



# VLT<sup>®</sup> Fieldbus Solutions

## Fast installation – easy integration

Dedicated Danfoss fieldbus hardware and software solutions save time and provide efficient control and monitoring.

14

fieldbus technologies

supported by the Danfoss  
VLT<sup>®</sup> fieldbus portfolio



# Reduce costs and increase quality

## Fieldbus solutions for any PLC network

### Reduce costs, ensure efficient communication and increase quality.

Real time information is becoming increasingly important in industrial automation and control systems. Immediate access to data increases transparency in production facilities, while making it possible to optimize system performance, carry out error analysis and provide remote support around the clock from anywhere in the world.

Industrial automation and control communication works in a hierarchy. At the top is a computer or server that oversees the system. In the middle are Programmable Logic Controllers (PLC) that instruct and operate the devices that carry out the actual work. At the bottom the many devices and frequency converters that control the motors in the specific application.

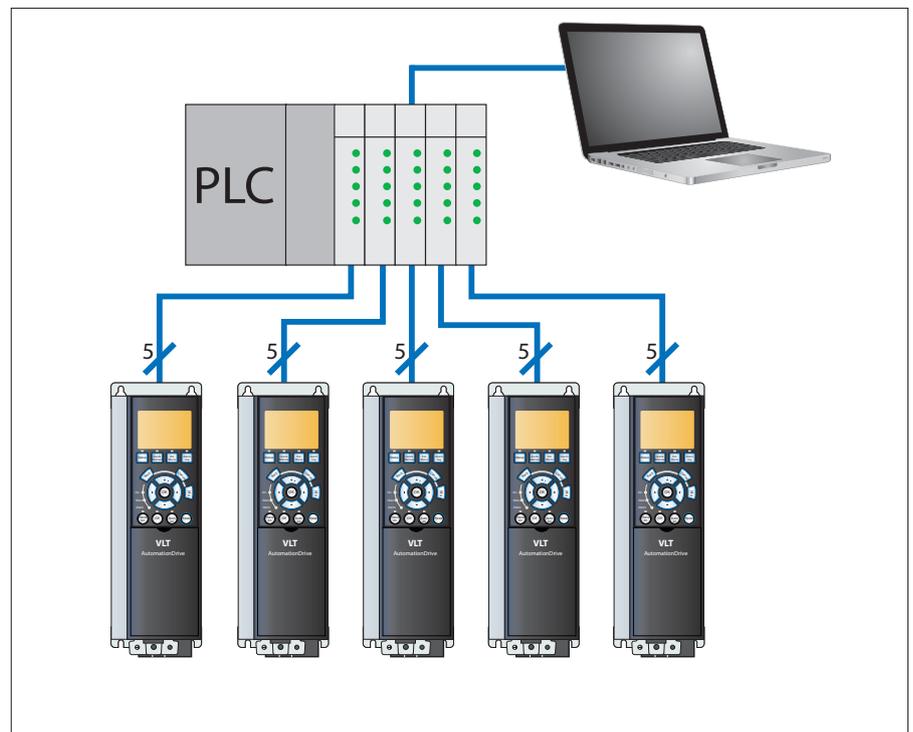


### Traditional wiring. No fieldbus.

In this type of network, communication between the drive and PLC requires one cable for each parameter that needs to be controlled. The advantage of such a system is that the individual components themselves are relatively cheap, and the system itself is not among the most complex.

This, however, come at a price, as such systems are relatively expensive both to install and extend, as each additional parameter or drive requires new cabling, PLC programming and often i/o hardware.

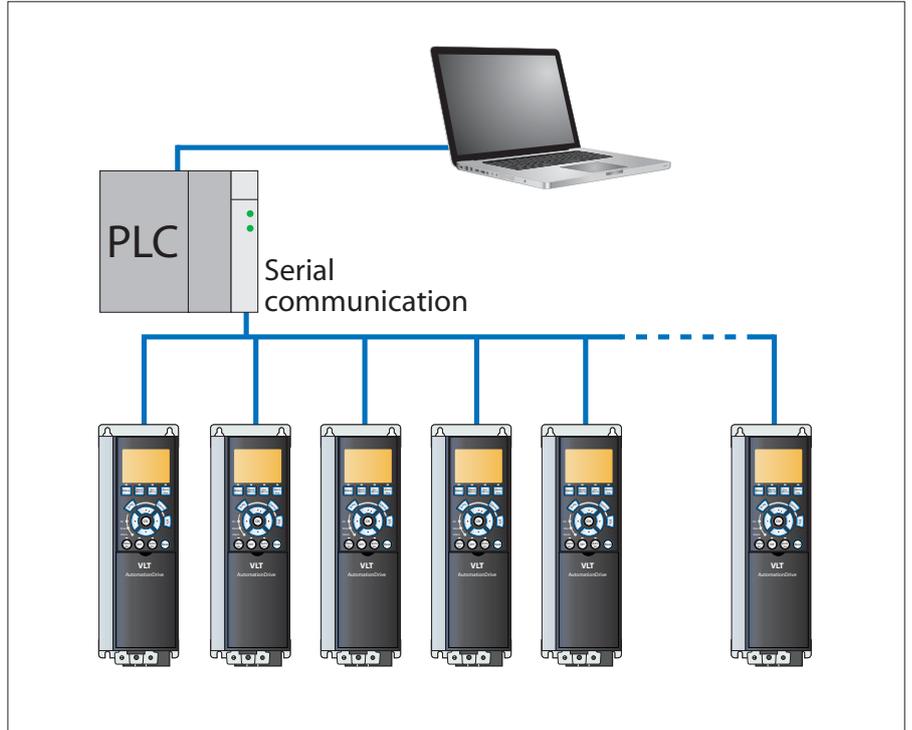
For owners this means higher capital costs and restricted flexibility. At the same time the risk of error is high, as the risk of a faulty connection to the PLC increases with the number of cables.



### Fieldbus wiring

A typical fieldbus system only uses twisted pair cables to connect the drive to the PLC. Despite the higher cost of components, fieldbus systems offer several advantages over older, hardwired systems: fewer cables, faster commissioning and a reduced risk of faults.

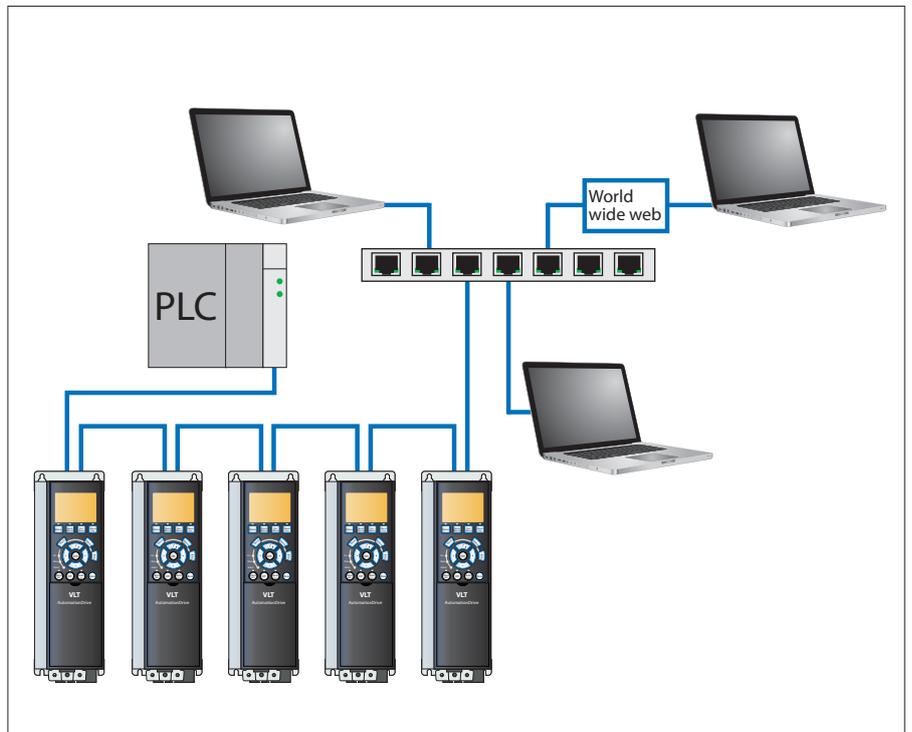
Additional drives are connected in a serial Ethernet based network that can be extended easily. New parameters only needed to be coded into the PLC, which is both faster, safer and at significantly lower cost than a hardwired system.



### Fieldbus over Ethernet

The Ethernet interface enables the possibility to access drive parameters and information from locations outside the production facility. This method bypasses the traditional control hierarchy, as communication with the fieldbus fitted drives and other equipment does not necessarily need to pass through the PLC.

External access is routed through a firewall, enabling communication with the fieldbus option's built-in webserver. Not only does this provide a high degree of flexibility during commissioning, it also provides advantages such as external monitoring and application support.



# Solutions for all networks

Danfoss VLT® drives support all major industry fieldbuses.

## Download drivers for easy PLC integration

Integrating a drive into an existing bus system can be time consuming and complicated. To make this process easy and more efficient, Danfoss has developed optimized fieldbus drivers, which can be downloaded for free from the Danfoss website. After installation the bus parameters, typically only a few, can be set directly in the VLT® drive.

## Increase productivity

Fieldbus communication reduces capital costs in production plants. In addition to the initial savings achieved through the significant reduction in wiring and control boxes, fieldbus networks are easier to maintain, while providing improved systems performance.

## Factory fitted plug-and-play

Delivered with the chosen communication protocol installed from the factory, Danfoss drives are easy to integrate with PLC systems and motors regardless of manufacturer.

Danfoss fieldbus options can also be installed as a plug-and-play solution if required at a later stage if the production layout demands a new communication platform.

## User friendly and fast setup

Danfoss fieldbuses are configured via the drive's local control panel, which

features a 27-language user friendly interface including Chinese. The drive and fieldbus can also be configured using Danfoss' MCT10 software.

The time saving setup procedure is identical whether you use a VLT® AutomationDrive, VLT® HVAC Drive or a VLT® AQUA Drive.

## Global fieldbus experts

Danfoss' global sales and support organization is trained in the market's many PLC systems. With in-depth knowledge about the challenges in modern production plants, they are perfectly equipped to provide advice and help so your VLT drives perform optimally.



## ProfiNet stars in Siemens PLC setup

The electronic control system for the main line at the Ulanhot cigarette factory includes over 130 VLT® AutomationDrive FC 302 equipped with ProfiNet cards. The stability and reliability of the ProfiNet system is a significant improvement compared with the original system.

## Star-structure automation system

Using Danfoss VLT® ProfiNet, the Siemens PLC and SCALANCE switch form a star network with the frequency converters, each drive working independently without affecting other nodes' communication. The star or tree topology ensures that all nodes are independent and free from the influence of other bus segments, the whole prime line automation network being divided into management and equipment levels.

## The Benefits

This has produced a number of benefits. The VLT® drive's proven reliability ensures its continuous operation in a variety of industrial environments throughout the factory. The system creates a star-structure automation system of greater reliability and functionality than is possible with Profibus. If one sub-station fails, the other stations remain operational to ensure that each node within the network is independent of each other.

The system's data processing capabilities have been strengthened, simplifying overall operation and also making the operators' tasks easy and convenient. In addition, managers are able to access much more data, thereby increasing the prime line efficiency.



# Fieldbus option overview



## VLT® PROFIBUS DP-V1 MCA 101

Operating the frequency converter via a fieldbus lets you reduce the cost of your system, communicate faster and more efficiently, and benefit from an easier user interface.

- PROFIBUS DP-V1 gives you wide compatibility, a high level of availability, support for all major PLC vendors, and compatibility with future versions

- Fast, efficient communication, transparent installation, advanced diagnosis and parameterisation and auto-configuration of process data via GSD-file
- A-cyclic parameterisation using PROFIBUS DP-V1, PROFIdrive or Danfoss FC profile state machines, PROFIBUS DP-V1, Master Class 1 and 2

Ordering number	VLT® HVAC Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 202	FC 301	FC 302
130B1100 uncoated 130B1200 coated	●	●	●	●



## VLT® PROFINET MCA 120

PROFINET uniquely combines the highest performance with the highest degree of openness. The MCA120 gives the user access to the power of Ethernet, and the options is designed, so that many of the features from the PROFIBUS MCA 101 can be reused, giving the user lowest effort to migrate PROFINET, securing the investment in PLC program.

### Other features:

- Built-in web server for remote diagnosis and reading out of basic drive parameters.
- Support of DP-V1 Diagnostic, allows a easy, fast and standardized handling of warning and fault information into the PLC, which improve bandwidth in the system.

PROFINET encompasses a suite of messages and services for a variety of manufacturing automation applications, including control, configuration and information.

Ordering number	VLT® HVAC Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 202	FC 301	FC 302
130B1135 uncoated 130B1235 coated	●	●	●	●



## VLT® EtherNet/IP MCA 121

Ethernet will become the future standard for communication on the factory floor. The EtherNet/IP Option is based on the newest technology available for the Industrial use and handles even the most demanding requirements. EtherNet/IP extends commercial off-the-shelf Ethernet to the Common Industrial Protocol (CIP™) – the same upper-layer protocol and object model found in DeviceNet.

The VLT® MCA 121 offers advanced features:

- Built-in high performance switch enabling line-topology, and eliminating the need for external switches
- Advanced switch and diagnosis functions
- Built-in web server
- E-mail client for service notification
- Unicast and Multicast communication

Ordering number	VLT® HVAC Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 202	FC 301	FC 302
130B1119 uncoated 130B1219 coated	●	●	●	●

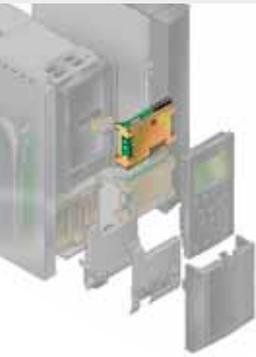


## VLT® DeviceNet MCA 104

DeviceNet offers robust, efficient data handling thanks to advanced Producer/Consumer technology.

- This modern communications model offers key capabilities that let you effectively determine what information is needed and when
- You will also benefit from ODVA's strong conformance testing policies, which ensure that products are interoperable

Ordering number	VLT® HVAC Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 202	FC 301	FC 302
130B1102 uncoated 130B1202 coated	●	●	●	●



### VLT® DeviceNet Converter MCA 194

The VLT® DeviceNet Converter emulates VLT® 5000 commands in the VLT® AutomationDrive. This means that a VLT® 5000 can be replaced by the VLT® AutomationDrive, or an existing system can be expanded, without costly change of the PLC program. For a later upgrade to a different fieldbus, the installed

converter can easily be removed and replaced with a different option. This secures the investment without losing flexibility. The option emulates I/O instances and explicit messages of a VLT® 5000.

Release in Q1, 2013

Ordering number	VLT® HVAC Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 202	FC 301	FC 302
130B1102 uncoated 130B1202 coated	●	●	●	●



### VLT® CANopen MCA 105

High flexibility and low cost are two of the cornerstones for CANopen. The CANopen option for the VLT® AutomationDrive is fully equipped with both high priority access to control and status of the Drive (PDO Communication) and access to all Parameters through acyclic data (SDO Communication).

For interoperability the option has implemented the DSP402 AC drive Profile. This all guarantees standardised handling, interoperability and low cost.

Ordering number	VLT® HVAC Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 202	FC 301	FC 302
130B1103 uncoated 130B1205 coated			●	●



### VLT® EtherCAT MCA 124

The VLT® EtherCAT Option offers connectivity to EtherCAT based networks via the EtherCAT Protocol. The option handles the EtherCAT line communication at full speed and connection towards the drive down to 4 ms intervals in both directions. This allows the MCA 124 to participate in networks from low performance up to servo applications.

- CoE CAN over EtherCAT Support
- EoE Ethernet over EtherCAT support
- HTTP (Hypertext Transfer Protocol) for diagnosis via built-in web server
- SMTP (Simple Mail Transfer Protocol) for e-mail notification
- TCP/IP for easy access to drive configuration data from MCT 10

Ordering number	VLT® HVAC Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 202	FC 301	FC 302
130B5546 uncoated 130B5646 coated			●	●



### VLT® POWERLINK MCA 123

POWERLINK represents the second generation of fieldbus. The high bit rate of Industrial Ethernet is used making the full power of IT technologies from automation world is now available for the factory world.

Due to its CANopen-based communication models, network management and device description model, the technology offers much more than just a fast communication network.

POWERLINK does not only provide high performance real-time and time synchronisation features.

- The perfect solution for:**
- Dynamic motion control applications
  - Material handling
  - Synchronisation and positioning applications

Ordering number	VLT® HVAC Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 202	FC 301	FC 302
130B1489 uncoated 130B1490 coated			●	●



### VLT® LonWorks MCA 108

LonWorks is a fieldbus system developed for building automation. It enables communication between individual units in the same system (peer-to-peer) and thus supports decentral of control.

- Supports Echelon free-topology interface (flexible cabling and installation)
- Supports embedded I/Os and I/O options (easy implementation of de-central I/Os)
- Sensor signals can quickly be moved to another controller via bus cables
- Certified as compliant with LonMark ver. 3.4 specifications

- No need for big main station (master-follower)
- Units receive signals directly

Ordering number	VLT® HVAC Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 202	FC 301	FC 302
130B1106 uncoated 130B1206 coated	●			



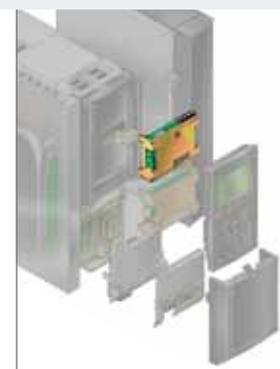
### VLT® BACnet MCA 109

The open communications protocol for world-wide building automation use. The BACnet protocol is an international protocol that efficiently integrates all parts of building automation equipment from the actuator level to the building management system.

- BACnet is the world standard for building automation
- International standard ISO 16484-5

- With no license fees, the protocol can be used in building automation systems of all sizes
- The BACnet option lets the drive communicate with building management systems running the BACnet protocol
- BACnet is typically used for heating, ventilation, cooling and climate equipment control
- The BACnet protocol is easily integrated into existing control equipment networks

Ordering number	VLT® HVAC Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 202	FC 301	FC 302
130B1144 uncoated 130B1244 coated	●			



### VLT® Modbus TCP MCA 122

Modbus TCP is the first industrial Ethernet based protocol for automation. The MCA 122 Modbus TCP option connects to Modbus TCP based networks. It is able to handle connection intervals down to 5 ms in both directions, positioning it among the fastest performing Modbus TCP devices in the market. For master redundancy the option features hot swapping between two masters.

#### Other features:

- Built-in web-server for remote diagnosis and reading out basic drive parameters
- An e-mail notifiator can be configured for sending an e-mail message to one or several receivers, if certain warnings or alarms occurs, or has cleared again

Ordering number	VLT® HVAC Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 202	FC 301	FC 302
130B1196 uncoated 130B1296 coated	●	●	●	●



### VLT® 3000 Converter MCA 113

The VLT® 3000 Converter is a special version of the Profibus options that emulates the VLT® 3000 commands in the VLT® AutomationDrive. The VLT® 3000 can then be replaced by the VLT® AutomationDrive, or the system can be

expanded without costly change of the PLC program. When upgrading to a new fieldbus, the installed converter is easily removed and replaced with a new option. This secures the investment without losing flexibility.

Ordering number	VLT® HVAC Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 202	FC 301	FC 302
NA uncoated 130B1245 coated				●



### VLT® 5000 Converter MCA 114

The VLT® 5000 Converter is a special version of the Profibus options that emulates the VLT® 5000 commands in the VLT® AutomationDrive. The VLT® 5000 can then be replaced by the VLT® AutomationDrive, or the system can be expanded without costly change of the PLC

program. When upgrading to a new fieldbus, the installed converter is easily removed and replaced with a new option. This secures the investment without losing flexibility. The option supports DPV1.

Ordering number	VLT® HVAC Drive	VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 202	FC 301	FC 302
NA uncoated 130B1246 coated				●



### VLT® LonWorks for ADAP-KOOL® MCA 107

ADAP-KOOL® is a complete electronic refrigeration and control system for monitoring and controlling refrigeration plants. Connecting this drive to an ADAP-KOOL® Lon network is simple.

After entering a network address, pressing a service pin starts the automatic configuration procedure.

Ordering number	VLT® HVAC Drive		VLT® AQUA Drive	VLT® AutomationDrive	
	FC 102	FC 103	FC 202	FC 301	FC 302
130B1169 uncoated 130B1269 coated		●			



# What VLT® is all about

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

## Environmentally responsible

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

All frequency converter factories are certified according to ISO 14001 and ISO 9001 standards.

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.

## Impact on energy savings

One year's energy savings from our annual production of VLT® 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®.

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® 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.

