

*Danfoss*



VLT® HVAC Drive  
makes HVAC operation child's play



# VLT® – an intelligent part of the intelligent building

The VLT® HVAC Drive, built on Danfoss' new modular plug-and-play platform and dedicated to HVAC applications, makes HVAC operation a child's play.

**Lowest cost of ownership**  
VLT® HVAC Drives let you:

- **Save energy**  
The VLT® HVAC Drive includes:
  - 98% basic energy efficiency
  - Sleep Mode
  - Automatic Energy Optimisation
  - Flow compensation

• **Save money**  
The modular design and a host of options allows for a low initial investment and low cost upgrades according to future needs.

- **Save time**  
Operators, equipment and control systems all communicate effortlessly with the VLT® HVAC Drive. It is fluent in all common BMS network protocols and displays every alphabet. 27 languages, including English, German, Mandarin and Cantonese are available.

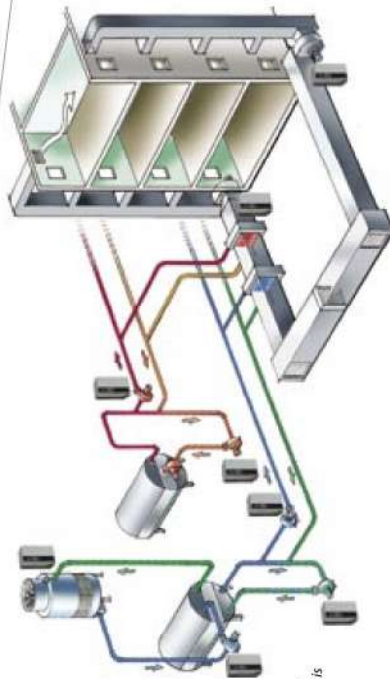
The award-winning Local Control Panel constantly improves on the intuitive man-machine interface. Automatic Motor Adaptation and Automatic Energy Optimisation support fast commissioning.

Due to a series of self-protecting and monitoring features and a highly durable mechanical design, the VLT® HVAC Drive is practically maintenance free.

- **Save space**  
Due to its small size, the VLT® HVAC Drive is easily mounted inside a HVAC unit or panel.
- **Fire override mode**  
Fire Override Mode helps keep fire escape routes free of smoke, overrides the drive's self-protecting features and keeps the fan running as long as possible in the event of fire.
- **Save cabinet**  
Protection class IP55 requires no cabinet.

**Dedicated to HVAC**  
Danfoss has unequalled experience in advanced drive technologies for HVAC applications.

This experience has been used to optimise features in the VLT® HVAC Drive and make it the perfect match for pumps, fans and water chillers (compressors) in buildings fitted with sophisticated HVAC solutions.



VLT® HVAC Drive operate all HVAC operations by providing exactly the power required. No energy is consumed by valves and dampers.



VLT® HVAC Drive features and benefits apply to district heating applications as well – improving control and providing major energy savings.

Perfect comfort levels and major energy savings can be achieved in any building by harnessing the VLT® HVAC Drive to your applications: Hotels, hospitals, airports, casinos, classrooms, sports facilities, concert halls, commercial buildings and residential buildings – if you can name a need, we can name a solution: the VLT® HVAC Drive.

## The VLT® HVAC Drive

### Small investment

The VLT® HVAC Drive is available in a range of versions, from a basic serial communication and I/O configuration capable right up to a fully equipped and personalized drive, including all relevant HVAC I/O points and protocols. Delivered from factory. No extra assembly work on-site!

### 50° C ambient temperature

The robust VLT® HVAC Drive is designed to work at maximum output in an ambient temperature up to 50° C.

### Suitable for "slave" operation

The drive's modular structure makes it suitable for "slave" operation mastered by BMS, PLC's or DDC's.

### Stand-alone unit

VLT® HVAC Drive provides intelligent stand-alone functionality via:

- Built-in Real Time Clock
- Programmable actions
- Smart Logic Controller
- 4 auto-tuned PID controllers.

### Automatic Energy Optimisation

The standard feature AEO provides optimized motor magnetisation at all speeds and loads.

This increases energy efficiency by 5-15% at partial loads.

## unleashes the full potential of HVAC

### Flow compensation

Significant energy savings and reduced installation costs are provided by flow compensation in both fan and pump systems. A pressure sensor mounted close to the fan or pump provides a reference enabling pressure to be kept constant at the discharge end of the system. The drive constantly adjusts the pressure reference to follow the system curve.

### Energy monitoring

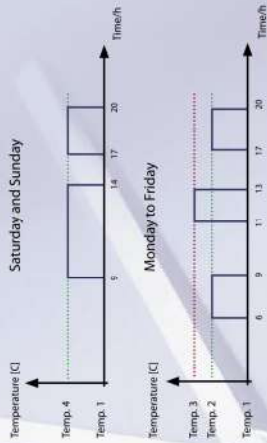
The VLT® HVAC Drive provides a complete range of energy consumption information. Choose to divide absolute energy consumption into hours, days or weeks. Or choose to monitor a load profile for the application.

### Energy analysis

This data can even be uploaded to a VLT® Energy Box – PC software that performs in-depth real life/true energy analysis of your application and displays the payback time for the drive.

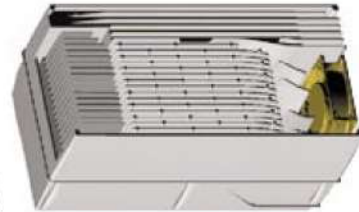
### Real Time Clock

Real Time Clock can be used to adjust building comfort to demands that change over the week.



The VLT® HVAC Drive is built on Danfoss Drives, new generation modular concept. Real plug-and-play adding and exchanging of options. Just upgrade instead of buying a new drive.

**No dust in electronics**  
The unique cooling system prevents dusty and aggressive ambient airflow to damaging the drive electronics. This extends the drive's lifetime.



The VLT® HVAC Drive has an award winning Local Control Panel and a well-structured menu system that ensures fast commissioning and trouble-free operation of the many powerful functions.



The VLT® HVAC Drive can be remote commissioned and monitored through a USB pluggable cable or BMS network communications. VLT® Set-up Software MCT 10 and Language Changer make drive operation child's play.



# Best HVAC performance with VLT® HVAC Drive



## Comfort for flight personnel and passengers

Clean air and comfortable temperature supports comfort and soothes frayed tempers. Air is moved, chilled, heated, humidified and cleaned effectively consuming a minimum of energy and financial resources. With VLT® HVAC Drive you get full control of pumps, fans and compressors.

## Healthy Environment

Patients thrive better breathing clean, conditioned air. Autotuning PID controllers ensure accurate control of airflow, maintaining a positive pressure in operating rooms to help maintain hygienic conditions and prevent cross contamination. VLT® HVAC Drive can maintain a negative pressure in isolation wards as well, ensuring a healthy environment for all.



## Where dust is critical

Cleanroom facilities for the production of micro electronics like semiconductor chips require special precautions. The VLT® HVAC Drive can meticulously control to maintain air quality and humidity levels under a variety of operating conditions, including continued operation during mains voltage fluctuations.

## The bottom line

The initial cost of HVAC is almost negligible. Energy efficient control of fans, pumps and compressors – day and night, during opening and closing hours – ensures maximum economy and low running costs. Let VLT® HVAC Drive impact your bottom line.

## District heating/Cooling

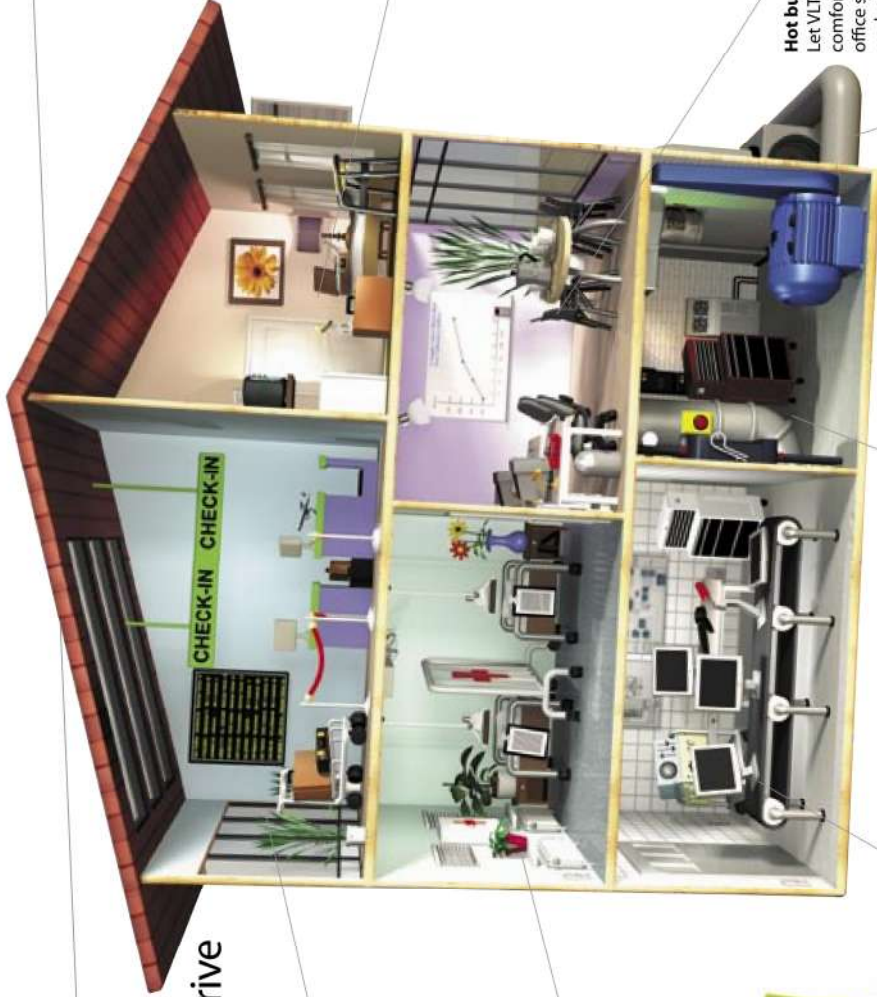
The larger the system, the larger the savings that can be derived from the use of VLT® HVAC Drive. Precise control of temperature, pressure and flow is done by speed control of pumps and fans – the best way to save natural resources. The larger system, the greater the power required – and VLT® HVAC Drives goes all the way.

## Hot business

Let VLT® HVAC Drive provide a reliable, comfortable environment for your office staff. People should be able to work efficiently without being distracted by sudden changes in temperature or humidity. Let a VLT® HVAC Drive quietly and effectively control the indoor climate, improve work efficiency and help you keep cool in a hot business environment.

## Treated like a guest

When walking into a hotel room you should experience a mild, fresh, clean smell and a feeling of comfort and relaxation. To provide this and at the same time go easy on energy and operating costs – choose a VLT® HVAC Drive.





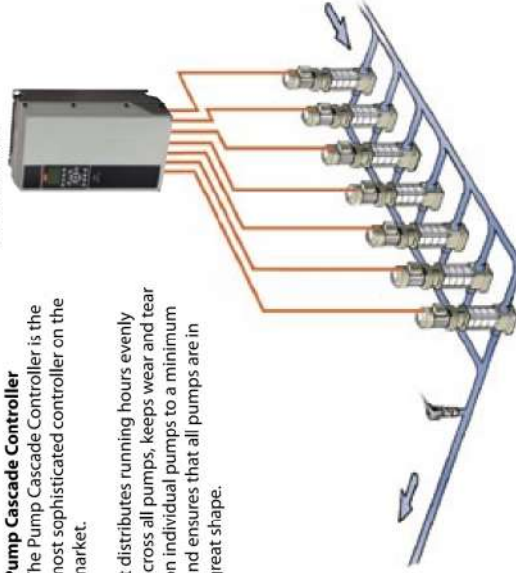
## Dedicated pump features in VLT® HVAC Drive

**The VLT® HVAC Drive** offers a vast number of pump-specific features developed in cooperation with OEMs, contractors and manufacturers around the world.

**Vital water supply**  
Vital water supply can be assured in the event of leakage or a broken pipe. For example overload is prevented by reducing speed – and supply is secured at lower flow.

**Pump Cascade Controller**  
The Pump Cascade Controller is the most sophisticated controller on the market.

It distributes running hours evenly across all pumps, keeps wear and tear on individual pumps to a minimum and ensures that all pumps are in great shape.

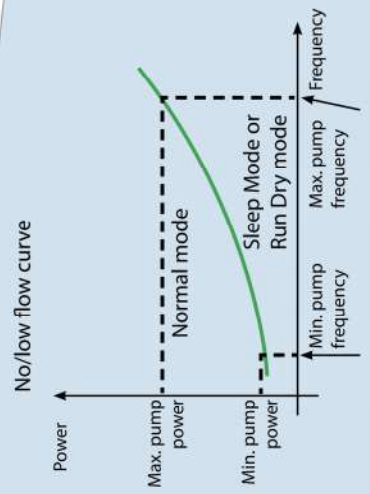


**Sleep Mode**  
In Sleep Mode the drive detects situations with low or no flow. Instead of continuous operation it boosts the system pressure and then stops to save energy. The drive starts automatically when the pressure falls below the lower set point.

### Dry Pump Protection and End of Curve

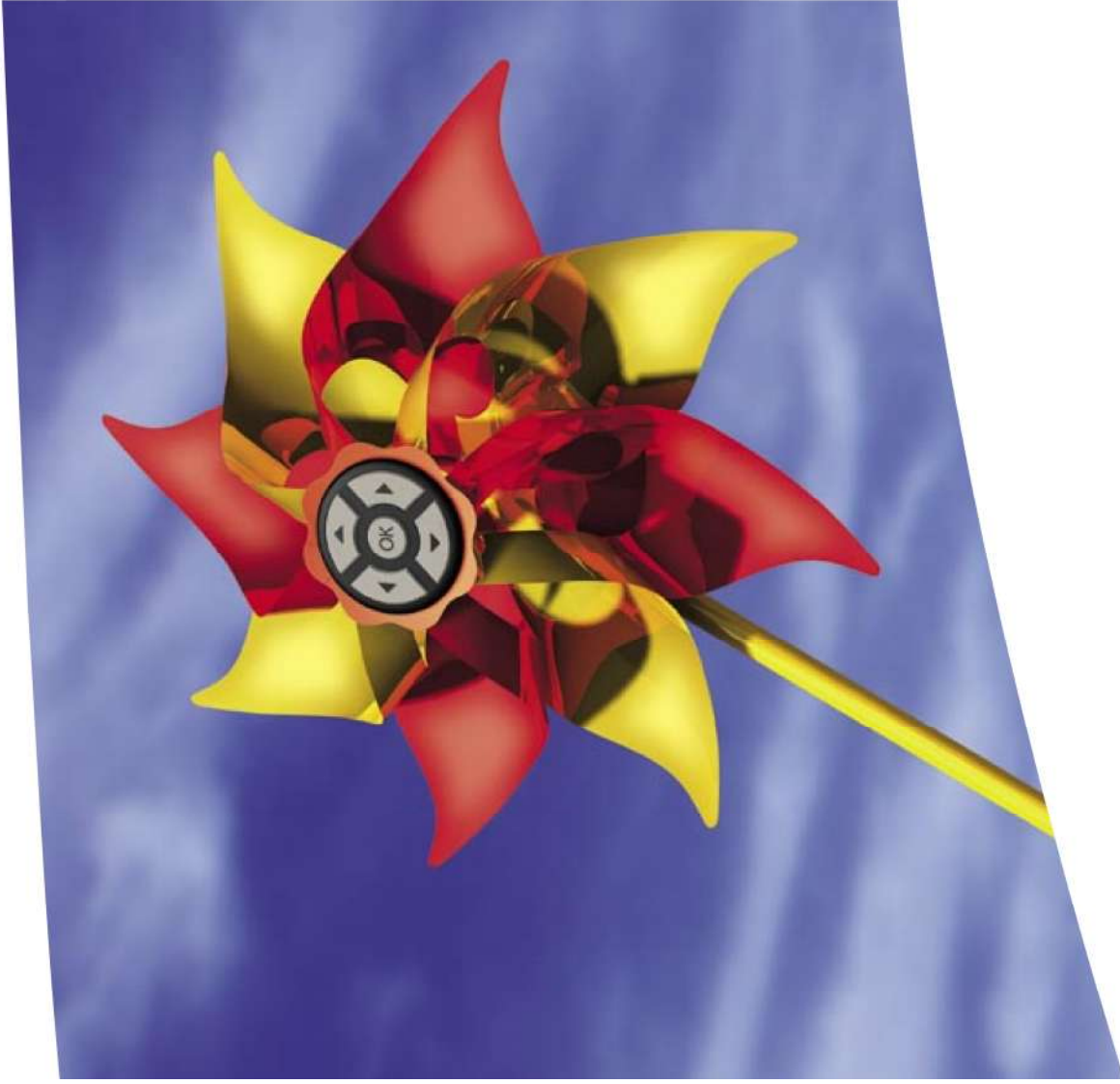
Dry Pump Protection and End of Curve relate to situations where the pump runs without creating the desired pressure – as when a well runs dry or a pipe leaks.

The drive sets off an alarm, shuts off the pump, or performs another programmed action.



*An operating pump will normally consume more power the faster it runs – according to a curve determined by the pump and application design.*

*VLT® HVAC Drive will detect situations where the pump runs fast but is not fully loaded – and thereby not consuming adequate power. This is the case when water circulation stops, the pump runs dry or when pipes leak.*



## Dedicated fan features

User-friendly, distributed intelligence and reduced power consumption are beneficial for fan applications.

### Lower AHU costs

The VLT™ HVAC Drive is fitted with a built-in Smart Logic Controller and 4 auto tune PID controllers and can control air handling functions with fans, valves, and dampers. The building management's DDC-'s are thereby released and valuable data points (DP) are saved.

### Extends BMS capacity

When integrated into the BMS network, all the HVAC Drive I/O points are available as remote I/O's to extend BMS's capacity. For example, room temperature sensors (Pt1000/Ni1000) can be directly connected.

### Resonance Monitoring

By pressing a few buttons on the Local Control Panel the drive can be set to avoid frequency bands at which connected fans create resonances in the ventilation system. This improves building comfort.

### Intelligent AHU functions

The VLT™ HVAC Drive handles logical rules and input from sensors, real-time functionality, and time-related actions. This enables the HVAC Drive to control a wide range of functions, including:

- Weekend and working-day operations
- Cascaded P-PI for temperature control
- Multi-zone pressure control
- Flow balancing between fresh and outlet air

### Belt Monitoring

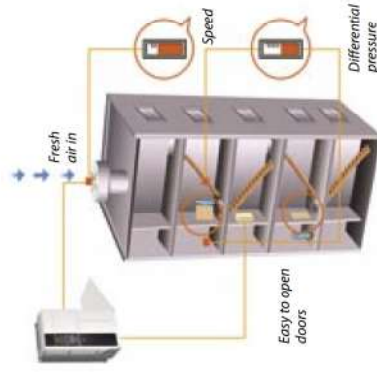
From the relation between current and speed, the VLT™ HVAC Drive is able to reliably recognize a broken belt. Lack of air flow detected immediately, first cost and down-time is reduced.

### Fire Override Mode

In Fire Override Mode the VLT™ HVAC Drive will not react to control signals, warnings or alarms. It will continue its reliable operation as long as possible and run until it eventually self-destruct.

### Stairwell Pressurization

In the event of fire, the VLT™ HVAC Drive can maintain a higher level of air pressure in stairwells than in other parts of the building and ensure that fire escapes remain free of smoke.



*Meticulous control of fans saves energy and keeps noise and draft at a minimum.*



## Dedicated compressor features

The VLT<sup>®</sup> HVAC Drive has been designed to offer flexible, intelligent control of scroll, screw and centrifugal compressors, making it even easier to optimize cooling capacity with constant temperature and pressure levels for water chillers, and other typical compressor applications in HVAC.

### Replace a cascade with a single compressor

The VLT<sup>®</sup> HVAC Drive provides the same level of flexibility with one large compressor instead of a cascade of 2 or 3 smaller compressors. The HVAC Drive operates all compressors at a far more refined range of speeds than normal – even above nominal speed – meaning that one large compressor is now enough.



### Set point in temperature

The VLT<sup>®</sup> HVAC Drive calculates the actual room temperature from the pressure in the cooling media and refines compressor operation accordingly – without the need for additional software, sensors or controllers.

This calculation is also applicable to the set point as well, so the desired temperature is set via the Local Control Panel – and not a pressure value.

### Fewer starts and stops

A maximum number of start/stop cycles within a given period of time can be set via the Local Control Panel. Since start-up is the most critical part of compressor operation (all parts of the unit are under mechanical stress before the system is sufficiently lubricated) this extends compressor lifetime.

### Quick start-up

To extend life even further, the VLT<sup>®</sup> HVAC Drive opens a bypass valve and lets the compressor start quickly without load.

The VLT<sup>®</sup> HVAC Drive provides 130% break away torque and can give 110% torque for 60 seconds in normal operation. This torque demand would normally require larger and more expensive drives.



VLT<sup>®</sup> HVAC drive allows you to rethink your compressor operation.



Flexible compressor mode operation even above nominal speed and high break away torque for start-ups allow for better control and major savings.

**Toronto Airport, Canada**  
 Toronto Pearson International Airport is Canada's busiest airport, welcoming close to 29 million passengers in 2004. The airport is currently in the middle of an ambitious 10-year, almost \$5 billion dollar Airport Development Program which began in 1998 – and Danfoss has provided hundreds of HVAC drives as part of this program.



## Proven HVAC experience



**Torre Mayor, Mexico City**  
 With its 55 floors and a height of 225 m the Torre Mayor is the highest building in Latin America. Danfoss drives control the heating and ventilation.



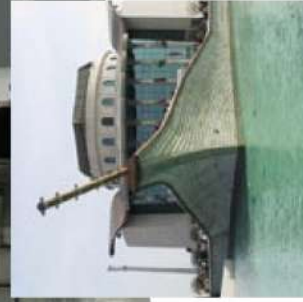
**Tropical Islands Resort near Berlin, Germany**  
 A steady 25 °C air temperature, 31 °C water temperature, no rain, and a pleasant 40% to 60% humidity for the resort's tropical plants. Everyone's idea of perfect weather!  
 All this is possible with a first class climate and water control system driven by VLT™ HVAC Drives.



**Opera House in Sydney, Australia**  
 The Sydney Opera House is one of the architectural wonders of the world, and perhaps the best known building of the 20th century. In 2001, the NSW Government provided \$69 million for several projects to improve the facilities and environment for performing arts companies, patrons and visitors. Danfoss provided the drives.



**Orlando Medical Center, Florida, USA**  
 Danfoss drives are part of the economical and energy smart solution that helps keep staff and patients cool and comfortable in the 20,000 m<sup>2</sup> Orlando Regional Medical Center in the middle of sunny Florida.



**National Theatre, Hungary**  
 In the new National Theatre of Hungary Danfoss HVAC drives in the air handling system ensure that audiences can enjoy performance in a tranquil and pleasant environment. The 20,800 m<sup>2</sup> building housing 620 visitors, was built in 15 months which required easy installing equipment.



**Shanghai General Motors, China**  
 Shanghai General Motors Co. Ltd. is a 50-50% joint venture between General Motors and the Shanghai Automotive Industry Corporation Group (SAIC). Shanghai GM has an annual production capacity of 200,000 vehicles. Danfoss provides the VLT™ HVAC drives to maintain the production environment.



**Grand Hyatt, Dubai**  
 Set within a lush oasis of 37 acres of landscaped gardens, the Grand Hyatt Dubai is an outstanding combination of resort facilities, luxury hotel guest rooms and suites, residential apartments and one of the most advanced conference centers in the Middle East. Danfoss provided the VLT™ HVAC Drives.



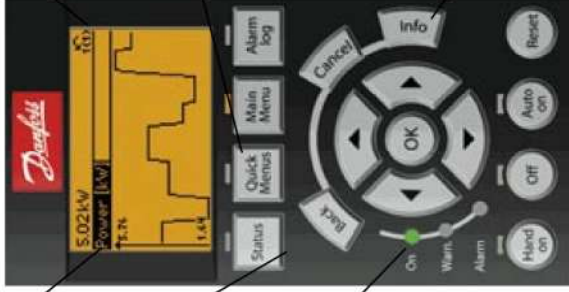
**Guangzhou Baiyun Pharmaceutical Factory, China**  
 Guangzhou Baiyunshan Pharmaceutical Manufacturer was established in 1993 and is a listed company with a good reputation in the pharmaceutical field in China. Its share value is around RMB 3.24 billion and sales turnover in 2004 was RMB 2.5 billion. Danfoss provided the drives.



## HVAC users participated in developing the user interface

### Graphical display

- International letters and signs
- Showing bars and graphs
- Easy overview
- Possible to select 27 languages
- IF awarded design



### Menu structure

- Based on the well known matrix system in today's VLT™ drives
- Easy short cut for the experienced user
- Edit and operate in different set-ups simultaneously

### Quick Menus

- A Danfoss defined Quick Menu
- A Personal defined Quick Menu
- A Changes Made Menu lists the parameters unique for your application
- A Function Setup menu provides quick and easy setup for specific applications
- A Logging menu provides access to operation history

### New buttons

- Info ("on board manual")
- Cancel ("undo")
- Alarm log (quick access)

### Other benefits

- Removable during operation
- Up- and download functionality
- IP65 rating when mounted in a panel door
- Numerical version also available

### Illumination

- Important buttons are now illuminated when active

## Connection overview

This diagram shows a typical installation of the VLT® HVAC Drive.

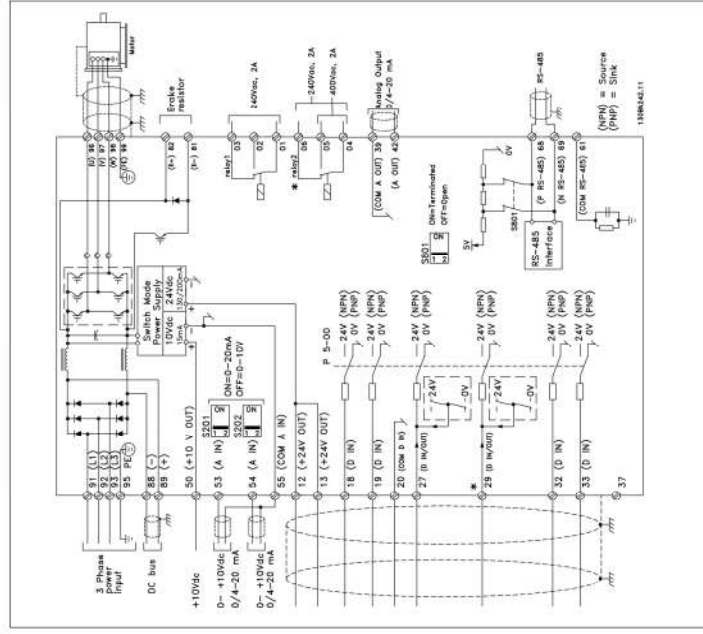
Power is connected to the terminals 91 (L1), 92 (L2) and 93 (L3) and the motor is connected to 96 (U), 97 (V) and 98 (W).

Terminals 88 and 89 are used for load sharing between drives. Analog inputs can be connected to the 53 (V or mA), 54 (V or mA) terminals.

These inputs can be set up to either reference, feedback or termostor. There are 6 digital inputs to be connected to terminals 18, 19, 27, 29, 32, and 33. Two digital input/output

as digital outputs to show an actual status or warning. The terminal 42 analog output can show process values such as 0 -  $f_{max}$ .

On the 68 (P+) and 69 (N-) terminals' RS 485 interface, the drive can be controlled and monitored via serial communication.



## Mains supply 3 x 200 – 240 VAC

Type	Typical shaft output		Output current [A]		Enclosure Weight		Enclosure Weight		Dimensions	
	kW	HP	Cont.	60s*	IP20/21**	kg	Lbs.	IP55	kg	Lbs.
FC102P1K1T2	1.1	1.5	6.6	7.3	4.8	10.6	14.2	31.4	268x90x205	420x242x195
FC102P1K5T2	1.5	2.0	7.5	8.3	4.9	10.8	14.2	31.4	268x90x205	420x242x195
FC102P2K2T2	2.2	3.0	10.6	11.7	4.9	10.8	14.2	31.4	268x90x205	420x242x195
FC102P3K0T2	3.0	4.0	12.5	13.8	6.6	14.6	14.2	31.4	268x130x205	420x242x195
FC102P3K7T2	3.7	5.0	15.7	18.4	6.6	14.6	14.2	31.4	268x130x205	420x242x195
FC102P5K5T2	5.5	7.5	24.2	26.6	22	49	23	51	480x242x260	480x242x260
FC102P7K5T2	7.5	10	30.8	33.9	22	49	23	51	480x242x260	480x242x260
FC102P11K1T2	11	15	46.2	50.8	27	60	28	62	650x242x260	650x242x260
FC102P15K1T2	15	20	59.4	65.3	27	60	28	62	650x242x260	650x242x260
FC102P18K1T2	18.5	25	74.8	82.3	62	137	65	144	680x308x310	680x308x310
FC102P22K1T2	22	30	88.0	96.8	62	137	65	144	680x308x310	680x308x310
FC102P30K1T2	30	40	115	126.5	62	137	65	144	775x370x335	775x370x335
FC102P37K1T2	37	50	143	157.3	43	95	45	100	775x370x335	775x370x335
FC102P45K1T2	45	60	170	187	43	95	45	100	775x370x335	775x370x335

\* I<sub>max</sub> for 60 s – \*\* IP21 from 5.5 kW to 45 kW – H x W x D means Height x Depth x Width

## Mains supply 3 x 380 – 480 VAC

Type	Typical shaft output		Output current [A]		Enclosure Weight		Enclosure Weight		Dimensions	
	kW	HP	Cont.	60s*	IP20/21**	kg	Lbs.	IP55***	kg	Lbs.
FC102P1K1T4	1.1	1.5	3.0	3.3	2.7	3	4.8	10.6	14.2	31.4
FC102P1K5T4	1.5	2.0	4.1	4.5	3.4	3.7	4.9	10.8	14.2	31.4
FC102P2K2T4	2.2	3.0	5.6	6.2	4.8	5.3	4.9	10.8	14.2	31.4
FC102P3K0T4	3.0	4.0	7.2	7.9	6.3	6.9	4.9	10.8	14.2	31.4
FC102P3K7T4	4.0	5.5	10.0	11	8.2	9	4.9	10.8	14.2	31.4
FC102P5K5T4	5.5	7.5	13.0	15.2	11.0	12.2	6.6	14.6	14.2	31.4
FC102P7K5T4	7.5	10	16.0	17.6	14.5	16	6.6	14.6	14.2	31.4
FC102P11K1T4	11	15	24.0	26.4	21.0	23.1	22	49	23	51
FC102P15K1T4	15	20	32.0	35.2	27.0	29.7	22	49	23	51
FC102P18K1T4	18.5	25	37.5	41.3	34.0	37.4	22	49	23	51
FC102P22K1T4	22	30	44.0	48.4	40.0	44.0	27	60	28	62
FC102P30K1T4	30	40	61.0	67.1	52.0	57.2	27	60	28	62
FC102P37K1T4	37	50	73.0	80.3	65.0	71.5	43	95	45	100
FC102P45K1T4	45	60	90.0	99	80.0	88	43	95	45	100
FC102P55K1T4	55	75	106	116.6	105	115.5	43	95	45	100
FC102P75K1T4	75	100	147	161.7	130	143	62	137	65	144
FC102P90K1T4	90	125	177	194.7	160	176	62	137	65	144
FC102P110T4	110	150	212	233	190	209	96	212	96	212
FC102P132T4	132	200	260	286	240	264	104	230	104	230
FC102P160T4	160	250	315	347	302	332.2	125	277	125	277
FC102P200T4	200	300	395	434	361	397.1	136	301	136	301
FC102P250T4	250	350	480	528	443	487.3	151	334	151	334
FC102P315T4	315	450	600	660	540	594	263	582	263	582
FC102P355T4	355	500	658	724	590	649	270	597	270	597
FC102P400T4	400	600	745	820	678	745.8	272	602	272	602
FC102P450T4	450	600	800	880	730	803	313	693	313	693

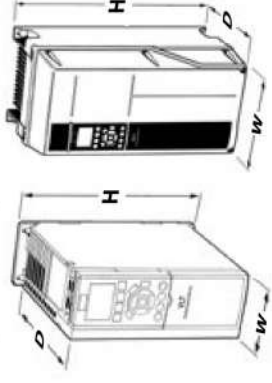
\* I<sub>max</sub> for 60 s – \*\* IP21 from 11 kW to 90 kW – \*\*\* IP54 from 110 kW – H x W x D means Height x Depth x Width

# Mains supply 3 x 525 – 600 VAC

Choose freely from thousands of configurations delivered from factory

Type	Typical shaft output		Output current [A]		Output current [A]		Enclosure Weight		Dimensions	
	kW	HP	60s*	Cont.	3x525-550V	3x551-575V	kg	Lbs.	H x W x D	IP20
FC102P1K1T6	1.1	1.5	2.6	2.9	2.4	2.6	6.5	14.3	268x130x205	
FC102P1K5T6	1.5	2.0	2.9	3.2	2.7	3	6.5	14.3	268x130x205	
FC102P2K2T6	2.2	3.0	4.1	4.5	3.9	4.3	6.5	14.3	268x130x205	
FC102P3K0T6	3.0	4.0	5.2	5.7	4.9	5.4	6.5	14.3	268x130x205	
FC102P4K0T6	4.0	5.5	6.4	7	6.1	6.7	6.5	14.3	268x130x205	
FC102P5K5T6	5.5	7.5	9.5	10.5	9.0	9.9	6.6	14.6	268x130x205	
FC102P7K5T6	7.5	10	11.5	12.7	11.0	12.1	6.6	14.6	268x130x205	

\* max for 60 s  
 \*\* Planned  
 H x W x D means Height x Depth x Width



## Specifications

Mains supply (L1, L2, L3):  
 Supply voltage: 200-240V ±10%  
 Supply voltage: 380-500V ±10%  
 Supply voltage: 525-600V ±10%\*  
 Supply frequency: 50/60 Hz  
 Displacement Power Factor (cos φ) near unity (> 0.98)  
 Switching on input supply L1, L2, L3 1-2 times/min.

Output data (U, I, V, W):  
 Output voltage: 0-100% of supply voltage  
 Switching on output: Unlimited  
 Ramp times: 1 - 3600 sec.  
 Closed loop: 0-132 Hz

Digital inputs:  
 Programmable digital inputs: 6\*  
 Logic: PNP or NPN  
 Voltage level: 0 - 24 VDC  
 \* 2 can be used as digital outs

Analog inputs:  
 Analog inputs: 2  
 Modes: Voltage or current  
 Voltage level: -10 to +10V (scalable)  
 Current level: 0/4 to 20 mA (scalable)

Pulse inputs:  
 Programmable pulse inputs: 2  
 Voltage level: 0 - 24 VDC (PNP positive logic)  
 Pulse input accuracy (0.1 - 110 kHz)  
 Pulse width of the digital inputs

Analog output:  
 Programmable analog outputs: 1  
 Current range at analog output: 0/4 - 20 mA

Relay outputs:  
 Programmable relay outputs: 2  
 (240 VAC, 2 A and 400 VAC, 2 A)

Fieldbus communication:  
 Standard built in:  
 • FC Protocol  
 • N2 Metasys  
 • FLN Apogee  
 • Modbus RTU  
 Optional:  
 • LonWorks  
 • BACnet  
 • DeviceNet  
 • Profibus

## Application options:

A wide range of integrated HVAC options can be fitted in the drive:

**General purpose I/O option:**  
 3 digital inputs, 2 digital outputs, 1 analog current output, 2 analog voltage inputs

**Relay option:**  
 3 relay outputs

**Analog I/O option:**  
 3 PPI000/NI1000 inputs, 3 analog voltage outputs

**External 24 VDC supply option:**  
 24 VDC external supply can be connected to supply control- and option cards

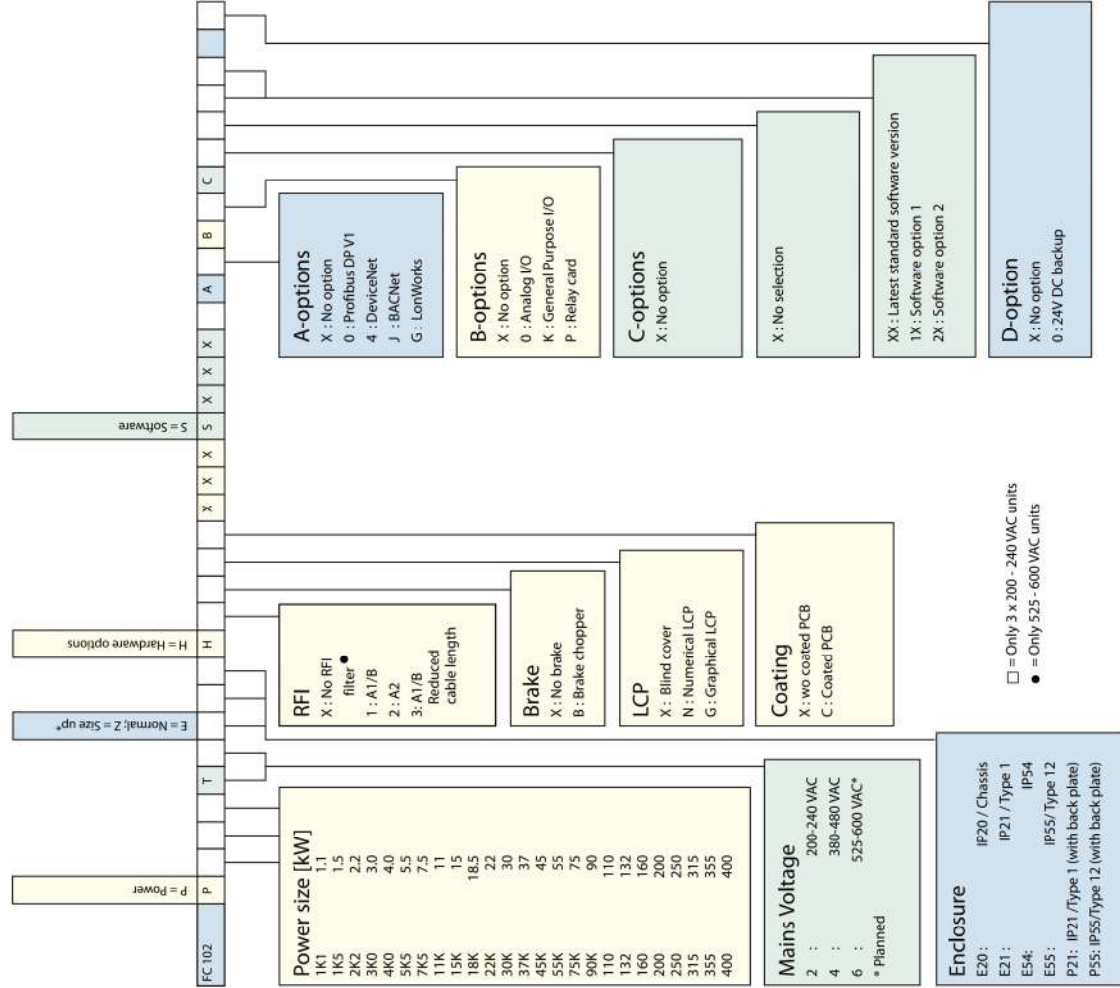
**Brake chopper option:**  
 Connected to an external brake resistor, the built-in brake chopper limits the load on the intermediate circuit in case the motor acts as generator.

**Power options**  
 Danfoss Drives offers a wide range of external power options for use together with our drive in critical networks or applications:

- **Advanced harmonic filters:** For critical demands on harmonic distortion
- **dv/dt filters:** For special demands on motor isolation protection
- **Sine filters (LC filters):** For noiseless motor

## HVAC PC software

- **MCT 10** – ideal for commissioning and servicing the drive
- **VLT HVAC Planet** – an interactive design guide including application examples.
- **VIT Energy Box** – comprehensive energy analysis tool, shows the drive pay-back time
- **MCT 31** – harmonics calculations tool



An overview showing the thousands of ways to configure a VLT™ HVAC Drive. Choosing between options creates a unique drive number.

The drive is factory built using this number. You can configure online at [www.Danfoss.com/Drives](http://www.Danfoss.com/Drives).



# What VLT® is all about

Danfoss Drives is the world leader among dedicated drives providers – and still gaining market shares.



## 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®.

Two thousand employees develop, manufacture, sell and service drives and softstarters in more than one hundred countries – and nothing but drives and softstarters.

## Intelligent and innovative

Developers at Danfoss 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 each element to take in parallel, at the same time reducing time to market and ensuring that customers always enjoy the benefits of the latest features.

## Depend on the experts

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



## Local backup – globally

VLT® motor controls are operating in applications all over the world and Danfoss Drives, experts are ready to support our customers with application advice and service wherever they may be.

Danfoss Drives experts only ever stop when the customer's drive problems are solved.

Danfoss Drives, Ulsnaes 1, DK-6300 Graasten, Denmark • Telephone: +45 74 88 22 22 • Fax: +45 74 65 25 80  
www.Danfoss.com/Drives • E-mail: info@danfoss.com

Danfoss can accept no responsibility for possible errors in catalogues, brochures and other printed material. Danfoss reserves the right to alter its products without notice. This also applies to products already on order provided that such alterations can be made without subsequential changes being necessary in specifications already agreed. All trademarks in this material are property of the respective companies. Danfoss and the Danfoss logotype are trademarks of Danfoss A/S. All rights reserved.