

ENGINEERING  
TOMORROW

*Danfoss*

Enjoy the ultimate in **travel comfort**  
- for **elevator solutions**  
in any power or voltage range

**>50%**

energy savings  
are typical when  
modernizing a  
hydraulic elevator

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

**VLT**®

**VAGON**®



# Elevate comfort and reliability to new heights

**Looking for the best in elevator drive solutions? Try us. You have already experienced Danfoss - in fact we are present with building automation solutions in almost every building, supermarket or factory you've ever been in.**

Producing more than 1 million AC drives annually, you can be confident that we are the global drive specialists.

## **Confidence - for the long haul**

Using our expertise, we have equipped products with features dedicated to elevators and escalators for more than 15 years. You can trust our tried and tested technology and rely on our solid production capacity.

This makes it easy for you to modernize your existing system with the confidence that you're getting a future-proof solution that keeps on delivering.

## **Flexibility – ideal for new projects or retrofits**

Designed for all motors and grid voltages, a Danfoss solution is suitable for both traction and hydraulic elevators in open or closed-loop systems. Fitting all common feedback systems, the Danfoss AC drives are swift to commission with just 10 parameters, in elevator terminology.

## **Performance – smooth, silent and safe**

Absolute safety is standard with all Danfoss solutions and comfort is our highest priority. With a high switching frequency, specially-controlled internal cooling fan and no motor contacts, you won't replace mechanical noise with "electrical noise" when you install a Danfoss AC drive.

## **Reliability – for long life**

Because our reputation is based on reliability we test our AC drives like no-one else: Every single unit is factory tested for up to 45 minutes at full load before it is dispatched, so you can be confident that your system will simply keep on running with the minimum amount of service, when others have reached the end of the line.

A case in point: Independent testing has proven that the Danfoss VLT® Lift Drive has a lifetime of 2.1 million cycles when operating at an ambient temperature of 45°C.

## **Competitive edge - enjoy cost synergies**

The benefits for you are ease of learning and reduced training costs - when you know one AC drive, you know them all, no matter what the size. What's more, the building already runs on the same drives technologies in ventilation and other processes - delivering additional training, spare parts and servicing synergies.

For retrofits, optimized installation and programming ensure seamless systems integration, with absolutely minimal disruption to normal operations.






Benefits

Applications

Solutions

Specifications





We are present in almost every building, supermarket or factory you've ever been in, with knowhow that keeps urban systems running dependably.

**45° C ambient temperature without derating**

# Profit from getting exactly the drive you need

**With standard or custom products we can always provide the ideal elevator drive for your project.**

Danfoss production processes make the difference. We mass-customise to meet your exact requirements, with all-new components – we do not deliver from old stock.

All options are mounted in the AC drive, so no extra manual nor organizational handling is required... Simply plug and play. One unique order number specifies exactly the AC drive and options you need – also when it's time to order spare parts. We understand how to support your lean warehousing, streamlining with minimum stock requirements.

## **Versatile**

Each VLT® and VACON® drive is built on a flexible, modular design concept to provide an extraordinarily versatile motor control solution. The AC drives are equipped with a wide range of industry features that enable optimal process control, higher quality output and reduced costs related to spare parts and service.

## **Exactly the size you need**

Available in a power range from 0.25 kW to 1.4 MW, for 230 V, 400 V, 500 V or 690 V supply, Danfoss AC drive solutions can control all relevant motor technologies, including permanent magnet motors, copper rotor motors and direct line PM motors, with no step-down transformer.

Thanks to this broad power range, there is a Danfoss AC drive solution for elevators in all buildings, from mid-range to high rise. Drives of all sizes can be equipped with features dedicated to elevators, ensuring the same handling, look and feel of drives throughout the building - no matter what the power rating.





## PRODUCT PLATFORM HIGHLIGHTS

- **Versatile, flexible, configurable**
- **Up to 1.4 MW in common voltages**
- **Asynchronous & PM motor control**
- **Low standby losses, highly efficient electronics**
- **Unique user interface**
- **Globally supported**
- **EMC filters integrated as standard**

## GLOBAL REACH

*Danfoss' efficient global logistics setup makes it possible to ship AC drives quickly to any destination.*

*Danfoss' global support organization is geared to react swiftly to resolve issues to help you reduce downtime. In the event of issues Danfoss' global hotline helps you find the right solution quickly and efficiently.*

*In order to provide fast support, Danfoss is present globally with highly trained, dedicated professionals. Based at many diverse centers located right around the world, Danfoss experts are never far away, ready to provide fast access to AC drive and application expertise.*

## TRAINING BASED ON EXPERIENCE

*Keep up to date on trends, methods and features that save additional energy or offer new technical opportunities to increase your product quality or decrease the downtime of your plant.*

*Receive the same quality training anywhere in the world with Danfoss-developed material and trainers. Training can take place at one of Danfoss' facilities or directly at the customer's own facility. Teaching is conducted by local trainers who have broad experience in the many conditions that may affect performance, so you get the most out of your Danfoss solution.*

*Additionally, the online platform Danfoss Learning offers you the opportunity to extend your knowledge in small and compact lessons up to extensive training courses, when and wherever you want.*

*Read more at [learning.danfoss.com](http://learning.danfoss.com)*



# Elevators and escalators - in residential and commercial buildings

Danfoss is a well-known player in residential and commercial buildings, globally.

Our knowhow already operates behind the scenes, keeping the urban systems running dependably – in every aspect imaginable, from heating supply, refrigerated cabinets in the supermarket, ventilation evaporators and fans in skyscrapers, to ensuring a reliable water supply for the city.

Everything we stand for, we also offer you in your elevator application.

## **Hear the difference**

The VLT® Lift Drive is developed especially for excellent travel comfort, including reduced acoustic noise via a series of unique features:

- No derating at high switching frequency - which reduces audible noise throughout the journey, including operation with creeping speed
- No motor contacts - which reduces the switching noise and improves elevator reliability
- Cooling fans which run only when absolutely necessary. This also reduces the standby energy consumption
- Optimized control algorithm which eliminates rollback and reduces noise originating from the brake discs at startup

## **Built-in EMC performance**

Integrated DC chokes eliminate the need for extra components to meet relevant EMC standards – and facilitate a more compact installation, too.

## **Reliability – we won't let you down**

We use all-new components and every single drive is individually tested for 45 minutes at full load – your guarantee of long trouble-free lifetime. With short circuit and earth fault protection on output and automatic reduction of switching frequency at high temperatures, a Danfoss solution is designed to safely handle the unexpected.





# Elevators for industrial buildings

## Powerful performance

With a power range of 0.25 kW right up to 1.4 MW, the VLT® Lift Drive caters for the needs of industry with a uniform user interface that makes it just as easy to operate a high-power unit as a low power one.

All elevator features are available for all power sizes, with the same look and feel. So handling of the AC drive is always the same. Once you've learned one, you've learned them all.

## Suits any power supply

- 3-phase 200 - 240 V
- 3-phase 380 - 500 V
- 3-phase 525 - 690 V

## Programming tailored to elevator applications

- Parametrization uses elevator terminology
- Quick set-up wizard contains more than ten specific adaptations to control systems /digital I/Os
- Integrated European motor database

## Save on equipment - and space

- No step-up, step-down transformer required
- EMC compliance as standard with integrated DC chokes – no additional equipment required



# Traction elevators

- A smooth, safe, silent journey

**Absolute safety. When combined with a gentle start, rapid transport of passengers or goods, precise landing point, and a gentle stop, this is the operator's idea of perfect elevator operation.**

**The elevator controller, incorporating both hardware and software, should always brake and then stop the elevator safely. In the past, motor contactors always performed these tasks. However, the new solution offered by the VLT® Lift Drive LD 302 promises significant advantages and cost savings in practice, thanks to operation without contactors.**

## Contactor-free elevator operation

There is hardly a component in elevator construction so closely linked to safety issues as motor contactors, which have been used for decades. Use of motor contactors ensured safe tripping of the motors in an emergency situation, so that unintentional movement after an emergency stop was safely prevented. But it also had its drawbacks.

Danfoss has developed a patented process which makes these motor contactors redundant in the system. Using the VLT® Lift Drive, it is now possible to stop the motor torque by purely electronic means, without additional mechanical components.

## Benefits

- Improved comfort during operation, with no switching noise
- Simplified installation
- Reduced space requirement
- Motor cable can be connected directly to the AC drive, which improves the EMC
- Savings on wiring, clamps, connections for cable shield
- When motor contactors are used they can potentially fail – without motor contactors there is one less source of wear and unplanned downtime

- Increased availability of the system
- No interfering signals, such as those occurring at interruptions on the cable screen
- Fulfills EN 81-1/2 and EN 81-20

The VLT® Lift Drive is the dedicated product Danfoss offers for elevator applications – but no matter what the application we can offer a solution with the same look and feel - solutions are available up to 1.4 MW and up to 690 V.

- **Comfort** - VLT® Lift Drive is developed especially to reduce acoustic noise
- **Broad range of flexibility** retaining same look and feel throughout the range
  - Broad power range up to 1.4 MW
  - Broad voltage range with a variety of 3-phase power supplies
  - same look and feel for commercial or residential elevator.
  - Same look and feel means reduced training

## Operate PM motors without absolute encoder.

The availability of motors with a simplified encoder facilitates savings without compromising on comfort. With the VLT® Lift Drive you gain the ability to run a PM motor without an absolute encoder. So you are free from the cost and time involved in installing different cables between the AC drive and encoder – and you can economize on the encoder itself, by using an encoder without absolute interface.

## Dedicated to elevator applications

The VLT® Lift Drive offers a series of useful features for traction elevators. The dedicated power card enables

- Optimized control of internal cooling fans - for long life
- Reduction of audible noise to an absolute minimum - for comfort
- Low standby losses due to very highly-efficient electronics - for energy savings







### Operation with any typical motor type

- Using the Static Automatic Motor Adaptation function for asynchronous and PM motors, you can commission quickly and easily without removing the ropes from the traction sheaves. For other non-VLT® drives, you need to remove the ropes, which is both tedious and time-consuming
- Can operate segmented motors as used in ski lifts
- Effective warehousing with one AC drive type for many different installations – instead of a new AC drive for each installation, as is required with bundled solutions
- Train only once, to operate and service the full range of power sizes on all installations – when using one AC drive type with same functionalities throughout all your elevators

### Easy installation for either new build or retrofit

- Easy handling for on-site installation and commissioning
- Motor database is available in the application software for fast parametrization during set-up
- The **Lift Set-up Tool** for easy commissioning is available online or from your local Danfoss sales office

### Complete solution

With the complete dedicated elevator drive, no extra components are required

- Integrated components: all I/Os, all communication ports, DC choke, EMC filter
- One ordering number per power size
- Can run open-loop or closed-loop control, for all typical motor types
- Save space
- Save money due to reduced installation effort, reduced process order handling complexity with just one ordering number
- Delivery with VLT® Lift Controller MCO 361 is available upon request



# Hydraulic elevators

## Modernization with minimal disruption

**Speed-controlled hydraulic elevators offer a reliable, silent and extremely energy-efficient operation so it is no surprise that they are enjoying increasing popularity. Formerly known as maintenance-intensive and prone to failure as soon as journey frequency increased, they are now quiet, clean and offer frequency-controlled design which enables safe, highly reliable and energy efficient operation.**

Traditional drawbacks of hydraulic elevator systems:

- Low efficiency due to valve control. The pump always ran at full speed, even if only a part of the volume flow was necessary for the movement of the cage
- Restrictions on driving comfort and availability due to oil overheating

These drawbacks still exist in many conventional hydraulic lifts, and become important as soon as the travel frequency exceeds a couple of journeys per day.

### **Quick solution: retrofitting of existing plants**

To eliminate these problems, retrofitting of variable speed motor control is the modern solution.

### **Advantages**

- Ride comfort is increased considerably by optimized AC drive curves, smoother starting and braking and high positioning accuracy
- The availability of the system is ensured even when used frequently – no delays to cool hydraulic oil
- The operator can often save 50% or more of the energy required, significantly reducing operating costs

- Maintenance and repair costs are lower, reducing total cost of operation (TCO)
- Ventilation requirements for the engine room are reduced to a minimum, because the engine room heats up considerably less

### **Two routes to modernization**

The modernization of an existing hydraulic system can be performed in two ways:

- Replace the complete hydraulic power unit, including the valve block. This ensures full comfort for travel in both directions, minimal oil heating, and minimal energy consumption. Acoustic noise emission will also be far less during all phases of operation
- Replace only the control block – somewhat less expensive, and a good compromise. This eliminates noise originating from the bypass and optimizes comfort during upward travel. Other benefits are less oil heating, and significant energy savings

### **Maybe a replacement is all you need**

Overall, the modernization is associated with little to no noise or dirt load, and the interruption to normal operation is only brief, when well-prepared.

The whole modernization can easily be performed within one or two days. The downtime of the elevator can be reduced to a few hours. Solutions are available to keep the whole control system as it is, which offers a further optimization.


Finally, commissioning of the system requires only few minutes. Fine-tuning of the handling characteristics optimizes ride comfort of the elevator

### **A second life for your elevator**

The modernization of an existing hydraulic elevator is a fast, clean and very cost-effective solution, by comparison with an investment in a new plant. Typically the conversion achieves energy savings of more than 50 percent, and also results in reduced wear and maintenance costs.

At the same time, the modernization reduces acoustic noise and results in improved elevator reliability.





*New hydraulic elevator installation controlled by a VLT® Lift Drive at Fielmann Optics in Cologne, Germany.*



# Escalators and moving walkways

Huge savings to be won

**Traditionally escalators and moving walkways operate direct-on-line (DOL) so there are huge savings to be won by converting to variable speed motor control, which reduces energy consumption when the motor runs at less than full load.**

## **Full AC drive control**

Typical fully driven escalator or walkway operation involves running at two speeds:

- Full speed when loaded with passengers
- 20% speed as standby when there are no passengers

Operation with the integrated Automatic Energy Optimisation (AEO) function ensures optimized energy consumption.

Energy consumption is less than DOL due to optimized motor operation.

Generative operation involves operation with AC drives, in combination with regenerative units or DOL as bypass for the drive. In this case the motor is acting as generator towards the mains.

## **AC drive control at partial load only**

For partial load operation, the AC drive is only used in standby. Full speed is operated DOL, handled by bypass contactors.

This enables the drive to be undersized, providing savings in purchasing costs. However, when operating at partial load, no energy optimization is possible, and the energy consumption is higher than operation without AC drives.







Benefits

Applications

Solutions

Specifications



# The big picture

## An investment that pays off

**Increase application performance and streamline processes with energy efficient, adaptive motor control. Combine reliable, high performing solutions from a single supplier to reduce the lifetime costs of your applications.**

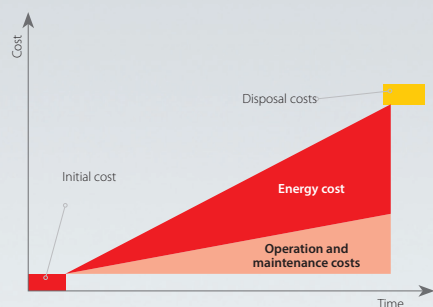
### **Minimize energy costs**

As energy becomes increasingly expensive, variable speed control of electrical motors has proven to be one of the most effective cost-reducing measures available.

### **Reduce total cost of ownership**

Seen over its lifetime, the initial cost of an AC drive only amounts to 10% of the total cost of ownership; the remaining 90% cover energy consumption, service and maintenance.

Once in operation, VLT® drives serve reliably for their entire lifetime. Only requiring minimal maintenance, each VLT® drive provides a fast return on investment and ultimately a competitive cost of ownership.







Benefits

Applications

Solutions

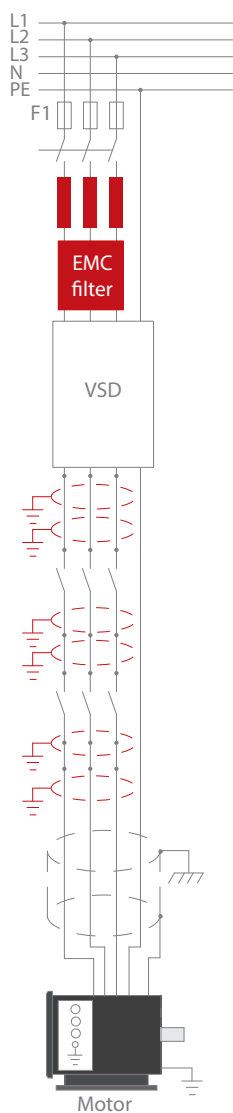
Specifications



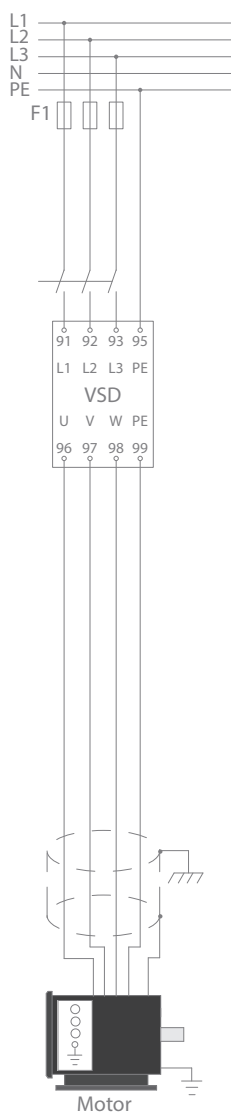
**Danfoss AC drives are available  
in enclosures rated IP20, IP21  
and IP 55**

# Safe Torque Off - the easy way

## Conventional solution



## Danfoss solution - with no motor contactors

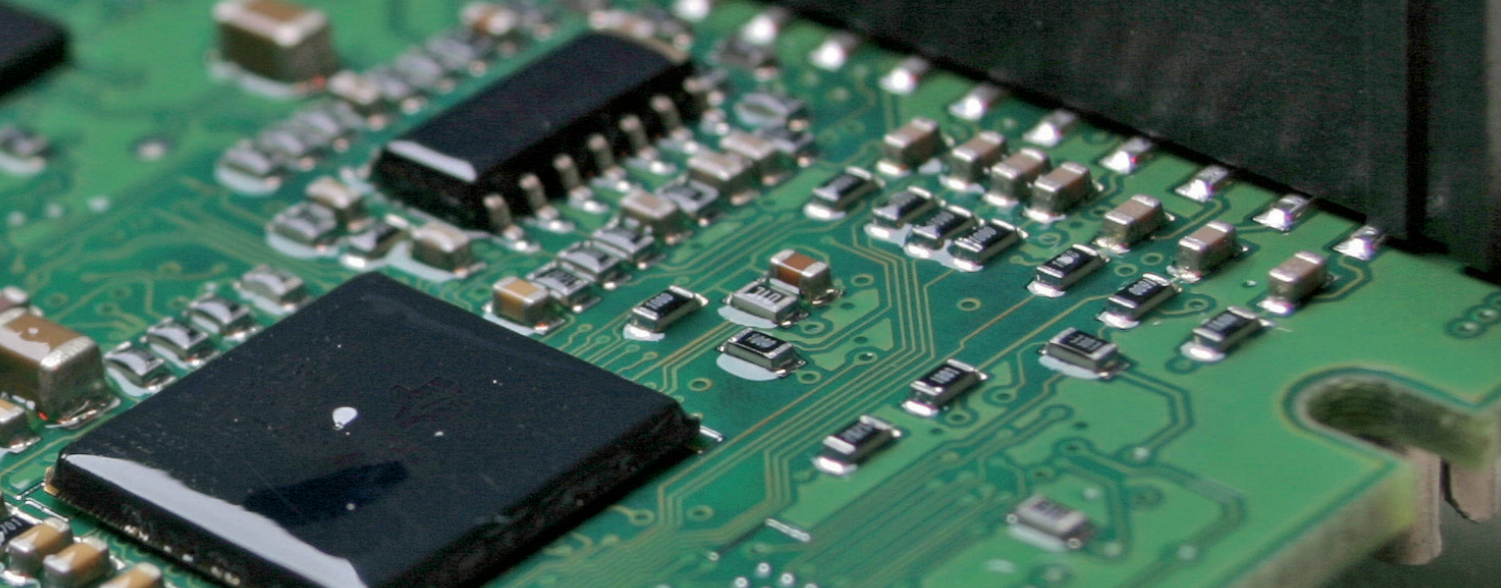


## Safe Torque Off - free of motor contactors

Thanks to the integrated components such as EMC filter and DC choke, and with no motor contactors required, far less organizational and installation effort is required to implement a Danfoss elevator solution, than a conventional one.

- : Line Choke
- : Contactor
- : Shield
- : Clamps
- : Chassis
- : Earth





# Built to last

## Coated circuit boards

VLT® drives conform as standard to class 3C2 (IEC 60721-3-3). For especially harsh conditions, order a special coating to comply with class 3C3.

## Ruggedized for extra protection

VLT® and VACON® drives are available in a 'ruggedized' version, that ensures that components remain firmly in place in environments characterized by high degrees of vibration such as marine and mobile equipment.

## Save space

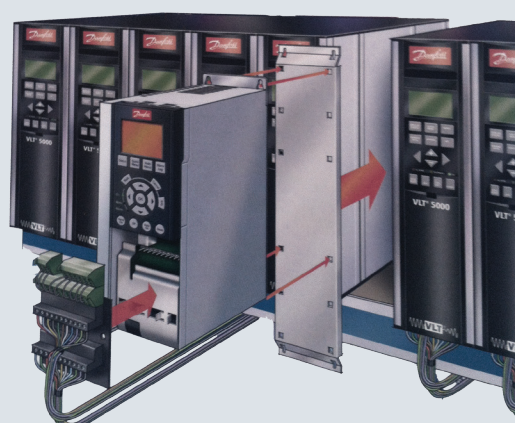
The compact design of Danfoss AC drives enables them to fit easily even in small installation spaces:

- Built-in DC choke for harmonic suppression. No need for external AC coils.
- Optional, built-in RFI filters in the whole power range
- Intelligent cooling concept reduces the need for installation space

## Save time

- Short commissioning time due to integrated quick start wizard which uses elevator terminology
- Intuitive interface means handling is easy
- No external components required

## RETROFITTING. FAST UPGRADE TO NEWEST TECHNOLOGY PLATFORM



*As technologies evolve and newer, smaller and more efficient models replace old AC drives, it is important to Danfoss that you can change and upgrade as easily as possible.*

*Minimize downtime in your production and update your installation in a few minutes with prepared tools from Danfoss.*

*Many features and possibilities available for adaptation of a new Danfoss AC drive to your existing system. This can help you to keep the existing control system, by replacing the drive only, regardless of the former drive supplier.*

*Danfoss AC drives are suitable for retrofit of a wide range of elevator brands:*

- Perform retrofit of different drives
- Keep the same control system
- Obtain compatible modules





# Optimize performance and grid protection

## Built-in protection as standard

Danfoss AC drives contain all modules necessary for compliance with EMC standards.

A built-in scalable RFI filter minimizes electromagnetic interference.

Integrated DC chokes reduce harmonic distortion in the mains network, which increases the lifetime of the DC link capacitors and the overall efficiency of the drive system.

The solutions save cabinet space, as they are integrated in the AC drive from the factory. Efficient EMC mitigation also enables the use of cables with smaller cross-sections, which again reduces installation costs.

## Expand grid protection with filter solutions

If needed, Danfoss' wide range of solutions for harmonic mitigation can provide additional protection, such as

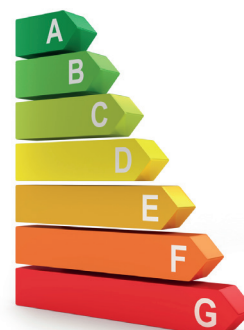
- Advanced harmonic filters
- Advanced active filters
- Low harmonic drives
- 12-pulse drives

With these solutions you can achieve optimum performance for your application, even in weak or unstable grids.

## EN 12015 compliance with no extras

The VLT® Lift Drive offers a complete solution, fulfilling the requirements of EN 12015:2014 with no extra external components required.

EN 12015 is based on EN 55011 and EN/IEC 61800-3, and Danfoss AC drives are designed from the conceptual stage, to fulfil these requirements. This means quite simply, you obtain higher efficiency performance at lower cost.



## HIGHLY EFFICIENT

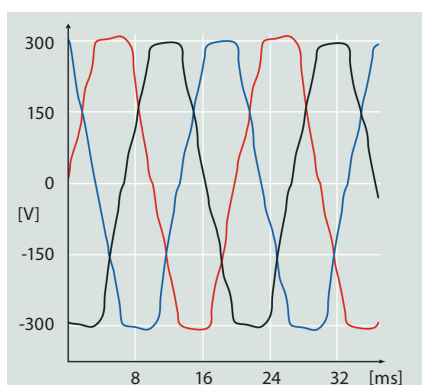
Danfoss AC drives support you in achieving the highest possible energy efficiency class according to VDI 4707 - the German system of energy efficiency classification for elevators - due to highly-efficient design and electronics.

EMC Standards		Conducted emission		
Standards and requirements	EN 55011 Facility operators must comply with EN 55011	Class B Housing and light industries	Class A Group 1 Industrial environment	Class A Group 2 Industrial environment
	EN/IEC 61800-3 Converter manufacturers must conform to EN 61800-3	Category C1 First environment, home and office	Category C2 First environment, home and office	Category C3 Second environment
VLT® Lift Drive compliance <sup>1)</sup>		■	■	■

For further details see the VLT® AutomationDrive Design Guide or VLT® Lift Drive LD 302 Operating Instructions  
<sup>1)</sup> Compliance to mentioned EMC classes depends on the selected filter

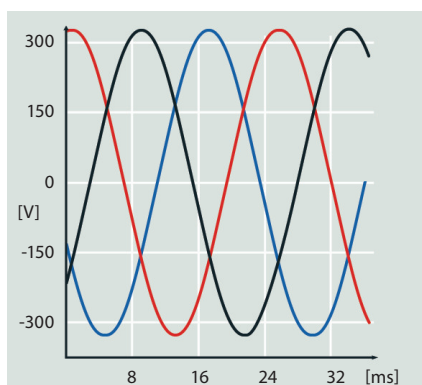


**Danfoss AC drives are equipped with an integrated DC choke, reducing mains interference to a THDi of 40%**



#### **HARMONIC DISTORTION**

*High inverter loads without mitigation affect mains quality.*



#### **OPTIMISED HARMONIC PERFORMANCE**

*Efficient harmonic mitigation protects electronics and increases efficiency.*

#### **SUPPLY NETWORKS AT RISK**

*The quality of the mains power supply is declining throughout the energy network, due to higher utilization of networks and lower investment. Non-linear power consumption appliances such as AC drives, energy-saving lamps and computers, give rise to harmonic disturbances, which increase power losses and shorten equipment life. Deviations from the ideal sinusoidal shape are therefore regulated to maintain as clean and high quality mains voltage as possible.*

*In Europe, the standards EN 61000-3-2 and EN 61000-3-12 regulate and define permissible limits for connected devices such as AC drives. Frequently, AC drives manufacturers offer drives with no integrated choke. For these drives, the charging current peak causes a strong current distortion up to 100% THDi, due to the DC link capacitors on the network side.*

*To reduce the THDi to under 40% an external power choke can be mounted – at extra expense and taking up more space.*

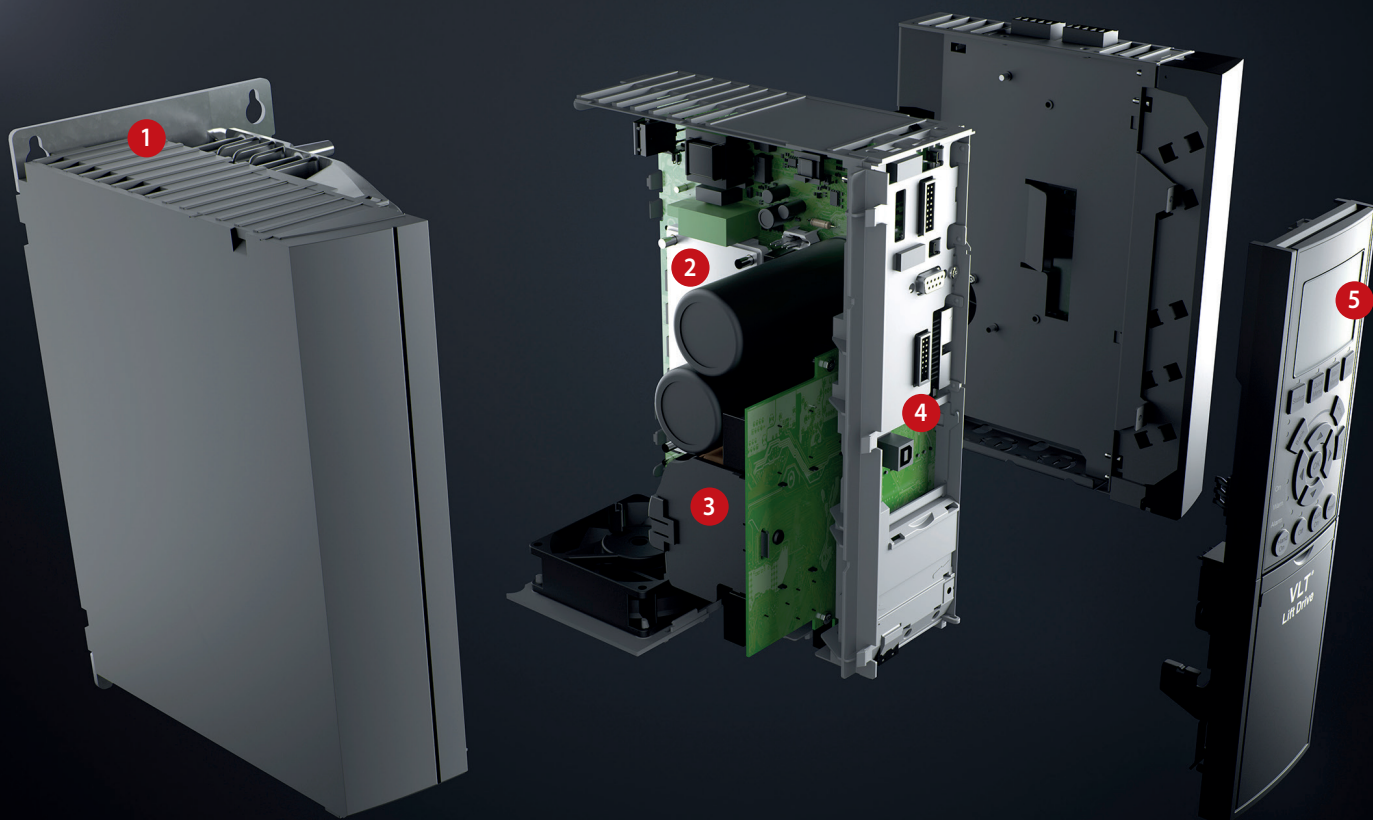
#### **NUMBER ONE FOR EMC**

*Therefore at Danfoss we have solved the problem. The standard Danfoss solution features optimal EMC compliance with no extra equipment required - and you win the advantages of a smaller, lighter and more cost effective unit.*

*With integrated radio interference filters, all Danfoss solutions maintain the category limits C1 and C2 of the product standard EN 61800-3 without additional external components. Even more importantly, the AC drives comply with the environmental standard EN 55011, Class B (residential) and Class A1 (industrial area). This ensures a reliable plant operation via full compliance with all EMC requirements for the respective power range, and eliminates the warnings and restrictions prescribed by the product standard. The mains side integrated chokes flatten the system perturbation drastically and thus maintain the limits of EN 61000-3-12.*

*Thanks to robust design, the Danfoss solutions maintain stability and highly dynamic performance, even when subject to voltage disturbances and unfavorable network conditions.*





# Modular simplicity - VLT® Lift Drive

**Delivered fully assembled and tested to meet your specific requirements**

## **1. Enclosure**

The AC drive meets requirements for enclosure class IP 20/Chassis. IP 21/Type 1, or IP 55/Type 12.

## **2. EMC and Network effects**

The VLT® Lift Drive solutions comply as standard with the relevant EMC norms, EN 12015 and EN 12016. The standard integrated DC choke ensures low harmonic load on the network according to EN 12015, and increases the lifetime of the DC link capacitors.

## **3. Protective coating**

VLT® drive circuit boards conform to class 3C2 (IEC 60721-3-3). If used in especially harsh conditions it is possible to order a special coating that complies with class 3C3.

## **4. Control terminals**

Double-stack, spring-loaded cage clamps enhance reliability and facilitate easy commissioning and service.

## **5. Display option**

The removable Local Control Panel is available with a variety of language packs: East European, West European, Asian and North American. English and German are available in all AC drives. Alternatively, commission the AC drive on a PC using the Lift Set-up Tool. Connect via the built-in USB/RS485 connection or a fieldbus.

## **Mains disconnect**

This switch interrupts the mains supply and has a free useable auxiliary contact. When operating without motor contactors, use this switch to create a power independent control system.

The mains disconnect switch is available as an option for IP21 and IP55 enclosure types.



# Free choice of motor technology

## Easy commissioning and algorithms for optimal efficiency

As an independent manufacturer of AC drive solutions, Danfoss is committed to supporting all commonly used motor types and fostering ongoing development.

Danfoss AC drives have traditionally offered control algorithms for high efficiency with standard asynchronous motors and permanent magnet (PM) motors, and now they also support high-efficiency synchronous reluctance motors. In this way Danfoss

offers you the opportunity to combine your favorite motor technology such as asynchronous or permanent magnet motors with the VLT® Lift Drive or another Danfoss elevator solution.

Furthermore, a VLT® Lift Drive makes commissioning equally easy for all motor types by combining ease of use with additional helpful functions such as SmartStart and automatic motor adaptation, which measures the motor characteristics and optimises

the motor parameters accordingly. This way the motor always operates at the highest possible efficiency, allowing users to reduce energy consumption and cut costs.

In the VLT® Lift Drive and other Danfoss elevator solutions, the integrated European motor database is an additional aid to fast commissioning. Once the relevant motor is selected, complete parameterization simply in one click!







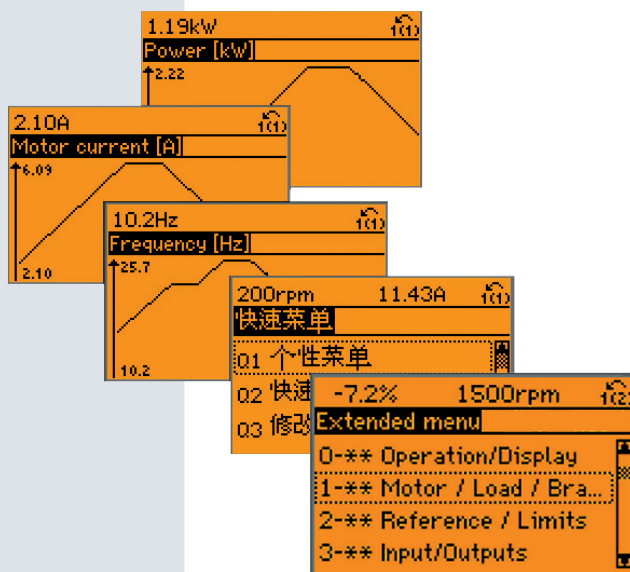
## Intuitive setup with graphical interface



VLT® and VACON® drives feature a user-friendly, hot pluggable local control panel (LCP) for easy setup and parameter configuration.

After choosing language, navigate through setup parameters individually. Alternatively, use a pre-defined quick menu or a StartSmart guide for application specific setup.

The LCP can be detached and used to copy settings to other AC drives in the system. It can also be mounted remotely on a control panel fascia. This enables the user to take full advantage of the LCP, eliminating the need for additional switches and instrumentation.







# Software tools for VLT® drives

## Easy engineering and setup with Lift Set-up Tool

In addition to operating the AC drive via LCP (local control panel), VLT® drives can also be configured and monitored with Danfoss' own PC software. This provides plant managers with a comprehensive overview of the system at any point in time, adding a new level of flexibility in configuration, monitoring and troubleshooting.

The Lift Set-up Tool is a Windows-based engineering tool with a clearly structured interface that provides an instant overview of all the AC drives in a system of any size. The software runs under Windows and enables data exchange over a traditional RS485 interface or via USB.

Parameter configuration is possible both online on a connected AC drive and offline in the tool itself. Additional documentation, such as electrical diagrams or operating manuals, can be embedded in the tool. This reduces the risk of incorrect configuration while offering fast access to troubleshooting.

## Analyse harmonic distortion with VLT® Harmonic Calculation Software HCS

This is an advanced simulation program that makes calculating harmonic distortion in your mains network fast and easy.

It is the ideal solution both if you are planning to extend your existing plant

or installation or if you are planning a new installation from scratch.

The user-friendly interface allows you to configure the mains environment as desired and returns simulation results, which you can use to optimize your network.

Contact your local Danfoss sales office or visit our website for more information or visit directly at **[www.danfoss-hcs.com](http://www.danfoss-hcs.com)**

## VLT® Motion Control Tool MCT31 Harmonics Calculation Software

VLT® Motion Control Tool MCT31 calculates system harmonic distortion for both Danfoss and non-Danfoss drives. It is also able to calculate the effects of using various additional

harmonic reduction measures, including Danfoss harmonic filters.

With VLT® Motion Control Tool MCT31, you can determine whether harmonics will be an issue in your installation, and if so, what strategies will be most cost-effective in addressing the problem.

VLT® Motion Control Tool MCT31 features include:

- Short circuit current ratings can be used instead of transformer size and impedance when transformer data is unknown
- Project oriented for simplified calculations on several transformers
- Easy to compare different harmonic solutions within the same project
- Supports current Danfoss product line as well as legacy AC drive models

## MOTOR DATABASE

*Danfoss offers a motor database especially for elevators. Enter your own construction data - then one click completes the whole setup (parametrization) of the elevator. Data for most well-known European motors are available in the database.*

## MORE INFORMATION

*Contact your local Danfoss sales office, or visit our website for more information and software downloads free of charge:*  
**[drives.danfoss.com](http://drives.danfoss.com)**



## A photograph of a modern, curved staircase. The staircase features a white, curved railing and a glass balustrade. The steps are made of a dark, textured material. The background is a light-colored, textured wall with horizontal lines and small circular indentations. The lighting is soft and even, highlighting the architectural details.

Danfoss' VLT® Lift Drive is dedicated to elevators in areas where acoustic noise matters.

Danfoss also offers high power and customised solutions. To learn more about our other elevator and escalator solutions, contact your local Danfoss office.

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- A large, black, industrial-grade VLT Lift Drive unit. The unit has a control panel on the left side with a small screen and several buttons. The brand name 'Danfoss' is visible on the top left of the control panel. The unit is labeled 'VLT Lift Drive' on the front.

## Electrical data

Power rating	4 kW	5.5 kW		7.5 kW		11 kW		15 kW	18 kW		22 kW	30 kW		37 kW	45 kW	55 kW	
Ingress protection	IP20	IP20	IP55	IP20	IP55	IP20	IP55	IP20	IP20	IP55	IP20	IP20	IP55	IP20	IP20	IP20	IP55
Enclosure size	A2	A3	A5	A3	A5	B3	B1	B4	B4	B2	B4	C3	C1	C4	C4	C4	C2
Voltage [V]	400 V																
Continuous output current 100%	10	13		16		26	21	35	44	35	51	60	50	75	90	110	98
Overload 6s/60s [A]	16	20.8		25.6		46.8/41.6	33.6	59.9/56	70.4	56	91.3/81.6	108/90	75	135/112.5	162/135	198/165	147
Current @ 16 kHz [A]	10	13		16		N/A	N/A	32	35	35	44	N/A	50	N/A	N/A	N/A	N/A
Current @ 14 kHz [A]	10	13		16		N/A	N/A	32	35	35	44	N/A	50	N/A	N/A	N/A	N/A
Current @ 12 kHz [A]	10	13		16		21	21	35	44	35	51	60	50	75	83	98	98
Current @ 10 kHz [A]	10	13		16		26	21	35	44	35	51	60	50	75	90	98	98
Current @ 8 kHz [A]	10	13		16		26	21	35	44	35	51	60	50	75	90	110	98
Ambient temperature	45°C																
Duty cycle	50 %																



# Specifications

## VLT® Lift Drive - basic unit without extensions

Main supply (L1, L2, L3)	
Supply voltage	3x380 – 400 V AC $\pm 10\%$
Supply frequency	50/60 Hz $\pm 5\%$
Displacement power factor (cos $\phi$ )	> 0.98 near unity
Harmonic disturbance	Meets EN 63000-3-12

Output data (U, V, W)	
Output voltage	0 – 100% of supply voltage
Output frequency	0-590 Hz
Switching on output	Unlimited
Ramp times	0.01-3600 sec.

Motor and Motor Feedback	
Supported Motor feedback	Incremental: 5V TTL (RS422), Incremental: 1Vpp SinCos, Absolute: ENDAT, Hiperface
Supported Motor types	Asynchronous motors in open and closed loop, permanent magnet synchronous motors in open or closed loop

Digital inputs	
Programmable digital inputs	4 (6), Terminals 27 and 29 can also be programmed as output
Changeable to digital output	2 (terminal 27 and 29)
Logic	PNP or NPN
Voltage level	0 – 24 V DC
Maximum voltage on input	28 V DC
Input resistance, Ri	Approx. 4 k $\Omega$
Scan interval	1 ms

Analogue inputs	
Analogue inputs	2
Modes	Voltage or current
Voltage level	-10 to +10 V (scaleable)
Current level	0/4 to 20 mA (scaleable)
Accuracy of analogue inputs	Max. error: 0.5% of full scale

Pulse/encoder inputs	
Programmable pulse/encoder inputs	1
Voltage level	0 – 24 V DC (PNP positive logic)
Pulse input accuracy (0.1 – 1 kHz)	Max. error: 0.1% of full scale
Encoder input accuracy (1 – 110 kHz)	Max. error: 0.05% of full scale

Digital output	
Programmable digital/pulse outputs	2
Voltage level at digital/frequency output	0 – 24 V DC
Max. output current (sink or source)	40 mA
Maximum output frequency at frequency output	0 to 32 kHz
Accuracy on frequency output	Max. error: 0.1% of full scale

Analogue output	
Programmable analogue outputs	1
Current range at analogue output	0/4 – 20 mA
Max. load to common at analogue output (clamp 30)	500 $\Omega$
Accuracy on analogue output	Max. error: 0.5% of full scale

Control card	
USB interface	1.1 (Full Speed)
USB plug	Type "B"
RS485 interface	Up to 115 kBaud
Max. load (10 V)	15 mA
Max. load (24 V)	200 mA

Relay output	
Programmable relay outputs	2
Max. terminal load (AC) on 1-3 (break), 1-2 (make), 4-6 (break) power card	240 V AC, 2 A
Max. terminal load (AC) on 4-5 (make) power card	400 V AC, 20 mA
Min. terminal load on 1-3 (break), 1-2 (make), 4-6 (break), 4-5 (make) power card	24V DC, 20 mA

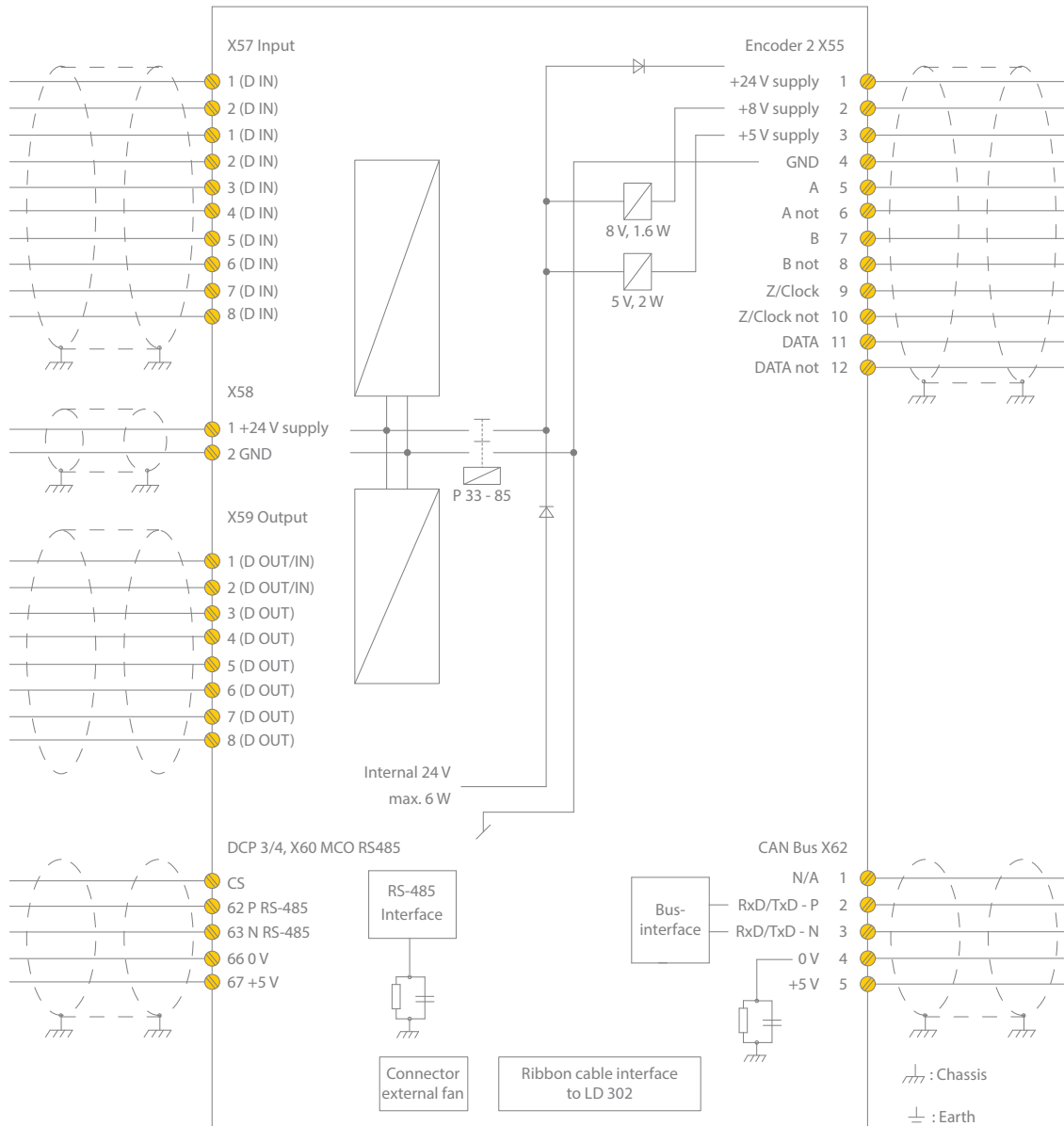
Control card	
USB interface	1.1 (Full Speed)
USB plug	Type "B"

Surroundings/external	
Enclosure	IP20, IP55
Vibration test	1.0g
Max. THVD	10%
Max. relative humidity	5% - 93% (IEC 721-3-3; Class 3K3 (non-condensing) during operation)
Aggressive environment (IEC 60068-2-43) H2S test	class Kd
Aggressive environment (IEC 60721-3-3)	Standard coated PVB Class 3C2, optional coated class 3C3
Ambient temperature	45 °C without derating (higher temperatures possible with derating)
Minimum ambient temperature during full-scale operation	0°C
Minimum ambient temperature at reduced performance	-10°C
Temperature during storage/transport	-25 to +65/70 °C
Galvanic isolation of all	I/O supplies according to PELV
Maximum altitude above sea level without derating	1000 m
EMC standards, Emission	EN 61800-3
EMC standards, Immunity	EN 61800-3
RFI Filter	Included as standard
DC- Coils	Included as standard



# Connection examples

## VLT® Lift Drive



130BE483.10

The numbers represent the terminals on the AC drive.

VLT® Lift Drive standard interfaces:

- RS485
- USB
- DCP 3/4
- CANopen DSP 417



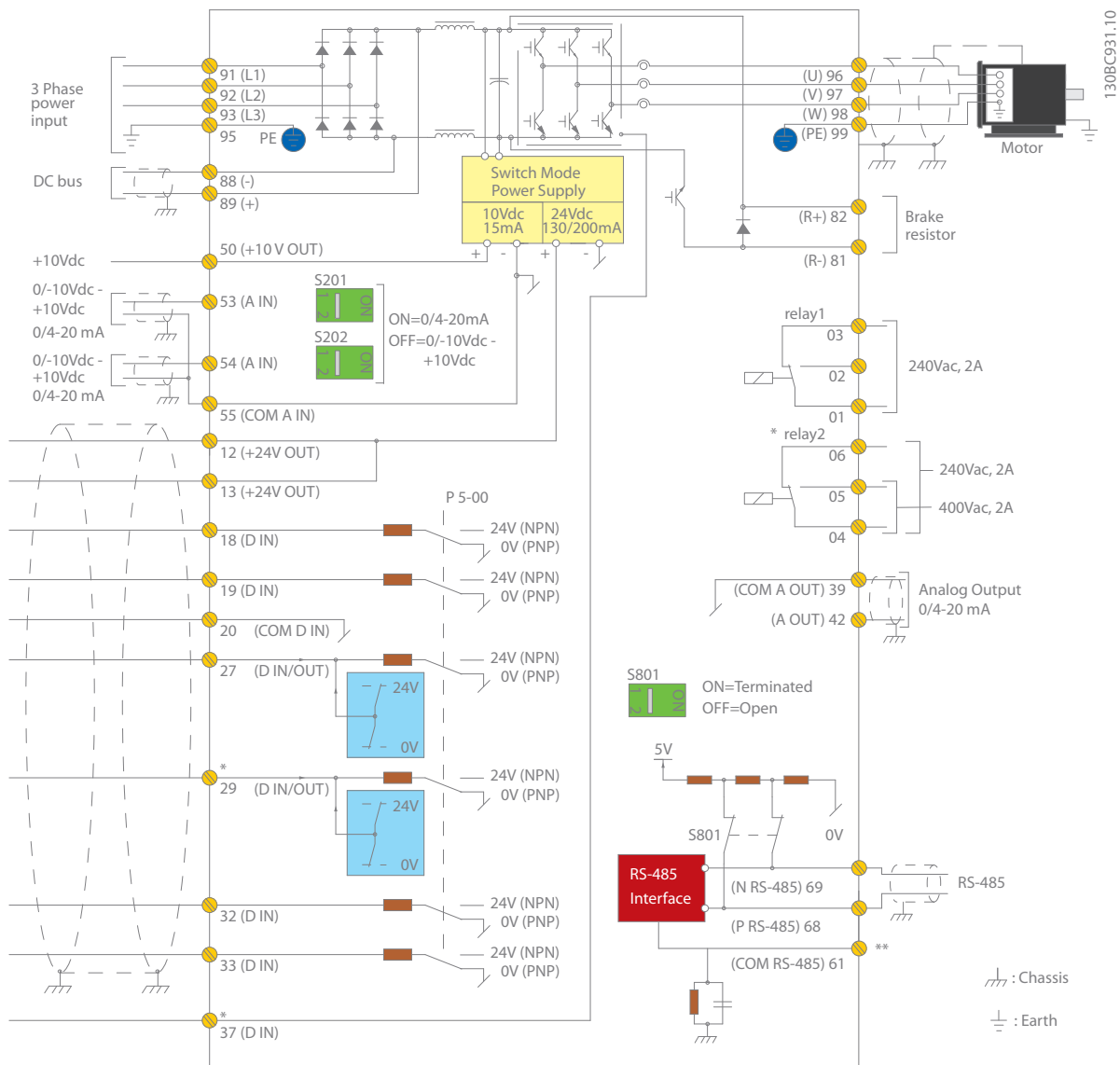
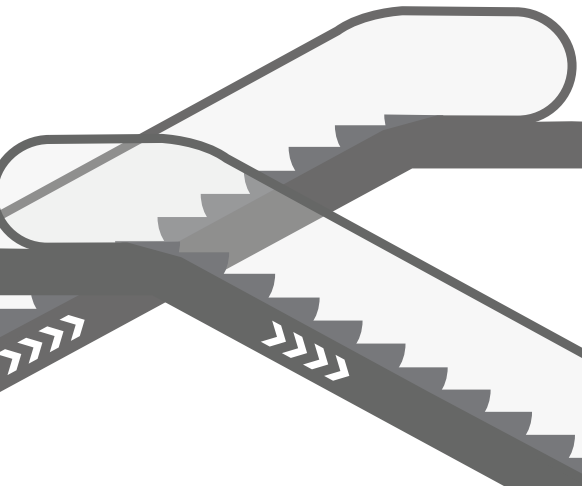


Diagram showing all electrical terminals without options.  
 A = analog, D = digital  
 For instructions on Safe Stop installation please refer to the section Safe Stop Installation in the VLT® AutomationDrive FC 302 Design Guide.



# The drive experts for elevators and escalators



From harsh Arctic marine applications to the punishing demands of the South East Asia textile industry, Danfoss drives deliver. With each Danfoss drive you experience all the reliability and performance that has made us the global leader in drives for the last 50 years.

Danfoss drives are known as some of the most innovative and reliable drives worldwide. The outstanding quality standards and performance of our drives make them perfect for the demanding elevator and escalator market.

## **Flexible – ideal for new projects or retrofits**

With the addition of dedicated VLT® Lift Drive to our portfolio, you can be confident that you get the most flexible, highest performing elevator drive solutions backed up by a world of drives experience.

## **Intelligent and innovative**

Customer needs are always our starting point when developing the features of tomorrow's drives. We focus on reducing time to market so that you always get the benefit of the latest features, as early as possible.

## **Rely on the experts**

The fact that we develop and produce our own features, hardware, software, power modules, printed circuit boards, and accessories is your guarantee of reliability.

## **Local backup – globally**

Danfoss drives operate in applications all over the world, and Danfoss Drives' experts located in more than 100 countries are ready to support you with

application advice and service wherever you may be. We won't stop until your drive challenges are solved.

## **Environmentally responsible**

VLT® and VACON® products are manufactured with respect for the safety and well-being of people and the environment. Danfoss adheres to the UN Global Compact on social and environmental responsibility. Most factories are ISO 14001 certified, and products fulfil the EU Directives for General Product Safety, RoHs and WEEE directives.

**Contact our experts via email at**  
[lift@danfoss.com](mailto:lift@danfoss.com)

