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ENGINEERING  
TOMORROW

*Danfoss*

# Harmonics – a costly problem easily solved

**<40%**

Transformer loading with Danfoss VLT Drives prevents harmonic issues. Hereafter filtration is needed.

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

**VLT**<sup>®</sup>  
THE REAL DRIVE



## Q What are harmonics?

A An electrical AC supply is ideally a pure sine-wave of either 50 or 60 Hz fundamental frequency and all electrical equipment is designed for optimal performance on this supply.

**Harmonics are voltages and currents which have frequency components that are integers multiple of the fundamental frequency – polluting the pure sinusoidal waveform.**

Power electronics such as those used in rectifiers, variable speed drives, UPS, lighting dimmer switches, televisions and hosts of other equipment, draw current in a non-sinusoidal fashion.

This non-sine current interacts with the mains supply and distorts the voltage to a greater or lesser degree depending upon the strength or weakness (fault level) of the supply.

Generally, the greater the amount of installed electronic power switching equipment on-site, the greater the degree of harmonic distortion.

## Q Why are harmonics a problem?

A Excessive harmonic distortion of the mains supply implies that the source not only carries 50 or 60 Hz frequencies but also components of higher frequencies.

These components can not be utilized by electrical equipment and adverse effects can be severe and include:

- Limitations on supply and network utilisation
- Increased losses
  - Increased transformer, motor and cable heating
  - Reduced equipment life-time
  - Costly unintended production stops
- Control system malfunctions
- Pulsating and reduced motor torque
- Audible noise

**Put simply, harmonics reduce reliability, affect product quality and increase operating costs.**



*Illustration of a pure sinusoidal waveform being polluted.*



# Q Does that mean that every drive leads to harmonic problems?

A Not at all. **All Danfoss VLT Drives come with built-in DC-coils\* to reduce the harmonics interference and in most cases this is sufficient to avoid voltage pollution.**

In some cases additional harmonic suppression might be required due to grid conditions or when multiple drives are installed.

For that purpose Danfoss offers a wide range of individual mitigation solutions such as: VLT® 12-pulse Drives and standard drives with either built-in or external, active or passive harmonic filters.

*\*With exception of VLT® Micro Drive FC 51 – an external mitigation solution is available.*

In addition to this, Danfoss also offers both passive and active solutions for central harmonic suppression where several loads can be compensated simultaneously.

Determining the degree of voltage pollution on your network is easily done with the free Danfoss VLT® MCT 31 Harmonic Calculation software.

It helps you determine whether or not additional harmonic suppression is needed.



*VLT® MCT 31 estimates the harmonic current and voltage distortion of your application and determines if harmonic filtering is needed. In addition the software can calculate the effect of adding mitigation equipment and if your system complies with various standards.*



*Danfoss offers on-site harmonic survey and recommendation of the most suitable mitigation solution.*

# Q How is the optimal harmonic solution chosen?

A Different equipment exists to reduce harmonic pollution and they all have their advantages and disadvantages.

No single solution offers a perfect match for all applications and grid conditions.

To achieve the optimum mitigation solution, several parameters have to be considered.

The key parameters can be divided into four groups:

- Grid conditions including other loads
- Application
- Compliance with standards
- Cost

**Danfoss will, upon request, carry out a full harmonic survey and recommend the most appropriate and most cost-effective solution for your site.**

The survey will take the installed loads, the regulatory standards and the diversity of your operation and application into consideration.

# The essential considerations

Two VLT® Active Filters compensate the power quality on a vessel with limited wall space in a



>300 VLT® Advanced Harmonic Filters installed at decentral oil pumping stations. Ensures 24hour/day pumping.



Two VLT® Advanced Active Filters for HVAC installed at a hospital to ensure a stable supply for vital equipment.



Danfoss solutions are easily installed, commissioned and individually tuned for your application.

## How do grid conditions affect harmonics pollution?

The most important factor in determining the harmonic pollution of a supply grid is the system impedance.

The system impedance is mostly dependent on the transformer size in relation to the total power consumption of installed loads. The bigger the transformer is in relation to non-sinusoidal power consumption, the smaller the pollution.

The power grid is an interconnected system of power supplies and power consumers all connected via transformers. All loads drawing a non-sinusoidal current contribute to the pollution of the power grid – not just at the low voltage supply but also at higher voltage levels.

When measuring at a power socket, some degree of pollution will thus always be present. This is referred to as harmonic pre-distortion. As not all consumers draw three-phase current, the load on each phase is dissimilar. This leads to unequal voltage values on each phase, causing phase imbalance.

Different harmonic solutions have different immunity against pre-distortion and imbalance and so this has to be evaluated when determining the most suitable harmonic mitigation solution.

*Thruster drive application in a tough environment.*



*Three VLT® Low Harmonic Drives installed at waste water station ensure compliance with IEEE519.*



*Six cost optimized VLT® 12-pulse drives incl. transformer installed at facility for material handling.*



## What application aspects must be considered?

Harmonic distortion increases with the amount of power consumed by the non-linear load and so both the number of drives installed, and their individual power sizes and load profiles, must be considered.

The distortion of a drive is defined by the total harmonic current distortion (THDi) which is the relationship between the sum of harmonic components and the fundamental frequency.

The loading of each drive is important because the THDi increases at partial load, thus over-sizing drives increases the harmonic pollution on the grid.

Additionally, environmental and physical constraints must be taken into account because the different solutions all have characteristics making them more or less suited to specific conditions.

What needs to be considered is, for example, wall space, cooling air (polluted/contaminated), vibration, ambient temperature, altitude, humidity, etc.

## Are compliance with standards consistent globally?

To ensure a certain grid quality, most power distribution companies demand that consumers comply with standards and recommendations.

Different standards apply in different geographical areas and industries but all of them have one basic goal, – to limit the grid voltage distortion.

Standards depend on grid conditions and so it is impossible to guarantee standards compliance without knowing the grid specifications.

Standards themselves do not compel a specific mitigation solution and so an understanding of standards and recommendations is important to avoid unnecessary cost for mitigation equipment.

## What areas of cost must be considered when applying harmonic mitigation?

Finally, the initial costs and running expenses have to be evaluated to ensure that the most cost-effective solution is found.

The initial cost of the different harmonic mitigation solutions in comparison to the drive varies with the power range. The mitigation solution that is most cost efficient for one power range is not necessarily best cost fit over the full power range.

The running costs are determined by the efficiency of the solutions across the load profile and their lifetime maintenance/service costs.

Compared to active solutions, passive solutions often do not require regular maintenance.

On the other hand, active solutions tend to keep the true power-factor close to unity over the entire load range, resulting in better energy utilization at partial load.

Also, future development plans for the plant or system need to be taken into account because although one solution will be optimal for a static system, another will be more flexible if the system needs to be extended.



# The route to ...



## Grid conditions

### Grid conditions

Before considering mitigation equipment, the system impedance has to be known.

No grid is ideal because pre-distortion and imbalance is always present and so needs to be considered when choosing equipment.

## Application

### Application

A common pitfall is over-sizing of components between load and grid. The consequence is a poor harmonic performance, low system efficiency and a higher initial cost.

## Compliance with standards

### Compliance with standards

A total voltage distortion (THDv) of 5-8% good engineering practice and will, in most cases, make the installation comply with local standards and recommendations. It ensures that unintended tripping or component breakdown is not caused by harmonic pollution.

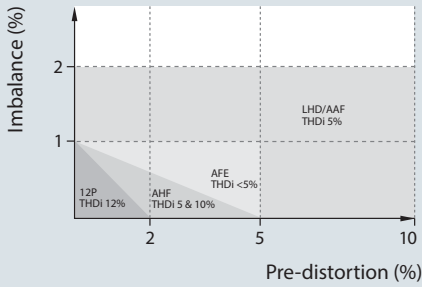
## Cost

### Cost

The initial cost of different mitigation equipment depends on power size.

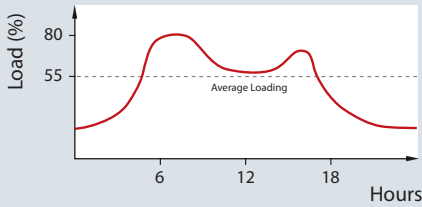
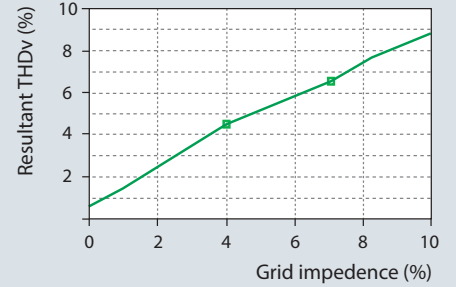
The system efficiency determines the running expenses, but service costs also need consideration.

# Cost effective mitigation



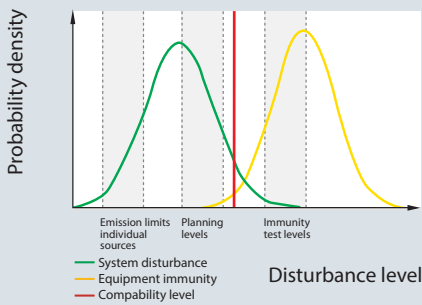
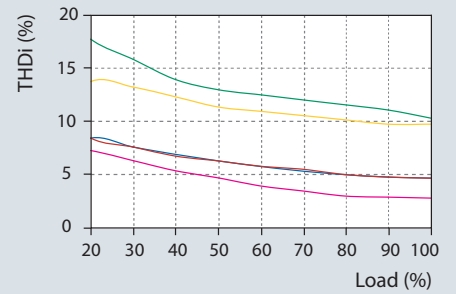
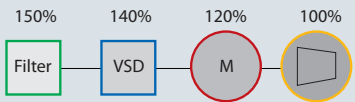
## Imbalance and pre-distortion

The harmonic mitigation performance of the different solutions depends on the grid quality. The higher the imbalance and pre-distortion, the more harmonic the equipment has to suppress. The graph shows at what pre-distortion and imbalance level each technology can keep its guaranteed THDi performance.



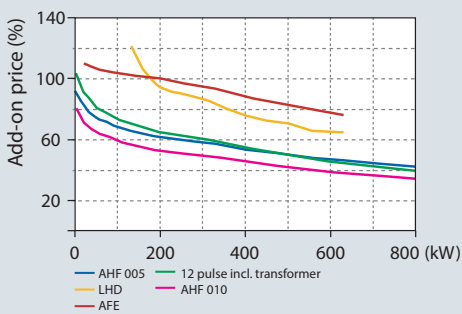
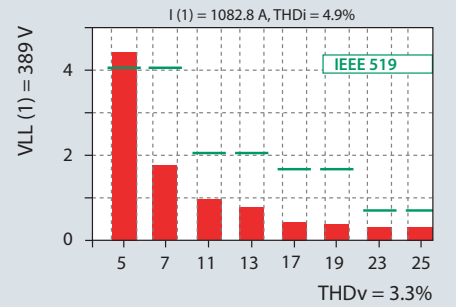
## Over-sizing

Published filter data are all given at 100% loading but filters are seldom run at full load due to over-sizing and load profile. Serial mitigation equipment must always be sized for the maximum current, but be aware of the duration of part load operation and evaluate the different filter types accordingly. Over-sizing gives poor mitigation performance and high running costs. It is also a waste of money.



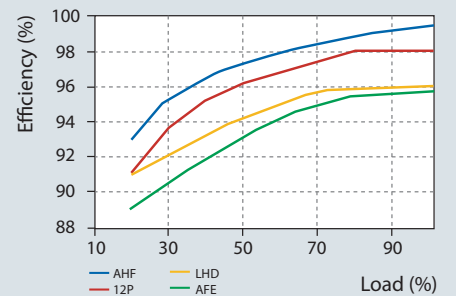
## Standards compliance

Keeping equipment immunity higher than system distortion ensures trouble free operation. Most standards set restrictions on total voltage distortion according to a planned level, often between 5% and 8%. Equipment immunity is, in most cases, far higher: for drives, between 15-20%. However, this influences product life adversely.



## Power size vs. initial costs

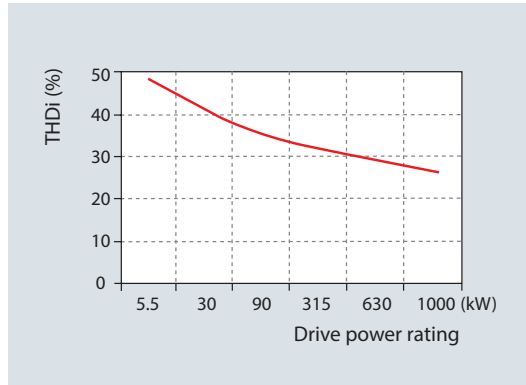
Compared to the frequency converter, the different solutions have different add-on prices depending on power size. The passive solutions in general offer the lowest initial cost and as the complexity of the solutions increase, so does the price.





### System impedance

As an example, a 400 kW FC 102 drive on a 1000 kVA transformer with 5% impedance results in ~5% THDv (total harmonic voltage distortion) at ideal grid conditions, whereas the same drive on a 1000 kVA, 8% imp. transformer leads to 50% higher THDv, namely 7.5%.

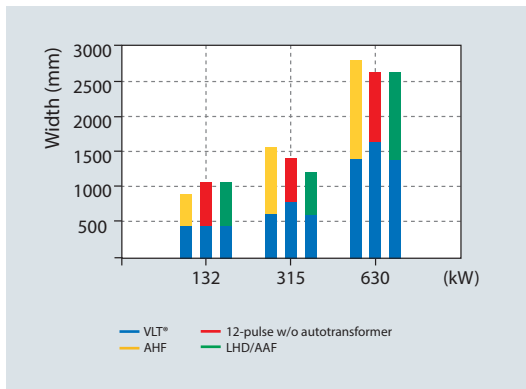


### Total Harmonic distortion

Each drive generates its own total harmonic current distortion (THDi) which depends on the grid conditions. The bigger the drive is in relation to the transformer the smaller the THDi.

### Harmonic performance

Each harmonic mitigation technology has its own THDi characteristic which is load dependent. These characteristics are set at ideal grid conditions without pre-distortion and with balanced phases. Variations hereof will result in higher THDi values.



### Wall space

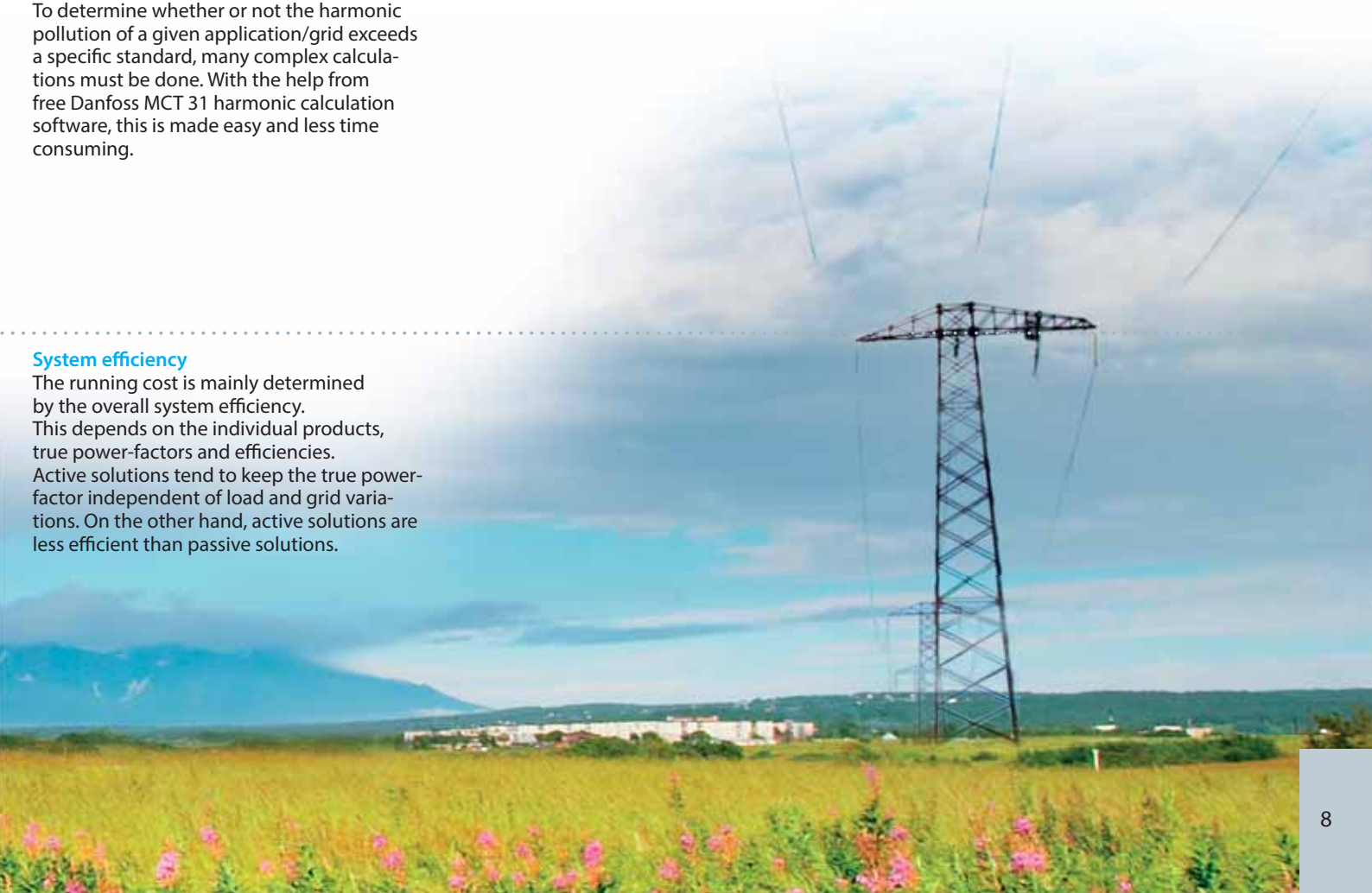
In many applications the amount of available wall space is limited and must be utilized to the greatest extent possible. Based on different technologies, the various harmonic solutions each have their optimum size and power relationship.

### Fulfilling the standards

To determine whether or not the harmonic pollution of a given application/grid exceeds a specific standard, many complex calculations must be done. With the help from free Danfoss MCT 31 harmonic calculation software, this is made easy and less time consuming.

### System efficiency

The running cost is mainly determined by the overall system efficiency. This depends on the individual products, true power-factors and efficiencies. Active solutions tend to keep the true power-factor independent of load and grid variations. On the other hand, active solutions are less efficient than passive solutions.



# ... best match



## The application

To guarantee the many outdoor activities during the winter season, multiple snow guns are ensuring snow availability around the stadium at Östersund in Sweden.

The snow guns can be quickly connected to a piping network where water is fed from a single large water pump located in a movable hut nearby.

As part of a renovation project, the customer requested that a new 200 kW water pump be installed.

The pump was to maintain constant water flow and pressure through the entire piping system independently of how many snow canons were connected.

Due to the long distance from the power supply, the local authority imposed a maximum total current distortion of 5%.

## The solution

A VLT® Low Harmonic AQUA Drive was installed to provide the required water flow and pressure.

Load variations of 20-100% and existing grid distortion of 2.4% were important factors when the application was evaluated.

The drive was supplied with coated PCBs and installed in IP 54 enclosures to withstand the high humidity in the uninsulated galvanised pump shed.

Although the mains supply was weak, the drive easily met the < 5% THDi requirement.



## The application

In a world where the focus on the reduction of CO<sub>2</sub> emissions is increasing, alternatives to fossil fuels are increasingly being sought. The bio-refining of cereals means that grain (such as wheat) is broken down into sugars and proteins and the sugars fermented into bio-fuel. The protein solids and remaining parts of the grain are converted into high protein animal food – leaving no waste.

To build one of Europe's largest bio-refineries, the customer requested VLT®s totalling more than 7 MW, ranging from 2.2 – 350 kW.

With its own 3300/400 V transformer, the bio-refinery had to set and comply with site harmonic standards to ensure high reliability and the longest possible service intervals as demanded by the customer.

To achieve this, harmonics were to be maintained at less than 8% Total Demanded Distortion (TDD) at the supply transformer.

## The solution

In total 48 VLT®s were installed to control pumps and ventilation fans throughout the bio-refinery.

Based on the VLT® power sizes and the demands for robustness/reliability, the majority of the VLT®s were designed and installed with Advanced Harmonic Filters mounted side-by-side in IP 54 panels and the specified 8% TDD was easily achieved.

# 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.





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VLT® AutomationDrive FC 300 11 KW / 15 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), Brake chopper Further options according to typecode	131H1549	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 160 KW / 250 HP, 380 - 500 VAC, IP21 / Type 1, RFI Class A2 (C3), No brake chopper Further options according to typecode	131F1980	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 160 KW / 250 HP, 380 - 500 VAC, IP54 / Type 12, RFI class A1 (C2), No brake chopper Further options according to typecode	131F1983	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 200 KW / 300 HP, 380 - 480 VAC, Safe Stop, IP20 / Chassis, RFI Class A2 (C3), No A Option, MCB-101 General purp. I/O, Coated PCB, No Mains Option FC-102N200T4E20H2TGCXXXSXXXAXBKXXXXDX	134H7442	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 132 KW / 200 HP, 380 - 500 VAC, IP21 / Type 1, RFI Class A2 (C3), Brake chopper Further options according to typecode	131U9560	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 160 KW / 250 HP, 380 - 480 VAC, No brake chopper, IP21 / Type 1, RFI class A1 (C2), No A Option, No B Option, Coated PCB, No Mains Option FC-102N160T4E21H4XGCXXXSXXXAXBKXXXXDX	134F4251	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 11 KW / 15 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), Brake chopper Further options according to typecode	131F7924	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 200 KW / 300 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI class A1 (C2), No A Option, No B Option, Coated PCB, No Mains Option FC-102N200T4E54H4XGCXXXSXXXAXBKXXXXDX	134F4253	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 160 KW / 250 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N160T4E54H2XGCXXXSXXXAXBKXXXXDX	134F4252	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 200 KW / 300 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N200T4E54H2XGCXXXSXXXAXBKXXXXDX	134F4254	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 200 KW / 300 HP, 380 - 500 VAC, IP54 / Type 12, RFI class A1 (C2), Brake chopper Further options according to typecode	131F2248	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 160 KW / 250 HP, 380 - 500 VAC, IP21 / Type 1, RFI Class A2 (C3), No brake chopper Further options according to typecode	131B6855	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 315 KW / 450 HP, 380 - 480 VAC, Safe Stop, IP20 / Chassis, RFI Class A2 (C3), No A Option, MCB-105 Relay Card, Coated PCB, No Mains Option FC-102N315T4E20H2TGCXXXSXXXAXBKXXXXDX	134H7848	<a href="#">Buy on EAN</a>

VLT® HVAC Drive FC 102 710 KW / 1000 HP, 525 - 690 VAC *, No brake chopper, IP21 / Type 1, RFI Class A2 (C3), PROFIBUS DP MCA 101, No B Option, Coated PCB, Mains Disconnect + Fuse FC-102P710T7E21H2XGC3XXSXXXXA0BXCXXXXX	134N0338	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 200 KW / 300 HP, 380 - 500 VAC, IP21 / Type 1, RFI class A1 (C2), No brake chopper Further options according to typecode	131H4074	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 315 KW / 450 HP, 380 - 480 VAC, Safe Stop, IP54 / Type 12, LHD - AAF006 filter + A2 RFI, PROFINET MCA 120, No B Option, Coated PCB, Mains Disconnect + Fuse FC-102P315T4E54N2TGC3XXSXXXXALBXCXXXXX	134N8766	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 250 KW / 350 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI class A1 (C2), No A Option, MCB-101 General purp. I/O, Coated PCB, No Mains Option FC-102N250T4E54H4XGCXXXSXXXXAXBKXXXXX	134L3519	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 355 KW / 500 HP, 380 - 500 VAC, IP00 / Chassis, RFI Class A2 (C3), Brake chopper Further options according to typecode	131F3298	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 315 KW / 450 HP, 380 - 480 VAC, No brake chopper, IP21/Type 1+mains shield, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N315T4E2MH2XGCXXXSXXXXAXBKXXXXX	134F6808	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 250 KW / 350 HP, 380 - 480 VAC, Safe Stop, IP20 / Chassis, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N250T4E20H2TGCXXXSXXXXAXBKXXXXX	134H0677	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 110 KW / 150 HP, 380 - 480 VAC, No brake chopper, IP21 / Type 1, RFI class A1 (C2), No A Option, No B Option, Coated PCB, No Mains Option FC-102N110T4E21H4XGCXXXSXXXXAXBKXXXXX	134F4246	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 132 KW / 200 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N132T4E54H2XGCXXXSXXXXAXBKXXXXX	134F4247	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 250 KW / 350 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI Class A2 (C3), PROFIBUS DP MCA 101, No B Option, Coated PCB, No Mains Option FC-102N250T4E54H2XGCXXXSXXXXA0BXCXXXXX	134G5725	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 250 KW / 350 HP, 380 - 480 VAC, Brake chopper, IP20 / Chassis, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N250T4E20H2BGCXXXSXXXXAXBKXXXXX	134G5433	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 90 KW / 125 HP, 380 - 500 VAC, IP21 / Type 1, RFI Class A2 (C3), No brake chopper Further options according to typecode	131B6825	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 160 KW / 250 HP, 380 - 500 VAC, IP00 / Chassis, RFI class A1 (C2), No brake chopper Further options according to typecode	131B6820	<a href="#">Buy on EAN</a>

VLT® HVAC Drive FC 102 110 KW / 150 HP, 380 - 480 VAC, Brake chopper, IP54 / Type 12, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N110T4E54H2BGCXXXSXXXXAXBXXXXD0	134U4754	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 315 KW / 450 HP, 380 - 480 VAC, Safe Stop, IP20 / Chassis, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N315T4E20H2TGCXXXSXXXXAXBXXXXDX	134F9232	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 132 KW / 200 HP, 380 - 500 VAC, IP21 / Type 1, RFI class A1 (C2), No brake chopper Further options according to typecode	131B5931	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 160 KW / 250 HP, 380 - 500 VAC, IP21 / Type 1, RFI class A1 (C2), No brake chopper Further options according to typecode	131B5932	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 132 KW / 200 HP, 380 - 500 VAC, IP21 / Type 1, RFI class A1 (C2), No brake chopper Further options according to typecode	131B5938	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 11 KW / 15 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), Brake chopper Further options according to typecode	131G2175	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 200 KW / 300 HP, 525 - 690 VAC *, Safe Stop, IP20 / Chassis, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N200T7E20H2TGCXXXSXXXXAXBXXXXDX	134L0398	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 11 KW / 15 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A2 (C3), Brake chopper Further options according to typecode	131F8653	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 15 KW / 20 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), No brake chopper Further options according to typecode	131F8654	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 15 KW / 20 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), Brake chopper Further options according to typecode	131F8655	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 132 KW / 200 HP, 380 - 480 VAC, Brake chopper + Safe stop, IP20 / Chassis, RFI Class A2 (C3), PROFIBUS DP MCA 101, No B Option, Coated PCB, No Mains Option FC-102N132T4E20H2UGCXXXSXXXXA0BXXXXDX	134G5609	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 630 KW / 900 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, Fuse FC-102P630T4E54H2XGC7XKSXXXXAXBXXXXDX	134G1948	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 250 KW / 350 HP, 380 - 500 VAC, IP54 Hybrid LHD elect., LHD + Class A1 RFI, No brake chopper Further options according to typecode	131Z3864	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 250 KW / 350 HP, 380 - 480 VAC, Brake chopper, IP20 / Chassis, RFI class A1 (C2), PROFIBUS DP MCA 101, No B Option, Coated PCB, No Mains Option FC-102N250T4E20H4BGCXXXSXXXXA0BXXXXDX	134L6697	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 315 KW / 450 HP, 380 - 500 VAC, IP54 / Type 12, RFI class A1 (C2), Brake chopper Further options according to typecode	131F5543	<a href="#">Buy on EAN</a>



VLT® AutomationDrive FC 300 355 KW / 500 HP, 380 - 500 VAC, IP54 / Type 12, RFI class A1 (C2), No brake chopper Further options according to typecode	131F5547	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 110 KW / 150 HP, 380 - 500 VAC, IP00 / Chassis, RFI class A1 (C2), No brake chopper Further options according to typecode	131B6835	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 110 KW / 150 HP, 380 - 500 VAC, IP21 / Type 1, RFI Class A2 (C3), No brake chopper Further options according to typecode	131B6836	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 110 KW / 150 HP, 380 - 500 VAC, IP54 / Type 12, RFI Class A2 (C3), No brake chopper Further options according to typecode	131B6838	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 200 KW / 300 HP, 380 - 500 VAC, IP54 / Type 12, RFI Class A2 (C3), No brake chopper Further options according to typecode	131X3266	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 400 KW / 550 HP, 380 - 500 VAC, IP00 / Chassis, RFI Class A2 (C3), No brake chopper Further options according to typecode	131B6905	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 315 KW / 450 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI class A1 (C2), PROFIBUS DP MCA 101, No B Option, Coated PCB, No Mains Option FC-102N315T4E54H4XGCXXSXXXXA0BXCXXXXDX	134H4584	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 315 KW / 450 HP, 380 - 480 VAC, No brake chopper, IP20 / Chassis, RFI class A1 (C2), No A Option, MCB-101 General purp. I/O, Coated PCB, No Mains Option FC-102N315T4E20H4XGCXXSXXXXAXBKXXXXDX	134G7240	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 11 KW / 15 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), No brake chopper Further options according to typecode	131F8716	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 400 KW / 550 HP, 380 - 480 VAC, No brake chopper, IP21 / Type 1, LHD - AAF006 filter + A2 RFI, PROFIBUS DP MCA 101, No B Option, Coated PCB, Mains Disconnect + Fuse FC-102P400T4E21N2XGC3XXSXXXXA0BXCXXXXDX	134H4804	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 110 KW / 150 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI Class A2 (C3), PROFIBUS DP MCA 101, No B Option, Coated PCB, No Mains Option FC-102N110T4E54H2XGCXXSXXXXA0BXCXXXXDX	134F9206	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 315 KW / 450 HP, 380 - 480 VAC, Safe Stop, IP54/Type 12+main shield, RFI class A1 (C2), No A Option, No B Option, Coated PCB, Fuse FC-102N315T4E5MH4TGC7XXSXXXXAXBKXXXXDX	134G4270	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 15 KW / 20 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), Brake chopper Further options according to typecode	131H1167	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 11 KW / 15 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A2 (C3), No brake chopper Further options according to typecode	131G0027	<a href="#">Buy on EAN</a>

VLT® HVAC Drive FC 102 110 KW / 150 HP, 380 - 480 VAC, No brake chopper, IP20 / Chassis, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N110T4E20H2XGCXXXSXXXAXBXXXXX	134F0374	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 11 KW / 15 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A2 (C3), No brake chopper Further options according to typecode	131F7145	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 110 KW / 150 HP, 380 - 500 VAC, IP21 / Type 1, RFI Class A2 (C3), Brake chopper Further options according to typecode	131F3402	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 90 KW / 125 HP, 380 - 500 VAC, IP54/Type 12+main shield, RFI class A1 (C2), No brake chopper Further options according to typecode	131N2423	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 160 KW / 250 HP, 380 - 480 VAC, Safe Stop, IP20 / Chassis, RFI Class A2 (C3), PROFINET MCA 120, No B Option, Coated PCB, No Mains Option FC-102N160T4E20H2TGCXXXSXXXALBXXXXX	134L5613	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 315 KW / 450 HP, 380 - 500 VAC, IP54 / Type 12, RFI class A1 (C2), No brake chopper Further options according to typecode	131B6892	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 315 KW / 450 HP, 380 - 500 VAC, IP54 / Type 12, RFI class A1 (C2), No brake chopper Further options according to typecode	131B6890	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 110 KW / 150 HP, 380 - 500 VAC, IP54 / Type 12, RFI class A1 (C2), No brake chopper Further options according to typecode	131B8209	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 355 KW / 500 HP, 380 - 500 VAC, IP21 / Type 1, RFI class A1 (C2), No brake chopper Further options according to typecode	131B6898	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 11 KW / 15 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), Brake chopper Further options according to typecode	131F6613	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 200 KW / 300 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, Mains Disconnect + Fuse FC-102N200T4E54H2XGC3XXSXXXAXBXXXXX	134G9095	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 160 KW / 250 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, Mains Disconnect + Fuse FC-102N160T4E54H2XGC3XXSXXXAXBXXXXX	134G9094	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 250 KW / 350 HP, 380 - 480 VAC, No brake chopper, IP20 / Chassis, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N250T4E20H2XGCXXXSXXXAXBXXXXX	134F0530	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 15 KW / 20 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), Brake chopper Further options according to typecode	131F5235	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 90 KW / 125 HP, 380 - 500 VAC, IP00 / Chassis, RFI Class A2 (C3), No brake chopper Further options according to typecode	131B6818	<a href="#">Buy on EAN</a>

VLT® AutomationDrive FC 300 110 KW / 150 HP, 380 - 500 VAC, IP00 / Chassis, RFI class A1 (C2), No brake chopper Further options according to typecode	131B6819	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 110 KW / 150 HP, 380 - 500 VAC, IP00 / Chassis, RFI Class A2 (C3), No brake chopper Further options according to typecode	131B6814	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 500 KW / 650 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102P500T4E54H2XGCXXXSXXXAXBXCXXXDX	131G4864	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 800 KW / 1200 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102P800T4E54H2XGCXKXSXXXAXBXCXXXDX	134U5018	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 90 KW / 125 HP, 380 - 500 VAC, IP00 / Chassis, RFI Class A2 (C3), Brake chopper Further options according to typecode	131X3717	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 132 KW / 200 HP, 380 - 480 VAC, No brake chopper, IP20 / Chassis, RFI Class A2 (C3), LonWorks MCA 108, No B Option, Coated PCB, No Mains Option Option FC-102N132T4E20H2XGCXXXSXXXAGBXCXXXDX	134H6072	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 110 KW / 150 HP, 380 - 480 VAC, No brake chopper, IP20 / Chassis, RFI Class A2 (C3), PROFIBUS DP MCA 101, No B Option, Coated PCB, No Mains Option FC-102N110T4E20H2XGCXXXSXXXA0BXCXXXDX	134F4995	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 15 KW / 20 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), Brake chopper Further options according to typecode	131H0241	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 90 KW / 125 HP, 380 - 500 VAC, IP21 / Type 1, RFI Class A2 (C3), Brake chopper Further options according to typecode	131F2874	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 90 KW / 125 HP, 525 - 690 VAC *, No brake chopper, IP54/Type 12 -D1 frame, RFI Class A2 (C3), PROFIBUS DP MCA 101, No B Option, Coated PCB, No Mains Option FC-102N90KT7E5DH2XGCXXXSXXXA0BXCXXXDX0	134L0363	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 160 KW / 250 HP, 380 - 480 VAC, Safe Stop, IP21 / Type 1, RFI class A1 (C2), No A Option, No B Option, Coated PCB, Mains Disconnect + Fuse FC-102N160T4E21H4TGC3XSXXXAXBXCXXXDX	134H8853	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 110 KW / 150 HP, 380 - 480 VAC, Brake chopper, IP20 / Chassis, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N110T4E20H2BGCXXXSXXXAXBXCXXXDX	134G2164	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 90 KW / 125 HP, 380 - 500 VAC, IP00 / Chassis, RFI Class A2 (C3), Brake chopper Further options according to typecode	131F5820	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 11 KW / 15 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), Brake chopper Further options according to typecode	131F8288	<a href="#">Buy on EAN</a>

VLT® AutomationDrive FC 300 160 KW / 250 HP, 380 - 500 VAC, IP54 / Type 12, RFI Class A2 (C3), Brake chopper Further options according to typecode	131H1923	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 315 KW / 450 HP, 380 - 480 VAC, No brake chopper, IP54/Type 12+main shield, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, Mains Disconnect + Fuse FC-102N315T4E5MH2XGC3XXSXXXAXBXCXXXXX	134L0186	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 15 KW / 20 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), No brake chopper Further options according to typecode	131G5185	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 11 KW / 15 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), No brake chopper Further options according to typecode	131G5186	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 11 KW / 15 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), No brake chopper Further options according to typecode	131H0411	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 132 KW / 200 HP, 380 - 500 VAC, IP21 / Type 1, RFI Class A2 (C3), Brake chopper Further options according to typecode	131F2901	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 160 KW / 250 HP, 380 - 480 VAC, Safe Stop, IP20 / Chassis, RFI Class A2 (C3), No A Option, MCB-101 General purp. I/O, Coated PCB, No Mains Option FC-102N160T4E20H2TGCXXXSXXXAXBKXXXXX	134H8408	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 630 KW / 900 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI class A1 (C2), No A Option, No B Option, Coated PCB, No Mains Option FC-102P630T4E54H4XGCXXXSXXXAXBKXXXXX	131G8974	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 200 KW / 300 HP, 380 - 500 VAC, IP21 / Type 1, RFI Class A2 (C3), No brake chopper Further options according to typecode	131B3646	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 250 KW / 350 HP, 380 - 480 VAC, No brake chopper, IP20 / Chassis, RFI Class A2 (C3), PROFIBUS DP MCA 101, No B Option, Coated PCB, No Mains Option FC-102N250T4E20H2XGCXXXSXXXA0BXCXXXXX	134F5964	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 160 KW / 250 HP, 380 - 480 VAC, No brake chopper, IP20 / Chassis, RFI Class A2 (C3), PROFIBUS DP MCA 101, No B Option, Coated PCB, No Mains Option FC-102N160T4E20H2XGCXXXSXXXA0BXCXXXXX	134F5966	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 200 KW / 300 HP, 380 - 480 VAC, Safe Stop, IP20 / Chassis, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N200T4E20H2TGCXXXSXXXAXBKXXXXX	134H0676	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 132 KW / 200 HP, 380 - 480 VAC, No brake chopper, IP20 / Chassis, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N132T4E20H2XXCXXXSXXXAXBKXXXXX	134G0835	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 110 KW / 150 HP, 380 - 480 VAC, Safe Stop, IP20 / Chassis, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N110T4E20H2TGCXXXSXXXAXBKXXXXX	134G3059	<a href="#">Buy on EAN</a>



VLT® HVAC Drive FC 102 160 KW / 250 HP, 380 - 480 VAC, Safe Stop, IP54 / Type 12, RFI Class A2 (C3), PROFIBUS DP MCA 101, No B Option, Coated PCB, Mains Disconnect + Fuse FC-102N160T4E54H2TGC3XXSXXXXA0BXCXXXX0	134L6438	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 132 KW / 200 HP, 380 - 480 VAC, No brake chopper, IP21 / Type 1, RFI class A1 (C2), No A Option, No B Option, Coated PCB, No Mains Option FC-102N132T4E21H4XGCXXXSXXXXAXBXXXXDX	134F4249	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 800 KW / 1200 HP, 380 - 480 VAC, Safe Stop, IP54 / Type 12, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102P800T4E54H2TGCXXSXXXXAXBXXXXDX	134U5929	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 450 KW / 600 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, LHD - AAF006 filter + A2 RFI, PROFINET MCA 120, No B Option, Coated PCB, Mains Disconnect + Fuse FC-102P450T4E54N2XGC3XXSXXXXALBXXXXDX	134L2550	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 15 KW / 20 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), Brake chopper Further options according to typecode	131F8891	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 90 KW / 125 HP, 380 - 500 VAC, IP21 / Type 1, RFI Class A2 (C3), No brake chopper Further options according to typecode	131F1826	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 200 KW / 300 HP, 380 - 500 VAC, IP21 / Type 1, RFI class A1 (C2), No brake chopper Further options according to typecode	131B5940	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 132 KW / 200 HP, 380 - 480 VAC, Safe Stop, IP20 / Chassis, RFI Class A2 (C3), No A Option, MCB-101 General purp. I/O, Coated PCB, No Mains Option FC-102N132T4E20H2TGCXXXSXXXXAXBKXXXXDX	134H8407	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 110 KW / 150 HP, 380 - 480 VAC, Brake chopper, IP54 / Type 12, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N110T4E54H2BGCXXXSXXXXAXBXXXXDX	134H0168	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 315 KW / 450 HP, 380 - 500 VAC, IP54 / Type 12, RFI Class A2 (C3), No brake chopper Further options according to typecode	131G3678	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 200 KW / 300 HP, 380 - 480 VAC, No brake chopper, IP20 / Chassis, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N200T4E20H2XGCXXXSXXXXAXBXXXXDX	134F0389	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 160 KW / 250 HP, 380 - 480 VAC, No brake chopper, IP20 / Chassis, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N160T4E20H2XGCXXXSXXXXAXBXXXXDX	134F0386	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 132 KW / 200 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI class A1 (C2), No A Option, No B Option, Coated PCB, No Mains Option FC-102N132T4E54H4XGCXXXSXXXXAXBXXXXDX	134F0385	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 132 KW / 200 HP, 380 - 480 VAC, No brake chopper, IP20 / Chassis, RFI class A1 (C2), No A Option, No B Option, Coated PCB, No Mains Option FC-102N132T4E20H4XGCXXXSXXXXAXBXXXXDX	134F0384	<a href="#">Buy on EAN</a>

VLT® HVAC Drive FC 102 132 KW / 200 HP, 380 - 480 VAC, No brake chopper, IP20 / Chassis, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N132T4E20H2XGCXXXSXXXAXBXXXXX	134F0383	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 110 KW / 150 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI Class A2 (C3), No A Option, MCB-101 General purp. I/O, Coated PCB, No Mains Option FC-102N110T4E54H2XGCXXXSXXXAXBXXXXX	134F0381	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 110 KW / 150 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N110T4E54H2XGCXXXSXXXAXBXXXXX	134F0380	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 200 KW / 300 HP, 380 - 500 VAC, IP54 / Type 12, RFI Class A2 (C3), Brake chopper Further options according to typecode	131H7123	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 11 KW / 15 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), No brake chopper Further options according to typecode	131G2302	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 110 KW / 150 HP, 380 - 500 VAC, IP21 / Type 1, RFI Class A2 (C3), No brake chopper Further options according to typecode	131H6898	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 200 KW / 300 HP, 380 - 480 VAC, No brake chopper, IP20 / Chassis, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, Fuse FC-102N200T4E20H2XGC7XXSXXXAXBXXXXX	134F8458	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 200 KW / 300 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI Class A2 (C3), PROFIBUS DP MCA 101, No B Option, Coated PCB, Mains Disconnect + Fuse FC-102N200T4E54H2XGC3XXSXXXA0BXXXXX	134N2910	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 90 KW / 125 HP, 380 - 500 VAC, IP54 / Type 12, RFI class A1 (C2), No brake chopper Further options according to typecode	131F1965	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 110 KW / 150 HP, 380 - 500 VAC, IP21 / Type 1, RFI Class A2 (C3), No brake chopper Further options according to typecode	131F1969	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 15 KW / 20 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A2 (C3), Brake chopper Further options according to typecode	131G5520	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 110 KW / 150 HP, 380 - 500 VAC, IP00 / Chassis, RFI class A1 (C2), Brake chopper Further options according to typecode	131H0432	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 15 KW / 20 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), No brake chopper Further options according to typecode	131F8724	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 560 KW / 750 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI Class A2 (C3), PROFIBUS DP MCA 101, No B Option, Coated PCB, No Mains Option FC-102P560T4E54H2XGCXXXSXXXA0BXXXXX	131L8038	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 200 KW / 300 HP, 380 - 500 VAC, IP21 / Type 1, RFI Class A2 (C3), No brake chopper Further options according to typecode	131L3505	<a href="#">Buy on EAN</a>

VLT® AutomationDrive FC 300 11 KW / 15 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), No brake chopper Further options according to typecode	131F7527	Buy on EAN
VLT® HVAC Drive FC 102 250 KW / 350 HP, 380 - 480 VAC, No brake chopper, IP20 / Chassis, RFI Class A2 (C3), No A Option, MCB-109 I/O, RTC Back-up, Coated PCB, No Mains Option FC-102N250T4E20H2XGCXXXSXXXAXBXXXXX	134L1756	Buy on EAN
VLT® AutomationDrive FC 300 11 KW / 15 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A2 (C3), Brake chopper Further options according to typecode	131F8417	Buy on EAN
VLT® HVAC Drive FC 102 315 KW / 450 HP, 380 - 480 VAC, No brake chopper, IP20 / Chassis, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N315T4E20H2XGCXXXSXXXAXBXXXXX	134F1124	Buy on EAN
VLT® AutomationDrive FC 300 90 KW / 125 HP, 380 - 500 VAC, IP21 / Type 1, RFI Class A2 (C3), No brake chopper Further options according to typecode	131B6826	Buy on EAN
VLT® AutomationDrive FC 300 15 KW / 20 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), No brake chopper Further options according to typecode	131F4874	Buy on EAN
VLT® HVAC Drive FC 102 132 KW / 200 HP, 380 - 480 VAC, No brake chopper, IP54/Type 12+main shield, RFI class A1 (C2), PROFIBUS DP MCA 101, No B Option, Coated PCB, Mains Disconnect + Fuse FC-102N132T4E5MH4XGC3XQSXXXXA0BXXXXX	134U6580	Buy on EAN
VLT® HVAC Drive FC 102 200 KW / 300 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, Fuse FC-102N200T4E54H2XGC7XSXXXAXBXXXXX	134F6900	Buy on EAN
VLT® AutomationDrive FC 300 132 KW / 200 HP, 380 - 500 VAC, IP54 / Type 12, RFI Class A2 (C3), No brake chopper Further options according to typecode	131F1975	Buy on EAN
VLT® HVAC Drive FC 102 250 KW / 350 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI class A1 (C2), No A Option, No B Option, Coated PCB, No Mains Option FC-102N250T4E54H4XGCXXXSXXXAXBXXXXX	134F4264	Buy on EAN
VLT® HVAC Drive FC 102 315 KW / 450 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI class A1 (C2), No A Option, No B Option, Coated PCB, No Mains Option FC-102N315T4E54H4XGCXXXSXXXAXBXXXXX	134F4265	Buy on EAN
VLT® HVAC Drive FC 102 315 KW / 450 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N315T4E54H2XGCXXXSXXXAXBXXXXX	134F4266	Buy on EAN
VLT® HVAC Drive FC 102 250 KW / 350 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N250T4E54H2XGCXXXSXXXAXBXXXXX	134F4263	Buy on EAN
VLT® HVAC Drive FC 102 132 KW / 200 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI class A1 (C2), PROFIBUS DP MCA 101, No B Option, Coated PCB, No Mains Option FC-102N132T4E54H4XGCXXXSXXXA0BXXXXX	134G7777	Buy on EAN

VLT® AutomationDrive FC 300 11 KW / 15 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A2 (C3), Brake chopper Further options according to typecode	131F0154	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 200 KW / 300 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI class A1 (C2), PROFIBUS DP MCA 101, No B Option, Coated PCB, No Mains Option FC-102N200T4E54H4XGCXXXSXXXXA0BXCXXXXXDX	134G7404	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 11 KW / 15 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), No brake chopper Further options according to typecode	131F8792	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 15 KW / 20 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), No brake chopper Further options according to typecode	131F8424	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 400 KW / 550 HP, 380 - 500 VAC, IP00 / Chassis, RFI Class A2 (C3), Brake chopper Further options according to typecode	131F3300	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 450 KW / 600 HP, 380 - 500 VAC, IP21 / Type 1, RFI Class A2 (C3), No brake chopper Further options according to typecode	131F8363	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 90 KW / 125 HP, 380 - 500 VAC, IP00 / Chassis, RFI class A1 (C2), Brake chopper Further options according to typecode	131B8492	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 15 KW / 20 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A2 (C3), Brake chopper Further options according to typecode	131G3651	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 250 KW / 350 HP, 380 - 480 VAC, Safe Stop, IP54 / Type 12, RFI Class A2 (C3), PROFIBUS DP MCA 101, MCB-114 VLT Sensor Input, Coated PCB, Mains Disconnect + Fuse FC-102N250T4E54H2TGC3XXSXXXXA0B4CXXXXD0	134N7585	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 450 KW / 600 HP, 380 - 500 VAC, IP54 / Type 12, RFI Class A2 (C3), No brake chopper Further options according to typecode	131H0872	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 160 KW / 250 HP, 380 - 500 VAC, IP54 / Type 12, RFI Class A2 (C3), No brake chopper Further options according to typecode	131B6858	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 15 KW / 20 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), No brake chopper Further options according to typecode	131F8887	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 15 KW / 20 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A2 (C3), No brake chopper Further options according to typecode	131F8886	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 132 KW / 200 HP, 380 - 500 VAC, IP21 / Type 1, RFI Class A2 (C3), No brake chopper Further options according to typecode	131H7484	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 250 KW / 350 HP, 380 - 480 VAC, No brake chopper, IP20 / Chassis, RFI class A1 (C2), No A Option, MCB-109 I/O, RTC Back-up, Coated PCB, No Mains Option FC-102N250T4E20H4XGCXXXSXXXXAXB0CXXXXDX	134L3340	<a href="#">Buy on EAN</a>



VLT® HVAC Drive FC 102 200 KW / 300 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI Class A2 (C3), PROFIBUS DP MCA 101, No B Option, Coated PCB, No Mains Option FC-102N200T4E54H2XGCXXXSXXXXA0BXCXXXXDX	134H3241	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 15 KW / 20 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), No brake chopper Further options according to typecode	131H2630	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 315 KW / 450 HP, 380 - 500 VAC, IP54 / Type 12, RFI class A1 (C2), No brake chopper Further options according to typecode	131F2377	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 315 KW / 450 HP, 380 - 500 VAC, IP54 / Type 12, RFI class A1 (C2), Brake chopper Further options according to typecode	131F2372	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 15 KW / 20 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A2 (C3), Brake chopper Further options according to typecode	131F9966	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 160 KW / 250 HP, 380 - 480 VAC, Safe Stop, IP20 / Chassis, RFI Class A2 (C3), No A Option, MCB-105 Relay Card, Coated PCB, No Mains Option FC-102N160T4E20H2TGCXXXSXXXXAXBPCXXXXDX	134U7588	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 160 KW / 250 HP, 380 - 480 VAC, Safe Stop, IP54/Type 12+main shield, RFI class A1 (C2), No A Option, No B Option, Coated PCB 3C3 + Ruggedise, Fuse FC-102N160T4E5MH4TGR7XXSXXXXAXBPCXXXXDX	134H3257	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 15 KW / 20 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), No brake chopper Further options according to typecode	131F8890	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 500 KW / 650 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI Class A2 (C3), No A Option, MCB-101 General purp. I/O, Coated PCB, No Mains Option FC-102P500T4E54H2XGCXXXSXXXXAXBKXXXXDX	134L1264	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 500 KW / 650 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RCD TN/TT Mains+ A2 RFI, PROFIBUS DP MCA 101, No B Option, Coated PCB, Circuit Breaker + Fuse FC-102P500T4E54HEXGCJXXSXXXXA0BXCXXXXDX	134U4079	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 450 KW / 600 HP, 380 - 480 VAC, Safe Stop, IP54 / Type 12, LHD - AAF006 filter + A2 RFI, PROFINET MCA 120, No B Option, Coated PCB, Mains Disconnect + Fuse FC-102P450T4E54N2TGC3XXSXXXXALBXCXXXXDX	134N8765	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 15 KW / 20 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A1/B (C1), No brake chopper Further options according to typecode	131F8178	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 630 KW / 900 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102P630T4E54H2XGCXXXSXXXXAXBPCXXXXDX	131G5110	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 90 KW / 125 HP, 380 - 500 VAC, IP00 / Chassis, RFI class A1 (C2), No brake chopper Further options according to typecode	131L1318	<a href="#">Buy on EAN</a>

VLT® AutomationDrive FC 300 11 KW / 15 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A2 (C3), No brake chopper Further options according to typecode	131F8843	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 132 KW / 200 HP, 380 - 480 VAC, Safe Stop, IP20 / Chassis, RFI Class A2 (C3), No A Option, No B Option, Coated PCB, No Mains Option FC-102N132T4E20H2TGCXXXSXXXAXBXXXXX	134G1214	<a href="#">Buy on EAN</a>
VLT® AutomationDrive FC 300 15 KW / 20 HP, 380 - 500 VAC, IP20 / Chassis, RFI Class A2 (C3), Brake chopper Further options according to typecode	131F8421	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 200 KW / 300 HP, 380 - 480 VAC, No brake chopper, IP20 / Chassis, RFI Class A2 (C3), No A Option, MCB-109 I/O, RTC Back-up, Coated PCB, No Mains Option FC-102N200T4E20H2XGCXXXSXXXAXB0CXXXXX	134L4819	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 200 KW / 300 HP, 380 - 480 VAC, Safe Stop, IP54 / Type 12, RFI Class A2 (C3), PROFIBUS DP MCA 101, No B Option, Coated PCB, Mains Disconnect + Fuse FC-102N200T4E54H2TGC3XXSXXXXA0BXXXXD0	134U0550	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 315 KW / 450 HP, 380 - 480 VAC, Safe Stop, IP20 / Chassis, RFI Class A2 (C3), PROFIBUS DP MCA 101, No B Option, Coated PCB, No Mains Option FC-102N315T4E20H2TGCXXXSXXXXA0BXXXXDX	134H0217	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 110 KW / 150 HP, 380 - 480 VAC, Safe Stop, IP20 / Chassis, RFI Class A2 (C3), PROFIBUS DP MCA 101, No B Option, Coated PCB, No Mains Option FC-102N110T4E20H2TGCXXXSXXXXA0BXXXXDX	134H0218	<a href="#">Buy on EAN</a>
VLT® HVAC Drive FC 102 315 KW / 450 HP, 380 - 480 VAC, No brake chopper, IP54 / Type 12, RFI Class A2 (C3), PROFIBUS DP MCA 101, No B Option, Coated PCB, No Mains Option FC-102N315T4E54H2XGCXXXSXXXXA0BXXXXDX	134L9245	<a href="#">Buy on EAN</a>