

VLT<sup>®</sup> motor controllers are operating in applications all over the world and Danfoss VLT Drives' experts located in more than 100 countries are ready to support our customers with application advice and service wherever they may be.

Danfoss VLT Drives experts don't stop until the customer's Drive challenges are solved.

