

ENGINEERING TOMORROW

**Operating Guide** 

# **VLT® Motion Control Tool MCT 10**

vlt-drives.danfoss.com





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# **1** Introduction

### 1.1 Purpose of this Operating Guide

This manual provides basic knowledge required to use the MCT 10 Set-up Software with Danfoss drives. Familiarity with the following is assumed:

- MS<sup>®</sup>-Windows<sup>o</sup> at user level.
- Set-up, process knowledge, and operation of drive.
- Use of and linkage with communication equipment.

The manual does not provide any detailed information regarding specific applications or possible solutions and related parameter combinations in the set-up and use of a drive. Refer to the operating guide and design guide of the drive. Any update of the manual and instructions related to the MCT 10 Set-up Software is available at <u>www.danfoss.com</u>.

Familiarity with the PC or PLC master of the system is assumed. Issues regarding hardware or software produced by other manufacturers are beyond the scope of this manual and are not the responsibility of Danfoss.

Refer to the appropriate manuals for more information about master-to-master communication, or communication to a non-Dan-foss slave.

# 1.2 Manual and Software Version

This manual is regularly reviewed and updated. All suggestions for improvement are welcome.

Edition	Remarks	Software ver- sion
AQ283728700891, version 0201	Upgrade to new software version. Support of Multiple Drive Handling, Wire- less Direct, and Condition-based Monitoring.	5.3

The original language of this manual is English.

# 1.3 Intended Use

The MCT 10 Set-up Software enables full system configuration and control. With MCT 10, it is possible to monitor the entire system more efficiently for faster diagnosis and better preventive maintenance.

MCT 10 is designed as an interactive commissioning tool for quick and easy commissioning of the following drive series:

- VLT<sup>®</sup> 2800.
- VLT<sup>®</sup> 4000.
- VLT<sup>®</sup> 5000.
- VLT<sup>®</sup> 6000.
- VLT<sup>®</sup> 8000.
- VLT<sup>®</sup> Micro Drive FC 51.
- VLT<sup>®</sup> HVAC Basic Drive FC 101.
- VLT<sup>®</sup> HVAC Drive FC 102.
- VLT<sup>®</sup> Refrigeration Drive FC 103.
- VLT<sup>®</sup> AQUA Drive FC 202.
- VLT<sup>®</sup> Midi Drive FC 280.
- VLT<sup>®</sup> AutomationDrive FC 301/FC 302.
- VLT<sup>®</sup> AutomationDrive FC 360.
- VLT<sup>®</sup> Decentral Drive FCD 302.
- VLT<sup>®</sup> DriveMotor FCM Series.
- VLT<sup>®</sup> Compressor Drive CD 302.
- VLT<sup>®</sup> Compressor Drive CDS 302.
- VLT<sup>®</sup> Compressor Drive CDS 303.
- VLT<sup>®</sup> Soft Starter MCD 500.
- VLT<sup>®</sup> Soft Starter MCD 600.

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- VLT<sup>®</sup> Advanced Active Filter AAF 005.
- VLT<sup>®</sup> Advanced Active Filter AAF 006.

Use cases of the MCT 10:

- For planning a new communication network offline. The MCT 10 contains a complete database with all Danfoss Drives products.
- For commissioning drives online.
- For easy replacement of drives.
- For easy expansion of networks with more drives.
- For back-up of parameter settings of drives in a communication network.
- The MCT 10 supports PROFIBUS DP-V1 communication via a master class 2 connection. This connection eliminates the need for an extra communication network.

The communication framework part of MCT 10 is handling the control of the fieldbuses. It provides enhanced capabilities allowing multiple concurrent fieldbus communication. Several fieldbuses can be configured and combined in the same network within MCT 10.

# NOTICE

If several fieldbuses are created with the same type, make sure that they are configured with different scan ranges.

### **1.4 System Requirements**

To use the VLT® Motion Control Tool MCT 10, the IBM-compatible computer must meet the following minimum system requirements:

• 4 GB of available space on the hard drive.

MCT 10 runs on Windows<sup>o</sup> 10 32/64-bit editions.

# 1.5 Software Modules

The VLT® Motion Control Tool MCT 10 Set-up Software is supplied in 2 modules:

- MCT 10 Set-up Software for:
  - Setting the drive parameters.
  - Copying parameter sets to and from a drive.
  - Documentation/printout of set-up, including diagrams.
  - Servicing and fault analysis.
- APoss program for creating APoss programs.

# 1.5.1 Features of the VLT<sup>®</sup> Motion Control Tool MCT 10

- Project-oriented PC tool, 1 tool for all drive series.
- Links to all Windows applications possible.
- Supports Siemens CP PCMCIA-and PCI cards for PROFIBUS DP-V1 master class 2 connection.
- Supports standard interfaces: COMx, USB, RS232 (Flux).
- Siemens PG/Field PGs already have the required hardware.
- View is highly individually configurable.
- Downwards compatibility with Dos-Dialog (\*.mnu) and WinDialog (\*.vlt).
- Windows<sup>o</sup> Explorer-like interface for quick and easy start-up and navigation.
- Wireless Direct.



Introduction



Illustration 1: Connect up to 126 Nodes with a Repeater and up to 31 Nodes without Repeater

# 1.6 Versions

VLT® Motion Control Tool MCT 10 is available in 2 versions:

 MCT 10 Set-up Software Basic is available free of charge. Download the program from <u>www.danfoss.com</u> - select VLT<sup>®</sup> Motion Control Tool MCT 10.

e30bt513.12

• MCT 10 Set-up Software Advanced can be purchased using ordering number 130B1000.

#### Table 1: Features of the Basic and Advanced Versions

Version supports	MCT 10 Set-up Software Advanced	MCT 10 Set-up Soft- ware Basic
Drives per project	Unlimited	4
FC protocol		٥
Functional safety		×
USB		
PROFIBUS DP-V1		٥
PROFIBUS DP-V1 handling multiple Danfoss nodes concurrently	[] (limited performance)	×
Ethernet-TSC		
Logging and scope function	8 channels	2 channels
Real-time logging from a drive	4 channels	×
Alarm display		View only
VLT® Motion Control Option MCO 305		٥
Graphical smart logic control	٥	٥
VLT <sup>®</sup> 5000 to FC 302, VLT <sup>®</sup> 6000 to FC 102, and VLT <sup>®</sup> 2800 to FC 280 conversion wizards	0	0

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Version supports	MCT 10 Set-up Softwa Advanced	are MCT 10 Set-up Soft- ware Basic
FC to FC conversion wizard	0	0
Import 3000.XLS to FC 302	D	×
Motor database	0	×
VLT® Extended Cascade Controller MCO 101	0	×
Drive file system	D	×
VLT <sup>®</sup> Wireless Control Panel LCP 103	0	0
Status plug-in	D	0
Drive plug-in	0	×
VLT <sup>®</sup> Software Customizer	0	×

# 1.7 Further Information

The following manuals related to VLT<sup>®</sup> Motion Control Tool MCT 10 are available:

- VLT<sup>®</sup> PROFIBUS DP-V1 MCA 101 Installation Guide.
- Design guides for the relevant drives.

Refer to www.danfoss.com/en/about-danfoss/our-businesses/drives/ for more information. It is also possible to find video training material on this site for operating the MCT 10.

# 2 Safety

# 2.1 Safety Symbols

The following symbols are used in this manual:

# 🛦 D A N G E R 🛦

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

🛦 W A R N I N G 🛦

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

**A** C A U T I O N **A** 

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

ΝΟΤΙΟΕ

Indicates information considered important, but not hazard-related (for example messages relating to property damage).

# 2.2 Safety Precautions

# 🛦 W A R N I N G 🛦

#### **HIGH VOLTAGE**

AC drives contain high voltage when connected to AC mains input, DC supply, or load sharing. Failure to perform installation, start-up, and maintenance by qualified personnel can result in death or serious injury.

- Only qualified personnel must perform installation, start-up, and maintenance.

# 🛦 W A R N I N G 🛦

#### UNINTENDED START

When the drive is connected to the AC mains, DC supply, or load sharing, the motor may start at any time, causing risk of death, serious injury, and equipment, or property damage. The motor may start by activation of an external switch, a fieldbus command, an input reference signal from the LCP or LOP, via remote operation using MCT 10 Set-up software, or after a cleared fault condition.

- Press [Off] on the LCP before programming parameters.
- Disconnect the drive from the mains whenever personal safety considerations make it necessary to avoid unintended motor start.
- Check that the drive, motor, and any driven equipment is in operational readiness.

#### AQ283728700891en-000201 / 130R0466

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Safety

# 🛦 W A R N I N G 🛦

#### DISCHARGE TIME

The drive contains DC-link capacitors, which can remain charged even when the drive is not powered. High voltage can be present even when the warning indicator lights are off.

Failure to wait the specified time after power has been removed before performing service or repair work could result in death or serious injury.

- Stop the motor.
- Disconnect AC mains, permanent magnet type motors, and remote DC-link supplies, including battery back-ups, UPS, and DC-link connections to other drives.
- Wait for the capacitors to discharge fully before performing any service or repair work. The discharge time is specified in the drive operating guides.
- Use a measuring device to make sure that there is no voltage, before opening the drive or performing any work on the cables.

# 3 Installation and De-installation

#### 3.1 Introduction

The VLT® Motion Control Tool MCT 10 Software and SyncPos modules are installed via a multilingual, self-explanatory installation program.

# 3.1.1 Starting the Installation Program

#### Procedure

- 1. Run VLT\_MCT10\_Vx.xx.msi.
- 2. Follow the instructions of the installation program.

When the installation process is complete, the MCT 10 Set-up Software can be found on the following path:



Illustration 2: Path for MCT 10 Set-up Software

#### 3.1.2 Selecting the Software Language

The Danfoss default language is English. If another language is selected, it becomes the new default. **Procedure** 

- 1. Select *Options* from the main menu, then select *Select Language*.
- 2. Select the wanted language from the scrollbar and click OK.



Changing the language affects the parameter language. If an external LCP is connected to the drive, the change of language version does not affect the language in the display.

3. Close and restart MCT 10 to activate the language setting.

# 3.1.3 Uninstalling the Software



The following procedure is only valid for Windows operating systems.

#### Procedure

- 1. Select Start.
- 2. Select Settings.
- **3.** Select Control Panel.
- 4. Double-click Remove/Add Programs.
- 5. Select Remove.

# 4 Set-up of Communication

#### 4.1 Communication Options

Drives in the VLT® HVAC Drive FC 102, VLT® AQUA Drive FC 202, and VLT® AutomationDrive FC 302 series are equipped with a USB port. Communication from a PC can be established using a standard A–B male-to-male USB cable connected to the drive. No extra hardware or bus configuration is required. If the PC is equipped with more than 1 USB port, several drives can be connected. The USB bus is automatically added to the network bus list.

Establish a hardwired connection through:

- Standard built-in RS485, or
- USB port.

The USB interface socket allows devices to be connected and disconnected using hot swapping. When connecting a drive using USB, MCT 10 Set-up Software automatically adds on to the bus list.

If the VLT® PROFIBUS DP-V1 MCA 101 or the VLT® EtherNet/IP MCA 121 option is mounted in the drive, establish the connection through:

- PROFIBUS master class 2 connection (MSAC 2), or
- Ethernet-based network.



Connect soft starters either via a USB cable or via ethernet.

# NOTICE

#### **RISK OF DAMAGE TO PC USB HOST CONTROLLER**

When connecting the PC to the drive through the USB cable, there is a risk of damaging the PC USB host controller.

- Follow the recommendations for grounding described in the Operating Guide for the relevant drive.
- Use a USB isolator with galvanic isolation to protect the PC USB host controller from ground potential differences when connecting the PC to a drive through a USB cable.
- Do NOT use a PC power cable with a ground plug when the PC is connected to the drive through a USB cable.

Communication from a PC can be established via RS232 to RS485 converters or via USB to RS485 converters.

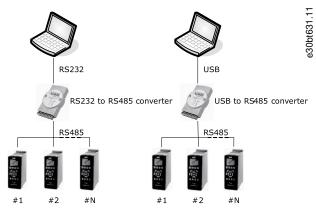


Illustration 3: Communication from a PC

#### 4.2 Manual Fieldbus Configuration

After installation, configure the non-plug-and-play networks via the fieldbus configuration dialog. **Procedure** 

- 1. Start the MCT 10 Set-up Software.
- 2. Select Network.

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3. Right-click Network and select Add/Remove/Configure Buses.

🚰 Untitled - MCT 10 Set-up Software	e30bt622.12
File Edit View Insert Communication Tools Options Help	30bt6
🎦 💕 🖬 👗 🖓 👪 🕼 🏝 🌫 🏥 🗰 🎯 🐶 🕘 🔳 🕨 🦭	<u>ل</u> ه.
Network     Add/Remove/Configure Buses	
L. Serial	

#### Illustration 4: Refreshing the Fieldbus List

4. Add, remove, or configure the properties for the connected buses.

	rives Fieldbus (	Configuration	×
stalled fieldbu	ises:		
Туре	Fieldbus name	Installation	
Profibus	DP-V1	Manual	
SerialFCBus	Serial	Manual	
Ethernet	Ethernet	Manual	
Add	Remo	ve	Properties

Illustration 5: Fieldbus Configuration

5. Scan the network for active drives to make MCT 10 indicate available drives on the non-plug-and-play fieldbuses.

# 4.3 Automatic Scan

Only the USB fieldbus is scanned automatically when a drive is connected to the PC. For non-plug-and-play fieldbuses, scan manually for active drives.

# 4.3.1 Scan Range Configuration

Enter the preferred scan setting by right-clicking *SerialCom* and then selecting *Configure Driver*.

Adding a standard bus RS485 or PROFIBUS to the network tree configures the scan range to scan the entire address range. The Ethernet-TSC bus is added using the current IP address settings.

The fieldbus scan range can be configured in several ways:

- Right-click the *Fieldbus* icon in the network tree and select *Configure Bus*.
- Mark the *Fieldbus* icon in the network tree and select *Configure* under *Communication* in the main menu bar.
- Open the Fieldbus Configuration dialog, right-click the Network icon, and select Add/Remove/Configure Buses.
- Open from the Windows panel.

antoss



#### Illustration 6: Scan Network Icon

#### 4.3.2 Scan Network

Scan a fieldbus in 3 ways:

- Right-click the *Fieldbus* icon in the network tree and select *Scan Bus* for active drives.
- Mark the Fieldbus icon in the network tree and select Scan/Refresh under Communication in the main menu bar.
- Mark the *Fieldbus* icon in the network tree and select the *Scan* icon on the toolbar.

The Scanning for Drives window appears and indicates the progress of the scan.

Status		
Scanning bus for active drives 1 drive(s) responded to scan. Identifying drive(s) ✓ Drive Address: 1 - Identification finished.		
ase wait		100%
	50%	

Illustration 7: Progress of Network Scanning

#### 4.4 Set Up the Drive with RS485 Data Communication

All drives can be configured to 300, 1200, 4800, 9600 (default), 19200, 38400, 57600, or 115200 baud. The serial configuration is always configured with:

- 8 data bits.
- 1 stop bit.
- Even parity.

# 4.4.1 Configuring the Fieldbus

When using an RS485 converter as the Advantech ADAM converter, MCT 10 Set-up Software indicates online drives available on the fieldbus after scanning the bus.



Protocol and advanced settings are for performance optimization and should normally not be changed.

Procedure

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1. Open the Serial Fieldbus Configuration dialog box or right-click the appropriate fieldbus.

neral Protocol Advanced			
Line settings Port:			
COM3: Intel(R) Active Managemen	t Technology - SOL	~	
Baud rate:	Parity:	Stop bits:	
9600 ~	Even parity V	1 ~	
Fieldbus scanning Start scanning from address: 1			
Stop scanning at address: 12	5		
Reset to default			

#### Illustration 8: Serial Fieldbus Configuration

**2.** Set the COM port number.

When using USB to RS485 converters, the actual COM port number can be identified from the device manager part of the Windows control panel.

- 3. Set the baud rate, parity, and the number of stop bits (must match the settings in the drive).
- 4. Set the fieldbus scanning range to the available address to limit the time scanning for active drives.
- 5. Press OK to activate settings or select to restore the default settings.

# 4.4.2 USB Data Communication

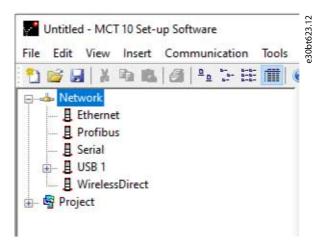


Illustration 9: Network Bus List

When the USB cable is disconnected, the drive connected via the USB port is removed from the network bus list.

#### 4.5 Set-up of Soft Starter

Setting up connectivity to the VLT<sup>®</sup> Soft Starter MCD 500 and VLT<sup>®</sup> Soft Starter MCD 600 requires that the USB communication module is mounted on the soft starter. Communication from a PC can be established using a standard A–B male-to-male USB cable connected to the USB communication module. If the PC is equipped with more than 1 USB port or a USB HUB, several soft starters can be connected.

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# 4.5.1 Serial Configuration

All soft starters can be configured to 300, 1200, 4800, 9600 (default), 19200, 38400, 57600, or 115200 baud. The serial configuration is always configured with:

- 8 data bits.
- 1 stop bit.
- No parity.

erial AuCom configuration						×
General						
Line settings Port:						
COM6: Standard Serial ov	er Bluetoo	th link		~		
Baud rate:		Parity:		Stop bits:		
9600	~	No parity	~	1	~	
Reset to default						
				OK	Cancel	

Illustration 10: Serial Configuration of Soft Starters

# 4.5.1.1 Configuring the Fieldbus

#### Procedure

1. Add and configure the bus from the Fieldbus Configuration dialog.

If the bus is already added to the network, it can be reconfigured by right-clicking on the appropriate soft starter fieldbus.

- 2. Set the COM port number. The actual COM port number can be identified from the device manager part of the control panel.
- 3. Set the baud rate, parity, and the number of stop bits (must match the setting in the soft starter).
- 4. Reset to Default restores the general settings and fieldbus scanning to factory configuration values.

# 4.5.1.2 Using the Hilscher Netldent Protocol

Use the tool for searching for devices and for identifying and changing IP addresses. The tool also has a filtering function. **Procedure** 

1. Click the Tools menu.



2. Select Soft Starter Discover and Configuration Tool.

2 Tools Options Help e30bt980. Compare... Apply Parameter View Settings... Filter Parameter ... Update VLT Software Customizer support... Update Drive support ... VLT2800 Conversion Wizard... VLT5000 Conversion Wizard... VLT6000 Conversion Wizard... Import drive from Excel... Import drive from Excel and write ... Manage motor db ... Manage Sensorless Pumps db ... OSS Creator... MME Creator... LCP103 Whitelist Creator... Export CSV/Master Files ... Drive Converter Tool ъ Soft Starter Discover and Configuration Tool SafeOption Log Viewer

#### Illustration 11: Selecting the Hilscher NetIdent Tool

- 3. Select the soft starter for which the IP address should be configured.
- 4. Click Configure.

# 4.5.2 Importing/Exporting Parameter Files, MCD 600

With VLT<sup>®</sup> Soft Starter MCD 600, a parameter file (PAR file) can be exported from the soft starter to a USB stick and copied into VLT<sup>®</sup> Motion Control Tool MCT 10. After changing the file in MCT 10, the PAR file can be copied back to the USB stick and applied to the soft starter.

#### Procedure

- 1. Create an MCD 600 project soft starter.
- 2. Right-click the project folder.
- 3. Select Import parameters.
- 4. From the dialog, select the file to import.

A dialog opens showing information about the selected file.

Set-up of Communication

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Level	Message	e30pn310
Info	Soft Starter type: MCD600	Ŭ
Info	Parameter list version: 0.1.0.0	
Info	Soft Starter Model: MCD6-0020B	
Info	File checksum correct: 56122	
	Continue Cancel	

ence.

#### 5. Press *Continue* to apply the file.

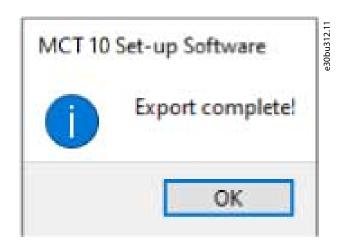
A view, which shows all changed parameters, appears.

	e30bu31
3	e e
Info Parameter "1-3" changed, Old: "15" New: "22"	
Tulumeter 1-5 changed. Old. 15 New. 22	
Info Parameter "1-4" changed. Old: "00:20" New: "00:10"	
Info Parameter "1-5" changed. Old: "720" New: "600"	
Info Parameter "3-4" changed. Old: "00:20" New: "00:10"	
Info Parameter "4-2" changed. Old: "42" New: "0"	
Info Parameter "4-3" changed. Old: "28" New: "0"	
Info Parameter "7-1" changed. Old: "Jog Forward" New: "Input Trip (N/O	)"
Info Parameter "20-2" changed. Old: "64" New: "80"	
Info All done!	

- 6. Click *Ok* to close the window.
- 7. Right-click the project to export from MCT 10.
- 8. Select the parameters to export.
- 9. In the file selection dialog, select where to export the file to.

A dialog appears when the export is completed.





## 4.6 PROFIBUS DP-V1 Communication

Setting up PROFIBUS DP-V1 communication requires a VLT<sup>®</sup> PROFIBUS DP-V1 MCA 101 option module. Communication from a PC using PROFIBUS DP-V1 can be established using a PROFIBUS PCMCIA card or a card installed in the PC. The PROFIBUS cable from the drive is connected to the 9-pin sub D socket connector on the card.

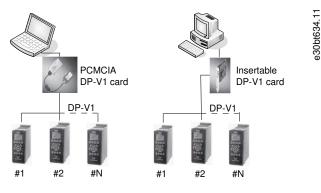


Illustration 12: PROFIBS DP-V1 Communication

Consult Siemens www.siemens.com for the latest supported cards for PCs.



Connectivity via PROFIBUS DP-V1 to a VLT<sup>®</sup> AutomationDrive FC 302 utilizing the VLT<sup>®</sup> PROFIBUS Converter MCA 114 with option firmware version 2.03 is not possible from MCT 10 Set-up Software. Use the fieldbus or USB bus instead.

# 4.6.1 Configuring PROFIBUS DP-V1

When using a PROFIBUS interface card with the associated driver installed, MCT 10 Set-up Software indicates online drives available on the specific PROFIBUS after scanning the bus for active drives.

#### Procedure

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Set-up of Communication

1. Configure the bus from the Fieldbus Configuration dialog or by right-clicking the appropriate PROFIBUS bus.

Number of connection retries:	3	_	Parameter I/O Read parameter timeout:	50	msec
Number of reconnection retries	: 3		Write parameter timeout:	200	msec
ile I/O			Parameters allowed per tele	gram:	_
File telegram timeout:	500	msec	Maximum speed (automatic	)	•
Max failures on file read:	10				
Reset to default					

Illustration 13: PROFIBUS Fieldbus Configuration

- 2. Set the board number.
- 3. Set the fieldbus scanning range to the available addresses only to limit the time used for scanning active drives.
- 4. Press OK to activate or reset to restore factory default settings.

### 4.6.2 DP-V1 Connection and PG/PC Interface

The MCT 10 Set-up Software PROFIBUS DP-V1 fieldbus plug-in utilizes the Siemens SoftNet driver available from Step7, or alternatively Simatic NET, to establish connectivity via the supported master class 2 cards such as CP5511 or CP5512.



# 4.6.2.1 Setting Up the PG/PC Interface

This procedure explains how to set up the PG/PC Interface from default configuration to open the PROFIBUS connection from MCT 10.

Cabling and terminations must be in accordance with wiring and cabling requirements for PROFIBUS. **Procedure** 



1. Open the PG/PC Interface.

			_
Access Point of the Application:			
CP_L2_1:> CP5512(PR0)	FIBUS)	~	•
(Standard interface SIMATIC NE	ET)		
Interface Parameter Assignment	Used:		
CP5512(PROFIBUS)		Properties	
CP5512(Fw/L)	~	Diagnostics	ור
E CP5512(MPI)			-
E CP5512(PPI)		Сору	
CP5512(PROFIBUS)	~	Dejete	
<	>		
(Parameter assignment of your communications processor CP5 PROFIBUS network)	512 for a		
Add/Remove:	1	Select	
	(	Sele <u>c</u> t	

Illustration 14: Set PG/PC Interface

- 2. Configure Access Point of the Application to CP\_L2\_1 pointing to the master class 2 card used.
- 3. Set Interface Parameter Assignment Used corresponding to the master class 2 card used.
- 4. Select *Properties* to configure the station- and network parameters.
  - Station parameters:

Set *PG/PC is the only master on the bus* to *Active* if no PLC is active on the bus. Use the *Diagnostics* described later to select a valid PROFIBUS address.

- Network parameters:

Set the *Transmission rate* to the same baud rate as the PLC if it is active.

5. Use *DP* as *Profile* and click *OK* to close the *Properties* dialog.

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Set-up of Communication

6. Select *Diagnostics* in the Set PG/PC Interface to verify network- and bus communication.

Properties - CP5512(PROFIL	aus) 🔊
PROFIBUS	
Station Parameters	- 1 
I PG/PC is the only master of	in the bus
Address:	1 *
Check address	
Imeout	1 s 💌
Network Parameters	
Transmission gate:	1.5 Mbps 💌
Highest station address:	126 💌
<u>P</u> rofile:	DP Standard Universal (DP/FMS) User-Defined
	<u>B</u> us Parameters
Network Configuration	
Les the following network of	configuration
Master: 1	Slayes: 0
OK Default	Cancel Help

#### Illustration 15: Properties Dialog

PROFIBUS/MPI Network Diagnostics Hardwa	sre	
Status/Network Diagnostics		
[est] OK		-
		×.
Station address: 1		
Bus parameters:		
Baudrate:	1500.00 Kbps	►
Highest station address (HSA): Minimum station delay Time (Min Tsdr):	126 11 (Bit	
Maximum station delay Time (Max Tsdr):	150 tBit	_
Setup time (tset):	1 tBit	~
Bus Nodes		
0 1 2 3 4 5 6 7 8 9 1011 121	13 14 15 16 17 18	319
		<u> </u>
		-
		-
	TEFEF	Ê I
	TEFE	
120FFFFFFF Key		
Station pa		
Bead ✓ Station ac ✓ Station ac	ctive ready	
	and ready	

#### Illustration 16: Simatic Network Diagnostics Dialog

7. Select *Test* to verify the access path and network configuration. If a sharing violation is detected, the test results in an error message. When the test result is successful, select *Read* to identify the active PROFIBUS nodes available on the network. Make sure that the address defined for the PG/PC interface does not conflict with an active node.

**Operating Guide** 



- 8. Close the PG/PC interface and start MCT 10.
- 9. Right-click a PROFIBUS and select Scan for active drives. MCT 10 Set-up Software identifies the same node IDs, except PLCs.

# 4.6.3 PROFIBUS Multitelegrams

With the *Parameters allowed per telegram* drop-down list, it is possible to configure the number of requests to be associated within a multitelegram. The standard allows up to 40 telegrams to be associated.

The following options are available:

- *Maximum speed* (default configuration). Handles the association automatically and adapts the number of telegrams for each drive according to the series. Can be used in PROFIBUS networks containing both old and new Danfoss drives.
- Conservative. Always associates 10 telegrams within a multitelegram. This option is useful when communicating only with old products such as the VLT<sup>®</sup> Decentral Drives FCD 300, VLT<sup>®</sup> DriveMotor FCM 300, series derived from VLT<sup>®</sup> HVAC Drive FC 102, VLT<sup>®</sup> AQUA Drive FC 202, and VLT<sup>®</sup> AutomationDrive FC 302.
- Single request. Only 1 request per telegram.

### 4.7 Ethernet-TSC Data Communication

To set up an Ethernet-TSC (transparent socket channel) communication, the VLT<sup>®</sup> EtherNet/IP MCA 121 option module is required within the drive. Communication from a PC can be established using a standard Ethernet cable connected to the drive.

# 4.7.1 Ethernet-TSC Configuration

An Ethernet-TSC bus is scanned using DDP (drive discovery protocol). The protocol does not require an IP port number and IP scan range. It identifies drives based on the MAC addresses.



When scanning through different subnets or remotely via a VPN tunnel, it is advised not to utilize the ADDP protocol but to use an IP range.

Click *Refresh* to generate a list of all active drives in the Ethernet. The list appears in the *Ethernet Fieldbus Settings* dialog when the scan is complete.

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# Set-up of Communication

### **Operating Guide**

asic Options Advanced							
Drive Discovery Method		_		Discovered D	Drives		515500 - 10 - 10 - 10 - 10 - 10 - 10 - 1
Multicast:	Refresh						20 drives found
posting to single multicast address,	Model	MAC Address	DHCP	IP Address	Subnet Mask	Default Gateway	Port
using Drive Discovery Protocol and UDP.	FC-102	00:18:08:00:08:9F	Enabled	10.28, 196, 43	255,255,240.0	10.28,193.1	4000
	FC-302	00:1B:08:00:06:97	Enabled	10,28,196,24	255,255,240,0	10,28,193,1	4000
Range Scan:	FC-302	00:1B:08:00:0B:87	Enabled	10.28, 196, 29	255,255,240.0	10.28, 193, 1	4000
probing all addresses in specified range, using FC Protocol and TCP.	FC-302	00:1B:08:00:06:81	Disabled	10.28, 196, 4	255,255,240.0	10.28, 193, 1	4000
using FC Flottocol and FCF.	FC-302	00:1B:08:00:06:CC	Enabled	10.28, 196, 27	255.255.240.0	10.28, 193, 1	4000
Multicast is superior to Range Scan. Use Range	FC-302	00:18:08:00:00:67	Enabled	10.28.196.25	255.255.240.0	10.28, 193, 1	4000
Scan if drives were not discovered with Multicast.	FC-302	00:1B:08:00:06:C9	Enabled	10.28.196.11	255.255.240.0	10.28.193.1	4000
	FC-302	00:18:08:00:06:99	Enabled	10.28.196.28	255.255.240.0	10.28.193.1	4000
	FC-302	00:18:08:00:06:96	Enabled	10.28.196.17	255,255,240.0	10.28.193.1	4000
Filtering	FC-302	00:1B:08:00:0B:90	Enabled	10.28.196.32	255.255.240.0	10.28, 193, 1	4000
	FC-302	00:18:08:00:08:90	Enabled	10.28.196.21	255.255.240.0	10.28.193.1	4000
Use IP Address Filter/ Range	FC-302	00:18:08:00:08:88	Disabled	10.28.196.21	255.255.240.0	10.28.193.1	4000
	FC-302		Enabled	10.28.196.12	255.255.240.0	10.28.193.1	4000
Start Address:		00:1B:08:00:07:49	Enabled				6.000
10 . 28 . 196 . 43	FC-302	00:1B:08:00:06:98	Disabled	10.28.196.23	255.255.240.0	10.28.193.1	4000
	FC-302	00:1B:08:00:0B:B5		10.28.196.40	255.255.240.0	10.28.193.1	4000
End Address:	FC-302	00:1B:08:00:0B:AC	Disabled	10.28.196.42	255.255.240.0	10.28.193.1	4000
10 . 28 . 196 . 43	FC-302	00:1B:08:00:06:94	Disabled	10.28.196.38	255.255.240.0	10.28.193.1	4000
	FC-302	00:1B:08:00:0B:99	Enabled	10.28.196.19	255.255.240.0	10.28.193.1	4000
Smaller set of drives requires less processing, thus Filtering can boost discovery from within application.	FC-302 FC-302	00:1B:08:00:0B:A2 00:1B:08:00:0B:93	Enabled Disabled	10.28.196.22 10.28.196.39	255.255.240.0 255.255.240.0	10.28.193.1 10.28.193.1	4000 4000
Drive Discovery Timeout							
500 19999 ms							
		🕐 You can	configure drive	e IP settings remotely	y by double clicking on	it (over UDP only).	

Illustration 17: ADDP Configuration

Drive types without any IP configuration use their Auto IP Class B address, which is 169.254.yy.xx, with yy.xx corresponding to the last 2 segments in the MAC address. Several uncommissioned drives without any IP configuration can be scanned on the same network.

Select a device from the Discovered Drives list to;

- Get more information about the device.
- Assign a static IP address, a subnet mask, or default value to the drive.
- Set up DHCP (dynamic host configuration protocol) look-up.

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Set-up of Communication

Options Drive IP Settings	Advanced		
ive Info			
Found on Interface	e: 10.28.196.8		
Drive Mode	l: FC-102		
MAC Address	s: 00:1B:08:00:0B:9F		
Host Name	e: n/a		
DNS Address			
TSC Port Number	r: 4000		
Use DHCP			
Manually Configure N	letwork Settings		
<ul> <li>Manually Configure N</li> <li>IP Address:</li> </ul>	letwork Settings		
IP Address:	10 . 28 . 196 . 43	Back to List	
IP Address: Subnet Mask:	10 . 28 . 196 . 43 255 . 255 . 240 . 0	Back to List	
IP Address: Subnet Mask:	10 . 28 . 196 . 43 255 . 255 . 240 . 0	Back to List	

Illustration 18: TSC Configure

# 4.7.1.1 Scanning with IP Range

When scanning using an IP range, the Ethernet telegrams are transmitted as traditional TCP/IP packages routed out in a router, switch, or manage switch without requiring any changes. The disadvantage is an increased scanning time, and drives without IP address configured are not identified.

# ΝΟΤΙΟΕ

Identification of drives using the VLT<sup>®</sup> EtherNet/IP MCA 121 option is possible only from option firmware version 1.03 or newer. If using options with firmware versions earlier than 1.03, configure *parameter 12-89 Transparent Socket Channel Power* to 0 to prevent the option from failing to operate.

Procedure

Set-up of Communication

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1. Configure the IP start address and the transparent socket channel port (parameter 12-89 Transparent Socket Channel Port), which is factory default 4000 in the drive.

sic Options Advanced					
rive Discovery Method			Discovere	ed Drives	
Multicast;	Refresh				
posting to single multicast address, using Drive Discovery Protocol and UDP.	IP Address	Port			
Range Scan:					
probing all addresses in specified range, using FC Protocol and TCP.					
Multicast is superior to Range Scan. Use Range Scan if drives were not discovered with Multicast.					
Itering					
Use IP Address Filter/Range					
Start Address:					
10 . 28 . 196 . 19					
End Address:					
10 . 28 . 196 . 24					
Smaller set of drives requires less processing, thus Filtering can boost discovery from within application.					
rive Discovery Timeout					
500 19999 ms					
		You can co	onfigure drive IP settings remo	tely by double clicking on it (over U	IDP only).

#### Illustration 19: Scan Range

- Ð After the scan, all active drives are identified.
- 2. Use a corresponding drive to read or write to a single drive instead of waiting for MCT 10 to scan and identify all drives.
  - a. Open the project file and create offline drives manually.
  - **b.** Configure the connection properties.
  - c. Right-click the offline drive.
  - d. Read and write to the drive without scanning the bus.

# 4.7.1.2 Filtering

When using multicast, it is possible to filter a range of IP addresses. Also, use filtering for boosting scan performance.

#### Set-up of Communication

Basic Options	Advanced								
Drive Discovery Method		Discovered Drives						5 drives found	
Multi	cast:	Refrest		Transmission a				5 drives tound	
	ng to single multicast address,	Model	MAC Address	DHCP	IP Address	Subnet Mask	Default Gateway	Port	
using Drive Discovery Protocol and UDP.		FC-302	00:1B:08:00:06:98	Enabled	10.28.196.23	255.255.240.0	10.28.193.1	4000	
<ul> <li>Range Scan:</li> <li>probing all addresses in specified range,</li> </ul>		FC-302	00:1B:08:00:0B:A2	Enabled	10.28.196.22	255.255.240.0	10.28.193.1	4000	
		FC-302	00:1B:08:00:0B:99	Enabled	10.28.196.19	255.255.240.0	10.28.193.1	4000	
	FC Protocol and TCP.	FC-302	00:1B:08:00:0B:8B	Enabled	10.28.196.21	255.255.240.0	10.28.193.1	4000	
	_		00:1B:08:00:06:97	Enabled	10.28.196.24	255.255.240.0	10.28.193.1	4000	
	P Address Filter/ Range start Address:								
	10 . 28 . 196 . 19								
E	ind Address:								
	10 . 28 . 196 . 24								
	er set of drives requires less processing, Filtering can boost discovery from within								

#### Illustration 20: Filtering

# 4.7.2 Wink Drive

During a commissioning process of a system containing several drives, it can be time-consuming physically to locate a drive based on the MCT 10 project. This is especially the case if the drive is not equipped with an LCP.

Through the Ethernet\_TSC fieldbus, it is possible via MCT 10 to use a wink function. This function blinks with the MS, NS1, and NS2 LEDs on all Danfoss Ethernet-based fieldbus options.

On the Ethernet-based fieldbus option, the winking is recognized with all 3 LEDs blinking orange with 1-Hz interval. There is no limit to the number of drives winking and the duration of winking.

# 4.7.2.1 Start Winking

# ΝΟΤΙΟΕ

It can take up to 30 s from starting or stopping the winking, until the option responds.

#### Procedure

1. Right-click a drive from the Ethernet network.

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Set-up of Communication

2. Select Start winking or Stop winking.

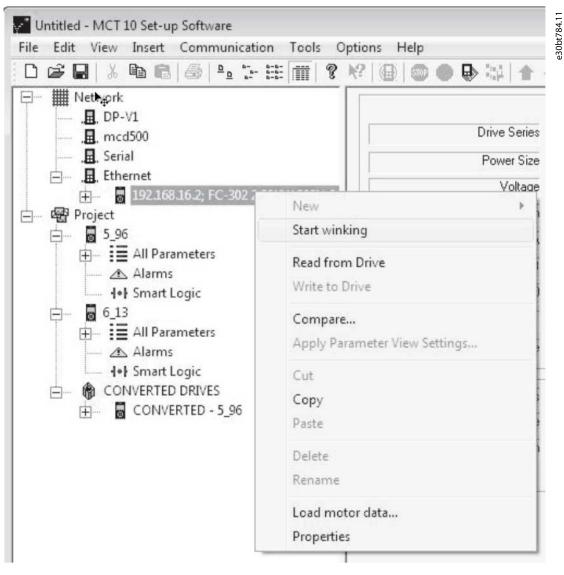


Illustration 21: Start Winking

### 4.7.3 Advanced

Use the Advanced tab:

- To configure Port Number For Range Scan. The default value is 4000.
- To define the TSC Connection Allocation/Sharing.

The drive has limited simultaneous connections, and with this function it is possible to define if the connections should be released or not. If selecting *Release Idling Connections*, the MCT 10 releases unused connections and makes them available to other users in the network after idle timeout.

**Operating Guide** 

Set-up of Communication

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rnet - Ethernet Fieldbus Settings	Self-see Terror	Capitan A	Capture &	X
sic Options Drive IP Settings Advanced				
Port Number For Range Scan				
When opting to Range Scan, make sure that below matches with respective setting of drives (Paramete				
4000 165535				
With Multicast, Port Number is detected autor	natically on basis of each individual drive.			
SC Connection Allocation / Sharing				
Release Idling Connections				
Idle Timeout: 5 1999 s				
Capacity of simultaneous connections is limited connections makes them available to other us	d with drives. Releasing unused			
You can disable Idle Timeout to reserve estable				
Only specific drives will be affected when you	combine this setting with respective addres	s Filter.		
arameter Channel Response Timeout				
4000 19999 ms				
1.3333 113				
				OK Cancel

Illustration 22: The Advanced Tab

Parameter Set-up

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# **5 Parameter Set-up**

#### 5.1 Introduction

This chapter explains how to control a drive using the MCT 10 Set-up Software. After starting the MCT 10, the main window looks like the example shown in <u>Illustration 23</u>.

e Edit View Insert Communication Tool	the second s		
Network	Folders	Series	

Illustration 23: MCT 10 Set-up Software Main Window

#### 5.2 User Interface

#### 5.2.1 Display

The MCT 10 Set-up Software has 2 views:

- Left view.
- Right view.

#### Left view

The left view shows the network view (real, online) and the project view (simulated, offline) of the drive network. Use the left view to:

- Add or delete folders and elements.
- Store changes into the Project folder.

Store changes made to the real online set-up into the Project folder in the simulated, offline set-up for later use.

For more information on saving data, refer to 6.8.1.1 Saving a Project.

The left view is organized in a tree structure and contents can be expanded or collapsed as required. Click +/- to expand/collapse the folder.

#### **Right view**

The right view shows details of the element highlighted in the left view. In the right view, the elements of the drive network can be programmed.

titled - MCT 10 Set-up Software	Tools Options	Help					-		
/ 🖬   X 🖻 🛍   🎯   🏪 🗄 🆽									
Network	ID	Name	Setup 1	Setup 2	Setup 3	Setup 4	Factory Setup	Unit	Ĩ
Ethernet	001	Language	[0] English	[0] English	[0] English	[0] English	[0] English		
Profibus	002	Motor Speed Unit	[0] RPM	[0] RPM	[0] RPM	[0] RPM	[0] RPM		
E Serial E SerialAuCom	003	Regional Settings	[0] International	[0] International	[0] International	[0] International	[0] International		
L USB 1	004	Operating State at Power-up (Hand)	[1] Forced stop, ref=	[1] Forced stop, ref					
A WirelessDirect	010	Active Set-up	[1] Set-up 1	[1] Set-up 1	[1] Set-up 1	[1] Set-up 1	[1] Set-up 1		
Project	011	Edit Set-up	[9] Active Set-up	[9] Active Set-up	[9] Active Set-up	[9] Active Set-up	[9] Active Set-up		
drive	012	This Set-up Linked to	[0] Not linked	[0] Not linked	[0] Not linked	[0] Not linked	[0] Not linked		
All Parameters	013.0	Readout: Linked Set-ups	{0}	{0}	{0}	{0}	{0}		
-Alarms	013.1	Readout: Linked Set-ups	{1}	{1}	{1}	{1}	{1}		
	013.2	Readout: Linked Set-ups	{2}	{2}	{2}	{2}	{2}		
Clock Functions     Timed Actions	013.3	Readout: Linked Set-ups	{3}	{3}	{3}	{3}	{3}		
Preventive Maintenance	013.4	Readout: Linked Set-ups	{4}	{4}	{4}	{4}	{4}		
Drive File System	014	Readout: Edit Set-ups / Channel	AAAAAAAAhex	AAAAAAAAhex	AAAAAAAAhex	AAAAAAAAhex	AAAAAAAAhex		
Software Customizer	015	Readout: actual setup	1	1	1	1	1		
	020	Display Line 1.1 Small	[1617] Speed [RPM]	[1617] Speed [RPM]	[1617] Speed [RPM]	[1617] Speed [RPM]	[1617] Speed [RPM]		
d Motor	021	Display Line 1.2 Small	[1614] Motor current	[1614] Motor current	[1614] Motor current	[1614] Motor current	[1614] Motor current		
	022	Display Line 1.3 Small	[1610] Power [kW]	[1610] Power [kW]	[1610] Power [kW]	[1610] Power [kW]	[1610] Power [kW]		
	023	Display Line 2 Large	[1613] Frequency	[1613] Frequency	[1613] Frequency	[1613] Frequency	[1613] Frequency		
	024	Display Line 3 Large	[1602] Reference %	[1602] Reference %	[1602] Reference %	[1602] Reference %	[1602] Reference %		
	025.0	My Personal Menu	1	1	1	1	1		
	025.1	My Personal Menu	20	20	20	20	20		
	025.2	My Personal Menu	21	21	21	21	21		
	025.3	My Personal Menu	22	22	22	22	22		
	025.4	My Personal Menu	23	23	23	23	23		
	025.5	My Personal Menu	24	24	24	24	24		
	025.6	My Personal Menu	67	67	67	67	67		
	025.7	My Personal Menu	1551	1551	1551	1551	1551		
	025.8	My Personal Menu	0	0	0	0	0		
	025.9	My Personal Menu	0	0	0	0	0		
	025.10	My Personal Menu	0	0	0	0	0		
	025.11	My Personal Menu	0	0	0	0	0		
	025.12	My Personal Menu	0	0	0	0	0		
	025.13	My Personal Menu	0	0	0	0	0		
	025.14	My Personal Menu	0	0	0	0	0		
	025.15	My Personal Menu	0	0	0	0	0		

Illustration 24: Details Shown in the Right View

Toolbar

A toolbar shows icons for the most commonly used functions.



#### Illustration 25: Toolbar

Activate the toolbar under *View* in the main menu bar, where the toolbar is tick-marked when it is active. To deactivate the toolbar, select *View*⇒*Toolbar*. Check that the toolbar is no longer tick-marked.

#### 5.2.2 Network and Project Folders

The Network folder gives access to physical devices operating in the field. Use Network to configure the physical drive as with the LCP. Configuration changes made in the Network folder are therefore saved only in the physical device in the field. The Network folder contains online data.

The Project folder contains offline data.



Changes made in the Network folder are not saved automatically to the Project folder.

#### Network mode - online

The Network folder contains the drives, low harmonic drives, active filters, and/or soft starters online connected to the PC. Monitor and change the parameter settings exactly as if operating on the control panel.

Data entered online is stored in the drive, low harmonic drive, active filter, or soft starter only, not on the hard disk. For information on saving data to the hard disk, refer to <u>6.8.1.1 Saving a Project</u>.

#### Project mode - offline

The Project folder contains the user-defined network of drive, low harmonic drive, active filter, and/or soft starter.

Data entered offline is stored on hard disk.

Use the Project folder to:



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# Parameter Set-up

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- Open a project file.
- Insert folders.
- Store project-related files in any format, for example Word or PDF.

## 5.2.3 Other Folders

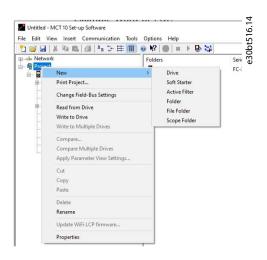
Four folder types are available for organizing a large system into several smaller systems.

#### Table 2: Available Folder Types

Name	Purpose	lcon
Folder	Organize drive and/or soft starters that are part of a machine or system.	e30bt713.12
File folder	Organize files belonging to a project. Any file format can be used.	e30bt714.11
Parameter fold- er	Store parameter settings temporarily or for documentation purposes. The folder can contain a single parameter, subgroup, parameter group, or the entire parameter database.	e30bt523.12
Scope folder	Analyze the behavior of 1 or several parameters for diagnostic purposes by visualizing them as a curve.	e30bt715.11

Insert any folder type in an offline project in 1 of 2 ways:

- Right-click the project or an existing folder and select New Folder/New File Folder, as shown in Illustration 26.
- Alternatively, mark the project or an existing folder and select New Folder/New File Folder under Insert in the main menu bar.



#### Illustration 26: Inserting a Folder Type

**Operating Guide** 



## 5.3 Setting Up Drives and Folders

Sometimes, it is necessary to insert a new folder before setting up new drives. See <u>5.3.1 Inserting a New Folder</u> for instructions. The way to set up drives depends on the drive type. The methods are described in <u>5.3.2 Setting Up Drives, Active Filters, or Soft Starters</u> and <u>5.3.3 Setting Up Low Harmonic Drives</u>.

## 5.3.1 Inserting a New Folder

#### Procedure

- 1. Right-click the Project folder or select*Insert* in the main menu bar.
- 2. Select New.
- 3. Select Folder or File Folder.

## 5.3.2 Setting Up Drives, Active Filters, or Soft Starters

Insert the drive, the active filter, or the soft starter in a project folder as follows:

### Procedure

- 1. Right-click in the left view or click *Insert* in the main menu bar.
- 2. Select New.
- 3. Select the appropriate device type.

Inserting a drive opens the New Drive window.

me					
Drive Name:	drive		Software Version:	08.72	~
			Voltage:	200V-240V	~
ect Drive Type					
Series:	FC-302	~	Power Size:	0.25kW (PK25)	~
PUD file:	FC-302PK25T2======		=_V0469-00.pud		~
tions			Connection		
Option A:	No Option	~	Field	l-bus: Serial	~
Option B:	No Option	~	Add	fress: 1	
Option C0/E0:	No Option	~	Warn if Address is	s in use	
Option C1/E1:	No Option	~			
condary addresses riting the same parame or example:	er values for multiple drives.				
	10-19; 20-25; 29 x.5; x.x.x.7; x.x.x.10-x.x.x. : is 126 for serial and 254 for IF		.29		

Illustration 27: New Drive Window

The New Drive window consists of 4 main sections:

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Name	Enter a unique name for the drive. Any text/number combination is allowed. Also specify with software version and the voltage in this section.
Select Drive Type	Information about the drive series and power size. A PUD file (power unit data information) is also available. The default file is always preselected.
Options	Various information about the installed options.
Connection	The fieldbus used between the PC and the drive associated with the address to communicate. The specific field- bus type is available from the drop-down menu.

It is mandatory to fill in all fields. The different selections are available from the drop-down menus.

Once the new drive is added to the Project folder, the drive data is stored in the offline Project folder. To view the data, click the drive icon.

<b>6   8   10   10   10   10   10   10   10 </b>	▶ ₩?   ●   = → 🕀 📖			
Network Project		Connected drive information	Database Information	^
andrive and all Parameters	Drive Series		FC-302	_
Alarms	Power Size		0.25kW (PK25)	_
	Voltage		200V-240V	_
Timed Actions	Basic SW Version		08.61	_
	Option A		No Option	_
Drive File System	Option B		No Option	
	Option C0/E0		No Option	
	Option C1/E1		No Option	
			No opian	
	Type Code		FC-3029425T2E20H1BXXXXXX	
	Type Code			
	Type Code			
	Type Code Type Code Type Code Secondary Address			
	Type Code		FC-302PK25T2E20H18XXXXX	
	Type Code Type Code Type Code Secondary Address		FC-302PK25T2E20H18XXXXX	
	Type Code Type Code Type Code Secondary Address Bus Name Serial		FC-302PK25T2E20H18XXXXX	
	Type Code Type Code Type Code Secondary Address Bus Name Serial Last synchronized		FC-302PK25T2E20H18XXXXX	
	Type Code Type Code Type Code Secondary Address Bus Name Serial Last synchronized		FC-302PK25T2E20H18XXXXX	
	Type Code Type Code Type Code Secondary Address Bus Name Serial Last synchronized		FC-302PK25T2E20H18XXXXX	

#### Illustration 28: View the Drive Data

To change the stored drive data, right-click the specific drive icon and select *Properties*.

# 5.3.3 Setting Up Low Harmonic Drives

Insert a low harmonic drive in a project folder as follows:

Procedure

- 1. Right-click in the left view or select *Insert* in the main menu bar.
- 2. Select New.
- 3. Select Drive.

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4. Enter all relevant data in the New Drive dialog and click Make LHD.

Name Drive Name:	FC302	Software Version:	06.22 🔹	
		Voltage:		
Select Drive Type				
Series:	FC-302 -	Power Size:	450.0kW (P450) 🔹	
PUD file	FC-302P450T4=======	V0415-00.pud		
Options		Connection		
Option A:	No Option 👻	Field-bus:	Serial 🔹	
Option B:	No Option 🔹	Address:	1	
Option CO/EO:	No Option 🔹	Warn if Address is in	use	
Option C1/E1:	No Option 👻			
e codes after the power siz	es distinguish the usual (Pxxx) pow	er cards from the new D-Frames	Nxxx). Check the type code in the	
ve.				

Illustration 29: Entering Data for a New Low Harmonic Drive



5. Enter all active filter data in the *New filter* dialog. Ensure that the fieldbus address used for the active filter is not used for other components.

The low harmonic drive is visible in the project as a composition of the drive and the active filter.

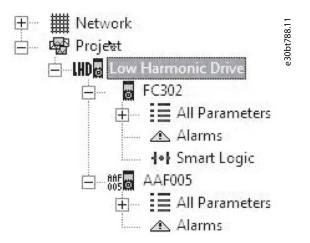


Illustration 30: Low Harmonic Drive Shown in the Project Folder

## 5.3.4 All Parameters Folders

A new Drive folder contains an All Parameters folder. This folder comprises a series of subfolders with generic names. There is no rename function for these folders. The generic folders within most drives consist of the following subfolders:

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- Operation and display.
- Load and motor.
- References and limits.
- Inputs and outputs.
- Special functions.
- Serial communication.
- Technical functions.

The generic folders can vary according to the type of drive selected.

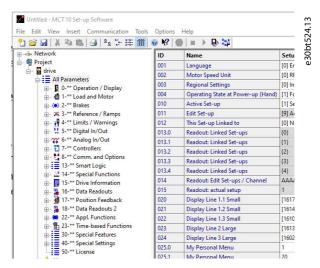


Illustration 31: Subfolders in the All Parameters Folder

The generic folders comprise parameters relevant to the drive type selected.

Ble Edit ⊻iew Insert ⊆ommunication	and the second second	tions Help					
□ ☞ 🖬 👗 助 📾 🚭 🛼 🤃 ⊞ 🛲	3 13 13	💿 🌰 🖶 👯					
🗄 🎹 Network	ID	Name	Setup 1	Setup 2	Setup 3	Setup 4	
	001	Language	English	English	English	English	
📲 Project	002	Active setup	Setup 1	Setup 1	Setup 1	Setup 1	
E E Conveyor 001	003	Setup copy	No copy	No copy	No copy	No copy	
È-I≡ All Parameters	004	Lcp copy	No copy	No copy	No copy	No copy	
- 🖪 Operation and display	005	Custom readout	100.00	100.00	100.00	100.00	
- Load and motor	006	Cust. read. unit	%	%	%	%	
	007	Large readout	Frequency [Hz]	Frequency [Hz]	Frequency [Hz]	Frequency [	
Inputs and outputs	008	Small readout 1	Reference [%]	Reference [%]	Reference [%]	Reference [	
	009	Small readout 2	Motor current [A]	Motor current [A]	Motor current [A]	Motor currel	
Special functions	010	Small readout 3	Power [kW]	Power [kW]	Power [kW]	Power [kW]	
E Serial communication	011	Unit of loc ref	Hz	Hz	Hz	Hz	
- 🕬 Technical functions	012	Hand start bttn	Enable	Enable	Enable	Enable	
i⊣≡ Group 7	013	Stop button	Enable	Enable	Enable	Enable	
	014	Auto start bttn	Enable	Enable	Enable	Enable	
	015	Reset button	Enable	Enable	Enable	Enable	
	016	Data change lock	Not locked	Not locked	Not locked	Not locked	
	017	Power up action	Auto restart	Auto restart	Auto restart	Auto restart	

Illustration 32: Data Example in a Generic Folder

### 5.3.5 Array Parameters

Parameters containing array data are shown as a matrix in the right view, where the rows of the matrix are defined as ID.1, ID.2, and so on. For example, array parameters *parameter 9-15 PCD Write Configuration* and *parameter 9-16 PCD Read Configuration* are shown over several entries as 915.1, 915.2, 915.3, and 916.1, 916.2, 916.3 in the right view.

Ρ	ar	am	eter	Set-u	b
۰.	uii		cici	Julia	ירי

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🔒 🕺 🖄 🛍 🔒 🐘 🖽 🏢	🔞 K? 🛛	🖻 = 🕨 🖶 🖏							
	1D	Name	Setup 1	Setup 2	Setup 3	Setup 4	Factory Setup	Unit	T
3-** Reference / Ramps	1800.0	Maintenance Log: Item	0	0	0	0	0		
	1800.1	Maintenance Log: Item	0	0	0	0	0		
	1800.2	Maintenance Log: Item	0	0	0	0	0		
Analog In/Out	1800.3	Maintenance Log: Item	0	0	0	0	0		
B- 4 8-** Comm. and Options	1800.4	Maintenance Log: Item	0	0	0	0	0		
13-** Smart Logic	1800.5	Maintenance Log: Item	0	0	0	0	0		
	1800.6	Maintenance Log: Item	0	0	0	0	0		
- 15-** Drive Information	1800.7	Maintenance Log: Item	0	0	0	0	0		
🔃 – 🎇 16-** Data Readouts	1800.8	Maintenance Log: Item	0	0	0	0	0		
17-** Position Feedback	1800.9	Maintenance Log: Item	0	0	0	0	0		
🖅 🕌 18-** Data Readouts 2	1801.0	Maintenance Log: Action	0	0	0	0	0		
	1801.1	Maintenance Log: Action	0	0	0	0	0		
30-** Special Features	1801.2	Maintenance Log: Action	0	0	0	0	0		
40-** Special Settings	1801.3	Maintenance Log: Action	0	0	0	0	0		
50-** License	1801.4	Maintenance Log: Action	0	0	0	0	0		
- Alarms	1801.5	Maintenance Log: Action	0	0	0	0	0		
	1801.6	Maintenance Log: Action	0	0	0	0	0		
Clock Functions	1801.7	Maintenance Log: Action	0	0	0	0	0		

#### Illustration 33: Array Parameters

## 5.3.6 Sorting

The Danfoss products listed under *Network* or *Project* can be sorted according to:

- Folder name.
- Series.
- Software version.
- Address (communication address).
- Power size.
- Voltage.

Click the sorting bar and select the relevant sorting option.

) 📽 🖬 👗 🖬 🛍 🖓 🖕 🗄 🗄	🛅 🕢 K? 🕘 = 🕨 🖏	1			
👍 Network	Folders	Series	Software Version	Address	Power Size
- Ethernet	FC-102 (2)	FC-202	03.80	1	0.25kW (PK25)
- B Profibus	FC-102	FC-102	05.71	1	1.10kW (P1K1)
- 📙 Serial - 📕 SerialAuCom	FC-302_2	FC-302	08.12	1	0.25kW (PK25)
B SenalAuCom WirelessDirect	FC-302_1	FC-302	08.61	3	0.25kW (PK25)
H - G H					



## 5.4 Customized Views

Select View in the main menu bar to see the display options. The following options are available:

- Show or hide the toolbar.
- Show or hide the status bar.
- Large icons/small icons view.
- View as list of folders and elements.
- View with details of network and project elements.

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📔 🔓 🖌 Toolbar 📴	E 🗰 🙆	K? 🔘	= > 🚯 😂							
🗕 📙 I 🖌 Status Bar	^	ID	Name	Setup 1	Setup 2	Setup 3	Setup 4	Factory Setup	Unit	^
Large Icons		001	Language	[0] English						
Small Icons		002	Motor Speed Unit	[1] Hz						
List		003	Regional Settings	[0] International						
Proj • Details		004	Operating State at Power-up	[0] Resume						
- Ka Forne		005	Local Mode Unit	[0] As Motor Speed						
Duick Menus		010	Active Set-up	[1] Set-up 1						
All Parameters		011	Programming Set-up	[9] Active Set-up	[9] Active Set-up	[9] Active Set-up	[9] Active Set-up	[9] Active Set-up		
-1 Alarms		012	This Set-up Linked to	[0] Not linked						
		013.0	Readout: Linked Set-ups	{0}	{0}	{0}	{0}	{0}		
Clock Functions		013.1	Readout: Linked Set-ups	{1}	{1}	{1}	{1}	{1}		
- 🛱 Timed Actions - 🍕 Preventive Maintenance		013.2	Readout: Linked Set-ups	{2}	{2}	{2}	{2}	{2}		
- S Preventive Maintenance		013.3	Readout: Linked Set-ups	{3}	{3}	{3}	{3}	{3}		
- Drive File System		013.4	Readout: Linked Set-ups	{4}	{4}	{4}	{4}	{4}		
Software Customizer		014	Readout: Prog. Set-ups / Channel	AAAAAAAAhex	AAAAAAAAhex	AAAAAAAAhex	AAAAAAAAhex	AAAAAAAAhex		
Service Log		015	Readout: actual setup	1	1	1	1	1		
— 🖇 Sensorless		020	Display Line 1.1 Small	[1602] Reference [%]						
di Motor		021	Display Line 1.2 Small	[1614] Motor current						

#### Illustration 35: The View Menu

### 5.4.1 Customize Parameter View Settings

Apply the selected parameter view settings to subfolders, to an entire project, or to the entire application, that is all MCT 10 Set-up Software folders in network or project mode.

#### Procedure

- 1. Right-click the parameter cell or set-up column.
- 2. Select Apply Parameter View Settings.

ID	Name	Setup 1	Setup 2	Setup 3	S				
001	Language	[0] English	[0] English	[0] English	[0	Parameter View Settings X			
002	Motor Speed Unit	[1] Hz	[1] Hz	[1] Hz	[1				
003	Regional Settings	[0] International	[0] International	[0] International	[0				
004	Operating State at Power-up	[0] Resume	[0] Resume	[0] Resume	[0]	Parameter View Settings			
005	Local Mode Unit	[0] As Motor Speed	[0] As Motor Speed	or Speed [0] As Motor Speed [0					
010	Active Set-up	[1] Set-up 1	[1] Set-up 1 [1] Set-up 1 [1]		O Apply settings to the sub folders				
011	Programming Set-up	[9] Active Set-up	[9] Active Set-up	[9] Active Set-up	[9				
012	This Set-up Linked to	[0] Not linked			[0	Apply settings to the entire project			
013.0	Readout: Linked Set-ups	{0} C	ut	Ctrl+X	{0	o ma secondaria			
013.1	Readout: Linked Set-ups	{1} C	ору	Ctrl+C	{1	And a way to the art of the transfer the			
013.2	Readout: Linked Set-ups	{2} P	aste	Ctrl+V	{2	Apply settings to the entire application			
013.3	Readout: Linked Set-ups	{3} P	ad From drive		{3				
013.4	Readout: Linked Set-ups	[4]	Write to drive		{4				
014	Readout: Prog. Set-ups / Channel	AAAAAAAI			A	OK Cancel			
015	Readout: actual setup	1	rite to Multiple Drives		1				
020	Display Line 1.1 Small	[1602] Refere A	pply Parameter View Set	tings	[1				
021	Display Line 1.2 Small	[1614] Motor current	[1614] Motor current	[1614] Motor current	[1				

#### Illustration 36: Applying Parameter View Settings

**3.** Select the relevant option and click *OK*.

## 5.4.2 Customize Background Color

To customize the background color of the views, go to *Options*⇒*Online Parameter Grid Settings*.

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e Edit View Insert Communication To			
) 🧭 🛃   👗 🖻 🛝   🖪   🏝 🦙 🖽 👖 	Read From Drive Settings Write To Drive Settings	Online Parameter Grid Settings	×
Ethernet	Communication fault tolerance	Badiground color	Restore Default
- A Profibus	Communication fault tolefance	Hidden parameter color I	Restore Default
- E Serial	Inline Edit	Not existing parameter color	Restore Default
BerialAuCom     B WirelessDirect	Enable PUD file selection	Parameter update failure color, happens when parameter database is inconsistent	Restore Default
Project	Firmware notifications for advanced users	Communication failure color	Restore Default
		Mark invisible parameters for P400 drives (e.g. FC-102, FC-202, FC-302)	
	Import Settings	Invisible parameters color	
	Select Language	All the parameters that are invisible in LCP are marked with this color. Usually, parameters are hidden because they are not relevant in the current configuration, and therefore their values can be ignored.	Restore Default
	MCO305 Settings	readed can be synamic.	
	Project properties		
	Converter tool Settings	Enable Smart Polling (slow down the polling when LCP is connected)	
	Online Parameter Grid Settings	Poling interval	
	Logging	1 - 1000 msec 0 NBI For poling as fast as possible, use 0.	
	Restore dialogs		
	DSU options	OK Cancel	

#### Illustration 37: Customizing Background Color

#### Procedure

- 1. Select Restore Default to restore factory default background color for online environment.
- 2. Click [...] to open a standard true color picker.
- 3. Select *Add to Custom Colors* for customizing colors for later usage.

### 5.4.3 Customize Parameter View

The parameters shown in the right view are presented in a series of columns, containing ID, parameter name, 4 set-ups, units, and factory set-up.

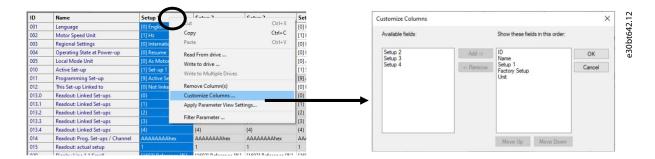
Select Parameter view  $\Rightarrow$  Set-up  $\Rightarrow$  Remove Menu.

ΝΟΤΙΟΕ

Changes made to the removed set-up are still stored in the MCT 10 Set-up Software and can be shown by selecting *Customize Columns*.

#### Procedure

- **1.** Right-click a column.
- 2. Select Customize Columns.
- 3. In the left view of the *Customize Columns* dialog, select the field to be added or removed.



#### Illustration 38: Customize Columns Dialog

- 4. Click either Add or Remove.
- 5. Change the order of the fields in the right view by clicking *Move Up* or *Move Down*.

6. Right-click a column and select Apply Parameter View Settings.

ID	Name	Setup 1		Setup 2	Setup 3	S
001	Language	[0] English		[0] English	[0] English	[0
002	Motor Speed Unit	[1] Hz		[1] Hz	[1] Hz	[1
003	Regional Settings	[0] International		[0] International	[0] International	[0
004	Operating State at Power-up	[0] Resume		[0] Resume	[0] Resume	[0
005	Local Mode Unit	[0] As Motor Spe	ed	[0] As Motor Speed	[0] As Motor Speed	[0
010	Active Set-up	[1] Set-up 1		[1] Set-up 1	[1] Set-up 1	[1
011	Programming Set-up	[9] Active Set-up		[9] Active Set-up	[9] Active Set-up	[9
012	This Set-up Linked to	[0] Not linked		IOI Not linked	101 Not linked	[0
013.0	Readout: Linked Set-ups	{0}	Cu	t	Ctrl+X	{0
013.1	Readout: Linked Set-ups	{1}	Co	ру	Ctrl+C	(1
013.2	Readout: Linked Set-ups	{2}	Pas	ite	Ctrl+V	{2
013.3	Readout: Linked Set-ups	{3}	Rei	ad From drive		(3
013.4	Readout: Linked Set-ups	{4}				{4
014	Readout: Prog. Set-ups / Channel	AAAAAAA		ite to drive		A
015	Readout: actual setup	1	Wr	ite to Multiple Drives		1
020	Display Line 1.1 Small	[1602] Refere	Ap	ply Parameter View Sett	ings	[1
021	Display Line 1.2 Small	[1614] Motor cur	rent	[1614] Motor current	[1614] Motor current	[1

1

#### Illustration 39: Apply Parameter View Settings

7. Select if the settings should apply to the subfolders, the entire project, or the entire application.

### 5.4.4 Filtering Parameters

Filter the parameters in the right view according to the following settings:

#### **Table 3: Available Filter Settings**

Setting	Description
Read only	Only read-only parameters are shown.
Read & Write	Only read & write parameters are shown.
Changed parameters	Only parameters that have been changed in the current session are shown.
All	All parameter groups are shown.
Group	One or more parameter groups are shown according to selection.

#### Procedure

- **1.** Right-click any column in the right view.
- 2. Select the appropriate filtering setting or the appropriate filtering group.

	K? 🔘	= >	🔁 🚧								
All Parameters	ID	Name		Setup 1	_	Factory Setup	Unit	Setup 2	Setup 4	Setup 3	E
Operation / Display     Operation / Display	001	Langu	ige	[0] English		[0] English		[0] English	[0] English	[0] English	1
⊕	002	Motor	Speed Unit	[0] RPM		[0] RPM		[0] RPM	[0] RPM	[0] RPM	
A 3-** Reference / Ramps	003	Region	Parameter Filter				×	[0] International	[0] International	[0] International	1
H 4-** Limits / Warnings	004	Operat						[0] Resume	[0] Resume	[0] Resume	
. 5-** Digital In/Out	005	Local I	Filter By		Filter By Gro			[0] As Motor Speed	[0] As Motor Speed	[0] As Motor Speed .	
⊕ 🙀 6-** Analog In/Out	010	Active	O Read Only			ration / Display d and Motor	^	[1] Set-up 1	[1] Set-up 1	[1] Set-up 1	
B- 5 8-** Comm. and Options	011	Progra	C Read & Write C Changed from Factory Default	2-** Brakes		(es		[9] Active Set-up	[9] Active Set-up	[9] Active Set-up	
13-** Smart Logic	012	This Se		3-** Reference / Ramps		[0] Not linked	[0] Not linked	[0] Not linked			
14-** Special Functions	013.0	Reado		efault		imits / Warnings Jigital In/Out		{0}	{0}	{0}	
15-** Drive Information	013.1	Reado			6-** Ana	og In/Out		{1}	{1}	{1}	
16-** Data Readouts     18-** Info & Readouts	013.2	Reado	Al			m. and Options art Logic		(2)	(2)	(2)	
B- 20-** Drive Closed Loop	013.3	Reado				ecial Functions	~	{3}	{3}	{3}	
- 1 21-** Ext. Closed Loop	013.4	Reado					- 1	{4}	{4}	(4)	
- 22-** Appl. Functions	014	Reado		OK	Cancel		- 1	AAAAAAAAhex	AAAAAAAAhex	AAAAAAAAhex	
1 23-** Time-based Functions	015	Reado		_			_	1	1	1	
- 24-** Appl. Functions 2	020	Display	Line 1.1 Small	[1601] Ref	erence [Un	[1601] Reference	U	[1601] Reference [U	[1601] Reference [U	[1601] Reference [U	
25-** Cascade Controller	021	Display	Line 1.2 Small	[1662] Ana	log Input 53	[1662] Analog Inp	ut	[1662] Analog Input	[1662] Analog Input	[1662] Analog Input.	i.
29-** Water Application Functions	022	Display	Line 1.3 Small	[1614] Mo	tor current	[1614] Motor curr	ent	[1614] Motor current	[1614] Motor current	[1614] Motor current	t
30-** Special Features	023	Display	Line 2 Large	[1613] Free	quency	[1613] Frequency		[1613] Frequency	[1613] Frequency	[1613] Frequency	
40-** Special Settings 50-** License	024 <	Display	Line 3 Large	[1652] Fee	dback[Unit]	(1652) Feedback/U	In	[1652] Feedback/Un	[1652] Feedback/Un	[1652] Feedback/Un.	

Illustration 40: Filtering Columns

### 5.4.5 Customize Columns

### Procedure

1. Right-click any column.

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e30bt529.12

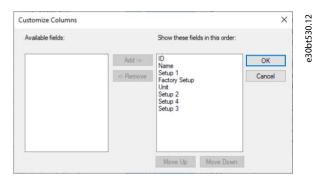
#### Parameter Set-up

2. Select Customize Columns.

🗅 😅 🛃   👗 🕸 🛍   🎿   🏤 🗁 🖽 📶	🕜 K? 🖉	) = > 🔂 🗱					
	^ ID	Name	Setup 1		· · · · · ·	Setup 4	Setup 3
- B Ethernet	001	Language	[0] English	Cut	Ctrl+X	[0] English	[0] English
A Profibus A Serial	002	Motor Speed Unit	[1] Hz	Сору	Ctrl+C	[1] Hz	[1] Hz
- B SerialAuCom	003	Regional Settings	[0] International	Paste	Ctrl+V	[0] International	[0] International
	004	Operating State at Power-up	[0] Resume	Read From drive		[0] Resume	[0] Resume
Project	005	Local Mode Unit	[0] As Motor Speed	Write to drive		[0] As Motor Speed	[0] As Motor Speed
	010	Active Set-up	[1] Set-up 1			[1] Set-up 1	[1] Set-up 1
🕀 📃 Quick Menus	011	Programming Set-up	[9] Active Set-up	Write to Multiple Drive	5	[9] Active Set-up	[9] Active Set-up
All Parameters	012	This Set-up Linked to	[0] Not linked	Remove Column(s)		[0] Not linked	[0] Not linked
-Alarms	013.0	Readout: Linked Set-ups	{0}	Customize Columns		{0}	{0}
	013.1	Readout: Linked Set-ups	(1)	Apply Parameter View	Settings	{1}	{1}
Clock Functions	013.2	Readout: Linked Set-ups	{2}			{2}	{2}
Timed Actions     Section     Arean Actions	013.3	Readout: Linked Set-ups	{3}	Filter Parameter		{3}	{3}
- S Preventive Maintenance	013.4	Readout: Linked Set-ups	{4}	{4}	{4}	{4}	{4}
- Drive File System	014	Readout: Prog. Set-ups / Channel	AAAAAAAAhex	AAAAAAAAhex	AAAAAAAAhex	AAAAAAAAhex	AAAAAAAAhex
Software Customizer	015	Readout: actual setup	1	1	1	1	1
Service Log	020	Display Line 1.1 Small	[1602] Reference [%]	[1602] Reference [%]	[1602] Reference [%]	[1602] Reference [%]	[1602] Reference [%]
- § Sensorless	021	Display Line 1.2 Small	[1614] Motor current	[1614] Motor current	[1614] Motor current	[1614] Motor current	[1614] Motor current
- 📹 Motor	022	Display Line 1.3 Small	[1610] Power [kW]	[1610] Power [kW]	[1610] Power [kW]	[1610] Power [kW]	[1610] Power [kW]
- Multi Motor	023	Display Line 2 Large	[1613] Frequency	[1613] Frequency	[1613] Frequency	[1613] Frequency	[1613] Frequency
E- FC-102 (2)	024	Display Line 3 Large	[1502] kWh Counter	[1502] kWh Counter	[1502] kWh Counter	[1502] kWh Counter	[1502] kWh Counter
Quick Menus     All Parameters	025.0	My Personal Menu	1	1	1	1	1

#### Illustration 41: Customize Columns Menu

3. Highlight a field to change the order.



#### Illustration 42: Change Order of Fields

4. Select *Move Up*, *Move Down*, or *Remove*.

Removed columns are still stored in the memory and can be retrieved into the right view by highlighting the relevant field name and selecting *Add*.

### 5.5 Parameter Edit

The parameter structures in the MCT 10 and in the drive are the same. Modify the parameter by double-clicking the relevant parameter entry. If an entry cell is shaded, the parameter is read-only and cannot be modified.

Parameter	Set-up

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FC-102	ID	the party of the second s						
Ouick Menus		Name	Setup 1	Setup 2	Setup 3	Setup 4	Factory Setup	Unit
	1500	Operating hours	120	120	120	120	120	h
All Parameters	1501	Running Hours	0	0	0	0	0	h
	1502	kWh Counter	2605	2605	2605	2605	2605	kWh
	1503	Power Up's	0	0	0	0	0	
3-** Reference / Ramps	1504	Over Temp's	0	0	0	0	0	
4-** Limits / Warnings	1505	Over Volt's	0	0	0	0	0	
- 1 5-** Digital In/Out	1506	Reset kWh Counter	[0] Do not reset					
🕒 🕁 6-** Analog In/Out	1507	Reset Running Hours Counter	[0] Do not reset					
B- 4 8-** Comm. and Options	1508	Number of Starts	0	0	0	0	0	
13-** Smart Logic	1510.0	Logging Source	[0] None					
- 2 14-** Special Functions	1510.1	Logging Source	[0] None					
⊕ ↓ 15-** Drive Information ⊕ ↓ ¼ 16-** Data Readouts	1510.2	Logging Source	[0] None					
H 4 18-** Info & Readouts	1510.3	Logging Source	[0] None					
- 2 20-** Drive Closed Loop	1511.0	Logging Interval	00:00:00.005	00:00:00.005	00:00:00.005	00:00:00.005	00:00:00.005	
- 1 21-** Ext. Closed Loop	1511.1	Logging Interval	00:00:00.005	00:00:00.005	00:00:00.005	00:00:00.005	00:00:00.005	
22-** Appl. Functions	1511.2	Logging Interval	00:00:00.005	00:00:00.005	00:00:00.005	00:00:00.005	00:00:00.005	
🖶 📅 23-** Time-based Functions	1511.3	Logging Interval	00:00:00.005	00:00:00.005	00:00:00.005	00:00:00.005	00:00:00.005	
- O 24-** Appl. Functions 2	1512	Trigger Event	[0] False					
25-** Cascade Controller	1513	Logging Mode	[0] Log always					
30-** Special Features	1514	Samples Before Trigger	50	50	50	50	50	
40-** Special Settings	1515	Info Message: "Service Log Full"	[0] Disabled					

Shaded cells indicate read-only parameters

#### Illustration 43: Editing Parameters

Change parameter set-up by manually entering new values in the cells in the right view. Alternatively, change the parameter set-up by importing values from an active drive using the *Read From Drive* function.

If a parameter value is set to an illegal value, an error is shown. Parameters can be edited in 2 different modes:

- Inline.
- Dialog-based.

lit Parameter	×
1	100: Configuration Mode
Value	Description
[0] Speed open loop [1] Speed closed loop [3] Process [4] Torque open loop [5] Wobble [6] Surface Winder [7] Extended PID Speed OL [8] Extended PID Speed CL	Select the application control principle to be used when a Remote Ref (via analog input) is active. A Remote Ref can be active only when par. 3-13 Ref Site is set to [0] or [1]. By default the Remote Ref is active in Auto mode only.
	OK Cancel

#### Illustration 44: Edit Parameter View

**Operating Guide** 



#### Inline edit

In inline edit mode, the available setting options are shown without any detailed descriptions of the options. Inline edit is only recommended for experienced users.

#### Dialog-based edit

To have details of parameters available while editing, use dialog-based edit. The parameter details are:

- Parameter options.
- Ranges.
- Functions.

Enter dialog-based edit by deselecting inline edit.

### 5.6 Comparison of Parameters

Parameter settings can be compared to the parameter settings in another drive. Comparisons can be made either to another drive inside the project or to an online drive. The comparison function evaluates whether settings inside the drive have been changed, or checks if 2 or more drives have the same settings.

#### Procedure

÷.

1. Activate the function by highlighting the base drive for comparison and select *Compare*.

lrive	New
	Print Selected Folder(s)
	Edit setup names
	Read from Drive
	Write to Drive
	Write to Multiple Drives
	Compare
	Compare Multiple Drives
	Apply Parameter View Settings
	Cut
	Сору
	Paste
	Delete
	Rename
	Update WiFi LCP firmware
	Load motor data
	Apply CSIV file
	Properties

#### Illustration 45: Comparison

2. Select the drive to compare with.

This drive can be an online drive from the network, or it can be a drive in the offline folder (Project folder).

The result of a comparison can be stored in an ASCII text file for documentation or for subsequent import into a spreadsheet. It is possible to compare all set-ups, or to compare 1 set-up to another.

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n Results					×
pared Drive Info		Second	Compared Drive Info		
dress 1 USB 1 tes: FC 302 se: 11.00kW (P11k) 380V-480V ion: 0.8.60 No Option No Option OrED No Option T/ET: No Option T/ET: No Option t/ET: No Option		Drive A Field-bu Drive S Drive T SW Ver Option 1 Option 1 Option 1 Option 1	ddress: 1 s: USB 1 eries: FC-302 /pe: 0.25kW (PK25) / alon: 08.72 A: No Option 3: No Option 20/E0: No Option 11/E1: No Option	200V-240V	
Name	1st Setup#	2nd Setup#	1st Value	2nd Value	^
Motor Power [kW]	1	1	3.00	0.37	
Motor Power [kW]	2	2	3.00	0.25	
Motor Power [kW]	3	3	3.00	0.25	
Motor Power [kW]	4	4	3.00	0.25	
Motor Power [HP]	1	1	4.02	0.50	
Motor Power [HP]	2	2	4.02	0.34	
Motor Power [HP]	3	3	4.02	0.34	
Motor Power [HP]	4	4	4.02	0.34	
Motor Voltage	1	1	400	230	
Motor Voltage	2	2	400	230	
Motor Voltage	3	3	400	230	
Motor Voltage	4	4	400	230	
Motor Current	1		7.00	2 00 0	~
	dress 1 USB 1 USB 1 Her: FC-302 er: 11.06kW (P11k) 380V-480V on: 08.60 No Option D/ED: No Option T/ET: No Option T/ET: No Option T/ET: No Option Note: No Option Note: No Option Note: Note: Comparison Motor Power [kW] Motor Power [kW] Motor Power [kW] Motor Power [kW] Motor Power [kW] Motor Power [kW] Motor Power [kP] Motor Power [PP] Motor Power [PP] Motor Power [PP] Motor Voltage Motor Voltage	USB 1           ters FC-302           ters FC-302           ters FC-302           ters FC-302           ters FC-302           No Option           No Option           D/ED: No Option           Name           Ist Setup#           Motor Power [Rvl]           1           Motor Power [Rvl]           4           Motor Power [Rvl]           4           Motor Power [Rvl]           5           Motor Power [Rvl]           6           1           Motor Power [Rvl]           4           Motor Power [Rvl]           4           Motor Power [Pf=]           3           Motor Power [Pf=]           4           Motor Voltage           2           Motor Voltage           3	dress 1         USB 1           USB 1         Drive A           tes: FC302         Pred 5u           period 5u         Drive A           No Option         Option 1           DCB: No Option         Option 1           Drive T         SW Ver           *         *           *         *           *         *           *         *           *         *           *         *           *         *           *         *           *         *           *         *           *         *           *         *           *         *           *         *           *         *           *         *           *         *           *         *           *         *           *         *           *         *           *         *           *         *           *         *           Motor Power [kW]         1           *         *           Motor Power [k*] <t< td=""><td>trees: 1         USB 1           tes:: FC-302         Feld-Sus:: USB 1           tes:: FC-302         Drive Series: FC-302           tes:: FC-302         Drive Series: FC-302           tes:: FC-302         Drive Series: FC-302           Drive Series: FC-302         Drive Series: FC-302           Drive Series: FC-302         Drive Series: FC-302           Site: No Option         Cytion A: No Option           Drive: Series: FC-302         Drive Series: FC-302           Name         Ist Setup#         Option A: No Option           Option: No Option         Drive Path: Project Vit; FC-302         Drive Path: Project Vit; FC-302           Name         Ist Setup#         Int Value           Motor Power [kW]         1         1           Motor Power [kW]         3         3           Motor Power [kW]         3         3           Motor Power [P]         1         4           Motor Power [P]         3         3           Motor Power [P]         3         3           Motor Power [P]         4         4.02           Motor Power [P]         4         4.02           Motor Power [P]         4         4.02           Motor Voltage         3         4.00</td><td>Image: Second Second</td></t<>	trees: 1         USB 1           tes:: FC-302         Feld-Sus:: USB 1           tes:: FC-302         Drive Series: FC-302           tes:: FC-302         Drive Series: FC-302           tes:: FC-302         Drive Series: FC-302           Drive Series: FC-302         Drive Series: FC-302           Drive Series: FC-302         Drive Series: FC-302           Site: No Option         Cytion A: No Option           Drive: Series: FC-302         Drive Series: FC-302           Name         Ist Setup#         Option A: No Option           Option: No Option         Drive Path: Project Vit; FC-302         Drive Path: Project Vit; FC-302           Name         Ist Setup#         Int Value           Motor Power [kW]         1         1           Motor Power [kW]         3         3           Motor Power [kW]         3         3           Motor Power [P]         1         4           Motor Power [P]         3         3           Motor Power [P]         3         3           Motor Power [P]         4         4.02           Motor Power [P]         4         4.02           Motor Power [P]         4         4.02           Motor Voltage         3         4.00	Image: Second

Illustration 46: Comparison Result

## 5.7 Compare Multiple Drives

Comparing multiple drives is done via the menu. The project drive has to have the correct addresses. If necessary, the addresses can be changed in the project properties by right-clicking the project and selecting *Drive's Properties*.

rive's Properties					×
Name	Name: 1; FC-302 0.55kW (PK55) 200	1V-240V	Software Version: 07	67	
Drive	Name: 1, 10 302 0.35KW (1103) 200				~
			Voltage: 20	0V-240V	~
Select Drive Type					
:	Series: FC-302	· • •	Power Size: 0.5	55kW (PK55)	~
PU	JD file: FC-302PK55T2E20==B====	=====V046	69-00.pud		~
Options			Connection		
	otion A: No Option	$\checkmark$		us: Serial	~
Opt	tion B: No Option	$\sim$	Addres	ss: 1	
Option	C0/E0: No Option	.~	Warn if Address is in	use	
Option	C1/E1: No Option	~			
Secondary addresses					
	, parameter values for multiple drives.				
	5; 7; 10-19; 20-25; 29				
	.1-x.x.x.5; x.x.x.7; x.x.x.10-x.x.x.19; x.x	x.20-x.x.x.25; x.x.x.29			
Max number of add	dresses is 126 for serial and 254 for IP	' addresses.			
		nower cards from the new D.E.		in the drive	
he codes after the po	ower sizes distinguish the usual (Pxxx)	power cards from the new D-r	rames (Nxxx). Check the type code	e in the unive.	
he codes after the po	ower sizes distinguish the usual (Pxxx)	OK	rames (Nxxx). Check the type code	a in the drive.	

#### Illustration 47: Drive's Properties

Only drives from the same product series can be compared and written. If the series do not match, a status message is shown.

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### Parameter Set-up

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Reading from drive	
Please wat	
0% 100	0%
100%	
Stop Close Save As	

Illustration 48: Drive Series Mismatch

To start the comparison, right-click the project drive and select Compare Multiple Drives.

🛿 🖬 🕹 📾 📾 🔤 🏝 計 註 🗰 🥹 🌾	· ● = → Ð 🚧			
Network		Connected drive information	Database Information	
L Serial				
B	Drive Series	FC-302	FC-302	
B 4 2; FC-302 1.50kW (P1K5) 380V-500V	Power Size	1.50kW (P1K5)	1.50kW (P1K5)	
B	Voltage	3807-5007	[380V-500V	
⊕ 4; FC-302 1.50kW (P1K5) 380V-500V ⊕ 5; FC-302 1.50kW (P1K5) 380V-500V	Basic SW Version	05.96	05.96	
⊕ 6: FC-302 1.50kW (P1K5) 380V-500V	Option A	MCA101 Profibus DP/V1 PW: 05.08	MCA101 Profibus DP/V1 FW: 05.08	
7; FC-302 1.50kW (P1K5) 380V-500V	Option B			
B 48 FC-302 1.50kW (P1K5) 380V-500V		No Option	No Option	
⊕ 🙀 9; FC-302 1.50kW (P1K5) 380V-500V	Option C0/E0	No Option	No Option	
⊕ 10; FC-302 1.50kW (P1K5) 380V-500V ⊕ 11; FC-302 1.50kW (P1K5) 380V-500V	Option C1/E1	No Option	No Option	
11; PC-302 1.50kW (P1K3) 380V-500V	Type Code	FC-302P1K5T5E20H180000X5000XA08XCX000XDX	FC-302P1KST5E20H18G000XS000XAX8XCX000DX	
B				
14; FC-302 1.50kW (P1K5) 380V-500V				
B 15; FC-302 1.50kW (P1K5) 380V-500V				
16; FC-302 1.50kW (P1K5) 380V-500V				
IT; FC-302 0.37kW (PK37) 380V-500V				
⊕ 18; FC-302 1.50kW (P1K5) 380V-500V ⊕ 19; FC-302 1.50kW (P1K5) 380V-500V				
⊕ 19 PC-302 1.50kW (P1K5) 380V-500V	Drive Address	27		
E 21: FC-302 1.50kW (P1K5) 380V-500V	Secondary Addresses	1-5		
# 22; FC-302 1.50kW (P1K5) 380V-500V	Bus Name	Serial		
380V-500V				
B 24; FC-302 1.50kW (P1K5) 380V-500V	Last synchronized	10/06/20 13:28:20		
-      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -	Drive Operation Status	10/06/20 13:28:20		
26; FC-302 0.57kW (PK57) 380V-500V     27; FC-302 1.50kW (P1K5) 380V-500V	Unive Operation Status	1		
Project				
27: FC-302 1 New				
Print Selected Folder(s)	í I			
Edit setup names				
Read from Drive				
Write to Drive				
Write to Multiple Drives				
Compare				
Convert Drive				
Compare Multiple Drives				
Apply Parameter View Settings				
Cut				
Сору				
Paste				

Illustration 49: Selecting Compare Multiple Drives

A window appears showing the relevant drives being read.

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## Parameter Set-up

### **Operating Guide**

File Edit View Insert Communication Tools O					
1 2 2 2 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2	₩?   ●   = > ₽ ≥				÷ č
_ I DP-V1		Connected drive information	Database Information		- G
B- 🛛 Serial					Ē
I; FC-302 0.37kW (PK37) 380V-500V	Drive Series	Jame	FC-302		ć
<ul> <li>         2; FC-302 1.50kW (P1K5) 380V-500V     </li> <li>         3; FC-302 1.50kW (P1K5) 380V-500V     </li> </ul>	Power Size	1.50kW (P1K5)	1.50kW (P1K5)		r i
B- 3; FC-302 1.50kW (P1K5) 380V-500V B- 4; FC-302 1.50kW (P1K5) 380V-500V	Voltage	380V-500V	380V-500V		a
B- 5; FC-302 1.50kW (P1K5) 380V-500V	Basic SW Version	05.96	05.96		
6; FC-302 1.50kW (P1K5) 380V-500V	Option A	MCA101 Profibus DP/V1 PW: 05-08	MCA101 Profibus DP/V1 FW: 05.08		
FC-302 1.50kW (P1K5) 380V-500V	Reading from drive	,	, , , , , , , , , , , , , , , , , , , ,		
<ul> <li></li></ul>					
10; FC-302 1.50kW (P1K5) 380V-500V	Status Identifying drive *** on b	or Castal at address 27			
11; FC-302 1.50kW (P1K5) 380V-500V	Identifying drive " on b				
I2; FC-302 1.50kW (P1K5) 380V-500V	Identifying drive " on b				
B 13; FC-302 1.50kW (P1K5) 380V-500V	Identifying drive " on b Identifying drive " on b				
H-10 14; FC-302 1.50kW (P1K5) 380V-500V - 10 15; FC-302 1.50kW (P1K5) 380V-500V	Identifying drive " on b				
B - 13; FC-302 1.50kW (P1K5) 380V-500V					
17; FC-302 0.37kW (PK37) 380V-500V					
18: FC-302 1.50kW (P1K5) 380V-500V					
19; FC-302 1.50kW (P1K5) 380V-500V					
B-12 20; FC-302 1.50kW (P1K5) 380V-500V					
B 21; FC-302 1.50kW (P1K5) 380V-500V					
22; FC-302 1.50kW (P1K5) 380V-500V					
B					
E 4 10 25; FC-302 1.50kW (P1K5) 380V-500V					
B 26; FC-302 0.37kW (PK37) 380V-500V					
B 27; FC-302 1.50kW (P1K5) 380V-500V					
😑 🚭 Project	Reading multiple drives: 6. Please w	at			
E - 27; FC-302 1.50kW (P1K5) 380V-500V					
	0%			100%	
		17%			
		Stop Close	Save As		
	Description				
	History Inc.				~
for Help, press F1	1 Hartwordson				

#### Illustration 50: Drives Being Read

When the read is complete, the comparison window appears.

X Drives With Differences	384 Differe	ince(s)				
1; FC-302 0.37kW (PK37) 380V-500V	ID	Name	Setup	Project value	Online value	^
Drives Without Differences	002	Motor Speed Unit	All Setups	RPM	Hz	
27; FC-302 1.50kW (P1K5) 380V-500V	020	Display Line 1.1 Small	1	Speed [RPM]	Frequency	
2; FC-302 1.50kW (P1K5) 380V-500V	020	Display Line 1.1 Small	2	Speed [RPM]	Reference %	
3; FC-302 1.50kW (P1K5) 380V-500V 4; FC-302 1.50kW (P1K5) 380V-500V	020	Display Line 1.1 Small	3	Speed [RPM]	Reference %	
5; FC-302 1.50kW (P1K5) 380V-500V	020	Display Line 1.1 Small	4	Speed (RPM)	Reference %	
2,10,302,133,611 (1103) 3001-3001	101	Motor Control Principle	1	WC+	U/f	
	120	Motor Power [kW]	1	2.00	0.37	
	120	Motor Power [kW]	3	1.50	0.37	
	120	Motor Power [kW]	4	1.50	0.37	~
	2 Warnings	s(s)				
	ID	Name	Message			
	918	Node Address	Address paran	neter is not compare	E.	
	970	Edit Set-up	Read-only in t	he online drive		
	970	Edit Set-up	Read-only in t	he online drive		
	970 2017 Matci		Read-only in t	he online drive		
			Read-only in t	No ne online drive		
	2017 Hatcl	h(es)				^
	2017 Matcl 10	M(es) Name	Setup	Value		^
	2017 Hatcl 10 001	h(es) Ninse Language	Setup All Setups	Value Deutsch	add	^
	2017 Match 10 001 003	N(es) Nimo Europaget Regional Settings	Setup All Setups	Value Deutsch International		^
	2017 Matcl 10 003 004	Ness) None Language Region Settaga Operating State at Power-up (Hao)	Setup All Setups All Setups 1	Value Deutsch International Forced stop, ref	rold	^
	2017 Match 60 003 004 004	N(es) None Language Regional Setting Operating State at Power-up Hand) Operating State at Power-up Hand)	Setup All Setups All Setups 1 2	Value Deutsch International Forced stop, ref Forced stop, ref	rold rold	^
	2017 Hatch 10 001 004 004	Ness) Nesse Language Repion Softings Operating State at Power-up Dead) Operating State at Power-up Dead Operating State at Power-up Dead	Setup All Setups All Setups 1 2 3	Value Deutsch International Forced stop, ref Forced stop, ref	rold rold	Â
	2817 Platf 10 001 003 004 004 004 004	N(es)  Iongrappe	Setup Al Setups Al Setups 1 2 3 4	Value Deutsch International Forced stop, ref Forced stop, ref Forced stop, ref	rold rold	A

#### Illustration 51: Comparison Window

The parameters in the red block are those which are set differently in the compared drives.

The parameters in the yellow block have not been compared.

The parameters in the green block have the same settings in the compared drives.

For common setup parameters, only setup 1 is compared. The result is shown as All Setups.

#### Exceptions

There are some parameters that, for technical reasons, are not written/compared. These parameters include some communication parameters (8-31, 9-18, and 12-01). Trying to write these parameters would cause loss of communication. Furthermore, safety parameters are not written.

### 5.8 View Change Log

When configuring a drive, active filter, or soft starter from the project, it is possible to view the change log containing the changes made by the user only, or the changes made including the dependent parameters.

User-defined changes can be read out by right-clicking All Parameters and selecting Minimal Changeset.

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Project		011	Edit S
	02 11.00kW (P11K) 380V-480V	012	This S
- <b>-</b>	Parameters	012.0	0
<b>—</b>	New		21
Đ	Print Selected Folder(s)		i
<b>H</b> -(	Compare parameters with def	fault values	
ŧ]   [	Minimal changeset		
	Read from Drive		
9	Write to Drive		1
	Write to Multiple Drives		
1	Compare		
	Compare Multiple Drives		
	Apply Parameter View Setting	5	
	Cut		5
	Сору		2
2	Paste		2
1	Delete		2
	Rename		
	Update WiFi LCP firmware		2
	Properties		2

Illustration 52: Minimal Changeset

Changes made including the dependent parameters can be read out by right-clicking *All Parameters* and selecting *Compare parameters with default values*.

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Project		011	Edit Set-up
🖶 🖥 1; FC-302 11.	00kW (P11K) 380V-480V	012	This Set-up
All Param	eters	013.0	Readout I j
⊕- <b>₽</b> 0-*	New		2 6
⊕- <b>€</b> 1-*	Print Selected Folder(s)		ir.
⊕-( <b>●</b> ) 2-*	Compare parameters wit	h default value	es ir
⊕- 🛪 3-* ⊕- 📲 4-*	Minimal changeset		ir
⊕- 11 5-*	Read from Drive		d
⊕ <b>₩</b> 6-*	Write to Drive		E.
庄 🎦 7-*			ie
⊕- <mark>-</mark> 8-*	Write to Multiple Drives		e
<b>⊕ 1</b> 3-	Compare		d c ie ie ie
⊕- <u>2</u> 14-	Compare Multiple Drives		ie
⊕- 📮 15- ⊕- 🍒 16-	Apply Parameter View Se	ttings	ie
⊕– 🎽 17-	Cut		a
⊕- <mark>%</mark> 18- ⊕- ● 22-	Сору		a
⊕- ₽ 22-	Paste		а
⊜-∎ 30-	Delete		a
	Rename		8
	Update WiFi LCP firmwar	'e	a
	Properties		a

Illustration 53: Compare Parameters with Default Values

### 5.9 Read Drive Operation Status

The drive can be in 2 different operating conditions:

- Auto On
- Off

The operation status can be monitored via the LCP or MCT 10. Use MCT 10 to monitor the actual operation status by clicking a drive located in the network. Select *Refresh Status* to update the status information. Parameters can only be written to drives in operation status *Off.* 

# **6** Operation

### 6.1 Reading and Writing Parameters

Parameter settings can be read from or written to an online connected drive.

Most parameters are read/write and can thus be configured. Other parameters are read-only and cannot be configured. Use the filter function to view which parameters are read/write or read-only.

Select the values to be read/written and then select the *Read From Drive* or *Write To Drive* menu.

The following options are available:

- A single parameter in the right view.
- All parameters in the left view.
- A parameter group in the left view, for example the Load and Motor group.

The read-from-drive and write-to-drive functions apply to the whole section.

Select *Options* in the menu bar to access a range of functions.

<ul> <li>Untitled - MCT 10 Set-up Software</li> </ul>	
<u>File Edit View Insert Communication Tools</u>	Options Help Read From Drive Settings
🎦 😂 🖬   🛦 🐿 🛝   🚳   🏪 🕁 🏥 🥅 (	Read From Drive Settings
	Write To Drive Settings
	Communication fault tolerance
🔤 Project	Inline Edit
	✓ Enable PUD file selection
	Import Settings
	Select Language
	MCO305 Settings
	Project properties
	Converter tool Settings
	Online Parameter Grid Settings
	Logging •
	Restore dialogs
	DSU options

#### Illustration 54: Select Options

### 6.1.1 Read From Drive Settings

Select the required options for reading from an active drive.

Setups

Select to read visible set-ups only or to read all set-ups.

Drive differences

If field device software and MCT 10 Set-up Software versions are not identical, specify the acceptable level of compatibility errors. Select *Allow drive differences* to ignore all compatibility errors.

Select Allow drive version difference to restrict the acceptable compatibility errors to those occurring in different software versions but same drive series. Select Do not allow drive differences not to accept differences between online devices and offline devices.

Save as default settings

Activate Read From Drive settings for all reads from the drive.

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Read From Drive(s) Settings	
Setups	- F L L C
🔿 Visible Setups Only	
All Setups	
Drive differences	
Allow drive differences	L
C Allow drive version difference	L
Do not allow drive differences	
Save as default settings	
OK Cancel	

Illustration 55: Read from Drive Settings

## 6.1.2 Write to Drive Settings

Select the required options for writing to an active drive, which then becomes applicable for all writing to drives.

Write to Drive(s) Settings	
Write Option Write Changed Parameters Write All Parameters	Setups Visible Setups Only All Setups
Drive differences Allow drive differences Allow drive version difference Do not allow drive differences	
Save as default settings	Cancel

Illustration 56: Write to Drive Settings

Write option

By default, *Write All Parameters* is selected. This means that all read and write parameters are written to online drives. If selecting *Write Changed Parameters*, only the subset of parameters different from default are written. This selection improves performance.

## 6.1.3 Communication Fault Tolerance

Set an acceptable number of communication faults before disconnecting. The default number of failures is 1000.

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Operation

## **Operating Guide**



Illustration 57: Fault Tolerance

### **6.2 Connection Properties**

To read or write between online and offline drives, configure the connection properties in the offline project. If the fieldbus does not refer to an available drive in the network tree, MCT 10 Set-up Software is not able to identify the online drive.

Reconfigure the fieldbus by right-clicking the offline project and select *Properties*⇒*Connection*.

Configure the fieldbuses added to the network tree in the Fieldbus drop-down list.

## 6.3 Read from Drive

Values can be read from an active drive by right-clicking a selection and then selecting *Read from drive*.

世 DP-V1	002	Motor Speed Unit	[0] RPM	[0] RPM	[0] RPM	[0]
<mark>且</mark> ether ⊕ <mark>且</mark> Serial	003	Regional Settings	[0] International	[0] International	[0] International	[0]
⊕ ∄ Serial	004	Operating State at Po	[1] Forced stop. ref	[1] Forced stop. ref	[1] Forced stop. ref	[1]
1; FC-302 11.00kW (P11K) 380V-480V	010	Active Set-up	[1] Set-up 1	Cut	Ctrl+X	t
Project	011	Edit Set-up	[9] Active Set-	Сору	Ctrl+C	1
🚽 🖬 drive	012	This Set-up Linked to	[0] Not linked	Paste	Ctrl+V	5
All Parameters	013.0	Readout: Linked Set	{0}			- 1
🚹 Alarms	013.1	Readout: Linked Set	{1}	Read From drive		
	013.2	Readout: Linked Set	{2}	Write to drive		
Clock Functions	013.3	Readout: Linked Set	{3}	Write to Multiple Drives		
🕅 Timed Actions 🗞 Preventive Maintenance	013.4	Readout: Linked Set	{4}	Apply Parameter View S	ettings	
Drive File System	014	Readout: Edit Set-up	AAAAAAAAhex	алалалала	аааааааааааа	A
Software Customizer	015	Readout: actual setup	1	1	1	1
Service Log	020	Display Line 1.1 Small	[1617] Speed [RPM]	[1617] Speed [RPM]	[1617] Speed [RPM]	[1
Motor	021	Display Line 1.2 Small	[1614] Motor current	[1614] Motor current	[1614] Motor current	[1
	022	Display Line 1.3 Small	[1610] Power [kW]	[1610] Power [kW]	[1610] Power [kW]	[1

#### Illustration 58: Read from Drive

Once *Read from drive* is selected, the software accesses the online device and shows the *Drives Check* window. This window contains a list of drives with detected compatibility issues.

## Operation

ddress	LHD Drive		Drive name	e	Details	Action	
		drive			Details	Continue	~
			Apply to all drives:	Continue			<

#### Illustration 59: Drives Check Window

Select *Details* to view details on the different properties between project device (based on database information) and online device (the connected drive).

	Connected drive	Project drive	
Drive series	FC-302	FC-302	
Drive type	37.00kW (P37K)	37.00kW (P37K)	
Device type	200V-240V	200V-240V	
Basic SW version	07.30	07.51	
Option A	No Option	No Option	
Option B	No Option	No Option	
Option C0/E0	MCO 305 FW: 05.01	No Option	
Option C1/E1	No Option	No Option	
egend			
Full Compatibility,	all parameters will be written		
Limited Compatibili	ty, some parameters may be skipped		
No Compatibility, G	Group(s) will be skipped		

#### Illustration 60: Details

The color codes indicate the level of compatibility between the project drive and the connected drive for each property. To continue the reading process, define an action in the *Drives Check* dialog. The default action is *Continue*. Other available selections are:

- Skip the drive.
- None.
- Update project and continue.

The same action can be applied to all devices at a time instead of 1 by 1.

If selecting *Skip the drive*, MCT 10 Set-up Software does not read that particular device, but continues reading the other devices. *Continue* resumes reading. Acknowledge and accept any differences found.

Update project and continue activates the read-from-drive process, and it deletes the data in the project drive and replaces it with data from the connected drive.

# NOTICE

The *Update from connected* selection deletes and replaces all information stored in the project drive. To retain the information entered into the project drive, select *Continue*.

Once the read-from-drive process is completed, the display shows details of both the Connected Drive Information and the Database Information.

	Connected Drive Information	Database Information	
Drive Series	FC-302	FC-302	1
Power Size	0.55kW	0.55KW	1
Voltage	380V-500V	380V-500V	
Basic SW Version	01.21	01.21	
Option A	00.00 No option	No option	
Option B	00.00 No option	No option	
Option C	00.00 No option	No option	]
Type Code	FC-302PK55T5E20H1BGXXXXSXXXA		
	······································		
Drive Address	1		
Driver Name	USB		
Region	International (50Hz)		

Illustration 61: Read-from-drive Process Completed

## 6.3.1 Changing the PROFINET Host Name

As of MCT 10 version 4.3, the domain name and host name can be changed via the *Read-from-drive Process Completed* dialog. **Procedure** 



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## Operation

1. Click Change domain or host name.

Drive Series	FC-103	FC-103
Power Size		45.00kW (P45K)
	(45.00kW (P45K)	
Voltage	380V-480V	380V-480V
Basic SW Version	02.20	02.20
Option A	MCA 120 Profinet	MCA 120 Profinet
Option B	No Option	No Option
Option C0/E0	No Option	No Option
Option C1/E1	No Option	No Option
Type Code	FC-103P45KT-0000000C00XS000XAXBXC000XDX	FC-103P45KT4E21H1BGX00XSX00XAXBXCX0XXDX
Drive Address	10	
Bus Name	1	
rive Operation Status	Г	Refresh status
Domain Name	Γ	
Host Name	Ţ	Change domain or host name
Set values	ering the domain name and host nam	e opens.
Domain Name		Φ

The values entered in the dialog are written to parameter 12-07 Domain Name and parameter 12-08 Host Name.

### 6.4 Write to Drive

Procedure

1. Right-click a parameter column title in the right view or click *Communication* in the main menu bar.



### Operation

2. Select Write to drive.

USB 1	004	Operating State at Po	[1] Force	d stop, ref	[1] Forced stop, ref	[1] Forced stop, re
1; FC-302 11.00kW (P11K) 380V-480V	010	Active Set-up	[1] Se	Cut		Ctrl+X
Project	011	Edit Set-up	[9] Ac	Сору		Ctrl+C
🔄 🖥 drive	012	This Set-up Linked to	[0] Nc	Paste		Ctrl+V
All Parameters	013.0	Readout: Linked Set				Ctri+V
Alarms	013.1	Readout: Linked Set	{1}	Read Fro	m drive	
	013.2	Readout: Linked Set	{2}	Write to a	drive	
Clock Functions	013.3	Readout: Linked Set	{3}	Write to I	Multiple Drives	
	013.4	Readout: Linked Set	{4}			
- I Drive File System	014	Readout: Edit Set-up	AAAA	Apply Pa	rameter View Settings	
Software Customizer	015	Readout: actual setup	1		1	1
Service Log	020	Display Line 1.1 Small	[1617] Sp	eed [RPM]	[1617] Speed [RPM]	[1617] Speed [RPN
Motor	021	Display Line 1.2 Small	[1614] M	otor current	[1614] Motor current	[1614] Motor curr
	022	Display Line 1.3 Small	[1610] Po	ower [kW]	[1610] Power [kW]	[1610] Power [kW]
	023	Display Line 2 Large	[1613] Fn	equency	[1613] Frequency	[1613] Frequency

Illustration 62: Write to Drive

## 6.5 Write to Multiple Drives

Add addresses in the *Address* field and in the *Secondary Addresses* field. *Secondary Addresses* in the right view is enabled for DP-V1, Ethernet, Serial, and Dummy.

						>
Name						
	Drive Name:	FC-302		Software Version:	08.74	~
				Voltage:	200V-240V	~
elect Drive	Type					
	Series:	FC-302	~	Power Size:	0.37kW (PK37)	~
	PUD file:	FC-302PK37T2=====:		===_V0471-00.pud		~
ptions	Option A:	No Option		Connection		
			~		-bus: Serial	~
	Option B:	No Option	~	Add	Iress: 1	
	Option C0/E0:	No Option	~	Warn if Address is	in use	
	Option C1/E1:	No Option	~			
Secondary a	ne same paramet	er values for multiple driv	es.			
For examp Serial add IP address	resses: 1-5; 7; 1 ses: x.x.x.1-x.x.x.	0-19; 20-25; 29 5; x.x.x.7; x.x.x10-x.x.x.19 is 126 for serial and 254 f	9; x.x.x.20-x.x.x.25; x.x.x.29 for IP addresses.			
For examp Serial add IP address	resses: 1-5; 7; 1 ses: x.x.x.1-x.x.x.	5; x.x.x.7; x.x.x.10-x.x.x.19				
For examp Serial add IP address Max numb	resses: 1-5; 7; 1 ses: x.x.x.1-x.x.x ber of addresses	5; x.x.7; x.x.x.10-x.x.x.19	for IP addresses.			
For examp Serial add IP address Max numb	resses: 1-5; 7; 1 ses: x.x.x.1-x.x.x ber of addresses	5; x.x.7; x.x.x.10-x.x.x.19	for IP addresses.	new D-Frames (Nxxx). Check the type co	ode in the drive.	
For examp Serial add IP address Max numb	resses: 1-5; 7; 1 ses: x.x.x.1-x.x.x ber of addresses	5; x.x.7; x.x.x.10-x.x.x.19	for IP addresses.	new D-Frames (Nxxx). Check the type co	ode in the drive.	

#### Illustration 63: New Drive Dialog

Write parameter values to the main address and to secondary addresses. If the drive is not available on the configured address, it must be skipped.

If a drive is configured with secondary addresses, the *Write to Multiple Drives* context menu is enabled on the right-view parameters and on the parameter headers context menu on the left-view group and on the drive menu.

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## Operation

### **Operating Guide**

ID	Name	Setup 1	C >	Ctrl+X	1	Setup 4	Factory Setup	Unit
001	Language	[0] English Cut		Ctrl+X Ctrl+C		[0] English	[0] English	
002	Motor Speed Unit	[0] RPM Pas		Ctrl+V		[0] RPM	[0] RPM	
003	Regional Settings	[0] Internation	ad From drive	Curry		[0] International	[0] International	
004	Operating State at Power-up	[1] Forced sto	ite to drive		=0	[1] Forced stop, ref=	[1] Forced stop, ref=.	
010	Active Set-up	[1] Cot up 1	ite to Multiple Drives			[1] Set-up 1	[1] Set-up 1	
011	Edit Set-up	[9] Active Set				[9] Active Set-up	[9] Active Set-up	
012	This Set-up Linked to	[0] Not linked	nove Column(s) stomize Columns			[0] Not linked	[0] Not linked	
013.0	Readout: Linked Set-ups	(0)	Apply Parameter View Settings			{0}	{0}	
013.1	Readout: Linked Set-ups	{1}			-	{1}	{1}	
013.2	Readout: Linked Set-ups	{2} Filt	er Parameter	<u>, -</u> ,		{2}	{2}	
013.3	Readout: Linked Set-ups	(3)	{3}	{3}		{3}	{3}	
012 4	Pandout Linked Set une	140	[4]	[4]		141	ran.	
ID	Name	Setup 1	Setup 2	Setup 3		Setup 4	Factory Setup	Unit
001	Language	[0] English	[0] English	[0] English		IOI English	IOI English	
002	Motor Speed Unit	[0] RPM	[0] RPM	[0] RPM	Cut		Ctrl+X	
003	Regional Settings	[0] International	[0] International	[0] Internation	Cop Past	5	Ctrl+C Ctrl+V	
004	Operating State at Power-up	[1] Forced stop, ref=	[1] Forced stop, ref=	[1] Forced stc			f=.	
010	Active Set-up	[1] Set-up 1	[1] Set-up 1	[1] Set-up 1		d From drive		
011	Edit Set-up	[9] Active Set-up	[9] Active Set-up	[9] Active Set		e to drive		
	This Set-up Linked to	[0] Not linked	[0] Not linked	[0] Not linkec	-	e to Multiple Drives		
012	The bet up Ennes to			101	App	ly Parameter View Settin	nas	
012 013.0	Readout: Linked Set-ups	{0}	{0}	{0}				

Illustration 64: Examples, Write to Multiple Drives, Right-View Parameters



Operation

e30bu978.10

FC-	> Drive Series		FC-302
Print Selected Folder(s)	Power Size		0.37kW (F
Edit setup names	Voltage	,	200V-240
Read from Drive Write to Drive	Basic SW Version	-	08.74
Write to Multiple Drives	Option A	1	No Option
Compare	Option B		No Option
Compare Multiple Drives	Option C0/E0	ſ	No Option
Apply Parameter View Setting:	S Option C1/E1		No Option
II-1 Com	Type Code		FC-302P
Paste			
Delete			
Rename			
B-			
Load motor data Properties	Drive Address	1	
Properties	Secondary Addresses	1-4	
🖶 🕌 16-** Data Readouts	Bus Name	Serial	
<ul> <li># 17-** Position Feedback</li> <li># 18-** Data Readouts 2</li> </ul>			
22-** Appl. Functions	Last synchronized	[	
23-** Time-based Functions     30-** Special Features	Drive Operation Status		
40-** Special Settings			
50-** License			
Smart Logic			
Clock Functions			
	003	Pagional Sattings	ſC
Project	005		
🖃 🖬 FC-302	004	Operating State at Powe	er-up [1
All Parameter	rs		
All Parameter			
🗐 🛱 0-** Opera	ation / Display		
	ation / Display asic New		>
□ □ □ 0-** Opera □ □ □ 0-0* B □ □ □ 0-0* B	ation / Display asic New et-u Print Selected		2
	ation / Display asic New et-u Print Selected CP D Compare par	i Folder(s)	>
□ □ □ 0-** Opera □ □ □ 0-0* B □ □ □ 0-0* B	ation / Display asic New et-u Print Selected CP D Compare par	f Folder(s) ameters with default values	2
	ation / Display asic New et-u Print Selected CP C Compare par Minimal char	f Folder(s) ameters with default values	2
	ation / Display asic New et-u Print Selected CP C Compare par CP K Minimal chan	f Folder(s) ameters with default values igeset	>
	ation / Display asic New et-u Print Selected CP C Compare par CP K Minimal chan opy, Read from Di	d Folder(s) ameters with default values igeset rive	>
	ation / Display asic New et-u Print Selected CP C Compare par CP K Minimal chan opy, Read from Dr assw Write to Drive	d Folder(s) ameters with default values igeset rive	>
	ation / Display asic New et-u Print Selected CP D Compare par CP K Minimal chan opy, Read from Dr assw Write to Drive lock Write to Mult	d Folder(s) ameters with default values igeset rive e	>
	ation / Display asic New et-u Print Selected CP D Compare par CP C Minimal chan opy, Read from Dr assw Write to Drive lock Write to Mult and	d Folder(s) ameters with default values igeset rive e	2
	ation / Display asic New et-u Print Selected CP D Compare par CP C Minimal chan opy, Read from Dr assw Write to Drive lock Write to Mult and	d Folder(s) ameters with default values igeset rive e	2
	ation / Display asic New et-u Print Selected CP D COMPare par CP K Minimal chan OPY/ Read from Drive Norke Write to Drive and Sompare	d Folder(s) ameters with default values igeset rive e ti <mark>ple Drives</mark>	2
	ation / Display asic New et-u Print Selected CP D COMPare par CP K Minimal chan OPy/ Read from Drive assw Write to Drive Nock Write to Mult and Secompare Mult	d Folder(s) ameters with default values igeset rive e i <mark>ple Drives</mark> Itiple Drives	2
O-** Operation     O-0* B     O-0* B     O-0* B     O-0* C     O-2* LC     O-2* LC     O-3* LC     O-3* LC     O-3* C     O-3* C     O-4* LC     O-4* C     O-7* C     O     O     O-7* C     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O	ation / Display asic New et-u Print Selected CP D COMPARE par CP C Minimal chan OPY/ Read from Drive assw Write to Drive New Write to Drive COMPARE Mult and S Compare Mult S / W Apply Parame	d Folder(s) ameters with default values igeset rive e ti <mark>ple Drives</mark>	2
	ation / Display asic New et-u Print Selected CP D COMPARE par CP C Minimal chan OPY/ Read from Drive assw Write to Drive New Write to Drive COMPARE Mult and S Compare Mult S / W Apply Parame	d Folder(s) ameters with default values igeset rive e i <mark>ple Drives</mark> Itiple Drives	2
O-** Operation     O-0* B     O-0* B     O-0* B     O-0* C     O-2* LC     O-2* LC     O-3* LC     O-3* LC     O-3* C     O-3* C     O-4* LC     O-4* C     O-7* C     O     O     O-7* C     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O	ation / Display asic New et-u Print Selected CP D Compare par CP C Minimal chan opy, Read from Dr assw Write to Drive lock Write to Mult and Compare ence Compare Mu s / V Apply Parame al In, Cut	d Folder(s) ameters with default values igeset rive e i <mark>ple Drives</mark> Itiple Drives	2
O-** Operation     Operation     O-** Operation     O-*** Operation     O-*** Operation     O	ation / Display asic New et-u Print Selected CP D Compare par CP C Minimal chan opy, Read from Di assw Write to Drive lock Write to Mult and Compare ence Compare Mult s / V Apply Parame al In Cut ogl r Copy	d Folder(s) ameters with default values igeset rive e i <mark>ple Drives</mark> Itiple Drives	2
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	ation / Display asic New et-ui Print Selected CP D Compare par CP K Minimal chan opy/ Read from Drive New Write to Drive Write to Mult ass Compare Compare Compare Mult S / W Apply Parame al In Cut Og Ir Copy Paste m. at	d Folder(s) ameters with default values igeset rive e i <mark>ple Drives</mark> Itiple Drives	>
	ation / Display asic Asic New et-u Print Selected CP D Compare par CP C Minimal chan opy Read from Di assw Write to Drive lock and compare ence Compare Mul s / W Apply Parame al In Cut og Ir Copy olle Paste m. at TLC Delete	d Folder(s) ameters with default values igeset rive e i <mark>ple Drives</mark> Itiple Drives	>
	ation / Display asic Asic New et-u Print Selected CP D Compare par CP C Minimal chan opy Read from Di assw Write to Drive lock and compare ence Compare Mul s / W Apply Parame al In Cut og Ir Copy olle Paste m. at TLC Delete	d Folder(s) ameters with default values igeset rive e i <mark>ple Drives</mark> Itiple Drives	>
O-** Operation     Operat	ation / Display asic Asic Asic Asic Asic Asic Asic Asic A	d Folder(s) ameters with default values igeset rive e ti <mark>ple Drives</mark> Itiple Drives eter View Settings	>
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O-** Operation     Operat	ation / Display asic Asic Asic Asic Asic Asic Asic Asic A	d Folder(s) ameters with default values igeset rive e ti <mark>ple Drives</mark> Itiple Drives eter View Settings	

Illustration 65: Examples, Write to Multiple Drives, Parameter Headers Context Menu, and Drive Menu

## 6.6 Poll

When in network mode, MCT 10 Set-up Software automatically polls the parameters in the right view to update their status continuously to reflect live operation.

## 6.6.1 Stop Polling

To stop polling, for example to freeze and analyze a particular moment:

## Procedure

- 1. Click *Communication* in the main menu bar.
- 2. Select Stop polling.

Alternatively, click the Stop polling icon in the toolbar.

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Operation



## 6.6.2 Resume Polling

#### Procedure

- 1. Click Communication in the main menu bar.
- 2. Click Resume polling.

Alternatively, click the *Resume polling* icon in the toolbar.

## 6.6.3 Using Smart Polling (Intelligent Scan Frequency)

While the MCT 10 Set-up Software is polling the parameter grid, the LCP becomes slow. To improve LCP usability, configure MCT 10 to enable smart polling. Enabling smart polling slows down the polling when the LCP is connected.

#### Procedure

- 1. Click Options in the main menu bar.
- 2. Select Online Parameter Grid Settings.

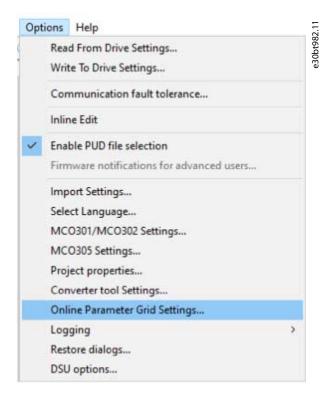


Illustration 68: Selecting Online Parameter Grid Settings

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Operation

3. Tick the checkbox Enable Smart Polling (slow down the polling when the LCP is connected).

Background color Hidden parameter color Not existing parameter color Parameter update failure color, happens when parameter database is inconsistent Communication failure color Mark invisible parameters for P400 drives (e.g. FC-102, FC-202, FC-302) Invisible parameters color All the parameters that are invisible in LCP are marked with this color. Usually, parameters are hidden because they are not relevant in the current configuration, and therefore their	Restore Default Restore Default Restore Default Restore Default Restore Default	
Not existing parameter color Parameter update failure color, happens when parameter database is inconsistent Communication failure color  Mark invisible parameters for P400 drives (e.g. FC-102, FC-202, FC-302) Invisible parameters color All the parameters that are invisible in LCP are marked with this color. Usually, parameters are hidden because they are not relevant in the current configuration, and therefore their	Restore Default Restore Default Restore Default	1
Parameter update failure color, happens when parameter database is inconsistent Communication failure color ☐ Mark invisible parameters for P400 drives (e.g. FC-102, FC-202, FC-302) Invisible parameters color All the parameters that are invisible in LCP are marked with this color. Usually, parameters are hidden because they are not relevant in the current configuration, and therefore their	 Restore Default Restore Default	] ] ]
parameter database is inconsistent Communication failure color Mark invisible parameters for P400 drives (e.g. FC-102, FC-202, FC-302) Invisible parameters color All the parameters that are invisible in LCP are marked with this color. Usually, parameters re hidden because they are not relevant in the current configuration, and therefore their	Restore Default	] ]
✓ Mark invisible parameters for P400 drives (e.g. FC-102, FC-202, FC-302) Invisible parameters color II the parameters that are invisible in LCP are marked with this color. Usually, parameters re hidden because they are not relevant in the current configuration, and therefore their		) 
Invisible parameters color Il the parameters that are invisible in LCP are marked with this color. Usually, parameters re hidden because they are not relevant in the current configuration, and therefore their	 Restore Default	
All the parameters that are invisible in LCP are marked with this color. Usually, parameters are hidden because they are not relevant in the current configuration, and therefore their	 Restore Default	
are hidden because they are not relevant in the current configuration, and therefore their	 Restore Default	
		3
Enable Smart Polling (slow down the polling when LCP is connected) Polling interval  1 - 1000 msec  NBI For polling as fast as possible, use 0.		

Illustration 69: Ticking the Checkbox

# 6.7 Changing the Set-up of a Field Device

### Procedure

- 1. Open the Network folder.
- 2. Select the relevant device.
- 3. Select *Stop* on the toolbar to stop polling.
- 4. Change the settings in the set-up columns in the right view.

The changes are implemented online in the field device, but are not recorded.

## 6.8 Save Changes to a Hard Disk

## 6.8.1 Recoding Online Changes

### Procedure

- 1. Select the relevant device in the Network folder.
- 2. Right-click the device and select Copy.
- 3. Select the Project folder.
- 4. Right-click and select *Paste*.
- 5. Select *File* from the main menu bar.
- 6. Select Save As.
- 7. Save the device file into a directory in the storage location.

## 6.8.1.1 Saving a Project

### Procedure

- 1. Click *File* in the main menu bar.
- 2. Select Save.

Alternatively, click the Save icon in the toolbar.

## 6.8.1.1.1 Including Drive Information

It is not possible to open a project file including a firmware version not supported by MCT 10 Set-up Software. Including the drive information in the project file makes it possible to open in other installations with MCT 10 without having the firmware installed. By opening the project file, the drive information is updated similarly to:



#### Operation

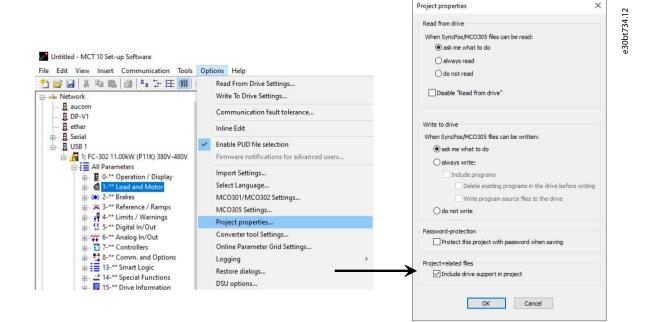
- Selecting Update Drive Support under Tools in the main menu bar.
- Downloading the drive information from an online drive.

The drive information is saved in the project file.

## 6.8.1.1.2 Excluding Drive Information

#### Procedure

- 1. Click Options in the main menu bar.
- 2. Select Project properties.
- 3. Click Include drive supprt in project.



#### Illustration 70: Save Drive Information

### 6.8.2 Archive/Unarchive

Projects that include links to other documents can store the linked files.

By selecting the Archive function, the MCT 10 Set-up Software generates a file that contains all drives and the linked files into a \*.ssa file. If this file is sent to other computers, the user gets a copy of the linked files on the computer.

### 6.9 Import of Older Dialog Files

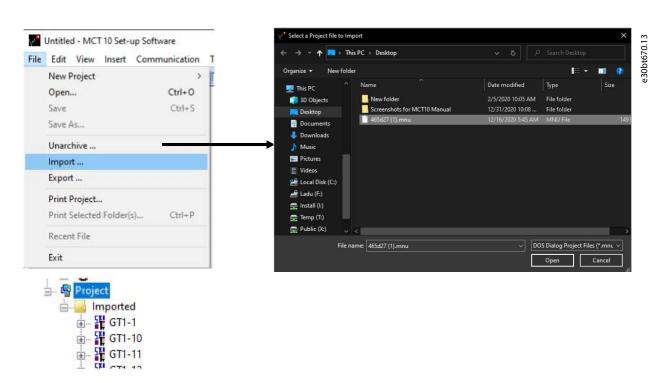
For users working with VLT set-up software dialog, the files generated with these software packages can be imported into the MCT 10 Set-up Software.

Files from DOS versions and Windows versions can be imported to the MCT 10 Set-up Software. Following a successful import, the MCT 10 places the imported files in an imported files folder.

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Operation

## **Operating Guide**



#### Illustration 71: Import Older Dialogs

Due to limitations in some of the former PC tools, some functionalities cannot be imported, for example, functions such as showing changed values only.

### 6.10 Printing

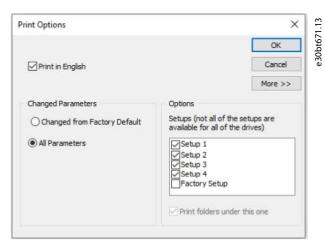
There are 2 print options in MCT 10 Set-up Software:

- Print project.
- Print selected folders.

Both options are in the File menu in the main menu bar. Alternatively, right-click the Project icon and select Print project.

To print a folder, right-click a folder icon within the project and select *Print selected folders*.

Select Print project to print parameter settings for an entire project. Select Print selected folders to print parameter settings for part of a project.



#### Illustration 72: Print Options

Select the desired print language from the drop-down list.

#### Changed parameters

Print either parameters that have been changed from factory default or all parameters.

Options

Select which set-up to print.

More

Click More to be able to print selected parameter groups only.

Jutput Language		OK
Language: English	*	Cancel
		Less <<
Changed Parameters	Options	
Changed from Factory Default	Setups (not all of the setups available for all of the drives)	
All Parameters	Setup 1 Setup 2 Setup 3 Setup 4 Factory Setup Print folders under this on	e
Nd Drives Group	New Drives Group	
Did Drives Group	New Drives Group	
	O-** Operation / Display     I-** Load and Motor     2-** Brakes     3-** Reference / Ramps     4-** Limts / Warnings     5-** Digital In/Out     6-** Analog In/Out     7-** Controllers     7-** Controllers	
Did Drives Group	♥ 0-** Operation / Display ♥ 1-** Load and Motor ♥ 2-** Brakes ♥ 3-** Reference / Ramps ♥ 4-** Limits / Warnings ♥ 5-** Digital In/Out ♥ 6-** Analog In/Out ♥ 7-** Controllers ♥ 8-** Comm. and Options ♥ 13-** Smart Logic ♥ 14-** Special Functions ♥ 15-** Devise Information	

Illustration 73: Example of Print Selection

## 6.11 Update Database Information

If the MCT 10 Set-up Software database information is outdated, updates are available either by download from the Internet or, when this is not possible, by reading from the drive itself.

When the MCT 10 Set-up Software database for a drive is outdated, the drive icon is shown with a red line through it and the *Database information* fields show the message *Not supported*.



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Operation

File Edit View Insert C		? @ ©●₽₩ ★◀	,	e30ht649 11
Network		Connected Drive Information	Database Information	1
Project	Drive Series	VLT 5000 Standard	Not Supported	
	Drive Type	5001	Not Supported	
	Voltage	2007-2407	Not Supported	
	Basic SW Version	3.71	Not Supported	
	Communication Option	4.43 PROFIBUS DPV1	Not Supported	
	Application Option	None	Not Support	
ſ	Drive Address	2	1	
	Driver Name	SerialCom		
	Region			
				<u>-</u>
For Help, press F1				14

#### Illustration 74: Outdated Software Database

Update the database either by right-clicking the drive icon and selecting *Download drive info*, or by clicking *Download drive info*.

Untitled - MCT 10 Set-up Software

File Edit View Insert Communication Tools Options Help

**Operating Guide** 

🖃 📕 Network

Project	New	Drive Series	MLT 5000 Standard	Not Supported
	Read from Drive	Drive Type	5001	Not Supported
	Write to Drive	Voltage	2007-2407	Not Supported
	Compare	Basic SW Version	3.71	Not Supported
	Apply Parameter View Settings	Communication Option	4.43 PROFIBUS DPV1	Not Supported
	Cut <b>Copy</b> Paste	Application Option	None	Not Supported
	Delete Rename			
	Properties			
		Drive Address	2	(
		Driver Name	SerialCom	1
		Region	<b></b>	

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#### Illustration 75: Database Update

To start reading from the drive, select Yes.

When reading from the drive is complete, the drive icon no longer has a red line through it, and the *Database information* shows settings identical to the *Connected drive information*.

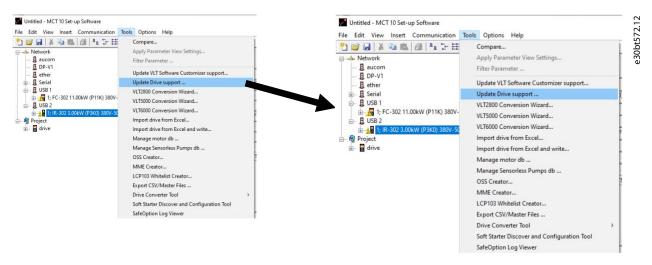
Also, the parameter settings are shown in capital letters.

## 6.12 Update Drives Firmware Support in MCT 10 Set-up Software

4

The MCT 10 Set-up Software can be updated regardless of the firmware of the drive.

Download upgrades from the Danfoss website <u>www.danfoss.com</u>.



#### Illustration 76: Update MCT 10 Set-up Software



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Operation

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The update files can be installed without administrator rights in Microsoft operating systems.

## 6.13 Software Compatibility

The MCT 10 Set-up Software project files can open legacy version project files.

#### **Table 4: Opening Legacy Versions**

Software versions of MCT 10 Set-up Software and drive in exist- ing project file	Software versions of Danfoss Set-up Software	Compatible 🛛 / 🗶	
2.00 and 2.01	2.02	0	
2.02 and 2.51	2.00	x	

When MCT 10 Set-up Software has been updated, project files saved with a newer firmware version can be opened and used. Refer to <u>Illustration 77</u> for an example.

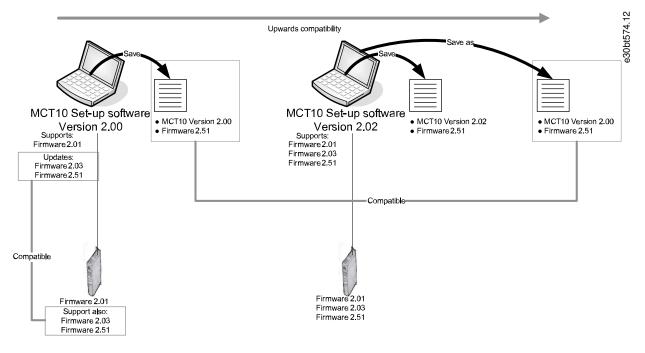


Illustration 77: Use Updated MCT 10 Set-up Software

### 6.13.1 Mapping to Compatible Firmware

To establish connectivity to a drive with firmware version 1.10, it is required to modify the MCT 10 Set-up Software drive database mapping to firmware version 1.05 as reference.

Procedure

- 1. Start the MS Explorer and open the path C:\Program Files\Common Files\Danfoss Drives\SharedSource\.
- 2. Open the text file ss\_version\_mapping.txt in Notepad by right-clicking the file and selecting *Edit*.
- 3. Change "Series="FC-202", AOC="01.10", Database="01.10" to Series="FC-202", AOC="01.10", Database="01.03".
- 4. Save and close the file.

To find out if the MCT 10 Set-up Software has been updated, check the information in the *About* box. This box shows the actual MCT 10 Set-up Software version.

Ν	0	Т	п	C	Ε
	-				

System information can be copied directly to the Windows clipboard.

### Operation

About	× 75.13		
VLT® Motion Control Tool MCT 10 Set-up Software Version: 5.20 (Build 5635)	× e30bt575.13		
Copyright (C) 2001-2020 Danfoss Drives			
Export log files Details <<	OK		
/hen reporting an error, please include the following information: 12/31/2020 12:40:12 pud	^		
Shared Source DLL info: AAF005 01.20 005, 01, 20, 1 (Registered) AAF005 01.40 005, 01, 40, 1 (Registered) AAF005 01.70 005, 01, 70, 1 (Registered) AAF005 01.81 005, 01, 71, 1 (Registered) AAF005 01.84 005, 01, 84, 1 (Registered) AAF005 01.84 005, 01, 84, 1 (Registered) AAF005 01.86 005, 01, 84, 1 (Registered) AAF005 01.92 005, 01, 92, 1 (Registered) AAF005 01.93 005, 01, 93, 1 (Registered) AAF005 01.93 005, 01, 94, 1 (Registered)	×		
	>		
<			

## 6.14 Conversion Wizard

### 6.14.1 Conversion

It is required that database versions, power size, voltage range, and option configuration of the source match the destination drive. Differences can be converted using 1 of the conversion wizards available in the MCT 10 Set-up Software:

- VLT to FC series conversion.
- FC to FC series conversion.



If the parameter database of a source drive is different from the database on the destination drive, it cannot be written without errors signaled during write to drive.

## 6.14.2 VLT to FC Series Converter Function

It is possible to convert, for example, a VLT<sup>®</sup> 5000 drive to a VLT<sup>®</sup> AutomationDrive FC 302 via the conversion matrix in the MCT 10 Set-up Software.

**Operating Guide** 



Operation

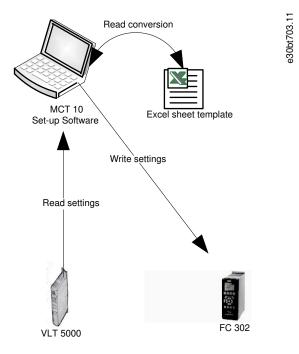


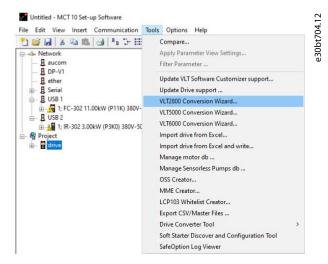
Illustration 79: Conversion

## 6.14.2.1 Converting Multiple Drives

#### Procedure

- 1. Select the Tools menu and activate Drive Conversion Wizard.
- 2. In the subsequent dialogs, select the drives for conversion.

When converted, a new VLT<sup>®</sup> AutomationDrive FC 302 drive is created in the Project folder.





## 6.14.2.2 Import Drive from Excel

Use this function to create a VLT<sup>®</sup> AutomatonDrive project based on an Excel sheet. For example, import of VLT<sup>®</sup> 3000 settings from an Excel sheet into a new FC 302.

An example file is attached in the MCT 10 Set-up Software (vlt3000conversion.xls). This example file can be edited and used for converting from VLT<sup>®</sup> 3000 to FC 302.



Detailed knowledge of Microsoft Excel formula editing is required.

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# 6.14.3 FC to FC Conversion

The converter tool can convert projects within the same drive series, regardless of software versions, power size, voltage range, and option configuration. It covers:

• VLT<sup>®</sup> HVAC Drive FC 102.

**Operating Guide** 

- VLT<sup>®</sup> Refrigeration Drive FC 103.
- VLT® AQUA Drive FC 202.
- VLT® AutomationDrive FC 301/FC 302.
- VLT<sup>®</sup> Lift Drive LD 302.
- All OEM versions based on the FC xxx series.

Differences can be matched by using the Conversion Tables Manager. A conversion table enables conversion from:

- Online to online drive.
- Online to offline drive.
- Offline to online drive.
- Offline to offline drive.

Two user profiles are available:

- Administrator qualifies and manages the conversion tables through access to the Conversion Tables Manager. From the Conversion Tables Manager, new conversion tables can be created and deployed to other MCT 10 Set-up Software installations.
- User writes projects to the destination using the conversion tables transparently. The user cannot access the Conversion Tables Manager. Conversion tables can be imported to the database.

MCT 10 Set-up Software is installed with user rights. Enabling the Conversion Tables Manager is done from the checkbox in the *Converter Tool Settings* dialog.

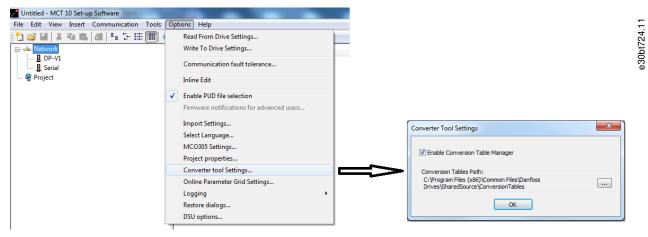


Illustration 81: Enabling Conversion Table Manager

The conversion tables are stored locally on the hard disk. Using the database non-distributed, the path to the network location can be reconfigured from the *Converter Tool Settings* dialog.

### 6.14.4 Conversion Tables Manager

Access the Conversion Tables Manager via the *Tools* menu in the MCT 10 Set-up Software.

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# Operation

### **Operating Guide**

Conversion Tables:	Preview:	
FC102_V2_97_to_V3_14.xml FC302 V4.4 to V5.61.xml	Series	
FC302_V4.40_to_V5.61.xml FC302_V4_40_to_V5_84.xml	Major Software version	
FC302_V4_85_to_V5_42.xml	Minor Software version	
	Power size	
	Voltage range	
	Option A	
	Option B	
	Option C0	
	Option C1	
	Destination Drive	
	Series	
	Major Software version	
	Minor Software version	
	Power size	
	Voltage range	
	Option A	
	.   Option B	
New Edit Dele	Option C0	
	Option C1	
mport		
Export	ок	

#### Illustration 82: Conversion Tables Manager

A dialog is divided into the following sections:

- A conversion table containing the list of conversion tables in the database.
- A preview pane.

Conversion tables can be created or imported, edited, exported, or deleted.

#### Exporting tables

Distribute to other MCT 10 Set-up Software installations by exporting the relevant tables to a \*.cvt file. The preview pane lists the conversion table source and destination drive information.

The conversion can be as follows:

- Drive series based on the FC 102/FC 202/FC 3xx platform.
- Software version (major and minor).
- Power size.
- Voltage range.
- Option A.
- Option B.
- Option C0.
- Option C1.

#### Create conversion tables

To create a conversion table, open the Conversion Tables Manager or right-click the source drive and select Convert drive.

# NOTICE

When using the right-click option, it is only possible to configure the information of the destination drive. Furthermore, *parameter group 19-\*\* User-defined Parameters* is not converted. These settings are configured when writing from source to destination.

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### Operation

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Source drive			Destination drive —	-	
Series	FC-302	•	Series	FC-302	•
Software version	04.40	•	Software version	05.84	•
Power size	1.10KW	•	Power size	1.10KW	•
Voltage range	200V-240V	•	Voltage range	200V-240V	•
Option A	No Option	•	Option A	MCA121 EtherNet/IP	
Option B	No Option	•	Option B	No Option	•
Option C0	No Option	•	Option C0	No Option	•
Option C1	No Option	•	Option C1	No Option	•

Illustration 83: Drive Conversion

#### Editing tables

In the *Drive conversion* view, enter the information for source and destination drives. Click *OK* to open the conversion table editor listing the parameter database differences.

Use the conversion table editor to create or load a conversion table. Ensure that the conversion table matches the drive series, software version, power size, voltage range, and option configuration. The MCT 10 Set-up Software is not able to find and load incompatible conversion tables. After loading or creating the conversion table, it is possible to re-edit the table or to convert the source drive and store the converted drive in an offline folder.

#### Formulas

The parameter database is listed and sorted according to the parameter ID. To simplify the conversion process, filter the database to list alerts or applied changes only.

#### Table 5: Alert Coding

Color code	Description
Red	Difference between source database and drive. A formula is required before changes can be applied to the drive.
Blue	Difference between source database and drive. The formula is ignored and changes can be applied to the drive.



If a formula is applied to all alerts, the source parameter database can be converted to the destination parameter database without any further configuration.

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Operation

	rce drive	-		Destination Drive			
Serie	es	FC-302		Series	FC-302		
Majo	or Software version	04		Major Software version			
Mine	or Software version	40		Minor Software version	84		
Pow	er size	1.10KW		Power size	1.10KW		
Volta	age range	200V-240V		Voltage range	200V-240V		
Opt	Option A No Option Option B No Option			Option A	MCA121 EtherNet/IP	_	
Opt				Option B	No Option No Option		
Opt	ion C0			Option C0			
Filte	ion C1 ers: Filter by alerts	No Option	/ changed item formula	option C1	No Option		
Filte	ers: Filter by alerts source ID d	Filter by	formula	s comment			
Filte	ers: Filter by alerts source ID d 0	Filter by		s	the source drive		
Filte	ers: Filter by alerts source ID de 0 0	Filter by	formula ignored	s comment parameter does not exist in	the source drive the source drive		
Filte = D D D	ers: Filter by alerts source ID d 0 0 0	Filter by estination ID	formula ignored ignored	s comment parameter does not exist in parameter does not exist in	the source drive the source drive the source drive	-	
Filte	ers: Filter by alerts source ID da 0 0 0 1	Filter by estination ID 30 31 32	formula ignored ignored ignored	s comment parameter does not exist in parameter does not exist in parameter does not exist in	the source drive the source drive the source drive the source drive the source drive		
	ers: Filter by alerts source ID d 0 0 0 1 137 1	Filter by estination ID 30 31 32 06	formula ignored ignored ignored ignored	s comment parameter does not exist in parameter does not exist in parameter does not exist in parameter does not exist in	the source drive the source drive the source drive the source drive up-indipendent		
	ers: Filter by alerts source ID d 0 0 0 1 137 1 1	Filter by estination ID 30 31 32 36 37	formula ignored ignored ignored default ignored ignored	s comment parameter does not exist in parameter does not exist in parameter does not exist in parameter does not exist in parameter does not exist in destination parameter is set	the source drive the source drive the source drive the source drive up-indipendent the source drive		
	ers: Fiter by alerts source ID d 0 0 0 1 137 1 137 1 1 1 1 1 1	Filter by estination ID 30 31 32 36 37 54 58 59	formula ignored ignored ignored ignored default ignored ignored ignored	s comment parameter does not exist in parameter does not exist in parameter does not exist in parameter does not exist in destination parameter is set parameter does not exist in	the source drive the source drive the source drive the source drive up-indipendent the source drive the source drive		
	ers: Filter by alerts source ID d 0 0 0 1 137 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Filter by estination ID 30 31 32 36 37 54 58 59 11	formula ignored ignored ignored ignored ignored ignored ignored ignored ignored	s comment parameter does not exist in parameter does not exist in parameter does not exist in parameter does not exist in destination parameter is set parameter does not exist in parameter does not exist in parameter does not exist in parameter does not exist in destination parameter is set	the source drive the source drive the source drive up-indipendent the source drive the source drive the source drive the source drive up-indipendent		
	ers: Filter by alerts source ID de 0 0 0 0 1 137 1 137 1 1 1 1 1 1 2 2	Filter by estination ID 30 31 32 36 37 54 58 59 11 18	formula ignored ignored ignored ignored default ignored ignored default ignored	s comment parameter does not exist in parameter does not exist in parameter does not exist in parameter does not exist in destination parameter is set parameter does not exist in parameter does not exist in parameter does not exist in destination parameter is set parameter does not exist in	the source drive the source drive the source drive up-indipendent the source drive the source drive the source drive up-indipendent the source drive		
	ers: Filter by alerts source ID de 0 0 0 1 137 1 137 1 137 1 1 1 1 1 1 1 2 3	Filter by estination ID 30 31 32 36 37 54 58 59 11 18 82	formula ignored ignored ignored ignored default ignored ignored default ignored ignored ignored	s comment parameter does not exist in parameter does not exist in parameter does not exist in parameter does not exist in destination parameter is set parameter does not exist in parameter does not exist in parameter does not exist in destination parameter is set parameter does not exist in parameter does not exist in parameter does not exist in parameter does not exist in	the source drive the source drive the source drive up-indipendent the source drive the source drive the source drive up-indipendent the source drive the source drive the source drive		
	ers: Filter by alerts source ID d 0 0 0 1 137 1 137 1 137 1 137 1 1 211 2 2 3 3 3	Filter by estination ID 30 31 32 36 37 54 58 59 11 18	formula ignored ignored ignored ignored default ignored ignored default ignored	s comment parameter does not exist in parameter does not exist in parameter does not exist in parameter does not exist in destination parameter is set parameter does not exist in parameter does not exist in parameter does not exist in destination parameter is set parameter does not exist in	the source drive the source drive the source drive up-indipendent the source drive the source drive the source drive up-indipendent the source drive the source drive the source drive the source drive		

#### Illustration 84: Conversion Table

Double-click an alert to open the *Formula Editor* dialog and specify the destination parameter mapping. The following configurations are possible:

- Destination parameter is set to default value (factory default value. Default settings for red alerts).
- Destination parameter = source parameter ID.
- Destination parameter = source parameter multiplied by a user-defined numeric value.
- Destination parameter = destination option list or numerical value.
- Ignore this parameter. Default setting for blue alerts.

Each formula applied can be associated with a comment containing a user-defined text. The comment is optional to each alert.

### VLT<sup>®</sup> Motion Control Tool MCT 10

### **Operating Guide**

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📥 de	stination parameter is setup-ind	lipendent				
Source Parame	eter:					
		setup valu	es:		choi	ce list:
D:	137	setup	value		v	description
Name:	d-axis Inductance (Ld)	Setup 1				parameter is not a choice-lis
nin Value:	0.000000	Setup 2 Setup 3	0.0			
nav Value:	1000000.015000	Setup 4				
Default Value:		•	III	•	•	4 III
Jeraurt Value,	0.0	,				▶
Destination Pa	rameter:					640) 
		setup valu	les:			choice list:
D:	137	setup	value		v	description
Name:	d-axis Inductance (Ld)	Setup 1				parameter is not a choice-li:
	0.000000	Setup 2				
	1000000.015000	Setup 3 Setup 4				
Default Value:		4	111	+	1	III. F
Jerault value:	0.0	-				
Formula:						
C Destinatio	n Parameter is set to Default va	alue				
C Destinatio	n Parameter = Source Paramet	er ID:				
C Destinatio	n Parameter = Source Paramet	er * 1				
	n Parameter =			(if cha	nicalie	t, type the numeric value)
		10000.0	) edit	(n uit	orcens	y type the numeric value)
C Ignore this	s parameter					
Comment:						
User defined	text					



When a formula is applied to all red alerts, assign a name to save the conversion table in the database.

If differences are detected when writing from source to destination drive, MCT 10 Set-up Software uses the following as search criteria:

- The drive series.
- Major software version.
- Power size.
- Voltage range.
- Option configuration.

With the proper conversion table in the database, any drive can be written transparently to a destination even if the minor software version does not match. If several conversion tables are found matching the criteria, MCT 10 Set-up Software uses the minor software version to find the closest match. Only 1 drive can be written transparently to the destination.

If parameter group 19-\*\* User-defined Parameters is available, the settings are written transparently to the destination drive.

# 6.14.4.1 Converting Offline to Offline/Online to Online

Procedure

- 1. Mark the appropriate number of set-ups from *All Parameters*.
- 2. Right-click and select Copy.

Operation

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3. Paste the parameters in the destination drive folder.

🖞 💕 🖬 🕌 🖦 🚳 🕒 🗄 🏙 🕷	N? 🔵						
Network	ID	Name	Setup 1	Setup 2	Setup 3	Setup 4	
- A aucom	001	Language	[0] English	[0] English	[0] English	[0] English	
DP-V1	002	Motor Speed Unit	[0] RPM	[0] RPM	[0] RPM	[0] RPM	
— 且 ether ⊕– 且 Serial	003	Regional Settings	[0] International	Cut	(	Ctrl+X ernation	
	004	Operating State at Po	[1] Forced stop, rel	Сору	(	trl+C ced sto	
1; FC-302 11.00kW (P11K) 380V-480V	010 Active Set-up		[1] Set-up 1	Paste		Ctrl+V -up 1	
	011	Edit Set-up	[9] Active Set-up			tive Set-	
1; IR-302 3.00kW (P3K0) 380V-500V	012	This Set-up Linked to	[0] Not linked	Read From drive		t linked	
🖃 📲 Project	013.0	Readout: Linked Set	{0}	Write to drive			
🚔 🗧 drive	013.1	Readout: Linked Set	{1}	Write to Multiple D	lrīves		
All Parameters	013.2	Readout: Linked Set	{2}	Apply Parameter V			
- Alarms	013.3	Readout: Linked Set	{3}	Apply Parameter v	iew Settings		
	013.4	Readout: Linked Set	{4}	{4}	{4}	{4}	
Timed Actions	014	Readout: Edit Set-up	AAAAAAAAhex	AAAAAAAAhex	AAAAAAAAhex	AAAAAAAA	
- & Preventive Maintenance	015	Readout: actual setup	1	1	1	1	
— 📕 Drive File System	020	Display Line 1.1 Small	[1617] Speed [RPM]	[1617] Speed [RPM]	[1617] Speed [RPM]	[1617] Speed [	

Illustration 86: Offline Online Conversion

MCT 10 Set-up Software recognizes any difference and automatically applies a matching conversion table, if available.

# 6.14.4.2 Converting Online to Offline/Offline to Online



### Procedure

1. Right-click the offline drive.

# Operation

e30bt729.12

2. Select Read from Drive.

🞽 🛃 👗	🔁 🛍 🛃 🖻 🖕 💱 🏥 🏢 🥝	₩?	) = ≻	🔁 🔐		
Network     B aucom     Dp. V1						Connected drive information
—		Ĩ.		Drive S	Geries	
⊕ Serial		Î		Powe	r Size	
				Vo	ltage	
		Basic SW Version Option A				
Project				Op	tion B	
⊕- o drive	New	>		Option (	CO/E0	
	Print Selected Folder(s)	1		Option (	C1/E1	
	Edit setup names	t		Type	Code	
	Read from Drive					
	Write to Drive Write to Multiple Drives					
	Compare Compare Multiple Drives Apply Parameter View Settings			Drive Ad	dress 1	
	Cut		Seco	ndary Addr	esses	
	Copy Paste		Bus Na			V1
	Delete		La	ast synchro	nized	
	Rename	Drive Operation Status			tatus	
	Update WiFi LCP firmware					
	Load motor data Apply CSIV file					

Illustration 87: Offline Online Conversion

Ð

The MCT 10 Set-up Software recognizes any difference and automatically applies a matching conversion table.

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Diagnostics

# 7 Diagnostics

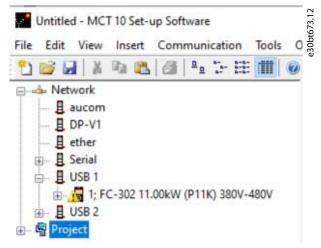
# 7.1 Alarm, Warning, and Fault Log Readout

Features from version 2.0 support:

- Reading out alarms, warnings, and fault logs of the online drives.
- Quick location of alarms and warnings in the connected drive system.
- Investigation of the fault log for previous trips.
- Gathering and storing events in the project file for later evaluation.
- Sending the project file to a remote specialist for further investigation.

# 7.2 Localization of Alarms and Warnings

After a complete scanning of a drive network, the MCT 10 Set-up Software indicates if the connected drives have active warnings and alarms. An exclamation mark in front of the drive icon indicates a warning or an alarm.



#### Illustration 88: Drive with Active Alarm or Warning

Expand the drive and click the alarm/warning icon.

Name	lcon
Active alarms/warnings	e30bt716.11
No active alarms/warning	e30bt712.11
Fault Log           Date Read         Time Read         Drive Time         Code         FaultLog Text         Value	FaultLog Time Fault log: Date and T Fault Log: Ext. Refer Fault Log: Frequency Fault Log: Current Fault Log: Voltage

#### Illustration 89: Fault Log View for Control Cards Marked MKI

Fault Log											
Date Read Time Read	Drive Time Code	FaultLog Text Value	FaultLog Time	Alarm Log: Date and Time	Alarm Log: Ext. Ref	. Alarm Log: Freq	Alarm Log: Current	Alarm Log: Volt	Alarm Log: DC Link Volt	Alarm Log: Control Word	Alarm Log: Status Word

#### Illustration 90: Fault Log View for Control Cards Marked MKII

For a more detailed description of the code, refer to the Operating Guide for the particular drive. If the drive trips, it stores the cause for the trip in a fault log buffer. The log consists of 3 values:

- Code.
- Value.
- Time.

When the MCT 10 Set-up Software reads the fault log, it shows the time and date when the log was read.

ΝΟΤΙΟΕ
The actual time when a fault occurs is not indicated.

### 7.3 Storing Alarms/Warnings in Project Files

Alarms/warnings and the fault loggings are stored into the Project file. The MCT 10 Set-up Software automatically reads alarms, warnings, and fault loggings at every read from/write to the drive.

### 7.4 Handling the Alarms and Warnings Loggings

The MCT 10 Set-up Software allows more than 200 alarms and warnings for each drive in the project. The loggings can be cleared individually. This is done by entering the loggings to clear and then right-clicking. Clearing the log only clears the PC log while the information in the drive is unaffected by this handling.

	ΝΟΤΙϹΕ	
There are redundant alarm entries in the log.		

The MCT 10 Set-up Software stores active alarms and warnings in the Project file at each read/write command. No alarm is lost, but an alarm can have multiple entries in the log.

※陶風 個 転 注注 #	Options Help	204										
rk com	Alarms											
-V1	Date Read	Time Read		Drive Time			Code	Alarm Text				
er	12-31-2020	12:51:12		14272 [h]			68	Safe Stop				
11												
1; FC-302 11.00kW (P11K) 380V-480V All Parameters												
Alarms												
Smart Logic     Clock Functions												
Timed Actions	<											
Preventive Maintenance Drive File System	Warnings											
Service Log Status	Date Read	Time Read		Drive Time			Code	Warning Text				
Drive Control												
Condition Based Monitoring												
2												
	<											
	Fault Log											
		Time Read	Drive Time	Code	FaultLog Text	Value	FaultLog Time	Fault log: Date and T	Fault Log: Ext. Refer	Fault Log: Frequency	Fault Log: Current	1
	Date Read	Time nead		68	Safe Stop	0	51314400 [s]			0.0 [Hz]	0.00 [A]	1
	12-31-2020	12:51:12	14272 [h]					1/1/2007 12:00:00 AM	0.0 [%]	0.0 [Hz]	0.00 [A]	1
	12-31-2020 12-31-2020	12:51:12 12:51:12	14272 [h]	68	Safe Stop	0	51314400 [s]					
	12-31-2020 12-31-2020 12-31-2020	12:51:12 12:51:12 12:51:12	14272 [h] 14272 [h]	68 80	Drive initialised	0	51314400 [s]	1/1/2007 12:00:00 AM	0.0 [%]	0.0 [Hz]	[A] 00.0	1
	12-31-2020 12-31-2020 12-31-2020 12-31-2020	12:51:12 12:51:12 12:51:12 12:51:12 12:51:12	14272 [h] 14272 [h] 14272 [h]	68 80 68	Drive initialised Safe Stop	0	51314400 [s] 51314400 [s]	1/1/2007 12:00:00 AM 1/1/2007 12:00:00 AM	0.0 [%]	0.0 [Hz]	0.00 [A]	
	12-31-2020 12-31-2020 12-31-2020	12:51:12 12:51:12 12:51:12	14272 [h] 14272 [h]	68 80	Drive initialised	0	51314400 [s]	1/1/2007 12:00:00 AM	0.0 [%]			

Illustration 91: Loggings

### 7.5 The Scope Function

The scope function supports monitoring and diagnosing of parameters. The function polls parameter data and dynamically shows the polled data as a curve graph.

The scope function provides 2 different channel types to sample parameters:



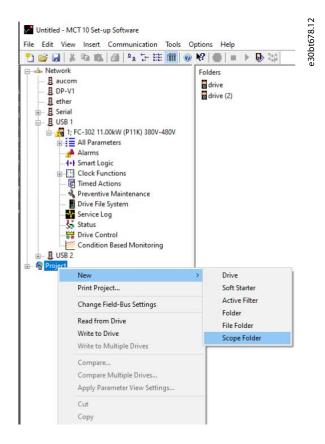
# Diagnostics

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- PC polling channel Channel selected when the PC SW requests the parameters from the drive. The channel does not have any time limitation, the buffer size is user-configurable and corresponds to the number of samples. Fast sampling with accurate sampling rate cannot be obtained because the Windows operating system does not support real-time extension.
- Drive real-time channel Only available in the FC 102, FC 202, and FC 300 series uses an internal 16-kByte buffer located in the drive. Recommended for continuously monitored applications requiring high and precise sampling rates. It is required to set up a trigger event for the drive to start filling up the buffer with samples.

# 7.5.1 Activating the Scope - MCT 10 Set-up Software

Insert a new scope from the *Insert* menu or by right-clicking the Project folder, Drive folder, Regular folder, or Drive.



#### Illustration 92: New Scope

Rename the Scope folder via the *Edit* menu or by right-clicking the icon and select *Rename*.

The 1<sup>st</sup> time that the Scope folder is selected, the *Add Channel* dialog pops up. From this dialog, select the drive to monitor. Then, depending on the drive series, select the type of channel to collect samples from.

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### Diagnostics

### **Operating Guide**

Drive	Parameter		
I Network	ID	Name	^
🖻 🖷 Project	1500	Operating hours	
drive	1501	Running Hours	
drive (2)	1502	kWh Counter	
w New Folder 1	1587	kWh Counter Hires	
	1600	Control Word	
	1601	Reference [Unit]	
	1602	Reference %	
	1603	Status Word	
	1605	Main Actual Value [%]	
	1606	Actual Position	
	1609	Custom Readout	
	1610	Power [kW]	
	1611	Power [hp]	
	1612	Motor Voltage	
	1613	Frequency	
	1614	Motor current	
	1615	Frequency [%]	
	1616	Torque [Nm]	
	1617	Speed [RPM]	
	1618	Motor Thermal	
	1619	Themistor Sensor Temperature	
	1620	Motor Angle	
	1621	Torque [1/2] High Res.	
	1622	Torque [%]	
	1623	Motor Shaft Power [kW]	
~~~~~	1624	Calibrated Stator Resistance	
PC Polling Channel	1625	Torque [Nm] High	140
O Drive Real Time Channel	1620	DC Link Vinitana	~
	<		>

#### Illustration 93: Add Channel

#### Adding text notes

Insert additional text for later usage to each scope folder such as the type of drive monitored and diagnostic help text. Text notes are added by right-clicking the Scope folder and selecting  $New \Rightarrow Text$  note. The default text can be changed by right-clicking the text note and selecting *Rename*. Several text notes can be added to the same Scope folder.



### Illustration 94: Text Notes

# 7.5.2 Configuring the PC Polling Channel

PC polling channel is enabled by default when a drive is selected within the Network folder or Project folder. All parameters available in the list are visible by ID name and are automatically updated according to the product.

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# Diagnostics

### **Operating Guide**

Drive	Parameter	
→         B aucom           →         B aucom           →         B aucom           →         B aucom           →         B ether           →         B stelat           →→         B USB 1           →→         B USB 2           →→         B 1:1R-302 3.00kW (P3K0) 380V-500V           →         B Project	ID         Name           1500         Operating hours           1501         Running Hours           1501         Running Hours           1502         KWh Counter           1600         Control Word           1601         Reference (Int)           1602         Reference (Int)           1603         Status Word           1605         Man Actual Value [X]           1606         Actual Position           1607         Ower [kV]           1618         Power [kV]           1619         Power [kV]           1611         Power [kV]           1615         Frequency Mathematic           1616         Torque [km]           1617         Speed [RPM]           1618         Motor Velage           1619         Torque [km]           1619         Torque [km]           1619         Torque [k]           1621         Torque [k]           1621         Torque [k]           1622         Torque [k]           1623         Motor Shaft Power [kV]           1623         Torque [k]           1623         Torque [k]           1623         Torque [k]	
● PC Polling Channel ◯ Drive Real Time Channel	1630 DC Link Voltage 1632 Brake Energy /s 1633 Brake Energy Average 1624 Haattink Term	~

Illustration 95: Parameter ID and Name

### Procedure

- 1. Select a parameter in the parameter list and click *Next* to update the *Add Channel* dialog.
- 2. Configure A/div (value/division).

	NOTICE f they are not shown within the visible area of the curve.	
Add Channel Signal  Si	e30bf680.13	

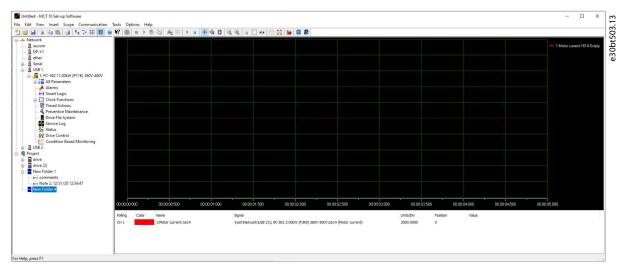
- 3. Define the position number (vertical zero line on the Y axis). If there are several signals on top of each other, it is useful to have them plotted apart.
- 4. Set color and tick *Marker* to differentiate the different curves in a black and white printout. Each curve gets a marker as box, triangle, cross, and so on.

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Diagnostics

e30bt681.12

5. Click OK to generate the curve graph.



#### Illustration 97: Generate Curve Graph

6. Right-click the channel box to open the *Add Channel* dialog and add extra channels.

Drive	Parameter		
Aetwork     Bacom     DP-V1     DP-V1     DState     USB 1     USB 2     Orive     orive     orive     orive     orive     orive     orive     orive     orive     New Folder 1     New Folder 4     New Folder 5	ID 1500 1501 1502 1600 1601 1602 1603 1605 1606 1609 1610 1611 1612 1613 1614 1615 1616 1617 1616 1617 1618 1619 1620 1621 1622 1623 1624	Name Operating hours Running Hours KWh Counter Control Word Reference [Uht] Reference % Status Word Main Actual Value [%] Actual Position Custom Readout Power [kW] Power [kW] Power [kM] Speed [RPM] Motor Thermal Thermistor Sensor Temperature Motor Angle Torque [%] High Res. Torque [%] Motor Shaft Power [kW] Calibrated Stator Resistance	
PC Polling Channel     Drive Real Time Channel	1625 1630 1632 1633	Torque [Nm] High DC Link Voltage Brake Energy /s Brake Energy /s	v

#### Illustration 98: Open Add Channel Dialog

### 7.5.3 PC Polling Channel Properties

More settings can be configured by right-clicking the Scope window and selecting Properties. It is possible to specify:

- General parameter sample settings.
- Sample trigger settings.
- Cursor settings.

**Operating Guide** 



General parameter sample settings

The General tab holds 4 basic settings for the Scope Properties:

- Seconds per division (SEC/DIV).
- Time format.
- Buffer size in samples.
- Polling rate in milliseconds.

General	Trigger	Data Storage	Polling	Cursor		
Time I	Base					
SEC/D	VIV	1	Time	e Format	hh:nn:ss:zzz	~
Buffer	Size	1000000	Trig	ger Pos.	0	[%]
Polli	ng Rate					
0	Specify		1	00	▲ mse	c
(	) As fast	as possible				

#### Illustration 99: Basic Scope Settings

Table 6: Format and Range of the Basic Scope Settings

Description	Format	Value range
SEC/DIV	Time base on the X-axis	0.0001-1.000.000.000 s
Time format	Year, month, date, hour, seconds, and milliseconds	-
Buffer size	Number of data sets in the buffer	0–1.000.000
Polling rate	Time in milliseconds between 2 samples	-

# ΝΟΤΙΟΕ

For systems with large inertia, a low sampling rate may be used since the value changes slowly. For systems with low inertia, a high sampling rate is needed.

NOTICE

Setting *Polling Rate* to *As fast as possible* means that MCT 10 Set-up Software does not control the actual time between each sample. This can lead to a high jitter between 2 samples.

#### Trigger

The trigger function starts the sampling of values only when a certain value is reached. This reduces the need for large buffer sizes. A trigger is also a valuable tool to see if values cross borders where the drive does not store any warnings.

**Operating Guide** 



Diagnostics

cope Pro	operties				×
General	Trigger	Data Storage	Polling Cursor		
Trigg	ger				
Sou	irce	1:Motor	current:161+ ~		
Lev	el	0			
Mo	de		Slope		
+	Auto	Norm	Rising	Falling	
		1	ОК	Cancel	Help

#### Illustration 100: Trigger Functions

#### Table 7: Descriptions of the Trigger Functions

Trigger func- tions	Description
Source	Source channel.
Level	Level where the trigger has to be activated.
Mode	Auto starts the trigger automatically when <i>Resume All</i> is pressed. The trigger line is set to the time when <i>Re-sume</i> was pressed. Normal (Norm) activates the trigger when level and slope settings are fulfilled.
Slope	Sets if the value must rise (source value goes from low values to high values) or the slope must fall (source value goes from high values to low values).

#### Cursor

Style defines the functionality of the cursor. The style contains 5 different possibilities:

- Value XY Shows the time and value of each signal at the cursor location.
- Value X Shows the time only.
- Value Y Shows the value only.
- Delta X Shows 2 cursors, and the time between the 2 cursors is calculated.
- Delta Y Works like Delta X, but this time the difference between 2 levels is calculated.

The pointer position defines the default position when a cursor is inserted in Scope.



# 7.5.4 Reuse of PC Polling Channel Settings

Often, the same settings are used when measuring with the PC polling channel on more than 1 drive. These settings can be reused either by copying an existing scope folder or by reusing an existing one.

Reconfigure the scope folder connection properties for another drive in the network by double-clicking an added channel. In the *Reconfigure Channel* dialog, another drive on the same or a different fieldbus can be selected.

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Diagnostics

Drive	Parameter	
→       Network         ▲       aucom         ▲       DP-V1         ▲       Serial         ▲       USB 1         ▲       USB 2         ▲       1: IR-302 3.00kW (P3K0) 380V-500V         ⊕       ➡         Project	ID         Name           1500         Operating hours           1501         Running Hours           1502         kWh Counter           1600         Control Word           1601         Reference [Unit]           1602         Reference [Unit]           1603         Status Word           1605         Main Actual Value [%]           1606         Actual Value [%]           1607         Cuatom Readout           1609         Cuatom Readout           1610         Power [kW]           1611         Power [kW]           1612         Motor Voltage           1613         Frequency           1614         Motor current           1615         Frequency [%]           1616         Torque [Nm]           1617         Speed [RPM]           1618         Motor Themal           1619         Thermistor Sensor Temperature           1620         Motor Angle           1621         Torque [%] High Res.           1622         Torque [%]           1623         Motor Shaft Power [kW]           1625         Torque [km] High	
PC Polling Channel     Drive Real Time Channel	1630     DC Link Voltage       1632     Brake Energy /s       1633     Brake Energy Average       1634     Hasteink Tamp	~

### Illustration 101: Reconfigure Channel

# 7.5.5 Configuring the Drive Real-time Channel

Drive real-time channel can be selected if the selected drive supports this functionality.

### Procedure

1. Select the relevant drive.

Drive Real-time Channel opens the Scope Properties dialog.



2. Configure the channels depending on what the actual drive supports.

	– 🗆 X
Parameter	
ID Name	

#### Illustration 102: Select Drive Real-time Channel

All available parameters are listed by parameter name.

- 3. Configure the sample rate for each channel using the time format HH:MM:SS:zzz.
- 4. Configure the sampling mode through:
  - The trigger event.
  - Logging mode.
  - Samples before trigger options.

**Operating Guide** 



Diagnostics

Unive Keal	Time Channel Prope	rties		×
	Logging Source	Lo	gging Interval [	HH:MM:SS.zzz]
Channel 1	None	~	00:00:00.00	01
Channel 2	None Readout: actual setu	^	00:00:00.00	01
Channel 3			00:00:00.00	01
Channel 4	Alert Status Word Legacy Alarm Word Legacy Warning Wor		00:00:00.00	01
Trigger Eve	Leg. Ext. Status Wor Control Word	Fa	lse	$\sim$
Logging Ma	Reference [Unit] Reference %	Log	g always	~
Samples Be	Status Word Actual Position		50	
	Power [kW] Power [hp] Motor Voltage		Cancel	
	Frequency Motor current		1	
	Torque [Nm] Speed [RPM]			
00:00:0	Motor Thermal Motor Angle	00:02	:000	00:00:02:500
	Torque [%] High Res Torque [%]			
	Calibrated Stator Re: Torque [Nm] High			
	DC Link Voltage Brake Energy /s			
	Brake Energy Averac Heatsink Temp.	<b>~</b>		

Illustration 103: Configure Sampling Mode

# 7.5.6 Using Advanced Triggers

The following example explains the set-up of a trigger, which triggers the collection of data in the drive when the motor speed exceeds a certain limit.

Set up a comparator in the smart logic control to get a trigger signal when the motor speed exceeds a certain limit:

### Procedure

- 1. Select the smart logic group.
- 2. Select a comparator not in use, 1310.0, and set it up to motor speed.

3. Set Comparator Operator 13.11.0 greater than >.

E-1; FC-302 11.00kW (P11K) 380V-480V	ID	Name	Setup 1
All Parameters	1300.0	SL Controller Mode	[0] Off
	1300.1	SL Controller Mode	[0] Off
	1300.2	SL Controller Mode	[0] Off
⊕- Ā 3-** Reference / Ramps	1300.3	SL Controller Mode	[0] Off
🗄 📲 4-** Limits / Warnings	1301.0	Start Event	[39] Start command
🖅 🛄 5-** Digital In/Out	1301.1	Start Event	[39] Start command
⊕-☆ 6-** Analog In/Out	1301.2	Start Event	[39] Start command
	1301.3	Start Event	[39] Start command
and Options	1302.0	Stop Event	[40] Drive stopped
==== 13-** Smart Logic	1302.1	Stop Event	[40] Drive stopped
- 13-0* SLC Settings	1302.2	Stop Event	[40] Drive stopped
a 13-1* Comparators a 13-1* RS Flip Flops	1302.3	Stop Event	[40] Drive stopped
- 13-2* Timers	1310.0	Comparator Operand	[0] DISABLED
- 13-4* Logic Rules	1310.1	Comparator Operand	[0] DISABLED
a 13-5* States	1310.2	Comparator Operand	[0] DISABLED

#### Illustration 104: Smart Logic View

- 4. Set Comparator Value 1312.0 to the required value.
- 5. Set up the trigger event in the Drive Real-time Channel Properties dialog to comparator 0.
- 6. Set the logging mode to log once on trigger.
- 7. Press OK to enable the set-up.

	Logging Source		Logging Interval [HH:MM:	SS.zzz]
Channel 1	Brake Energy /s	$\sim$	00:00:00.001	
Channel 2	None	~	00:00:00.001	
Channel 3	None	~	00:00:00.001	
Channel 4	None	~	00:00:00.001	
Trigger Eve	ent		Comparator 0 🛛 🗸	
Logging Ma	de		Log once on trigger $\sim$	
Samples Be	fore Trigger		50	
	ОК		Cancel	

#### Illustration 105: Trigger Event

8. Press Start (resume) poll to start logging.

The dialog for defining the real-time log style opens.

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**Operating Guide** 

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Diagnostics

Real Time log style	
Wait for trigger event or user input. MCT 10 will pop up a dialog that allows you to retrieve the Real Time log or wait for the trigger event to occur. Useful when monitoring a frequently occurring event.	۲
Just configure the Real Time log on the drive, do not wait for user input or trigger event. This allows you to set up logging on the drive, disconnect and return the day after and retrieve the log file. Useful for monitoring rarely occurring events.	0
Get the Real Time log currently on the drive. This allows you to retrieve a previously set up log. Note however that not all settings can be correctly deduced from the log file, and that doing this may alter the current settings for this oscilloscope.	0
OK	

# 7.5.7 Drive Real-time Channel Properties

More settings can be configured by right-clicking the *Scope* window and selecting *Properties*. It is possible to reconfigure all drive real-time channel settings and also to configure:

- SEC/DIV and time format.
- Appearance settings.
- Cursor settings.

ve Real Ti	me Channel Propertie	es A	ppearance	Polling	Curso	r:	
	Logging Source		Logging	Interval	(HH:MM:	SS.zzz]	
Channel 1	Brake Energy /s	~	00	:00:00.0	01		
Channel 2	None	~	00	:00:00.0	01		
Channel 3	None	~	00	:00:00.0	01		
hannel 4	None	~	00	:00:00.0	01		
rigger Eve	ent		Compara	tor 0	~		
ogging Ma	ode		Log once	on trigge	er v		
amples Be	fore Trigger			50			
EC/DIV				1	-		
ime Forma	hh:nr	1:55:2	22	Pro-	~		

#### Illustration 107: Reconfigure Drive Real-time Channel Settings

Besides being able to reconfigure the settings made from the Drive Real-time Channel Properties dialog, SEC/DIV and the time format are configurable.

SEC/DIV

The SEC/DIV and Time format functionalities are similar to the PC polling channel functionality, see <u>7.5.2 Configuring the PC Polling</u> <u>Channel</u>.

Appearance

Each channel name can be renamed.

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Diagnostics

The Units/Div, Position, Marker, and Color functionalities are similar to the PC polling channel functionality.

Cursor

The functionality is similar to the PC polling channel functionality.

# 7.5.8 Communication Control

The *Scope* toolbar has 4 main buttons for communication control.

Table 8: Functions of the Control Buttons

Control button		Function
Start Data Acquisi- tion	e30bt560.12	MCT 10 Set-up Software scope starts collecting the requested data from the drive net- work.
Stop Data Acquisi- tion	e30bt561.12	MCT 10 Set-up Software stops collecting data and there is no communication to the drive network while the scope part is active on the screen.
Resume All (Track- ing)	e30bt562.12	Activates the tracking mechanism. MCT 10 Set-up Software starts the readout of variables to the screen and to the buffer. Variables are checked against the trigger settings. If the buffer has been partially filled (use of the Pause All Tracking function), MCT 10 Set-up Software continues to fill data into the buffer.
Pause All (Tracking)	e30bu986.10	Deactivates the tracking. The buffer remains at its current state, no new data is shown. The buffer pointer keeps its current position.

# 7.5.9 Additional Functionality

Select *Resume* poll to start tracking. To stop tracking, click *Stop poll* or *Pause all tracking*. The tracking continues until the buffer is filled (default 1000 samples). If the tracking stops due to a filled buffer, the buffer has to be emptied before a new track can be activated. Clear the buffer and reset the scope in 1 step by clicking the icon shown in <u>Illustration 108</u>.

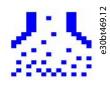


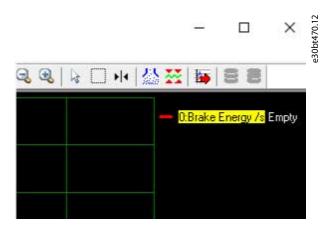
Illustration 108: Clear all Buffer for the Channel

Alternatively, the buffer can be cleared individually.

**Operating Guide** 



Diagnostics



#### Illustration 109: Individually Clearing the Buffer

Table 9: Functions of the Main Buttons

Name		Description
Reset Scope	e30bt567.12	Clears all buffers for the channel at once. This is more convenient if many channels are activated at the same time, or if a new channel is added to an existing track. Before new values can be added to a track, all channel buffers must be emptied, since MCT 10 Set-up Software requires that all buffers have the same amount of data.
Export to Excel	e30bt568.12	Enables storing scope data in a file which Microsoft Excel can open. A <i>Save file</i> dialog appears, making it possible to store the file in an appropriate location.
Scope storage	e30bt858.11	Enables storing scope data in a file on the hard disk. Save to the hard disk to avoid the limitation of 1 million points in the project file.
Open scope history viewer	e30bt859.11	Open scope data saved on the hard disk.

# 7.5.10 Scope Storage

Enable scope storage or persistent data storage in *Scope Properties*. In *Scope Properties*, it is also possible to change and select where data should be saved.



Scope Propertie	es 📃 📕
General Trig	es ger Data Storage Cursor
Enable pe	ersistent data storage
Database:	C:/Users/
	Open in new window
Database:	
	OK Cancel Help

Illustration 110: Scope Properties

If polling data in scope when scope storage is selected, data is saved in both the project file and on the hard disk. However, the project file is limited to 1 million points. When the limit is exceeded, MCT 10 Set-up Software replaces the oldest point with the latest point.

# 7.6 Export Log Files

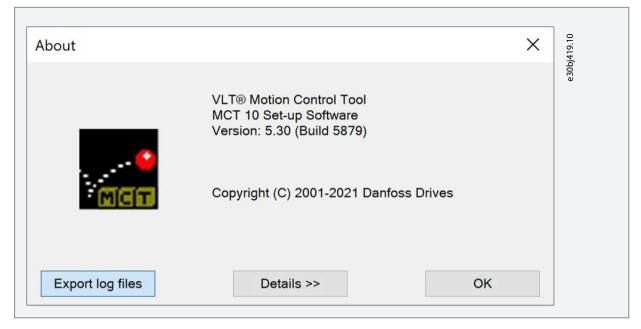
Г

All log files can be exported to the desktop in 1 compressed .zip file. **Procedure** 

1. Select  $Help \Rightarrow About$ .

Untitled - MCT 10	Set-up Software		e30bj418.10
	Communication Tools Op	tions Help	e30b
		Help	
Hetwork     Project	Folders AuCom	About	
	DP-V1	About Qt	

2. Click Export log files.



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Diagnostics

C:/Program Files (x86)/Danfoss Drives/VLT	Motion Control Tool/MCT 10 Set-up Software\LogPacker.exe	-	o x
Danfoss Drives MCT 10 Log Packer	4		
Starting procedure. ZIP file with Making temporary copies of active C:/Users/Danfoss/AppData/Local/Te Creating ZIP file to C:/Users/Danfoss/Desktop/LOGS_202 Zipped: Danfoss Drives # DDComm # Zipped: Danfoss Drives # DDComm #	<pre>mp/LOGS_2021-08-12 13-58-43 21-08-12 13-58-43.zip t DDComm.log FEDUmmy.log,1 FEDUmmy.log.1 FEDUmmy.log.3 FEDUmmy.log.4 FEDUmmy.log.5 FEDUmmy.log.6 FEBUmmy.log FESErialAuComPlugin.log FESErialAuCom.log FESErialFC.log FEUSE.log FEUSE.log FEUSE.log FEUSE.log TSCPlugin.log </pre>		
Zipped: Danfoss Drives # safeP600		ion 5.30 (Build 5879).log	
Zipped: Danfoss Drives # safe_ext Zipped: Danfoss Drives # SLCPTdll			
Cleaning up.	_exc1408		
Done! ZIP file location:			
C:/Users/Danfoss/Desktop/LOGS_202	21-08-12 13-58-43.zip		
This window will auto-close in 10	seconds.		

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# 8 Plug-ins

### 8.1 Smart Logic Controller Plug-in

From version 2.13, VLT<sup>®</sup> Motion Control Tool MCT 10 supports the smart logic controller plug-in. This feature enables quick set-up of logical sequence programs.

The smart logic controller monitors a predetermined event. When the specified event occurs, it performs a predetermined act and starts monitoring the next predetermined event. The smart logic controller continues like this in up to 20 different steps until it returns to step 1 – monitoring the 1<sup>st</sup> specified event.

The smart logic controller can monitor any parameter that can be characterized as true or false. This includes digital commands and logic expressions, which allow sensor outputs to determine the operation. Temperature, pressure, flow, time, load, frequency, voltage, and other parameters combined with the operators >, <, =, AND, and OR form logic expressions that control the drive logically in any application.

The smart logic controller supports multiple controllers. The basic functionality is the same, but the appearance differs slightly due to multiple controllers being available in different tabs.

Refer to the relevant Design Guide for a full overview of the smart logic controller features.

### 8.2 Time-based Actions and Preventive Maintenance Plug-ins

For the VLT® HVAC Drive FC 102, VLT® AQUA Drive FC 202, and VLT® AutomationDrive FC 301/FC 302, the MCT 10 Set-up Software provides the following plug-ins:

- Clock features.
- Preventive maintenance.
- Time-based actions.

# ΝΟΤΙΟΕ

Consult the relevant Design Guide for detailed information about the drive.

# 8.2.1 Clock Functions

The MCT 10 Set-up Software enables set-up of the clock functions. The clock functions are grouped in 2 sublevels:

- Date and time.
- Working days.

# 8.2.1.1 Date and Time

In the Date and time dialog, the following groups of settings are available:

- Display format.
- Set date and time.
- Daylight saving time.
- Enable clock fault.

### Display format in LCP

Select how date and time are presented in the LCP on the drive. In MCT 10 Set-up Software parameters, date and time format depends on PC regional options (date and time format).

### Set date and time

Change the date and time in the drive from the PC. Normally, it should be set to use the connected PC's date and time. When the connected PC's time is in another time zone, it is beneficial to set the date and time manually. Date and time are changed in the MCT 10 Set-up Software project file or in the drive only when the *Change* checkbox is ticked.

#### Daylight saving time

Set the date and time for daylight saving.

Daylight saving time begins for most of the United States at 2:00 a.m. on the first Sunday of April. Time reverts to standard time at 2:00 a.m. on the last Sunday of October. In the U.S., each time zone switches at a different time. In the European Union, summer time begins and ends at 1:00 a.m. Universal Time (Greenwich Mean Time). It begins the last Sunday in March and ends the last Sunday in October. In the EU, all time zones change at the same moment.

#### Enable clock fault

If the clock is not set up, the drive shows a specific warning. Enable or disable the clock fault function.



**Plug-ins** 

# 8.2.1.2 Defining Working Days

ΝΟΤΙΟΕ

Additional working days and non-working days include the year and must be updated every year.

#### Procedure

- 1. Select First day of the week (Monday or Sunday).
- 2. Select working days and non-working days.
- 3. Set additional working days (maximum 5).
- 4. Set additional non-working days (maximum 15).

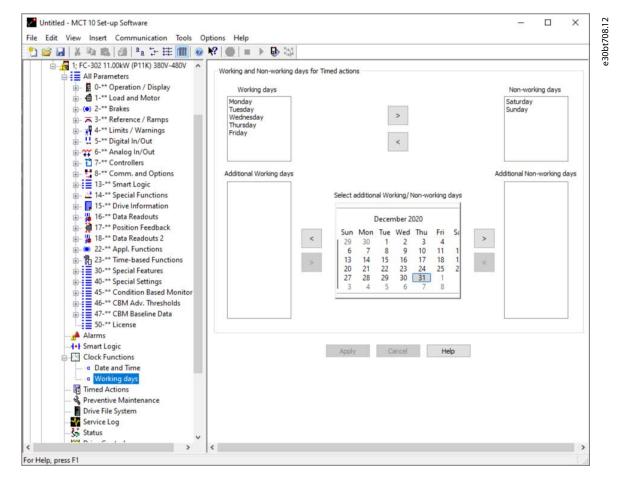


Illustration 111: Define Working Days

### 8.2.2 Preventive Maintenance

The preventive maintenance feature supports the planning of periodic maintenance of both the drive and other technical equipment. If the defined date and time of preventive maintenance is passed, the item is marked red.

**Plug-ins** 

e Edit View Insert Communication Tools (	Option	ns Help				
🖞 🧉 🛃   👗 🖻 🛝   🚳   🏪 🗁 🖽 🎹 🥥	<b>N?</b>	🔘 = 🕨 🖶 😂				
	No	Maintenance Item	Maintenance Action	Maintenance Time Base	Date and Time	Time Int
📙 DP-V1	1	Fan bearings	Replace	Date & Time	31-01-2018 00:00:00	
📙 Dummy	2	Temperature transm.	Renew	Operating Hours		32
📕 📙 Serial	3	Fan belt	Inspect/Check	Running Hours		1
- Project	4	Motor bearings	Clean	Operating Hours		1
E	5	10.000				
	6					
All Parameters	7					
	8					
Clock Functions	9					
Timed Actions	10					
Reventive Maintenance	11					
Cascade Controller	12					
Drive File System	13					
Software Customizer	14					
Service Log	15					
- & Sensorless	16					
- Motor	17					
🐟 Multi Motor	18					
	19					
	20					

Illustration 112: Preventive Maintenance



Program the clock parameters (parameters in the Clock functions folder) for preventive maintenance to function correctly.

#### Procedure

- 1. Double-click the cells in the right view to specify application item, action, and interval.
- 2. Reset Maintenance Word (in *parameter 23-15 Reset Maintenance Word*) and write to the drive.

# 8.2.3 Timed Actions

The time-based actions function enables automation of real-time controlled events.

Actions, which can be programmed, are the same as known from the SLC (smart logic controller), see <u>8.1 Smart Logic Controller</u> <u>Plug-in</u>.



The clock parameters (parameters in the Clock functions folder) must be correctly programmed for timed actions to function correctly.

Untitled - MCT 10 Set-up Software e Edit View Insert Communication Tools	Ontions Help						
		₽ ₩					
	Time	ON Action	OFF Action	Occurrence	ON Time	OFF Time	1
📕 DP-V1	Action 1 - A1	Select set-up 2	Select set-up 1	Monday	12:44:03	16:44:06	-
📕 Dummy	Action 2 - A2	Select preset ref 2	Select set-up 1	Working days	17:45:06	08:45:18	
📕 Serial	Action 3 - A3	Select preset ref 1	Select set-up 2	Non-working days	08:45:51	17:46:15	(
Project	Action 4 - A4	Disabled	No action	All days	00:00:00	00:00:00	
E- 🗱 FC-102	Action 5 - A5	Disabled	No action	All days	00:00:00	00:00:00	
All Parameters	Action 6 - A6	Disabled	No action	All days	00:00:00	00:00:00	
Alarms	Action 7 - A7	Disabled	No action	All days	00:00:00	00:00:00	
	Action 8 - A8	Disabled	No action	All days	00:00:00	00:00:00	
Clock Functions	Action 9 - A9	Disabled	No action	All days	00:00:00	00:00:00	
Timed Actions	Action 10 - A10	Disabled	No action	All days	00:00:00	00:00:00	
<ul> <li>Software Customizer</li> <li>Service Log</li> <li>Sensorless</li> <li>Motor</li> <li>Multi Motor</li> </ul>	0MondayA1A2TuesdayA2WednesdayA2ThursdayA2FridayA2SaturdayA3SundayA3	1 2 3 4	5 6 7 8 9			18         19         20         21         22           2         2         2         2         2         2           2         2         2         2         2         2         2           2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2 <th></th>	
felp, press F1							

#### Illustration 113: Time-based Actions

#### Procedure

- 1. Select *Timed Actions* in the product folder.
- 2. Double-click the cells in the right view to specify:
  - Action.
  - Time.
  - Recurrence.

# 8.3 Motor Plug-in

The Motor plug-in is an offline plug-in showing relevant parameters for commissioning of the motor. Select the plug-in from the structure.



Plug-ins



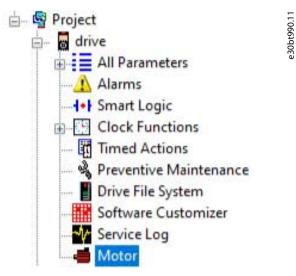


Illustration 114: Selecting the Motor Plug-in

The parameters shown depend on the setting in *parameter 1-10 Motor Construction*.

Setup 1	Setup 2	Setup 3	Setup 4		
	Motor Co	onstruction	(ID 110):	Asynchron	
ID Pa	rameter Na	ame		Asynchron PM, non salient SPM PM, salient IPM SynRM PMaSynRM	

Illustration 115: Select Motor Type

**Operating Guide** 

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**Plug-ins** 

e30bt993.11

# 8.3.1 Asynchronous Motors

Motor Construction (ID 1	10): Asynchron	n	•	
ID Parameter Name	Value	Unit	[ Min Max ]	Description
20 Motor Power [kW]	0.25	kW	[0.060.37]	Enter the nominal motor power in kW from the motor nameplate data. Note: Changing this parameter will affect the settings of other parameters.
22 Motor Voltage	230	v	[ 50 1000 ]	Set the nominal motor voltage from the motor nameplate data. Note: Changing this parameter will affect settings of other parameters.
23 Motor Frequency	50	Hz	[ 20 ., 1000 ]	Select the motor frequency value from the motor nameplate data. Note: Changing this parameter will affect settings of other parameters.
24 Motor Current	1.39	A	[0.105.40]	Enter the nominal motor current value from the motor nameplate data. Note: Changing this parameter will affect the settings of other parameters.
25 Motor Nominal Speed	1400	RPM	[ 10 60000 ]	Enter the nominal motor speed value from the motor nameplate data. Note: Changing this parameter will affect settings of other parameters.
26 Motor Cont. Rated Torque	1.7	Nm	[0.1100,000.0]	Enter the value from the motor nameplate data. This parameter is available only when par. 1-10 Design is set to PM, non-salent SPM [1]. Note: Changing this parameter will affect settings of other parameters.
30 Stator Resistance (Rs)	10.5086	Ohm	[1.0509105.0861]	Set the stator resistance value. Enter the value from a motor data sheet or perform an AMA on a cold motor.
31 Rotor Resistance (Rr)	6.4676	Ohm	[0.646864.6757]	Enter the rotor resistance value. Obtain the value from a motor data sheet or by performing an AMA on a cold motor. The default setting is calculated by the drive from motor nameplate data.
33 Stator Leakage Reactance (X1)	9.5533	Ohm	[ 0.9553 ., 95.5328 ]	Set the stator leakage reactance value. Enter the value from a motor data sheet or perform an AMA on a cold motor. The default setting is calculated by the drive from motor nameplate data.
34 Rotor Leakage Reactance (X2)	9.5533	Ohm	[0.9553 95.5328]	Set the rotor leakage reactance value. Enter the value from a motor data sheet or perform an AMA on a cold motor. The default setting is calculated by the drive from motor nameplate data.
35 Main Reactance (Xh)		ahu	[ 16.3361 1.633.6106 ]	Set the main reactance value. Enter the value from a motor data sheet or perform an AMA on a cold motor. The default setting is calculated by the drive from motor nameplate data.

Illustration 116: Example of Settings for an Asynchronous Motor

# 8.3.2 PM Non-salient SPM

For PM motors, calculation buttons are available. Below is an example of how to set parameter 1-25 Motor Nominal Speed.

Motor Construction (ID	110): PM, non	salient	t SPM		
ID Parameter Name	Value	Unit	[ Min Max ]	Description	
20 Motor Power [kW]	0.25	kW	[0.060.37]	Enter the nominal motor power in kW from the motor nameplate data. Note: Changing this parameter will affect the settings of other parameters.	
124 Motor Current	0.91	A	[0.10.5.40]	Enter the nominal motor current value from the motor nameplate data. Note: Changing this parameter will affect the settings of other parameters.	
125 Motor Nominal Speed	3000	RPM	[ 10 60000 ]	Enter the nominal motor speed value from the motor nameplate data. Note: Changing this parameter will affect settings of other parameters.	Calculate
126 Motor Cont. Rated Torque	0.6	Nm	[0.1100,000.0]	Enter the value from the motor nameplate data. This parameter is available only when par. 1-10 Design is set to PM, non-salent SPM [1]. Note: Changing this parameter will affect settings of other parameters.	Calculate
130 Stator Resistance (Rs)	7.5000	Ohm	[0.01503,750.0000]	Set the stator resistance value. Enter the value from a motor data sheet or perform an AMA on a cold motor.	Calculate
137 d-axis Inductance (Ld)	1.0	mH	[0.01,000.0]	Enter the value of the d-axis inductance. Obtain the value from the permanent magnet motor data sheet. The d-axis inductance cannot be found by performing an AMA.	Calculate
139 Motor Poles	4		[2255]	Enter the number of motor poles. The motor pole value is always an even number, because it refers to the total number of poles, not pairs of poles.	Calculate
140 Back EMF at 1000 RPM	27	٧	[19000]	Set the nominal back EMF for the motor when running at 1000 RPM. This parameter is only active when par. 1-10 has the value PM motor [1]. This parameter is available for FG 302 only.	

Illustration 117: Example of Settings for a Non-salient SPM Motor

### Procedure

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1. Enter the frequency and the number of pole pairs.

	12		
Frequency	50	Hz	
No of Pole Pairs	2		

Illustration 118: Enter Data for Nominal Speed

2. Click OK to get the value.

tor Nominal Speed       15060       RPM [106000]       Image: Construction of the second of the			
pr Nominal Speed       13       RPM [1060000]       III00000         VALUE OUT OF RANGE:       1250000000       VALUE REVERTED TO 13       III000000         Sion 120: Error Message when the Value is out of Range       III000000       III000000       III000000         Ing the number of pole pairs in parameter 1-25 Motor Nominal Speed also change       III0000000       III0000000       III0000000         or Nominal Speed       500       RPM [1060000]       Enter the non-salle Note: Change       III0000000000000000000000000000000000			e30bt995.11
ang the number of pole pairs in <i>parameter 1-25 Motor Nominal Speed</i> also change botor Poles.	n 119: Notification Stat	ting that the Value has	Changed
ar Nominal Speed 500 RPM [1060000] VALUE CHANGED FROM 1500 TO 500 Cont. Rated Torque 0.6 Nm [0.1100,000.0] Set the s		And a state of the	e30bt996.11
Of Nominal Speed         500         RPM         [ 10 60000 ]         Enter the settings         Settings           or Nominal Speed         500         RPM         [ 10 60000 ]         Enter the settings         Settings           or Cont. Rated Torque         0.6         Nm         [ 0.1 100,000.0 ]         Enter the non-saile Note: Ch           Set the s         Set the s         Set the s         Set the s	-		
or Cont. Rated Torque 0.6 Nm [0.1., 100,000.0] Enter the non-sale Note: Ch			
or Cont. Rated Torque 0.6 Nm [0.1., 100,000.0] Enter the non-sale Note: Ch			
			Enter the settings
	VALUE CHANGED FROM	1500 TO 500	Enter the non-salie
is Inductance (Ld) 33.0 mH [ 0.0 1,000.0 ] Enter the inductance	VALUE CHANGED FROM	1500 TO 500	Enter the non-sale Note: Ch
or Poles 12 [2128] Enter the number c	VALUE CHANGED FROM Cont. Rated Torque Resistance (Rs) 7	1500 TO 500 0.6 Nm [0.1., 100,000.0] 7,5000 Ohm [0.0150., 3,750.0000	Enter the non-sale Note: Ch Set the s 0] Enter the
Set the r	VALUE CHANGED FROM Cont. Rated Torque Resistance (Rs) 7 Inductance (Ld) Poles	1 1500 TO 500 0.6 Nm [0.1 100,000.0] 7.5000 Ohm [0.0150 3,750.0000 33.0 mH [0.0 1,000.0] 12 [2 128]	Enter the non-sale Note: Ch Set the s 0] Enter the inductan

## 8.3.3 PM Salient IPM

Same functions and behavior as PM, non-salient SPM.

**Operating Guide** 



**Plug-ins** 

Setup 1 Setup 2 Setup 3 Setup 4

Motor Construction (ID 1	10): PM, salient IP	4 🗾		
D Parameter Name	Value Unit	[ Min Max ]	Description	
20 Motor Power [kW]	0,25 kw	[0.060.37]	Enter the nominal motor power in kW from the motor nameplate data. Note: Changing this parameter will affect the settings of other parameters.	
24 Motor Current	0.91 A	[0.10.5.40]	Enter the nominal motor current value from the motor nameplate data. Note: Changing this parameter will affect the settings of other parameters.	
25 Motor Nominal Speed	3000 RPM	[ 10 60000 ]	Enter the nominal motor speed value from the motor nameplate data. Note: Changing this parameter will affect settings of other parameters.	Calculate
26 Motor Cont. Rated Torque	0.6 Nm	[0.1100,000.0]	Enter the value from the motor nameplate data. This parameter is available only when par. 1-10 Design is set to PM, non-salient SPM [1]. Note: Changing this parameter will affect settings of other parameters.	Calculate
30 Stator Resistance (Rs)	7.5000 Ohm	[0.01503,750.0000]	Set the stator resistance value. Enter the value from a motor data sheet or perform an AMA on a cold motor.	Calculate
37 d-axis Inductance (Ld)	1.0 mH	[0.01,000.0]	Enter the value of the d-axis inductance. Obtain the value from the permanent magnet motor data sheet. The d-axis inductance cannot be found by performing an AMA.	Calculate
38 q-axis Inductance (l.q)	33.000 mH	[0.0011,000.000]	Set the value of the q-axis inductance. See a motor data sheet. P. 1-38 cannot be changed while the motor is running.	
39 Motor Poles	4	[2255]	Enter the number of motor poles. The motor pole value is always an even number, because it refers to the total number of poles, not pairs of poles.	Calculate
40 Back EMF at 1000 RPM	V	[19000]	Set the nominal back EMF for the motor when running at 1000 RPM. This parameter is only active when par. 1-10 has the value PM motor [1]. This parameter is available for FC 302 only.	
45 q-axis Inductance Sat. (LqSat)	33.000 mH	[0.0011,000.000]	This parameter corresponds to the inductance saturation of Lq. Ideally, this parameter has the same value as p. 1-38. Anyway, if motor supplier provides an induction curve, the induction value @ 200% of isNom should be entered here.	
49 q-axis Inductance Sat. Point	100 %	[1316]	Par. 1-49 specifies the saturation curve of the d- and q-inductance values. From 20% to 100% of this parameter, the inductances are linearly approximated due to Par. 1-37, 1-38, 1-44 and 1-45. Below and above they are specified by the corresponding parameters.	

Illustration 122: Examples of Settings for a Non-salient IPM Motor

e30bt999.11

### **Plug-ins**

# 8.3.4 SynRM

Motor Construction (ID 110)	: SynRM		•	
ID Parameter Name	Value	Unit	[ Min Max ]	Description
120 Motor Power [kW]	0.25	kW	[0.06 <mark>0.37]</mark>	Enter the nominal motor power in kW from the motor nameplate data. Note: Changing this parameter will affect the settings of other parameters.
123 Motor Frequency	50	Hz	[ 20 1000 ]	Select the motor frequency value from the motor nameplate data. Note: Changing this parameter will affect settings of other parameters.
124 Motor Current	1.60	A	[0.10.5.40]	Enter the nominal motor current value from the motor nameplate data. Note: Changing this parameter will affect the settings of other parameters.
125 Motor Nominal Speed	1500	RPM	[ 10 60000 ]	Enter the nominal motor speed value from the motor nameplate data. Note: Changing this parameter will affect settings of other parameters.
126 Motor Cont. Rated Torque	3.5	Nm	[0.1100,000.0]	Enter the value from the motor nameplate data. This parameter is available only when par. 1-10 Design is set to PM, non-salient SPM [1]. Note: Changing this parameter will affect settings of other parameters.
130 Stator Resistance (Rs)	9.4440	Ohm	[0.01894,722.0001]	Set the stator resistance value. Enter the value from a motor data sheet or perform an AMA on a cold motor.
137 d-axis Inductance (Ld)	1.0	mH	[0.01,000.0]	Enter the value of the d-axis inductance. Obtain the value from the permanent magnet motor data sheet. The d-axis inductance cannot be found by performing an AMA.
139 Motor Poles	4		[2255]	Enter the number of motor poles. The motor pole value is always an even number, because it refers to the total number of poles, not pairs of poles.
144 d-axis Inductance Sat. (LdSat)	348.900	mH	[0.0011,000.000]	This parameter corresponds to the inductance saturation of Ld. Ideally, this parameter has the same value as p. 1-37. Anyway, if motor supplier provides an induction curve, the induction value @ 200% of isNom should be entered here.
145 q-axis Inductance Sat. (LqSat)	131.100	mH	[0.0011,000.000]	This parameter corresponds to the inductance saturation of Lq. Ideally, this parameter has the same value as p.1-38. Anyway, if motor supplier provides an induction curve, the induction value @ 200% of isNom should be entered here.
148 Inductance Sat. Point	73	%	[1 500]	Inductance Saturation Point

Illustration 123: Examples of Settings for a SynRM Motor

# 8.4 Multi-motor Plug-in

In applications where 1 drive controls multiple motors/fans, a motor or motor/fan coupling failure may pass unnoticed due to missing feedback from the controlled fan. One or a few motor failures may be less critical during low or normal operating load, but it can lead to a full stop of the system in high-load situations. The multi-motor plug-in monitors and diagnoses the fan/motor state. The plug-in is limited to 8 motors of equal size and type. The multi-motor calculation tool is only for variable torque applications. Find the multi-motor plug-in in the drive folder on the left side of the screen. Use the plug-in either online directly connected to a drive or offline for download later. Find the relevant parameters in *parameter group 24-9\* Application Functions 2*.

# ΝΟΤΙΟΕ

The multi-motor plug-in does not work on motors connected in parallel.

To get the right values, measure the current throughout the whole frequency band (from 0 Hz to maximum), also below the normal operating points.

Failures or underload of motors issue a missing motor warning. The drive continuously checks if the total motor current is below the expected value, which indicates situations where:

- One or more motors are missing/disconnected.
- One or more fans are loose.

Overload of motors issues a locked rotor warning. The drive continuously checks if the total motor current is above the expected value, which indicates situations where:

- A rotor is locked.
- A fan touches the housing.

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**Plug-ins** 

# **Operating Guide**

NOTICE During start-up or dynamic events like changes in speed references, the current may be below/above the current threshold. Consider and evaluate whether such situations may occur.

# 8.4.1 Defining Normal Operation Curve

The plug-in provides an easy way to find the coefficients of the 3<sup>rd</sup> order polynomial by measuring currents on different frequencies.

NOTICE

To avoid wrong logical minimum in the 3<sup>rd</sup> order polynomial, enter the lowest possible frequency into the tool.

# ΝΟΤΙΟΕ

Points can be inserted at any frequency, but the defaults are recommended as the points are not saved. Only calculated coefficients are saved and used to recalculate the points on default frequencies after closing and opening the view.

### Procedure

- 1. Measure normal operation currents on 5 different frequencies.
- 2. Insert the frequencies in Normal operation currents.

10 Hz	\$	0.00 A	÷
20 Hz	\$	0.00 A	¢
30 Hz	•	0.00 A	\$
40 Hz	\$	0.00 A	\$
50 Hz	-	0.00 A	\$

Illustration 124: Normal Operation Currents

# 8.4.2 Threshold

Measured points show normal operation curves. Settings in *Motor Data* define the threshold of the upper and lower limits.

Motor Data		
Number of motors	4	\$
Tolerance	20 %	\$

Illustration 125: Threshold

- Number of motors is a convenience value to reduce the tolerance bandwidth, dividing it by the number of motors used (maximum 8 motors).
- Tolerance defines the bandwidth as a percentage of the highest measured current.

NOTICE

These settings are not saved and are recalculated after closing and opening the view. If the values are different after recalculation, they still define the same tolerance. Example: 4 motors with 20% tolerance produce the same bandwidth as 2 motors with 10% tolerance.

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### 8.4.3 Coefficients

**Operating Guide** 

Locked Rotor Detection and Missing Motor Detection show parameter values exactly as they are written to the drive. The values are synchronized automatically.

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Locked Rotor Detection	
24-95 Function	Off ~
24-96 Coefficient 1 Cubic	0.0000
24-97 Coefficient 2 Quadratic	0.0000
24-98 Coefficient 3 Linear	0.0000
24-99 Coefficient 4 Constant	0.000
24-33 COEINDERL'4 CONSIGNE	0.000
	0.000
Missing Motor Detection	off ~
Missing Motor Detection 24-90 Function	
Missing Motor Detection 24-90 Function 24-91 Coefficient 1 Cubic	Off ~ 0.0000
Missing Motor Detection 24-90 Function 24-91 Coefficient 1 Cubic	Off ~ 0.0000

Illustration 126: Locked Rotor Detection and Missing Motor Detection



# 8.4.4 Modified Curves

Changing the frequency of a measured point moves the point along the defined curve. As the point follows the previously defined curve, the change of frequency only causes a slight change to the curve.

# 8.5 Cascade Controller Plug-in

The cascade controller is intended for pump applications where multiple motors control a common flow, level, or pressure. By varying the speed of the motors, variable speed control is provided for the system. This maintains constant pressure while eliminating pressure surges, resulting in reduced system stress and quieter operation.

Three versions of cascade controllers are available:

- Basic cascade controller
  - Delivered as part of the software in the VLT® HVAC Drive FC 102 and VLT® AQUA Drive FC 202. The 2 relays on the power card control the speed of a device connected to the drive output and on/off control devices.
- Extended cascade controller
  - Allows more devices to be applied to the control circuitry and offers more cascade principles. It is available only in the FC 202 with a VLT<sup>®</sup> Extended Cascade Controller MCO 101 option card installed.
- Advanced cascade controller
  - Offers the cascade principles similar to extended cascade, but allows extra devices to be applied to the control circuitry. It is available only in the FC 202 by using the VLT<sup>®</sup> Advanced Cascade Controller MCO 102 option card.

The add-on option cards MCO 101 and MCO 102 can be used with the basic cascade controller (*parameter group 25- \*\* Cascade Controller*) and with the extended/advanced cascade controller (*parameter group 27-\*\* Cascade CTL Option*).

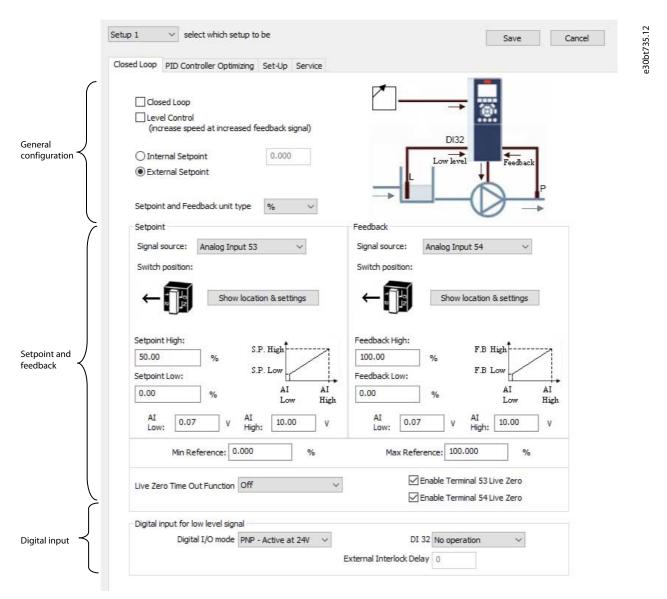
The cascade controller can be configured in MCT 10 Set-up Software from the cascade controller plug-in. Basic mode supports the basic cascade controller, and extended mode supports the extended/advanced cascade options MCO 101/MCO 102. The MCT 10 Cascade Controller view is divided into 4 tabs in both cascade modes:

- Preconditions.
- Set-up.
- System Optimizing.
- Service.

# 8.5.1 The Preconditions Tab

The *Preconditions* tab contains the general set-up required for the cascade controller to operate in an application. It can also be used in general to set up the closed loop for other applications without the need for the cascade control. Use *Preconditions* to configure:

- General configuration.
- Setpoint and feedback.
- Digital input.



#### Illustration 127: Preconditions

# 8.5.1.1 General Configuration

Closed loop is the configuration mode of the drive. Enabling or disabling the checkbox changes parameter 1-00 Configuration Mode.

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**Plug-ins** 

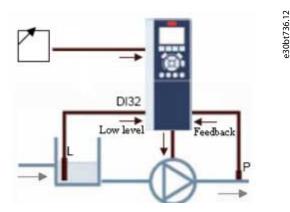
Danfoss

# Table 10: Closed-loop Checkbox Options

**Operating Guide** 

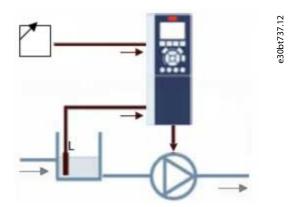
· · · · · · · · · · · · · · · · · · ·	
Options	Parameter 1-00 Configuration Mode
Enabled	[1] Closed loop
Disabled	[0] Speed open loop

Level control configures the inverse mode of the PID controller. It causes the drive output frequency to increase when the feedback is greater than the setpoint reference. If the checkbox is disabled, the PID is configured to normal control. Digital I/O mode and DI 32 are enabled.



#### Illustration 128: Level Control

Enabling the checkbox configures the PID to inverse control and digital I/O mode and DI 32 are disabled. The drive graphic is updated to reflect the general configuration.



#### Illustration 129: General Configuration

The setpoint is used in closed loop as the reference to compare the feedback values. It can be offset with the digital, analog, or bus references. Enabling the internal setpoint allows for entering a numerical value for the reference source. If the external setpoint is selected, the reference source is set to AI53. The internal setpoint settings remain in the field allowing to switch between a presetor an external setpoint.

Setpoint and feedback unit type configures the pressure unit for the closed-loop setpoint and feedback. The pressure unit can be defined in:

- %.
- mbar.
- bar.
- Pa.
- kPa.
- m WG.
- psi.

- lb/in<sup>2</sup>.
- in WG.
- ft WG.

General configuration affected parameters

- Parameter 1-00 Configuration Mode.
- Parameter 20-81 PID Normal/ Inverse Control.
- Parameter 3-15 Reference 1 Source.
- Parameter 20-12 Reference/Feedback Unit.

## 8.5.1.2 Setpoint and Feedback

Configure the analog input used as setpoint and feedback. The general configuration assumes the AI 53 (analog input 53) is used for the setpoint and the AI 54 (analog input 54) is used as feedback. The signal type can only be changed from current to voltage input with the switches on the control board of the drive. Click *Show location* to see the specific location on the drive.

Analog Input Mode Setpoint settings: Analog Input 53	×
Voltage	
OFF-ON ASS AND	ļ

Illustration 130: AI53 and AI54

Configure the signal type in accordance with the hardware switches.

esot739.11	e30bt740.1	
Push the switch to the left to get a $0-10$ V signal type.	Push the switch to the right to get a $0-20/4-20$ mA signal type.	

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**Plug-ins** 

Setpoint high and Feedback high configure the analog input scaling value corresponding to the maximum reference feedback value. Setpoint low and Feedback low are used to configure the analog input scaling value corresponding to the minimum reference feedback value. The minimum and maximum references are the lowest and highest values obtainable by adding all references together.

To receive notification of a missing or defective transmitter, define live zero among the functions:

- Off.
- Freeze output.
- Stop.
- Jogging.
- Maximum speed.
- Stop and trip.
- Select set-up 1.
- Select set-up 2.
- Select set-up 3.
- Select set-up 4.

The function is activated if the signal on terminal AI 53 or AI 54 is below 50% of the value defined in AI 53 low or AI 54 low. Default Live Zero Timeout time is 10 s and can be reconfigured in *parameter 6-00 Live Zero Timeout Time*.

Enable *Terminal 53 live zero* and *Terminal 54 live zero* to disable the live zero monitoring if the analog outputs are used as part of a decentral I/O system. As default, both checkboxes are enabled.

Setpoint and feedback affected parameters

- Parameter 3-02 Minimum Reference.
- Parameter 3-03 Maximum Reference.
- Parameter 6-01 Live Zero Timeout Function.
- Parameter 6-10 Terminal 53 Low Voltage.
- Parameter 6-11 Terminal 53 High Voltage.
- Parameter 6-12 Terminal 53 Low Current.
- Parameter 6-13 Terminal 53 High Current.
- Parameter 6-14 Terminal 53 Low Ref./Feedb. Value.
- Parameter 6-15 Terminal 53 High Ref./Feedb. Value.
- Parameter 6-17 Terminal 53 Live Zero.
- Parameter 6-20 Terminal 54 Low Voltage.
- Parameter 6-21 Terminal 54 High Voltage.
- Parameter 6-22 Terminal 54 Low Current.
- Parameter 6-23 Terminal 54 High Current.
- Parameter 6-24 Terminal 54 Low Ref./Feedb. Value.
- Parameter 6-25 Terminal 54 High Ref./Feedb. Value.
- Parameter 6-27 Terminal 54 Live Zero.

## 8.5.1.3 Digital Input

If a low-level signal is available, the DI32 (digital input 32) can be programmed to stop inverse or to external interlock, and an external interlock delay can be configured. The type of pulse to trigger can be configured from the digital I/O mode drop-down list.

## 8.5.2 The Set-up Tab

The Set-up tab contains the configuration interface for the cascade controller, parameter group 25-\*\* Cascade Controller. The cascade principle can be configured to Basic Cascade Ctrl or Motor Alternation Only (VLT® AQUA Drive FC 202 only).

**Operating Guide** 

up 1 💌 select which setup to be	Save Cancel
econditions Set-Up System Optimizing Service	
Basic cascade mode	ded cascade mode
Disabled	*
Disabled	
Basic Cascade Ctrl Motor Alternation Only	

Illustration 131: Configuration Interface for Parameter Group 25-\*\* Cascade Controller

## 8.5.2.1 Basic Cascade Control

Select basic cascade control to configure:

- Motor start.
- Pump configuration.
- Staging/destaging settings.

e 💌
Number of pumps 2
Staging/Destaging Settings

### Illustration 132: View of Basic Cascade Control Set-up Tab

**Table 11: View and Selection Descriptions** 

View	Description
Motor start	The view defines the configuration principle:

**Plug-ins** 

View	Description
	Direct on line – each lag pump is cut in directly via a contactor.
	<ul> <li>Soft starter – must be used for all fixed speed pumps and can be used to replace traditional contactors. When using soft starters, a delay is added from the staging signal occurs until staging takes place. The delay is required due to the ramp time of the fixed speed pump.</li> </ul>
Enable pump	The view defines whether the pump cycling is enabled or not:
cycling	Disabled - lag and lead pumps are cut in to have equal hours run for each pump.
	Enabled - lag pumps are cut in according to the first-in, last-out principle.
Fixed lead pump	This view defines whether a drive uses a fixed lead pump or not. The lead pumps are connected directly to the relays on the drive control card. This is shown in <u>Illustration 132</u> . To obtain equal hours of operation within the fixed speed pumps, the lead pump can be alternated. Timers on the relay outputs monitor the hours run of each pump. When a pump is not operating for a long time, corrosion may become an issue. When it is configured for alternating lead pump, select Alternation details to set up principles for alternation.
Lead pump al- ternation	This view instructs the drive to change the lead pump so all pumps run for the same period. The following options are available:
	Off - no lead pump alternation occurs.
	At staging - lead pump alternation occurs at pump staging.
	At command - lead pump alternation occurs at explicit commands.
	At staging or command - lead pump alternation occurs at pump staging and at explicit commands.
Alternation time	In this view, define the time period between automatic alternation of the lead pump:
interval	• 1–999.9 h - when the time expires, the lead pump alternates.
Alternation time value	This view contains the actual value of the alternation timer.
Alternation pre- defined time	In this view, set the time to perform an alternation. The time format depends on the settings configured in the drive.
Alternate if load	In this view, define whether the lead pump must be alternated:
<50%	• Enabled - pump alternation is carried out only if the capacity is equal to or below 50%.
Staging mode at alternation	<ul> <li>In this view, configure the staging mode at alternation and determine the time of the variable speed pump deceleration:</li> <li>Quick.</li> <li>Slow.</li> </ul>
Delay before cutting in next pump	In this view, set the time between stopping the old lead pump and starting another. Range: 0.1–5.0 s.
Delay before cutting in on mains	Time delay before a fixed speed pump is staged on according to normal staging sequence. When it expires, a fixed speed pump must be staged on according to normal staging. Range: 0.1–5.s.
Staging/destag- ing settings	In this view, configure when to add and remove a stage from a running application. A stage is a representa- tion of a 100% pump.
Staging band- width (SBW)	In this view, define the band around the head setpoint and configure it as a percentage of the maximum ref- erence. If the actual head exceeds the bandwidth for a specified time and the speed is at motor speed high limit, a stage is added. If the speed is at motor speed low limit, a stage is removed. Range: 1–100%.

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Plug-ins

View	Description
Override band- width (OBW)	Preserves a stable head in the application. When quick changes in the system demands occur, the override bandwidth must add/remove a stage immediately when the actual exceeds override bandwidth. To avoid un- intended staging until the head has settled after start, override bandwidth has a delay until the lead pump has reached motor nominal speed or motor speed high limit after a start command. Range: SBW to 100%.
Fixed speed pumps staging bandwidth (FSBW)	Ensures that the cascade controller continues if the drive issues an alarm. Keeping the head on the setpoint requires a frequent staging and destaging. When only fixed speed pumps are running, a wider bandwidth (FSBW) is used instead of SBW. Range: SBW to OBW.
OBW timer	Avoids frequent staging/destaging. The OBW timer prevents staging a pump until the application pressure is stabilized. Range: 0–300 s.
SBW staging de- lay	Delay between the feedback signal being below the staging bandwidth and a lag pump being added. SBW destaging delay is the time between when the feedback signal is above the staging bandwidth and when a lag pump is removed. Range: 0–3000 s.
Ramp-down de- lay and ramp-up delay	For use with soft starters. The ramp-down delay is for setting the lead pump ramp-down delay before staging a fixed speed pump on. Ramp-up delay is for setting the lead pump ramp-up delay before a fixed speed pump is destaged.
Stage- and de- stage threshold	The percentage of maximum pump speed to stage on and to destage fixed speed pump. The thresholds must be configured as a percentage of motor speed high limit.
Destaging speed	To prevent an overshoot when adding a fixed speed pump, the variable speed pump ramps to motor speed low limit. When the variable pump reaches staging speed, the fixed speed pump is staged on. To prevent an undershoot when removing a fixed speed pump, the variable speed pump ramps to motor speed high limit. Available options: RPM or Hz.
Enable staging function	Avoids frequent staging of fixed speed pumps. Enabling the checkbox starts the stage function timer. Enable destage function ensures that the lowest numbers of pumps are running to save energy and to avoid dead head water circulation in the variable speed pump. Enabling the checkbox starts the destage function timer.

## Table 12: Number of Pumps Configurable from the Drop-down List

Function	Number of pumps
Fixed lead pump	2-3
Alternating lead pump	2

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Alternation details		$\mathbf{X}$
Lead Pump Alternation	Off	•
Alternation Event	External	•
Alternation Time Interval	24	h
Alternation Timer value		
Alternation Predefined Time	00:00	h:mm
Alternate if Load < 50%	Enabled	•
Staging Mode at Alternation	Slow	•
Delay before cutting in new pump	0.1	s
Delay before cutting in on mains	0.5	s

#### Illustration 133: Alternation Details

If configuring the lead pump alternation At command or At staging or command, the alternation event can be configured to:

- External Alternation takes place when a signal is applied to 1 of the digital inputs in the terminal strip.
- Alternation time interval Alternation takes place every time the alternation time interval expires.
- Sleep mode Alternation takes place each time the lead pump goes into sleep mode. The no-flow function must be set to sleep mode or an external signal applied for this function.
- Predefined time Alternation takes place at a defined time of the day. If Alternation predefined time is set, the alternation is carried out every day at the specified time.

ging Bandwidth (SBW) % of set point range )	1.0	%	Override Bandwidth ( ( in % of set point ran	ige)		Autotune Stage/Destage Threshold     Autotune Stage On/Off Speeds
ed Speed Pumps Stagin en variable speed pum	g Bandwidt p is stoppe	th (FSBW)   10 d)	% OBW	Timer   10	s	
SBW Staging Delay	15	s	SBW Destaging Delay	15	s	Head     Override limit
Ramp Down Delay	10.0	s	Ramp Up Delay	2.0	s	
Stage Threshold	90	%	Destage Threshold	50	%	NOR Setpoint Actual Head
Staging Speed	0	RPM	Destaging Speed	0	RPM	NOR
Staging Speed	0.0	Hz	Destaging Speed	0.0	Hz	
🔽 Enable Sta	ging Functi	ion	🔽 Enable Dest	aging Functi	ion	Override hold time
Stage Function Time	15	s	Destage Function Time	15	s	Staging Destaging
			Conly if No-Fl		n is active)	Delay Delay Time
			Min Speed Destage Delay		s	

#### Illustration 134: Staging and Destaging Details

Stage function time is the time before staging on a fixed speed if the lead pump is at maximum speed. The stage timer starts when the adjustable speed pump is running at motor speed high limit with 1 or more constant speed pumps stopped. When the timer expires, a fixed speed pump is staged. The destage function time is the time before staging on a fixed speed if the lead pump is at minimum speed. It starts when the adjustable speed pump is running at motor speed pump is running at motor speed low limit with 1 or more fixed speed pumps in operation. When the timer expires, a stage is removed avoiding dead head water circulation within the adjustable speed pump. If the *Destage at no-flow* checkbox is enabled, a stage is removed when there is a no-flow situation.

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## 8.5.2.2 Motor Alternation Only

In *Motor alternation only*, 1 drive and 2 pumps are connected through contactors to both the drive and to mains. The functionality is used to allow the alternation between pumps that share a drive. The alternation takes place at an external command signal or a preprogrammed event.

## 8.5.3 The System Optimizing Tab

The System optimizing tab provides a simple way to start and stop the cascade controller. It allows configuration of:

PID controller.

**Operating Guide** 

• Feedback low-pass filter.

Controller		
🔽 PID Anti Windup		
PID Proportional Gain	2.00	
PID Integral Time	8.00	5
PID Differentiation Time	0.00	5
PID Diff. Gain Limit	5.0	
Terminal 54 Filter Time Constant	0.001	s
PI autotuning is a possible optio will autotune the P and I depend Please consult the AQUA or HVA for further instructions how to s general the PID.	ding on the syst C programming	tem. g guide

Illustration 135: Start and Stop Cascade Controller

#### Table 13: Description of PID functions

Field	Description
PID anti- windup	Controls the integration of the PID controller. If the checkbox is enabled, the PID controller stops integrating the error between the feedback and the setpoint reference if it is not possible to adjust the output frequency of the drive to correct the error. This situation can occur when the drive has reached the minimum or maximum output frequency, or when the drive is stopped. If the checkbox is disabled, the PID controller continues integrating the error between the feedback and setpoint reference, even though the drive cannot adjust its output frequency to correct this error.
PID propor- tional gain	Adjusts the output of the drive's PID controller based on the error between the feedback and the setpoint refer- ence. Quick PID controller response is obtained using a large value. If too large, the drive output frequency may become unstable. The value is configurable from 0–10.00.
PID integral time	The duration of integrating the error between the feedback and the setpoint reference to ensure the error approaches 0. Quick speed adjustments are obtained using a short duration. At a too short value, the drive output frequency may become unstable. The time is configurable from 0.01–10000.00 s.
PID differen- tiation time	The time the differentiator monitors the rate of change of the feedback. If it is quickly changing, it adjusts the output of the PID controller to reduce the rate of change of the feedback. Quick PID controller responses are obtained using a long duration of time. However, at too large values, the drive output frequency may become unstable. Differential time is useful in situations where fast responses and precise speed control are required. The time is configurable from 0.00–10.00 s.
Terminal 54 Filter Time Constant	A first-order digital low-pass filter constant for suppressing electrical noise from terminal 54. A high time constant improves the dampening, but also increases the time delay through the filter. The value can only be adjusted while the drive is stopped. The time constant can be configured from 0.001–10.000 s.

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**Plug-ins** 

## 8.5.4 The Service Tab

The Service tab provides a simple way to make cascade controller service.

#### Table 14: Service Tab Views

View	Description	Basic cascade control- ler	Exten- ded cas- cade control- ler
Cascade status	-		
Pump status	<ul> <li>Readout of the status for each pump selected with a string, which consists of the pump number and the current status of the pump. A readout with 2 pumps could be 1:D 2:O.</li> <li>1:D – Pump 1 running on drive.</li> <li>2:O – Pump 2 off.</li> </ul>		
Lead pump	Shows the actual lead pump in the application. When an alternation takes place, the field is updated to reflect the current lead pump.		
Manual alterna- tion	Select a new lead pump. The items available from the drop-down list are <i>Off</i> for the number of pumps.	0	x
Relay status	<ul> <li>Select relay status to update the status of the relays. The status can be</li> <li>On - the relay is activated.</li> <li>Off - the relay is deactivated.</li> <li>The values can only be updated if the drive is online.</li> </ul>		
Relay ON time	Monitors the total hours run of the connected relay. The resolution is in hours run. Re- set relay counter resets all relay on-times. It is only available, if the drives are connec- ted online.		×
Pump interlock	Disables a certain pump and is configurable from a checkbox at each pump.		x
Pump ON time	Monitors the total hours run of the connected pump. The resolution is in hours run. <i>Reset</i> clears the hours run of a specific pump.		x
Current run- time hours	Readout of the total number of hours run for each pump since last reset. The time is used to balance the hours run between pumps.	×	
Pump total life- time hours	Total hours run for each connected pump.	×	
Manual pump control	Readout of the command parameter that allows manual control of individual pump states.	×	
Reset relay counter	Resets all relay on-times. Only available if the drive is online.	×	

## VLT® Motion Control Tool MCT 10

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## **Operating Guide**

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	p System Optimizing S	iervice		
Cascade Statu	Basic Cascade Ctrl		Pump Status	
Manual Alternatio (new Lead Pump)		•	Lead Pump	0
Relay Statu	s Reset Relay Cour	iters		
	Relay         []]			Pump Interlock
			Pump ON Tim	ne 0 Reset
[	Relay []			
	Relay ON Time [0 ]	i da		

## Illustration 136: Service Tab Basic Cascade Controller

Cascade	e Status Disabled	Pump Stat		
	Status Reset Relay			
Pump	Pump Status	Current Runtime Hours	Pump Total Lifetime Hours	Manual Pump Control
	and the second sec		0	Ma Onevelian
1	Ready	0	0	No Operation
1 2	Ready Ready	0	0	No Operation
1 2 3				
3	Ready	0	0	No Operation
3 4	Ready Ready	0 0	0 0	No Operation No Operation
	Ready Ready Ready	0 0 0	0 0 0	No Operation No Operation No Operation
3 4 5	Ready Ready Ready Ready	0 0 0 0	0 0 0 0	No Operation No Operation No Operation No Operation

Illustration 137: Service Tab Extended Cascade Controller

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**Plug-ins** 

### Table 15: Status Descriptions

View	Status	Status description
Cascade status	Disabled	The cascade controller is disabled.
	Emergency	All pumps have been stopped by a coast/coast inverse or an external interlock com- mand applied to the drive.
	Off	All pumps have been stopped by a stop command applied to the drive.
	In open loop	Configuration mode has been set for open loop. All fixed speed pumps are stopped, and the variable speed pump continues to run.
	Frozen	Staging/destaging of pumps has been locked and the reference is locked.
	Jogging	All fixed speed pumps are stopped. When stopped, the variable speed pump runs at jog speed.
	Running	A start command is applied to the drive and the cascade controller controls the pumps.
	Running FSBW	The drive is tripped and the cascade controller controls the fixed speed pumps based on fixed speed bandwidth.
	Staging	The cascade controller is staging fixed speed pumps.
	Destaging	The cascade controller is destaging fixed speed pumps.
	Alternating	The lead pump alternation selection is different than <i>Off</i> and an alternation sequence is taking place.
	Lead not set	No pump available to be assigned as variable speed pump.
Pump status	Х	Disabled. The pump is interlocked either via pump interlock or signal on a digital in- put programmed for pump interlock in digital inputs.
	Off	Stopped by the cascade controller, but not interlocked.
	D	Running on drive, regardless of whether the variable speed pump is connected di- rectly or controlled via relay in the drive.
	R	Running on mains. Fixed speed pump running.
Relay Status <sup>(1)</sup>	On	The relay is activated.
	Off	The relay is deactivated.
Manual pump control <sup>(2)</sup>	No operation	The function is disabled.
	Online	Makes the pump available to the cascade controller.
	Alternate On	Forces the selected pump to be the lead pump.
	Offline-Off	Turns off the pump and makes the pump unavailable for cascading.
	Offline-On	Turns on the pump and makes the pump available for cascading.
	Offline-Spin	Initiates a pump spin.

<sup>1</sup> Only available in basic cascade controller.

<sup>2</sup> Only available in extended cascade controller.

Relay status enables readout of the function and status of each relay.



**Plug-ins** 

Parameter number	Name	Function of Relay	Status	
2770.0	Relay	Standard Relay	Off	1
2770.1	Relay	Standard Relay	Off	1
2770.2	Relay	Standard Relay	Off	1
2770.3	Relay	Standard Relay	Off	1
2770.4	Relay	Standard Relay	Off	1
2770.5	Relay	Standard Relay	Off	
2770.6	Relay	Standard Relay	Off	
2770.7	Relay	Standard Relay	Off	1
2770.8	Relay	Standard Relay	Off	1
2770.9	Relay	Standard Relay	Off	
2770.10	Relay	Standard Relay	Off	
2770.11	Relay	Standard Relay	Off	1
2770.12	Relay	Standard Relay	Off	1
2770.13	Relay	Standard Relay	Off	
2770.14	Relay	Standard Relay	Off	
2770.15	Relay	Standard Relay	Off	1
2770.16	Relay	Standard Relay	Off	
2770.17	Relay	Standard Relay	Off	1
2770.18	Relay	Standard Relay	Off	
2770.19	Relay	Standard Relay	Off	

#### Illustration 138: Relay Status

## 8.5.5 Extended Cascade Controller Options

The extended cascade controller offers 2 cascade modes that are not available in basic cascade control. The 2 modes are:

- Master/Follower.
- Mixed Pumps.

## 8.5.5.1 Set-up

Set-up is the interface for setting up the add-on cascade controller option. The *Cascade mode* drop-down list is extended with *Master/Follower* and *Mixed Pumps*.

Setup 1 💌 select which setup to be	Save Cancel
Preconditions Set-Up System Optimizing Service	
Basic cascade mode	Extended cascade mode
Disabled	Disabled 👻
	Disabled Master/Follower Mixed Pumps Basic Cascade Ctrl

### Illustration 139: Cascade Mode Drop-down List

### 8.5.5.2 Master/Follower

The master/follower function allows configuring:

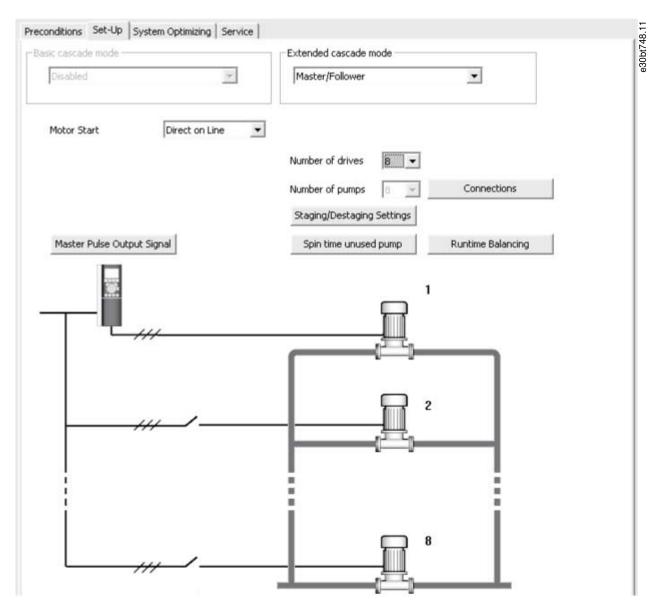
- Motor start.
- Pump configuration.
- Connections.
- Staging/destaging.
- Master pulse output signal.

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**Plug-ins** 

- Spin time unused pump.
- Run-time balancing.

**Operating Guide** 



#### Illustration 140: Master/Follower

The motor start drop-down list is similar to the configuration available in 8.5.2.1 Basic Cascade Control.

Each pump is controlled by a drive and the number of drives correspond to the number of pumps. Staging and destaging are done based on the speed of the drive. The constant pressure is controlled by the master drive operating in closed loop. Up to 6 pumps can be controlled with VLT<sup>®</sup> Extended Cascade Controller MCO 101 and up to 8 pumps with the VLT<sup>®</sup> Advanced Cascade Controller MCO 102.

Select Connections to configure the relay function for each relay in the application.

**Operating Guide** 



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ID	Name	Value	^
2770.0	Relay	Drive 4 Enable	
2770.1	Relay	Drive 3 Enable	
2770.2	Relay	Standard Relay 👻	1
2770.3	Relay	Standard Relay	
2770.4	Relay	Drive 2 Enable	
2770.5	Relay	Drive 3 Enable Drive 4 Enable	
2770.6	Relay	Drive 5 Enable	
2770.7	Relay	Drive 6 Enable Y	
2770.8	Relay	Standard Relay	-
2770 0	Dolau	Chandard Dalau	*

## Illustration 141: Configure Relay Options

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 The number of available relays depends on the add-on option.

To set up the function of each relay, double-click the *Value* field and select the relay from the drop-down list. If add-on option MCO 102 is installed, the relay option VLT<sup>®</sup> Relay Card MCB 105 may also be used as an expansion.

Select *Staging/Destaging settings* to configure when to add and remove a stage from a running application. All stages are a representation of 100% pumps in *Master/Follower*.

ormal Operating Range	100 1g Bandwidt	<b>%</b> h (FSBW)	Override Limit	Timer 1	00 % 0 s		e Stage/Destage Threshold e Stage On/Off Speeds	€ RPM C Hz
when variable speed pun	np is stoppe	d)					Stage on	Stage off
courses and a	15	-	course to be built	15	-		RPM	RPM
SBW Staging Delay	115	s	SBW Destaging Delay	115	s	Stage 1	1455	0
Ramp Down Delay	10.0	5	Ramp Up Delay	2.0	5	Stage 2	1455	0
		_			_	Stage 3	1455	675
Stage Threshold		%	Destage Threshold		%	Stage 4	1455	925
entrance and the	0	-	Parallel and parallel	0	RPM	Stage 5	1455	1050
Staging Speed	1º	RPM	Destaging Speed	1.	HCPIM	Stage 6	1455	1125
Staging Speed	0.0	Hz	Destaging Speed	0.0	Hz	Stage 7	1455	1175
				1		Stage 8	1455	1211
🔽 Enable St	aging Functi		📕 Enable Dest	aging Func				
Stage Function Time		5	Destage Function Time		5			
			Destage At (only if No-F		on is active)			
						Example		

#### Illustration 142: Staging and Destaging Details

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**Plug-ins** 

### Table 16: Staging and Destaging Description

Field	Description
Normal operating range	The allowed offset from the setpoint before a pump may be added or removed. The system must be outside of the limit for the time specified in <i>Staging delay</i> .
Override limit	The allowed offset from the setpoint before a pump immediately is added or removed.
Autotune stage/ destage threshold	Optimizes the threshold values during operation. The settings are updated to prevent pressure over- shoots and undershoots when staging and destaging.
Autotune stage on/off speeds	Stage on and off speeds are continually autotuned during operation. Settings are optimized to ensure high performance and low energy consumption.

All supported stages On and Off settings can be configured in RPM or Hz. Select *Example* to see a configuration example of 3 pumps.

Ramp-down delay and ramp-up delay are only configurable when motor start is configured to soft starter. Select *Master pulse output signal* to configure terminal 27 on the master drive.

D	Name	Value	
501	Terminal 27 Mode	Input	
530	Terminal 27 Digital Output	No operation	
560	Terminal 27 Pulse Output V		
000	reminar 27 Pulse Output V	No operation	
562	Pulse Output Max Freq #27	5000	e Macter

#### Illustration 143: Master Pulse Output Signal

In some applications, not all pumps are used regularly. Select *Spin time unused pump* to configure the time a pump is allowed to idle.

A.S.		Tatalan	-
ID	Name	Value	
2718	Spin Time for Unused Pumps	0	
	re is intended to make sure that n period of time. It is advised config		h to ensure

#### Illustration 144: Spin Time Unused Pump

Select *Runtime balancing* to balance the running hours of the available pumps. Three balancing priorities are available for each pump.

**Operating Guide** 



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ID	Name	Value
2716.1	Runtime Balancing	Balanced Priority 1
2716.2	Runtime Balancing	Balanced Priority 1 👻
2716.3	Runtime Balancing	Balanced Priority 1
2716.4	Runtime Balancing	Balanced Priority 2 Spare Pump
2716.5	Runtime Balancing	Balanced Priority 1
2716.6	Runtime Balancing	Balanced Priority 1
2716.7	Runtime Balancing	Balanced Priority 1
2716.8	Runtime Balancing	Balanced Priority 1
		OK Cancel

Illustration 145: Balancing Running Hours

## 8.5.5.3 Mixed Pumps

Select *Mixed pumps* to configure:

- Motor start.
- Pump configuration.
- Pump size.
- Connections.
- Alternation details.
- Staging/destaging settings.
- Spin time unused pump.
- Runtime balancing.

The motor start drop-down list is similar to <u>8.5.2.1 Basic Cascade Control</u>, but with the additional possibility to configure star/delta. *Mixed Pumps Cascade Mode* can be configured to:

### Table 17: Mixed Pump Cascade Mode

Mode	Description
Mixed pump	A mix of variable speed pumps connected to drives and more fixed speed pumps.
Unequal size pump	Limited mix of fixed speed pumps in different sizes.
Mixed pump with alternation	Alternates the drive between 2 pumps along with controlling more fixed speed pumps.

Select *Pump size* to configure the fixed pump capacity in the application. All variable speed pumps are read-only and 100% in capacity.

ID	Name	Value	
2714.1	Pump Capacity	100	
2714.2	Pump Capacity	100	
2714.3	Pump Capacity	100	
2714.4	Pump Capacity	200	
2714.5	Pump Capacity	300	
2714.6	Pump Capacity	300	
2714.7	Pump Capacity	100	
2714.8	Pump Capacity	100	
			_

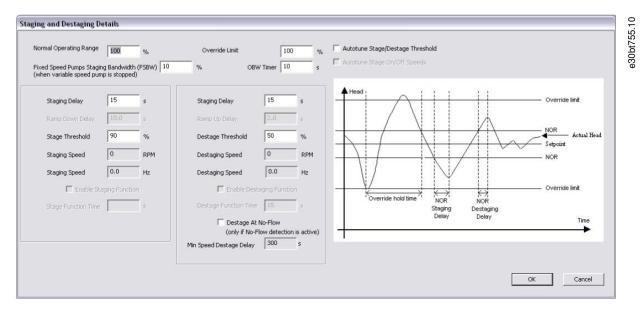
Illustration 146: Configure Fixed Pump Capacity

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Plug-ins

For configuration of connection, refer to <u>8.5.5.2 Master/Follower</u>. For mixed pump alternation details configuration, refer to <u>8.5.2.1</u> <u>Basic Cascade Control</u>.

The dialog *Staging and destaging details* is similar to <u>8.5.2.1 Basic Cascade Control</u> with the additional option to configure minimum speed destage delay. Configure for how many seconds the lead pump must run at minimum speed while system feedback is in normal operation band. When the time has elapsed, the pump turns off to save energy.



### Illustration 147: Staging/Destaging

Spin time unused pump and Runtime balancing configurations are similar to the master/follower configuration.

## 8.6 Drive File Manager Plug-in

## 8.6.1 Customer-specific Initialization Values - CSIV

The Drive file manager provides the functionality to download files containing customer-specific initialization values (CSIV), language files, and application wizard files to the drive. CSIV files contain parameter sets that can be used to initialize the drive to reduce the time for commissioning. Files can only be flashed via the fieldbus RS485 and USB with the drive serial address configured to 1.

#### Table 18: Available Features

	View drive flash file system	Download CSIV files	Delete CSIV files	Download language files	Delete language files	Download application wizard files	Delete ap- plication wizard files	Splash screen
VLT <sup>®</sup> Micro Drive FC 51	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VLT <sup>®</sup> HVAC Basic Drive FC 101	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VLT <sup>®</sup> HVAC Drive FC 102	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
VLT <sup>®</sup> AQUA Drive FC 202	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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## **Plug-ins**

	View drive flash file system	Download CSIV files	Delete CSIV files	Download language files	Delete language files	Download application wizard files	Delete ap- plication wizard files	Splash screen
VLT <sup>®</sup> Automation- Drive FC 302	Yes	Yes	Yes	Yes	Yes	Yes <sup>(1)</sup>	Yes <sup>(1)</sup>	Yes
Derived versions of the FC Series	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
VLT <sup>®</sup> Advanced Filter AAF 006	Yes	Yes	Yes	Yes	Yes	N/A	N/A	N/A

<sup>1</sup> Only FC 302 from firmware version 6.6x.

The functionality is available as a plug-in named Drive file system and is accessible both from the network and project nodes.

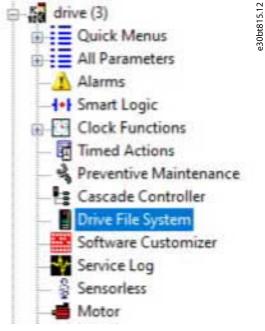


Illustration 148: Drive File Manager Plug-in

From the network node, it is only possible to view the content in the Drive flash system. It requires a change of the drive serial protocol *parameter 8-30 Protocol* to [1] FC MC. CSIV and language files can only be downloaded from the project node.

## 8.6.2 Creating New CSIV Files



To export CSIV files containing initialization values to a file, select *Export file* from the menu. From the file menu, it is possible to cut, copy, paste, delete, or renaming existing files from the list.

### Procedure

1. Right-click the right pane of the Drive file manager.

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**Plug-ins** 

2. Select New File and CSIV File.

Untitled - MCT 10 Set-up Software le Edit View Insert Drive File System Comm	unication Teals Ontion	Hale		-	×
NAMES OF A DESCRIPTION OF A	and the second	S Help			
Network Bucom Buco	File Name	Туре	Size		
All Parameters Alarms			New File >	CSIV File	ì
-++} Smart Logic			Import File	[	
Clock Functions     Timed Actions			Export File		
			Drive File Manager		
			Reinitialize Drive		
			Switch Drive to Normal Mode		
Software Customizer					
Service Log			Cut		
			Cut Copy		
- W Service Log - § Sensorless 					
Service Log  Sensorless  Motor  Multi Motor  New Folder 1			Сору		
- W Service Log - § Sensorless - Motor - Nulti Motor			Copy Paste		

#### Illustration 149: Create CSIV Files

An empty CSIV file is created and listed in the right view with the default name starting from 1.

## 8.6.3 Configuration of CSIV Files

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The CSIV file content is autogenerated based on the settings configured in the *File* menu.

- *Full change set* builds up the CSIV file content based on the user-made changes in the project including all the dependent parameters.
- *Minimal change set* builds up the CSIV file content based on user-made changes only. Selecting this option, the CSIV files are independent of the drive firmware version, except if 1 of the user-configured parameters is not available.

Use an editor to configure the CSIV file. To open the editor, double-click a file from the list or select *Edit File* from the menu.

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## **Plug-ins**

Edit CS							>
	eters below.				File Conter	its:	
ID	Name	Setup 1	Setup 2	Setup 3 ^	Para	Setup	Value
001	Language	[0] English	[0] English	[0] English	2		
002	Motor Speed Unit	[1] Hz	[1] Hz	[1] Hz			
003	Regional Settings	[0] International	[0] International	[0] Internat			
004	Operating State at Po	[0] Resume	[0] Resume	[0] Resume			
005	Local Mode Unit	[0] As Motor Speed	[0] As Motor Speed	[0] As Mot			
010	Active Set-up	[1] Set-up 1	[1] Set-up 1	[1] Set-up			
012	This Set-up Linked to	[0] Not linked	[0] Not linked	[0] Not lini			
020	Display Line 1.1 Small	[1602] Reference [%]	[1602] Reference [%]	[1602] Refe			
021	Display Line 1.2 Small	[1614] Motor current	[1614] Motor current	[1614] Mot			
022	Display Line 1.3 Small	[1610] Power [kW]	[1610] Power [kW]	[1610] Pow			
023	Display Line 2 Large	[1613] Frequency	[1613] Frequency	[1613] Frec			
024	Display Line 3 Large	[1502] kWh Counter	[1502] kWh Counter	[1502] kWł			
025.0	My Personal Menu	1	1	1			
025.1	My Personal Menu	20	20	20			
025.2	My Personal Menu	21	21	21			
025.3	My Personal Menu	22	22	22			
025.4	My Personal Menu	23	23	23			
025.5	My Personal Menu	24	24	24			
025.6	My Personal Menu	67	67	67			
025.7	My Personal Menu	1551	1551	1551			
025.8	My Personal Menu	0	0	0			
025.9	My Personal Menu	0	0	0			
025.10	My Personal Menu	0	0	0			
025.11	My Personal Menu	0	0	0			
025.12	My Personal Menu	0	0	0			
025.13	My Personal Menu	0	0	0			
025.14	My Personal Menu	0	0	0			
025.15	My Personal Menu	0	0	0			
025.16	My Personal Menu	0	0	0			
025.17	My Personal Menu	0	0	0			
025.18	My Personal Menu	0	0	0			
025.19	My Personal Menu	0	0	0			
030	Custom Readout Unit	[1] %	[1] %	[1] %			
011	C	0.00	0.00	0.00 ×			-

### Illustration 150: Parameter Settings Imported from the Project and the Actual CSIV File Content

The left view contains the parameter settings imported from the project. The right view lists the actual CSIV file content.

- Edit the relevant parameter settings in the *Edit parameters below* view.
- It is possible to undo the changes made from the Options menu.
- Revert parameters to project drive settings apply to initialization values to CSIV file contents corresponding to the original project.
- Reset to default values resets all parameters to factory configuration and erases the CSIV file content.
- Click Save to save parameter settings from the file content to the CSIV file.
- Click Cancel to discard all changes and close the CSIV editor.

As part of the CSIV content, the drive information is also saved to the file. When opening the file in the CSIV editor, a validation is made to check for compatibility.

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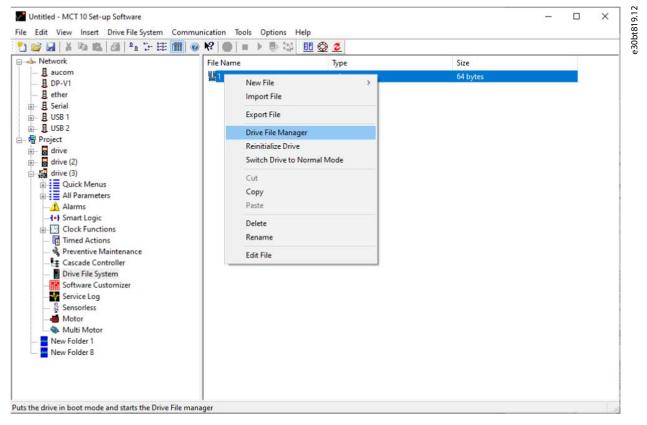
Project Drive Series: FC-302 Database: 06.41 Software: 06.42 File Software: 06.42 File Software: 06.42 Software: 06.4
Database: 06.41 Database: 06.41 Software: 06.42 Software: 06.42 Software: 06.42 Software: 06.42 Software: 06.41 Software: 06.41 Software: 06.41 Software: 06.41
Software: 06.42 Software: 06.42 Filter Notes C Warnings C Errors C All C
Filter Notes C Warnings C Errors C All C
Notes C Warnings C Errors C All 🕫

Illustration 151: Validation

When parameter settings have been saved to the file, open it for validation.

## 8.6.4 Drive File Manager

Files can be downloaded or existing files deleted in the drive via the Drive File Manager available from the menu.



#### Illustration 152: Drive File Manager

The drive is set into service mode when opening the Drive file manager.



If the connection is lost, or the drive is power cycled, the drive remains in service mode. It can be forced back to normal mode with the Software upgrade plug-in.

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## Plug-ins

#### e30bt820.11 Warning X Project Drive: Connected Drive: FC-302 FC-302 Series: 2.20KW 2.20KW Power: 2007-2407 2007-2407 Voltage: 06.42 06.42 Software Version: Options: Legend Full Compatibility: × Limited Compatibility: r Incompatibility warning: W Abort Proceed

#### Illustration 153: Service Mode

The Drive file manager is divided into a left pane named Project drive and a right pane named Connected drive.

- Project drive lists the files in the project.
- Connected drive lists the files present in the drive flash file system.

oject Drive			Connected drive	•	
Name	T	Size	Name	T	Size
CSIV-test	csiv	92 bytes	german french italian spanish danish Swedish Dutch Finnish	Ing Ing Ing Ing Ing Ing	93696 b 92120 b 94712 b 93904 b 92372 b 34472 b 34620 b 35620 b
			14/75		

Illustration 154: Present Files

Three buttons are located in the middle of the view. The right arrow transfers the files from the project to the drive flash file system.



Illustration 155: Right Arrow

The left arrow transfers the files from the drive flash file system to the project.



#### Illustration 156: Left Arrow

The Exit button closes the Drive file manager and switches the drive back to normal mode.



Illustration 157: Exit

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## 8.7 Functional Safety Configuration Plug-in

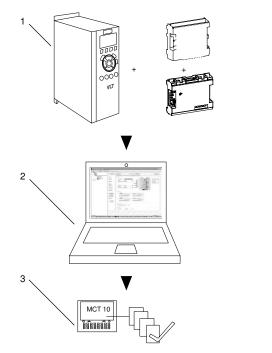
### 8.7.1 Introduction

The VLT® Safety Option MCB 15x Series is defined in the safety configuration plug-in:

- Configuration of the safety functions for safe motion shuts down the drive if an error occurs.
- Setting of:
  - Limit values.
  - Braking ramps for the safety functions.
  - Monitoring of motion sequences.

The VLT<sup>®</sup> AutomationDrive FC 301/FC 302 Operating Guide contains important information about safety systems that must be used to mount and set up the speed monitoring safety functions of the MCB 15x module.

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#### Illustration 158: System Overview

## 8.7.1.1 Safe Option Compatibility

The VLT<sup>®</sup> Safety Option MCB 15x Series is supported from SW version 6.64 of VLT<sup>®</sup> AutomationDrive FC 301/FC 302. Previous versions are not supported. MCB 15x Safe Plug-in supports the following fieldbuses:

- Serial communications:
  - RS232 to RS485
  - USB to RS485
- USB

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The MCT 10 safe plug-in for the VLT<sup>®</sup> Safety Option MCB 15x Series offers the following features:

- Offline project planning and preparation for safety functions.
- Commissioning of safety configurations.
- Creating backups of safety configurations.
- Safe option diagnosis.
- Monitoring the behavior and fault codes of active drives.

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## 8.7.2 Access

## 8.7.2.1 Password Management

Access to the VLT<sup>®</sup> Safety Option MCB 15x Series is restricted with passwords. The password is requested at every commissioning of a new set-up for the device.

## 8.7.2.2 Accessing the Safe Plug-in for VLT® Safety Option MCB 15x Series

### Procedure

- 1. Expand the drive's network or project view.
- 2. Expand the relevant drive to show its contents.

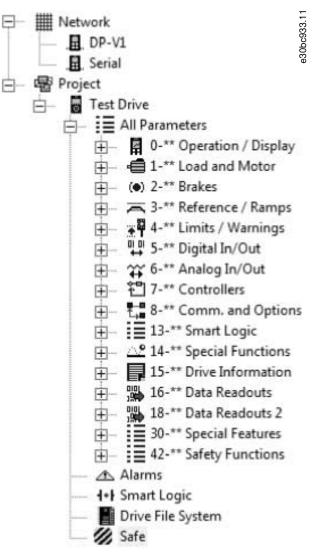


Illustration 159: The Safe Plug-in for MCB 15x (Safe) shown with Functional Safety Icon in Project Tree

If there are multiple separate online or offline drives, select the relevant drive to monitor from the structure tree.

## ΝΟΤΙΟΕ

The parameters that can be edited using the safe plug-in for MCB 15x are also included in *parameter group 42-\*\* Safety Functions* in the *All Parameters* group of the structure tree. These parameters can only be edited using the safe plug-in for MCB 15x.

To review *Parameter group 42-\*\** Safety Functions in the All parameters view, expand the All parameters group beneath the wanted drive and select the 42-\*\* Safety Functions entity. The parameter grid is shown on the right.

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## 8.7.3 Safe Plug-in Interface

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The layout of the plug-in is divided into separate sections that are all described in more details in this chapter.

	General Speed Monitoring Safe I	nput Safe Stop 1 Safely Limited Spee	d Safe Maximum Second Parameters
Status	General Speed Monitoring Sale 1	npuc Sale Stop 1 Salely Limited Spee	u sale maximum speeu Farameters
O DI1			
O DI2			
S37	Measured Speed Source:	Safe Option $\checkmark$	
🔿 STO	Mounting Type:	Motor Shaft Mounted $  \lor $	
SS1-A	Core Dation	1.0000	VVT Administration
SS1-B	Gear Ratio:	1.0000	
SLS-A	Encoder Resolution:	1024 PPR	
SLS-B			
SMS	Encoder Direction:	Clockwise $\vee$	
	Feedback Type:	Without direction info $ \lor$	
Power cycle required			
Yearly test needed	Feedback Filter:	200.00 Hz	
Blank Initial			
Error	Zero Speed Timer:	8760 h	
Error description	Speed Deviation	10 ms	
Time remaining until PUST	Fast Ramp:	No	
365 days 0 hours			
Time remaining until speed suspension 364 days 15 hours			
Time remaining until DI1 offline test required 365 days 0 hours			
Time remaining until DI2 offline test required 365 days 0 hours			

Illustration 160: The Opening Tab of the Safe Plug-in for VLT® Safety Option MCB 15x Series Plug-in Interface (Operating in Offline Mode)

The safe plug-in for the MCB 15x features tooltips for all plug-in interface components. Briefly hovering the mouse cursor over any interface component reveals a tooltip detailing the current option, LED, or tab header. Refer to these tooltips for quick and easy help information.



Illustration 161: Tooltip Example

## 8.7.3.1 Information and Administration Area

Administration Change password	Parameter Set Name: SafeSet1	Write to drive
--------------------------------	------------------------------	----------------

Illustration 162: Safe Plug-in for VLT® Safety Option MCB 15x Series Information and Administration Area

The information area at the top of the plug-in interface shows the current safe plug-in for MCB 15x profile name and notifies about pending changes.

Depending on the mode, further options are available in the information area.

- Offline mode: If a drive is connected, press Write to drive and upload the configuration to the MCB 15x.
- Online mode: Two more selections are present in the Information area:
  - Administration
  - Change password

The *Notification* icon is shown when there are changes pending for the drive that have not yet been written to it. This icon is shown at every configuration update. The icon is removed from the view only after a successful commissioning procedure.

## 8.7.3.2 LED Status Area

The left-hand side of the safe plug-in for the VLT<sup>®</sup> Safety Option MCB 15x Series contains the *Status* pane. The *Status* pane contains informative LED status icons that help to monitor the functionality and status of the safe plug-in for MCB 15x configuration entities.



#### Illustration 163: LED Status Area

ΝΟΤΙΟΕ

The LED icons are active only when the safe plug-in for MCB 15x is accessed in online network mode. When working in offline project mode, the LEDs remain inactive (gray).

#### Table 19: LED Status Information

LED status	Description
Green	OK state - the option is enabled or active.
Flashing green	Pending state - the option is pending. This applies only to DI1 and DI2 LEDs.
Yellow	Active state - the option is active.
Flashing red	Warning state - the option has encountered a warning state.
Red	Error state - the option has encountered an error.
Gray	Off state - the option is either disabled, offline, or inactive.

### Table 20: LED Status Information

LED	Status
DI1	Status of digital input 1.
DI2	Status of digital input 2.



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LED	Status
S37	Status of S37 safe output for terminal T37 on the drive.
STO	Status of Safe Torque Off.
SS1-A	Status of Safe Stop 1 A.
SS1-B	Status of Safe Stop 1 B.
SLS-A	Status of Safely Limited Speed A.
SLS-B	Status of Safely Limited Speed B.
SMS	Status of Safe Maximum Speed
Power cycle re- quired	This LED lights up when the device requires a power cycle.
Yearly test needed	Digital inputs must be tested once a year. A warning indicates when it is time to perform the test.
Blank initial	If the LED lights up, the MCB 15x is in a blank initial state, that means in factory settings. When writing to the MCB 15x for the 1 <sup>st</sup> time, provide a new password.
Error	The MCB 15x has detected an error. The specific fault code is shown in the fault code display below the error LED: For more information regarding fault codes, refer to <u>13.3.3 Warnings and Alarms</u> .

## 8.7.3.3 Configuration Area

The configuration area contains dedicated sections/tabs for configuring the safety functions.

The sequence of tabs shows the order in which the settings should be configured.

The following sections detail the contents of the configuration tabs:

- General speed monitoring.
- Safe input.
- Safe Stop 1.
- Safely limited speed.
- Safe Maximum Speed

The last tab, Parameters, contains a table layout of all configuration options, intended for advanced users.

## 8.7.3.4 General Speed Monitoring

The General Speed Monitoring tab contains primary and general information regarding the encoder/proximity switch feedback setup details.

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Sale I	nput Safe Stop 1 Safely Limited Speed Safe Maximum Speed Parameters	
Measured Speed Source:	Safe Option	
Mounting Type:	Motor Shaft Mounted	
Gear Ratio:	VT According Grow	
Encoder Resolution:	1024 PPR	
Encoder Direction:	Clockwise ~	
Feedback Type:	Without direction info	
Feedback Filter :	200.00 Hz	
Zero Speed Timer:	8760 h	
Speed Deviation	10 ms	
Fast Ramp:	No	

### Illustration 164: Speed Monitoring Configuration Tab

The left side of the tab contains the following configuration options:

Option	Description
Measured speed source	<ul> <li>This option defines the measured speed feedback source. The following options are available:</li> <li>Safe plug-in for VLT® Safety Option MCB 15x Series - the feedback source is safe plug-in for MCB 15x.</li> <li>None - no feedback source is used.</li> <li>Factory default: [Safe plug-in for MCB 15x].</li> </ul>
Mounting type	<ul> <li>This option defines where the encoder is mounted. The following options are available:</li> <li>Gear mounted - the encoder reading the speed is mounted on a shaft using a gear system.</li> <li>Motor shaft mounted - the encoder is mounted directly to the motor shaft.</li> <li>Sensorless - the drive is mounted with the VLT<sup>®</sup> Sensorless Safety MCB 159 option. The encoder senses the motor speed via back EMF.</li> </ul>
Gear ratio	This option defines the ratio between motor shaft and the encoder speed. 0.0001 and 32.0000. Factory default: 1.0000.
VLT <sup>®</sup> Safety Op- tion MCB 150 encoder resolu- tion	This option defines the encoder resolution connected to the safe plug-in for MCB 15x. Range: 1 and 4096 PPR for HTL, and 1 and 1000 PPR for TTL. Factory default: 1024 PPR.
Encoder direc- tion	This option provides the option to change the detected encoder rotation direction without altering the wiring to the encoder itself. The following options are available:

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Description
Clockwise - that is positive feedback when the encoder rotates clockwise.
Counterclockwise - that is positive feedback when the encoder rotates counterclockwise.
Factory default: [Clockwise].
This option defines the feedback type. The following options are available:
With direction info - the feedback provides direction information, for example an encoder.
• Without direction info - the feedback does not provide direction information (proximity switch configura- tion).
Factory default: [With direction info].
This option defines the frequency used by the feedback filter for low-resolution encoder or proximity switch if the resolution is low. Range: 0.01–200 Hz (off).
Factory default: [200 Hz (off)].
This option allows the speed to be below 120 RPM when SLS is active before STO is engaged. Range: 0 s and 10000 s. Factory default: [10].

## 8.7.3.5 Safe Input

The Safe input configuration tab details the input channel, settings, failure reaction, and reset functions that are mapped into the VLT<sup>®</sup> Safety Option MCB 15x Series.

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## Plug-ins

#### e30bc940.12 General Speed Monitoring Safe Input Safe Stop 1 Safely Limited Speed Safe Maximum Speed Parameters DI1 STO Safe Function: V NCNC $\checkmark$ Type: Manual Restart Behaviour: Channel 1 Channel 2 Y31/ DI1 A GND DI1 B CB 15X Safe Y30 Discrepancy Time: 10 ms D11 B ENC A D12 A ENC nA/GND ENC B D12 B ENC nB/GND 24V GND Safe Stop S37 Channel 1/2 Π 0 e Stable Signal Time: 10 9 10 11 12 ms 0 0 DI2 Safe Function: STO ~ Type: NCNC ~ Manual Restart Behaviour: Active chann Channel 1 Channel 2 Reset Disabled 10 Discrepancy Time: ms Channel 1/2 Uſ Stable Signal Time: 10 ms Failure reaction External Failure Reaction: STO ~ Reset settings Drive Reset Reset Source:

### Illustration 165: Safe Input Configuration Tab

The Safe input tab contains several sections and configuration possibilities.

### Table 22: Options for Safe Input

Option	Description
DI1 safe function	This option defines the safe function used by DI1. The following options are available:
	STO - Safe Torque Off is used as the safe functions by DI1.
	SS1-A - Safe Stop 1 A is used as the safe function by DI1.
	SS1-B - Safe Stop 1 B is used as the safe function by DI1.
	SLS-A - Safely Limited Speed A is used as the safe function by DI1.
	SLS-B - Safely Limited Speed B is used as the safe function by DI1.
	Disabled - The DI1 safe function is disabled.
	Factory default: STO.
DI1 type	This option defines the DI type used. The following options are available:

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Option	Description
	NCNC - NCNC type is used.
	Antivalent - NO/NC (antivalent) type is used.
	NC - 1 NC input type is used.
DI1 restart behavior	Restart of the MCB 15x configured the DI1 start behavior. The following options are available:
	Manual - The restart is performed manually.
	Automatic - The restart is performed automatically.
	Factory default: Manual.
DI2	This option defines the safety function used by DI2. The following options are available:
	• STO - Safe Torque Off is used as the safe functions by DI2.
	• SS1-A - Safe Stop 1 A is used as the safe function by DI2.
	• SS1-B - Safe Stop 1 B is used as the safe function by DI2.
	• SLS-A - Safely Limited Speed A is used as the safe function by DI2.
	• SLS-B - Safely Limited Speed B is used as the safe function by DI2.
	Disabled - The DI2 safe function is disabled.
	Factory default: STO.
DI2 type	The option defines the DI2 type used. The following options are available:
	NCNC - NCNC type is used.
	Antivalent - NO/NC (antivalent) type is used.
	NC - 1 NC input type is used.
DI2 restart behavior	This option defines the DI2 restart behavior. The following options are available:
	Manual – The restart is performed manually.
	Automatic – The restart is performed automatically.
	Factory default: Manual.

### Table 23: Options for Input Settings

Option	Description
DI1 discrepancy time	This option defines the time for the DI1 signal discrepancy. Range: 0–5000 ms. Factory default: 10 ms.
DI1 stable signal time	This option defines the time for the DI1 signal to become stable. Range: 0–5000 ms. Factory default: 10 ms.
DI2 discrepancy time	This option defines the time for the DI2 signal discrepancy. Range: 0–5000 ms. Factory default: 10 ms.
DI2 stable signal time	This option defines the time for the DI2 signal to become stable. Range 0–5000 ms. Factory default: 10 ms.

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#### **Table 24: Options for Failure Reaction**

Option	Description
External failure re- action	This option defines the reaction that is executed if there is an external failure. The following options are available:
	• STO - STO is executed.
	• SS1-A - SS1-A is executed.
	• SS1-B - SS1-B is executed.
	Factory default: STO.

#### **Table 25: Options for Reset Settings**

Option	Description
Reset source	This option defines the source for the reset signal for safe plug-in for MCB 15x. The following options are available:
	Drive Reset - The source is a drive reset.
	Drive Safe Reset - The source is a safe drive reset.
	Safe Option DI2_A - The source is MCB 15x DI2_A.
	Factory default: Drive Reset.

## 8.7.3.6 Safe Stop 1

The Safe Stop 1 tab allows setting specific scenarios for safe stopping of the drive using designated conditions.

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General Speed Monitoring Safe Input Safe Stop 1 Safely Limited Speed Safe Maximum Speed Parameters e30bc941.11 SS1-A Delay Type: vŧ 1.0 Delay Time: s Linear Ramp Profile: 2 ΔT: 9/ Actual Speed t ⊫li∎ Delay Time ► STO Ramp Down Start Timer SS1-B Delay Type: 1.0 Delay Time: ç Ramp Profile: Linear 2 ΔТ: % Actual Speed ⊫At Delay Time ► STO Ramp Down -Start Timer

#### Illustration 166: Safe Stop 1 Tab

The Safe Stop 1 tab contains the following separated sections with the following configuration possibilities:

### Table 26: Options for SS1-A

Option	Description		
Туре	This option defines the type for the safe stopping configuration. The following options are available:		
	Delay - a delay is used to stop the drive safely.		
	Ramp - a ramp is used to stop the drive safely.		
	Factory default: Delay.		
Type: De-	The following configuration options are available when the type is set to delay:		
lay	Delay time	This option defines the amount of time that is used by the SS1 delay function to ramp the speed down to 0 RPM.	
		Range: 0.1–3600 s.	
		Factory default: 1 s.	
	Ramp profile	This option defines the ramp profile setting. The following options are available:	
		Linear - a linear ramp is used for the delay.	
		• S-ramp const. time - a constant time ramp is used to stop the drive safely.	
		Factory default: Linear.	

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Option	Description	
	Delta time	This option defines buffer time that is added to the delay time before activating STO. Range: 0–99%.
	S-ramp Ratio start	This option is configurable only when S-ramp constant time is selected as the ramp profile. This option defines the proportion of the total ramp-down time where the deceleration torque increases. The greater the percentage value, the greater the jerk compensation achieved, and thus the lower the torque jerks in the application. Range: 1–50%. Factory default: 50%.
	S-ramp Ratio end	This option is configurable only when S-ramp constant time is selected as the ramp profile. This option defines the proportion of the total ramp-down time where the deceleration torque increases. The greater the percentage value, the greater the jerk compensation achieved, and thus the lower the torque jerks in the application. Range: 1–50%. Factory default: 50%.
Туре:	The following confi	guration options are available when the type is set to ramp:
Ramp		
	Ramping set-up	This option defines the ramping set-up used. The following options are available:
		Slope - a sloping ramp is used.
		Time - a time ramp is used.
	Deceleration rate	This option is configurable only when slope is selected for the ramping set-up. This option de- fines the deceleration rate for the SS1 slope-based ramp style. Range: 1–30000 RPM/s. Factory default: 1500 RPM/s.
	Ramp time	This option is configurable only when time is selected for the ramping set-up. It defines the time after which the safe plug-in for VLT <sup>®</sup> Safety Option MCB 15x Series engages the STO.
	Delta V	This option defines the tolerance between the calculated speed and the actual speed that the safe plug-in for MCB 15x allows. Range: 1–10000 RPM. Factory default: 120 RPM.
	Zero speed	This option defines the speed at which safe plug-in for MCB 15x engages the STO. Range: 1–600 RPM. Factory default: 10 RPM.

### Table 27: Options for SS1-B

Option	Description	
Туре	<ul> <li>This option defines the type for the safe stopping configuration. The following options are available:</li> <li>Delay - a delay is used to stop the drive safely.</li> <li>Ramp - a ramp is used to stop the drive safely.</li> <li>Factory default: Delay.</li> </ul>	
Type: De- lay	The following con Delay time	figuration options are available when the type is set to delay: This option defines the amount of time that is used by the SS1 delay function to ramp the speed down to 0 RPM. Range: 0.1–3600 s.

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Option	Description			
		Factory default: 1 s.		
	Ramp profile	<ul> <li>This option defines the ramp profile setting. The following options are available:</li> <li>Linear - a linear ramp is used for the delay.</li> <li>S-ramp const. time - a constant time ramp is used to stop the drive safely.</li> <li>Factory default: Linear.</li> </ul>		
	Delta time	This option defines buffer time that is added to the delay time before activating STO. Range: 0–99%.		
	S-ramp Ratio start	This option is configurable only when S-ramp constant time is selected as the ramp profile. This option defines the proportion of the total ramp-down time where the deceleration torque increases. The greater the percentage value, the greater the jerk compensation achieved, and thus the lower the torque jerks in the application. Range: 1–50%. Factory default: 50%.		
	S-ramp Ratio end	This option is configurable only when S-ramp constant time is selected as the ramp profile. This option defines the proportion of the total ramp-down time where the deceleration torque increases. The greater the percentage value, the greater the jerk compensation achieved, and thus the lower the torque jerks in the application. Range: 1–50%. Factory default: 50%.		
Туре:	The following conf	guration options are available when the type is set to ramp:		
Ramp	Ramping set-up	<ul> <li>This option defines the ramping set-up used. The following options are available:</li> <li>Slope - a sloping ramp is used.</li> <li>Time - a time ramp is used.</li> </ul>		
	Deceleration rate	This option is configurable only when slope is selected for the ramping set-up. This option de- fines the deceleration rate for the SS1 slope-based ramp style. Range: 1–30000 RPM/s. Factory default: 1500 RPM/s.		
	Ramp time	This option is configurable only when time is selected for the ramping set-up. It defines the time after which the safe plug-in for VLT <sup>®</sup> Safety Option MCB 15x Series engages the STO.		
	Delta V	This option defines the tolerance between the calculated speed and the actual speed that the safe plug-in for MCB 15x allows. Range: 1–10000 RPM. Factory default: 120 RPM.		
	Zero speed	This option defines the speed at which safe plug-in for MCB 15x engages the STO. Range: 1–600 RPM. Factory default: 10 RPM.		

## 8.7.3.7 Safely Limited Speed

The Safely Limited Speed tab allows setting specific scenarios for safely limited speeds of the drives using designated conditions.

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A			
SLS Setup:	SLS with ramp $  \lor $	<u>+</u>	7
Ramp Down Time:	1.0 s	V Error & STO Timer & STC	
Speed Limit:	150 RPM		
Cut Off Speed:	270 RPM	Cut Off Speed	
Apply recommended	value: 433 RPM.	-Speed Limit	
Fail Safe Reaction:	STO ~	ero Speed Limit	
		► • • • • • • • • • • • • • • • • • • •	
		t=0.0 t=1.0 t	
		Ramp Down Time	
		Ramp Down Time I≪	
		l <mark>⊲ Ramp Down Time</mark> ⊫l	
		l <del>⊲</del> Ramp Down Time <del>▶ </del>	
		l <del>⊲</del> Ramp Down Time ⊧	
		l <del>⊲</del> Ramp Down Time ⊨	
		l <del>⊲</del> Ramp Down Time ⊩	
3		l <del>⊲</del> Ramp Down Time ►I	
	SI S without rama	l <del>≼</del> Ramp Down Time ►I	
B SLS Setup:	SLS without ramp ~		7
	SLS without ramp V 1.0 S	v Error & STO	]
SLS Setup: Ramp Down Time:			
SLS Setup: Ramp Down Time: Speed Limit:	1.0 s 150 RPM	v Error & STO	
SLS Setup: Ramp Down Time: Speed Limit: Cut Off Speed:	1.0 s 150 RPM 270 RPM	v Cut Off Speed	
SLS Setup: Ramp Down Time: Speed Limit:	1.0 s 150 RPM 270 RPM	v V V Timer & STO	

### Illustration 167: Safely Limited Speed Tab

The safely limited speed contains the following separated sections with the following configuration possibilities:

### Table 28: Options for SLS-A

Option	Description
SLS set-up	<ul> <li>This option defines the type of the safely limited speed set-up. The following options are available:</li> <li>SLS without ramp.</li> <li>SLS with ramp.</li> </ul>
Ramp-down time	This option is configurable only when the SLS with ramp is selected in SLS set-up. It defines the ramp-down time for start ramp. Range: 0.1–3600 s. Factory default: 1 s.
Cutoff speed	This option defines the speed at which the fail-safe reaction is activated. This setting should equal the value of the speed limit parameter plus tolerance. Range: 1–10000 RPM.
Speed limit	This option defines the maximum allowed speed when the SLS function is engaged. This is a speed unit meas- ured in RPM.
Fail-safe reac- tion	This option defines the safety function that is engaged when the maximum speed is exceeded. The following options are available:

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Option	Description
	STO - Safe Torque Off is used.
	SS1-A - Safe Stop 1-A is used.
	SS1-B - Safe Stop 1-B is used.
	• SST-B - Sale Stop T-B is used.

### Table 29: Options for SLS-B

Option	Description
SLS set-up	<ul> <li>This option defines the type of the safely limited speed set-up. The following options are available:</li> <li>SLS without ramp.</li> <li>SLS with ramp.</li> </ul>
Ramp-down time	This option is configurable only when the SLS with ramp is selected in SLS set-up. It defines the ramp-down time for start ramp. Range: 0.1–3600 s. Factory default: 1 s.
Cutoff speed	This option defines the speed at which the fail-safe reaction is activated. This setting should equal the value of the speed limit parameter plus tolerance. Range: 1–10000 RPM.
Speed limit	This option defines the maximum allowed speed when the SLS function is engaged. This is a speed unit meas- ured in RPM.
Fail-safe reac- tion	<ul> <li>This option defines the safety function that is engaged when the maximum speed is exceeded. The following options are available:</li> <li>STO - Safe Torque Off is used.</li> <li>SS1-A - Safe Stop 1-A is used.</li> <li>SS1-B - Safe Stop 1-B is used.</li> </ul>

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# 8.7.3.8 Safe Maximum Speed - SMS

NOTICE

### SOFTWARE VERSION

The SMS function is only available in drives with software version 8.31 or newer.

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Network			B.L.L
- AuCom		Connected drive information	Database Information
— 且 DP-V1 — 且 Serial	Drive Series	FC-302	FC-302
USB 1	Power Size	1. 10kW (P1K1)	1.10kW (P1K1)
- 1; FC-302 1.10kW (P1K1) 200V-240V	Voltage	200V-240V	200V-240V
All Parameters     Alarms	Basic SW Version	18.71	18.71
-1+) Smart Logic	Option A	No Option	No Option
Clock Functions	Option B	MCB151 Safe Option HTL FW: 97.89	MCB151 Safe Option HTL FW: 97.89
- III Timed Actions - & Preventive Maintenance	Option C0/E0	No Option	No Option
System	Option C1/E1		
Service Log		MCB 159 Sensorless safety	MCB159 Sensorless safety
	Type Code	FC-302P1K1T2E20H1BX000XSXXXXXAXB7CX7XXDX	FC-302P1K1T2E20H1BXXXXX5X00XAXB7CX7XXDX
	Drive Address Bus Name	1  USB 1	-
- 🙀 Trined Actions - 🖏 Preventive Maintenance - 📕 Drive File System			
Software Customizer	Drive Operation Status	Auto On	Refresh status
- Service Log			
di Motor			
Motor     Safe     drive (2)     All Parameters			
Motor     Safe     drive (2)     dive (2)     Alarms     Alarms     Alarms     Alarms			
Motor     Grie     Grive (2)     Grie     All Parameters     All Amms     -1+1 Smart Logic     Gric     Clock Functions			
Motor			
Motor     Grie     Grive (2)     Grie     All Parameters     All Parameters     In Smart Logic     Grie     Clock Functions			
Motor  Motor  drive (2)  Alarms Alarms  Cock Functions  Timed Actions  Preventive Maintenance			
Motor Grive (2) All Parameters All Parameters All Parameters All Parameters -1+ Smart Logic -10 Clock Functions -10 Timed Actions -10 Timed Actions -10 Timed Actions -10 Time File System			

### Illustration 168: Identification of Drive Software Version

If a VLT<sup>®</sup> AutomationDrive FC 302 has the VLT<sup>®</sup> Sensorless Safety MCB 159 option installed, the Safe Maximum Speed function is available. The MCB 159 offers safe speed monitoring and prevents continuously exceeding a defined speed value.

Use the SMS function to monitor machine speed. When maximum allowed speed is exceeded, STO is activated as fail-safe reaction. In the *Safe Maximum Speed* tab, it is possible to enable or disable the SMS function and to set the cutoff speed in RPM.

lit View Insert Communication Tools								
Network			A				1	_
AuCom	Administration Change password	Write to drive	Paramet	er Set Name:	SafeSet1		Customization File Version: 1.00	
E DP-V1								
A Serial	Status	General Speed Monitor	ring Safe Input Safe Stop 1 Safe	ly Limited Speed	Safe Maximum Speed Parameter	rs		
L USB 1	3(80)	SMS						
- 1; FC-302 1.10kW (P1K1) 200V-240V	DI1	SMS						
Alarms	DI2				*			
Clock Functions     Timed Actions	S37	SMS Enable:	Inactive V Inactive Active		v		Error & STO	
- K Preventive Maintenance			1703.0				Timer & STO	
	STO	SMS Cut Off Spe	ed: 1700 RPM					
Status	SS1-A			Cut Off Spe	ed			
11 Safe	SS1-8							
Project	<b>•</b> • • • •							
drive	SLS-A			Zero Speed Li	mž			
\Lambda Alarms 	SLS-B					t	•	
Clock Functions     Timed Actions     Preventive Maintenance	SMS							
Drive File System	Power cycle required							
Software Customizer	Yearly test needed							
Safe	Blank Initial							
drive (2) All Parameters Alarms	Елог							
	Error description							
- 🛱 Timed Actions 								
Drive File System	Time remaining until PUST							
Service Log	361 days 0 hours							
Safe	Time remaining until speed suspension 361 days 0 hours							
	Time remaining until DI1 offline test							
	required 365 days 0 hours							
	Time remaining until DI2 offline test required							

#### Illustration 169: Safe Maximum Speed Configuration Tab

#### Table 30: Options for Safe Maximum Speed

Option	Description
SMS enable	<ul> <li>The setting of this option selects whether or not the SMS function is enabled:</li> <li>Inactive - the SMS function is not enabled.</li> <li>Active - the SMS function is enabled.</li> </ul>
SMS Cut off Speed	Set at which RPM the SMS function should cut off the drive.

# 8.7.4 Configuration

Configure the safe plug-in in online mode (PC connected to drive) or in offline mode (no PC connected to drive). In both cases, enter the required values in the configuration dialogs to configure the plug-in.

# ΝΟΤΙΟΕ

Multiple value entry fields in the configuration tabs are accompanied by recommended value settings that appear below the text field. The recommended values are generated dynamically based on the user input of related and dependent configuration options. To apply a recommended value to a field, press the underlined *Apply* link as it appears below the desired field.

#### Offline configuration

When configuring the VLT<sup>®</sup> Safety Option MCB 15x Series in an offline project mode, the configuration is stored in the project. After completing the configuration, connect to the PC and write to the drive.

ΝΟΤΙΟΙ

The LED status icons are not active in offline mode.

#### Online configuration

Changed settings within safe plug-in for MCB 15x are not applied before they are written to the device.



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### **Plug-ins**



If the safe plug-in for the MCB 15x interface is closed before the changes have been written to the drive, the changes are lost.

# 8.7.4.1 Configuring the Safe Plug-in Online

### Procedure

**Operating Guide** 

- 1. Connect the safe plug-in for MCB 15x to the drive.
- 2. Click *Write to drive* to apply changed settings in the safe plug-in. Writing the values to the drive always updates the entire device package and not just the changed value.

### 8.7.4.2 Dependencies

Multiple configurable safety parameters depend on other safety parameter values. The safe plug-in for VLT<sup>®</sup> Safety Option MCB 15x Series features notification dialogs that inform about the possible consequences. It is then possible to verify the changes and either accept or discard the change.

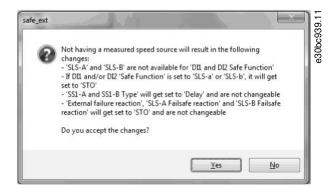


Illustration 170: Dependencies Confirmation Dialog

When accepting the dependency dialog, both the change that caused the dependency dialog and all other configuration items listed in the dependency dialog are applied.

### 8.7.4.3 Advanced Configuration Parameters

In the configuration area, the parameters section is a table format value entry for all configuration settings intended for advanced users.

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# **Plug-ins**

arameters							
ID	Name	Setup	Min. value	Max. value	Factory setup	Unit	^
4200	Speed Deviation Timer	10	10	5000	10	ms	
4201	Fast Ramp	No			No		
4210	Measured Speed Source	Safe Option			Safe Option		
4211	Encoder Resolution	1024	1	4096	1024		
4212	Encoder Direction	Clockwise			Clockwise		
4213	Gear Ratio	1.0000	0.0001	1000.0000	1.0000		
4214	Feedback Type	Without direction info			With direction info		
4215	Feedback Filter	200.00	0.01	200.00	200.00	Hz	
4216	Mounting Type	Motor Shaft Mounted			Motor Shaft Mounted		
4218	Zero Speed Timer	8760	0	10000	8760	h	
4220.0	Safe Function	STO			STO		
4220.1	Safe Function	STO			STO		
4221.0	Туре	NCNC			NCNC		
4221.1	Туре	NCNC			NCNC		
4222.0	Discrepancy Time	10	0	5000	10	ms	
4222.1	Discrepancy Time	10	0	5000	10	ms	
4223.0	Stable Signal Time	10	0	5000	10	ms	
4223.1	Stable Signal Time	10	0	5000	10	ms	
4224.0	Restart Behaviour	Manual			Manual		
4224.1	Restart Behaviour	Manual			Manual		
4230	External Failure Reaction	STO			STO		
4231	Reset Source	Drive Reset			Drive Reset		
4233	Parameter Set Name	SafeSet1			SafeSet1		
4240.0	Туре	Delay			Delay		
4240.1	Туре	Delay			Delay		
4241.0	Ramp Profile	Linear			Linear		
4241.1	Ramp Profile	Linear			Linear		
4242.0	Delay Time	1.0	0.1	3600.0	1.0	5	

### Illustration 171: Parameters Configuration Tab



Prepare a complete list of all configuration items and their respective values before commissioning.

# 8.7.4.4 Parameter Lists

ΝΟΤΙΟΕ

Parameters ending with .0 are used for either SS1-A or SLS-A. Parameters ending with .1 are used for either SS1-B or SLS-B in the *parameter groups 42-4\* SS1* and *42-5\* SLS*. For *parameter group 42-2\* Input*, .0 refers to DI1 and .1 to DI2.

### Table 31: Complete List of Parameters for Configuring via the Safe Plug-in

Parame- ter	Description	Factory value
4200	Speed Deviation Timer - The amount of time for which a speed deviation above 120 RPM between estimated and meas- ured speed is allowed.	10 ms
4201	Fast Ramp - Use when fast ramping is needed with poor resolution of measured speed.	No

## VLT<sup>®</sup> Motion Control Tool MCT 10

# **Operating Guide**

Plug-ins

Parame- ter	Description	Factory value
4210	Measured speed source – The source of the speed feedback.	Safe option
4211	Encoder resolution – The resolution of the encoder connected to the safe plug-in for MCB 15x.	1024
4212	Encoder direction.	Clockwise
4213	Gear ratio – The ratio between the motor speed and the encoder speed.	10.000
4214	Feedback type.	With direction info
4215	Feedback filter – The frequency of the feedback filter.	200.00
4216	Mounting type - Location where the measured speed source is mounted.	Motor shaft mounted
4218	Zero speed timer – The timer for the zero speed activation.	10
4220.0	Safe function – The safe function selected.	STO
4220.1	Safe function – The safe function selected.	STO
4221.0	Type – The type of the safe input.	NCNC
4221.1	Type – The type of the safe input.	NCNC
4222.0	Discrepancy time – The amount of time allowed for discrepancy.	10
4222.1	Discrepancy time – The amount of time allowed for discrepancy.	10
4223.0	Stable signal time – The amount of time for a stable signal.	10
4223.1	Stable signal time – The amount of time for a stable signal.	10
4224.0	Restart behavior – The restart behavior of the safe plug-in for MCB 15x, automatic or with user input.	Manual
4224.1	Restart behavior – The restart behavior of the safe plug-in for MCB 15x, automatic or with user input.	Manual
4230	External failure reaction – The safety function that is executed if there is an external failure.	STO
4231	Reset source – The source for the reset signal.	Drive reset
4233	Parameter set name – The title for the current safe plug-in for MCB 15x configuration. The maxi- mum length of the parameter set name is 8 symbols.	-
4240.0	Type – Type of the safe stop function.	Delay
4240.1	Type – Type of the safe stop function.	Delay
4241.0	Ramp profile – The ramp profile that is either defined by the safe plug-in for MCB 15x or within the drive itself.	Linear
4241.1	Ramp profile – The ramp profile that is either defined by the safe plug-in for MCB 15x or within the drive itself.	Linear
4242.0	Delay time – The amount of time spent by the safe stop function to ramp the speed down to 0 RPM.	1.0
4242.1	Delay time – The amount of time spent by the safe stop function to ramp the speed down to 0 RPM.	1.0



# **Plug-ins**

Parame- ter	Description	Factory value			
4243.0	Delta T – The buffer time that is added to the delay time before activating STO.	2			
4243.1	Delta T – The buffer time that is added to the delay time before activating STO.	2			
4244.0	Deceleration rate – The deceleration rate for the safe stop slope ramp type.	1500			
4244.1	Deceleration rate – The deceleration rate for the safe stop slope ramp type.	1500			
4245.0	Delta V – The tolerance between the calculated and actual speeds allowed by the safe plug-in for MCB 15x.	120			
4245.1	Delta V – The tolerance between the calculated and actual speeds allowed by the safe plug-in for MCB 15x.	120			
4246.0	Zero speed – The zero speed limit that the safe plug-in for MCB 15x uses to engage STO.	10			
4246.1	Zero speed – The zero speed limit that the safe plug-in for MCB 15x uses to engage STO.	10			
4247.0	Ramp time – The ramp time that the safe plug-in for MCB 15x uses to engage STO.	1.0			
4247.1	Ramp time – The ramp time that the safe plug-in for MCB 15x uses to engage STO.	1.0			
4248.0					
4248.1	S-ramp Ratio at deceleration start – The proportion of the total ramp-down time wherein the de- celeration torque increases. The greater the percentage value, the greater the jerk compensation achieved.	50			
4249.0	S-ramp Ratio at deceleration end – The proportion of the total ramp-down time wherein the de- celeration torque decreases. The greater the percentage value, the greater the jerk compensation achieved.	50			
4249.1	S-ramp Ratio at deceleration end – The proportion of the total ramp-down time wherein the de- celeration torque decreases. The greater the percentage value, the greater the jerk compensation achieved.	50			
4250.0	Cutoff speed – The speed at which the fail-safe reaction is engaged.	-			
4250.1	Cutoff speed – The speed at which the fail-safe reaction is engaged.	-			
4251.0	Speed limit – The maximum speed allowed when the safe limited-speed function is engaged.	-			
4251.1	Speed limit – The maximum speed allowed when the safe limited-speed function is engaged.	-			
4252.0	Fail-safe reaction – The safety function that is activated when the speed exceeds the limit set.	STO			
4252.1	Fail-safe reaction – The safety function that is activated when the speed exceeds the limit set.	STO			
4253.0	Start ramp – If the speed at the activation of safe limited speed is greater than the speed limit, the function either ramps down to the speed limit (Yes value) or activates the STO (No value.).	No			
4253.1	Start ramp – If the speed at the activation of safe limited speed is greater than the speed limit, the function either ramps down to the speed limit (Yes value) or activates the STO (No value.).	No			
4254.0	Ramp-down time – The ramp-down time for starting the ramp.	1.0			

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Plug-ins

Parame- ter	Description	Factory value
4254.1	Ramp-down time – The ramp-down time for starting the ramp.	1.0
4270	Activation - Use for activating or deactivating Safe Maximum Speed.	Inactive
4271	Cut Off Speed - The maximum allowed speed.	1500 RPM

# 8.7.5 Commissioning

# Procedure

- 1. Configure a safe plug-in for VLT<sup>®</sup> Safety Option MCB 15x Series.
- 2. Click *Write to drive* to upload to the drive.

	g drive "Project\1; FC-302 5 od to drive "Project\1; FC-30			
Writing drive "Proj	ect\1; FC-302 5.50KW 380\	/-480V''' drive at ad	dress 1 using Serial	
0%				100

Illustration 172: Writing to Drive Status Window

3. Enter the password when the Confirm password dialog pops up (default password: 12345678).

n	firm password	6	a30bc945.1
	Password	•••••	e3(
	Drive	1; FC-302 5.50KW 380V-480V	
	Confirm to	all drives	
	OK	Cancel	

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**Plug-ins** 

4. Press OK to continue OR press Cancel to discard the process and perform a rollback.

hen w				ΤΙΟ	
ropriate	riting to a dev e default pass		-	pted to pro	ovide a new password for the device. Have the ap
nfiguration p Drives		figuration in the following cel to cancel the process.	drives. To approve the safety	e30bc946.11	
Parameters					
ID N	lame	New values	Received values		
4210 M	leasured Speed Source	Safe Option	Safe Option		
4211 En	ncoder Resolution	410	410		
4212 En	ncoder Direction	Clockwise	Clockwise		
4213 Ge	ear Ratio	1.0022	1.0022		
4214 Fe	eedback Type	With direction info	With direction info		
4215 Fe	eedback Filter	200.00	200.00 *		
	CRC-VLT: A63Ehex	CRC-MC	T10: A63Ehex		
			T10: A63Ehex Approve Cancel I Dialog and Summary		
stration	n <b>174: Configur</b> The top sec drives affec there are m	ration Approva ction of the su cted by the w hultiple drives window to up	Approve Cancel	New values Be-	The value of the parameter that was desig- nated to be written to the drive. This col- umn must have the same value as <i>Received</i> <i>values</i> . If not, an error is shown.
stration Drives Param-	The top sec drives affec there are m tles in the v and CRC ac This section	ration Approva ction of the su cted by the we nultiple drives window to up ccordingly.	Approve Cancel I Dialog and Summary Immary shows all rite procedure. If 5, press the drive ti- date parameters e updated parame-		nated to be written to the drive. This col- umn must have the same value as <i>Received</i> <i>values</i> . If not, an error is shown. The value that was received from the drive after the update procedure. This column must have the same value as <i>New values</i> . If
	The top sec drives affec there are m tles in the v and CRC ac This section ters that we	ration Approva ction of the su cted by the we hultiple drives window to up ccordingly.	Approve Cancel I Dialog and Summary ummary shows all rite procedure. If s, press the drive ti- date parameters e updated parame- the drive.	Re- ceived	nated to be written to the drive. This col- umn must have the same value as <i>Received</i> <i>values</i> . If not, an error is shown. The value that was received from the drive after the update procedure. This column

- 5. When the configuration approval pops up, review the included summary.
- 6. Click *Approve* to confirm the changes and close the dialog window, OR click *Cancel* to discard the process and perform a rollback.

S When the configuration is approved, the commissioning report is generated and shown.



**Plug-ins** 

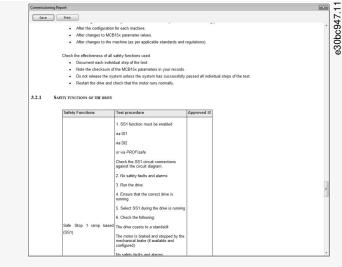


Illustration 175: Commission Report Review, Save, and Print Dialog

- 7. Click Save to save the commission report in Rich Text Format.
- 8. Click Print to print the report.
- 9. When the commissioning process is complete, press [Reset] on the drive to reboot.

# 8.7.5.1 Commissioning Report

During the commission process, the commission report is generated based on a fixed template within the MCT 10 application. The report contains all data written to the drive.

The report is generated during the write-to-drive procedure and the data is gathered at the moment the report is generated. This report contains the functions that must be tested, see more details in the VLT<sup>®</sup> Safety Option MCB 15x Installation Guide and in the VLT<sup>®</sup> Safety Option MCB 152 Operating Instructions.

The contents and structure of the commissioning report are as follows:

- General introduction general information and details about the report itself.
- Commissioning configuration details regarding the commissioned set-up and parameter configurations.
- Commissioning test specific testing scenarios for the current set-up. This section also contains CRC check procedure descriptions.

### 8.7.6 Operation

The following sections describe how to use the diagnostics function, how to reset, and how to change password.

### 8.7.6.1 Using the Diagnostics Function

### Procedure

- 1. Open the Safe Plug-in for VLT<sup>®</sup> Safety Option MCB 15x Series plug-in interface in network online mode.
- 2. Click Administration in the upper section of the interface.

The Safe Plug-in for MCB 15x Administration Window opens.

**Operating Guide** 

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**Plug-ins** 

Diagnostics Reset		e30bc948.1	
Download event log file.		Φ	
Password:			
Download			
	Close		
	EE		

- 3. Enter the Safe Plug-in for MCB 15x password configured for the drive.
- 4. Click *Download* to download the Safe Plug-in for MCB 15x event log.
- 5. Select a location to save the log file. The log is presented in simple text file format.

# 8.7.6.2 Using the Reset Function

NOTICE

Resetting the device restores factory settings and erases any customized configuration on the device. To ensure rollback possibility, back up the customized configuration before resetting.

#### Procedure

Ð

- 1. Open the safe plug-in for VLT<sup>®</sup> Safety Option MCB 15x Series plug-in interface in network online mode.
- 2. Click Administration in the upper section of the interface.
- 3. Click the Reset tab header to open the Reset tab.

The Reset Password window opens.

Diagnostics Reset			
	set Safe Option passv		
configuration in the	drive! This action can	not be undone!	
Ves, I want to r Drive.	eset Safe Option Conf	figuration in the	
Reset password:			
		Reset	

- 4. Tick Yes, I want to reset Safe Option Configuration in the Drive for the drive to continue.
- 5. Enter the master password configured for the drive to continue.
- 6. Click *Reset* to reset the drive password and configuration.
- 7. Press [Reset] on the drive to reboot.

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**Plug-ins** 

# 8.7.6.3 Change Password

When working with the safe plug-in for VLT<sup>®</sup> Safety Option MCB 15x Series plug-in in network online mode, *Change password* is shown in the information area of the plug-in interface.

New password		٢-
Current passwo New password: Confirm new pa		
	ength must be 8 characters. th must be 8 characters.	
Drive:	1; FC-302 5.50KW 380V-480V	

Illustration 178: Safe Plug-in for MCB 15x Password Changing Window

### Procedure

- 1. Click Change password.
- 2. Enter the current password into the *Current password* field.
- 3. Enter the new password into the *New password* field. The password length must be exactly 8 characters. The password is case sensitive.
- 4. Confirm the new desired password by entering it again into the *Confirm new password* field.
- 5. If necessary, select the option Confirm to all blank initial drives to apply the new password to all new drives in the network.
- 6. Click *Cancel* to discard the procedure.

# 8.8 Status Plug-in

The Status plug-in is an online plug-in that shows the digital status words, control words, and alarm words.

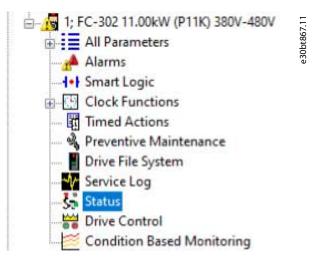


Illustration 179: Selecting the Status Plug-in

The plug-in only shows the available parameters. For each control word and status word, it shows the value in hex, reference, and control word profile. The plug-in shows all bits. Green LEDs indicate active bits (value = 1), while gray LEDs indicate inactive bits. The highlighted text shows the meaning of the bit status.

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# **Plug-ins**

#### Untitled - MCT 10 Set-up Software \_ × e30bt868.11 File Edit View Insert Communication Tools Options Help ----- Network Control Word Status Word Digital Input Digital Output [bin] Relay Output [bin] Ext. Status Word Ext. Status Word 2 Maintenance Word B aucom -- 🛔 ether --- 🛔 Serial Control Word: 43Chex Reference %: 0.0% Control Word Profile: FC profile Serial USB 1 USB Bit 0 External selection LSB Reference value 0 Bit 1 External selection MSB Reference value 0 Bit 2 DC brake 0 S Bit 3 Coasting 0 0 Bit 4 Quick stop Ramp 0 0 Bit 5 Hold output frequency 0 ۲ Bit 6 Start Ramp stop 0 0 Bit 7 No function Reset USB 2 + Project 0 Bit 8 No function Jog 0 Bit 9 Ramp 1 Ramp 2 S Bit 10 0 Data invalid 0 Bit 11 No function Relay 01 active 0 Sit 12 No function Relay 02 active 0 S Bit 13 Parameter set-up Selection LSB 0 S Bit 14 Parameter set-up Selection MSB 0 Bit 15 No function Reverse

For Help, press F1

#### Illustration 180: Example of Bit Status for Control Word

An information symbol in the left column of the screen indicates that a parameter has extra information. See <u>Illustration 180</u> for an example. Click the information symbol to get information about a bit.

	to select between the 4 Preset Reference acco			
Programmed ref. value	Parameter	Bit	01 Bit 02	
1	3-10 Preset Reference [0]	0	0	
3	3-10 Preset Reference [1]	0	1	
3	3-10 Preset Reference [2]	1	0	
4	3-10 Preset Reference [3]	1	1	
NOTICE				
Make a selection in a how Bit 00/01 gates the digital inputs.				

Illustration 181: Example of Bit Information

Communication OK

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# Plug-ins

### **Operating Guide**

Control Word	Status Word	Digital Input	Digital Output [bin]	Ext. S	tatus Word	Ext. Status Word 2	Maintenance Word
Maintenan	ce Word: FFFFFF	FAhex					
S Bit	t 0	Motor bearings		0	Bit 16	Maintenance Text	3
O Bit	t1	Pump bearings		0	Bit 17	Maintenance Text	4
S Bit	t 2	Fan bearings		0	Bit 18	Maintenance Text	5
S Bit	t 3	Valve		0	Bit 19	Reserved	
S Bit	t 4 Pre	essure transmitter	÷	$\odot$	Bit 20	Reserved	
<b>A B</b>				0	D3-31	Deserved	

Illustration 182: Example of Maintenance Word

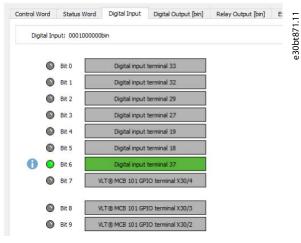


Illustration 183: Example of Digital Input



When bit 6 is active, the signal on DI 37 is inactive, meaning that there is no signal present on the input.

#### Status plug-in used with fieldbuses

All fieldbuses supported by MCT 10 Set-up Software support the Status plug-in. While the plug-in is open, MCT 10 reads the visible parameter constantly. This way, the plug-in updates automatically when values change.

### Loss of communication

If communication is lost, the plug-in turns yellow and sends a notification. The latest values are kept as they were before the communication loss. When communication is recovered, the plug-in recovers automatically.

# 8.9 Drive Control Plug-in

The Drive Control plug-in is available for online drive in the following product series:

- VLT<sup>®</sup> HVAC Drive FC 102.
- VLT<sup>®</sup> AQUA Drive FC 202.
- VLT<sup>®</sup> AutomationDrive FC 301/FC 302.
- VLT<sup>®</sup> HVAC Basic Drive FC 101.
- VLT<sup>®</sup> Midi Drive FC 280.
- VLT<sup>®</sup> AutomationDrive FC 360.

The plug-in is supported by serial communication and USB.

For the plug-in to work, it is required to be connected to the drive that should be controlled.

To open the plug-in, select *Drive control* in the structure in the left window.



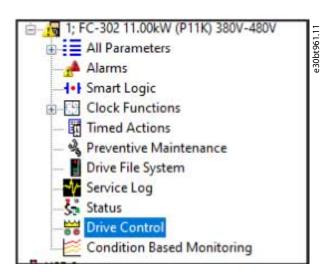


Illustration 184: Drive Control in Structure

A temporary page opens for accepting risks and configuring important parameters.

**Plug-ins** 

s30bt962.10

# WARNING AND DISCLAIMER!

If you continue, you will trigger the necessary commands to start the motor connected to the drive. Any remote operation is at your sole risk. Ensure that it is safe to start the drive and motor before continuing. In case of a lost connection for any reason, you may lose control of the drive and motor. Ensure that the site of the drive and motor is monitored during the remote operation.

Failure to ensure the safety of remote operation may cause serious accidents resulting in personal injury or damage to property. In no event shall Danfoss be liable for any direct, special, indirect or consequential damages, whatsoever, including, without limitation, damage to property, personal injury, damages for loss of savings or profits, or loss of data arising out of a failure to comply with these requirements.

During a control session following parameters (P8-01, P8-02 and P8-03) are temporarily changed. They are restored when the session is over. In case a system crash occurs while the control is running, power-cycle the drive to restore its state before the control session.

All parameters in the grid below must be read and validated at least once to enable launching the control session.

#### I accept the risks

Launch Drive Control

Cannot launch when motor is running

#### Parameters

Parameters shown here are automatically set to values necessary to make Drive Control work in the current set-up.

The set-up is determined by parameter 10.

If Multi Set-up or Factory setup is active, user has to select the set-up manually.

Set-up: 2 -

ID	Name	Current value	Change to	Unit
010	Active Set-up	Set-up 2		
015	Readout: actual setup	1		
302	Minimum Reference	0.000		Hz
303	Maximum Reference	1,500.000		Hz
410	Motor Speed Direction	Clockwise		
801	Control Site	Digital and ctrl.word	Controlword only	
802	Control Source	FC Port		
803	Control Timeout Time	1.0		s
804	Control Timeout Function	Off		
810	Control Profile	PROFIdrive profile		

#### Illustration 185: Risks to Accept

### 8.9.1 Launching the Drive Control Plug-in

To be able to launch the Drive Control plug-in, it is required to accept the risk. **Procedure** 

- 1. Tick I accept the risks.
- 2. Click Launch Drive Control.



### Illustration 186: Launch Drive Control Button

The Drive Control window opens.

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**Plug-ins** 

Contro	ol Request									Status	_									
0	🕅 Bit O		0	OFF 1		]		ON 1		0	0	Bit 0		Control n	ot ready			Con	trol ready	
0	🕅 Bit 1		o	OFF 2		]		ON 2		0	0	Bit 1		Drive no	ot ready			Drive ready		
0	🕅 Bit 2		0	OFF 3		]		ON 3		0	🚺 🔘 Bit 2 Co		Coa	Coasting			Enable			
0	🕅 Bit 3		Co	asting		]		No coasting		0		Bit 3		No e	rror			Trip		
0	🕅 Bit 4		Quir	ck stop		]		Ramp		0		Bit 4		OF	OFF 2			ON 2		
0	📰 Bit 5		Hold frequ	uency output	t	]		Use ramp		0	0	Bit 5		OF	F 3				ON 3	
0	🕅 Bit 6		Ram	np stop		Start			0	0	Bit 6		Start p	ossible			Start not possible			
0	🕅 Bit 7		No f	function		]		Reset		0	Bit 7 No warning				Warning					
0	🕅 Bit 8		Jog	1 OFF		]	Jog 1 ON			0	0	Bit 8		Speed ≠ r	eference			Speed=reference		
0	🕅 Bit 9	Bit 10     Data invalid			]	Jog 2 ON			0	Bit 9 Local operation				Bus control						
0	V Bit 10						Data valid		Bit 10 Out of frequency limit				Frequency limit ok							
0	🕅 Bit 11		No function No function					Slow down		0	0	Bit 11		No operation				In operation		
0	🕅 Bit 12							Catch up		0	Bit 12 Drive OK		Stopped, autostart							
0	Bit 13 Parameter set-up					S	election LSE	3	0	0	Bit 13		Volta	ge OK			Voltage exceeded			
0	🕅 Bit 14		Parame	eter set-up			s	election MSI	в	0	Bit 14 Torque OK				Torque exceeded					
0	🔲 Bit 15		No f	function			Reverse			Bit 15 Timer OK				Timer exceeded						
Reg	uest in hex —																			
								PPO	03 [4 Byte] 👻	Resp	onse i	n hex —								
CTW	REF	PCD2	PCD3	PCD4	PCD5	PCD6	PCD7	PCD8	PCD9	STV	/	FRQ	PCD2	PCD3	PCD4	PCD5	PCD6	PCD7	PCD8	PCD9
0400	0000	0000	0000	0000	0000	0000	0000	0000	0000											
Ref	erence [0x8000	0x7FFF]								Actu	al outp	out freque	ency —							_
Dec:	0	-327683	2767	%	: 0	-200	0200			Dec:		9/	6:							
Cun	rent outgoing re V REF	quest PCD2	PCD3	PCD4	PCD5	PCD6	PCD7	PCD8	PCD9	Conr	nection	n —								
040										Profi	le: PF	ROFIdrive	profile		Bus: 9	Serial		Address:	1	
										Profi		ROFIdrive	profile		Bus: S	Serial		Address:	1	
	Update out	tgoing req	uest			Start co	ontrol	Sto	op control	Never										

# 8.9.2 Setting the Control Word

At launch, the control word is set to 0400 but is not yet sent to the drive. **Procedure** 

- 1. Set the control word in 1 of 2 ways:
  - Use the checkboxes.

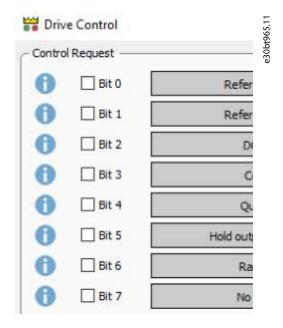


Illustration 188: Checkboxes for Setting Control Word

**Operating Guide** 

- Type the value directly in the *Request in Hex* field.



Illustration 189: Type in the Value Directly

Drive Control							
- Control Request			Status				
1 Bit 0	Reference value	External selection LSB	Bit 0     Control not ready	Control ready			
1 Bit 1	Reference value	External selection MSB	Bit 1     Drive not ready	Drive ready			
1 Eit 2	DC brake	Ramp	1 S Bit 2 Coasting	Enable			
1 Bit 3	Coasting	No coasting	Bit 3 No error	Trip			
🚹 🗌 Bit 4	Quick stop	Ramp	1 Sit 4 No error	Error (no trip)			
1 Bit 5	Hold output frequency	Use ramp	Bit 5     Reserved	• • • • • • • • • • • • • • • • • • •			
1 Bit 6	Ramp stop	Start	Bit 6 No error	Triplock			
1 Bit 7	No function	Reset	1 Sit 7 No warning	Warning			
1 Bit 8	No function	Jog	Bit 8 Speed # reference	Speed=reference			
1 Bit 9	Ramp 1	Ramp 2	Bit 9     Local operation	Bus control			
10 Eit 10	Data invalid	Data valid	1 Out of frequency limit	Prequency limit OK In operation Stopped, autostart Voltage exceeded Torque exceeded			
1 Bit 11	No function	Relay 01 active	Bit 11     No operation				
1 Bit 12	No function	Relay 02 active	Bit 12 Drive OK				
1 Bit 13	Parameter set-up	Selection LSB	1 Set 13 Voltage OK				
1 Bit 14	Parameter set-up	Selection MSB	1 Bit 14 Torque OK				
1 Bit 15	No function	Reverse	1 Bit 15 Timer OK	Timer exceeded			
Request in hex							
		PPO3 [4 Byte]	Response in hex				
CTW REF	PCD2 PCD3 PCD4 PCD5	PCD6 PCD7 PCD8 PCD9	STW FRQ PCD2 PCD3 PCD4 PCD5	PCD6 PCD7 PCD8 PCD			
0400 0000	0000 0000 0000 0000	0000 0000 0000	0608 0000				
Reference [0x8000 .	ux/HH]		Actual output frequency				
Dec: 0	3276832767 %: 0	-200200	Dec: 0 %: 0.0				
Current outgoing req	Jest						
	PCD2 PCD3 PCD4 PCD5	PCD6 PCD7 PCD8 PCD9	Connection     Profile: FC profile     Bus: USB 1	Address: 1			
CTW REF 0400 0000			bus, 036 1	HULLEDG. 1			

# 8.9.3 Start Drive Control

The control word must be set before starting the drive control. **Procedure** 

1. Click Start control.

ľ	e plug-in starts sending the c Control state: Stopped		e30bt968.11	
			e 30bt	
	Start control	Stop control		



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The control word is sent cyclically until clicking *Stop control* or until communication fails. The control state bar runs while the control word is being sent.



Illustration 192: Control State Bar Running

After a successful reading of a status, a notification is sent.



Illustration 193: Last Status Read Successfully

At loss of communication, the bits of the status view turn yellow, and an error appears.

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Plug-ins

			Status								
	ON 1		0	Bit 0		Control no	ot ready				
	ON 2		0	Bit 1		Drive no	t ready				
	ON 3		0	Bit 2		Coas	ting				
	No coastin	g	0	O Bit 3	it 3 No error						
	Ramp		0	Bit 4		OFF	= 2				
	Use ramp	N.	0	O Bit 5		OFF	3				
	Start		0	O Bit 6	Start possible						
	Reset		0	O Bit 7		No wa	rning				
	Jog 1 ON	N	0	Bit 8		Speed ≠ r	eference				
	Jog 2 ON		0	O Bit 9	Local operation Out of frequency limit						
	Data valid		0	O Bit 10							
	Slow down	1	0	Sit 11		No ope	eration				
	Catch up		0	Sit 12		Drive	e OK				
_	Selection LS		0	O Bit 13	Voltage OK						
	Selection M	SB	0	S Bit 14		Torqu	ie OK				
	Reverse		0	Bit 15		Time	r OK				
	PP	03 [4 Byte] 🔻	Res	ponse in hex —							
5 F	PCD6 PCD7 PCD8	PCD9	STV		PCD2	PCD3	PCD4	PCD5			
0	0000 0000 0000	0000									
			Actu	ual output freque	ency						
	-200200		Dec	: %	6:						
	PCD6 PCD7 PCD8	PCD9		nection	profile		Bus: S	erial			
Control s	state: Running										
			Last up	odate:							

### Illustration 194: Loss of Communication

### VLT<sup>®</sup> Motion Control Tool MCT 10

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### **Operating Guide**

ast update:	
4:22:40.102	
Accessed object is in an illegal state. Check drive connection (0xE0001006)	

Illustration 195: Error at Loss of Communication

# 8.9.4 Changing Control Word Bits

Control word bits can be changed while the control word is being sent. While changing the control word, the values of Request in hex and Current outgoing request differ.

								PPO3	[4Byte] 💛
TW	REF	PCD2	PCD3	PCD4	PCD5	PCD6	PCD7	PCD8	PCD9
3FF4	1000	0000	0000	0000	0000	0000	0000	0000	0000
Referen	nce [0x8000	0x7FFF]							
Dec: 4,0	)96	-327683	2767	%	25.0	-200.	.200		
Current	outgoing re	equest							
CTW	REF	PCD2	PCD3	PCD4	PCD5	PCD6	PCD7	PCD8	PCD9
3FF4	0000		h						
	Request in 1	Нех			Con	trol state: R	unning		
tion 196:	Request in l				Con	trol state: R	unning		
tion 196:	Request in loutgoing re		PCD3	PCD4	Cont PCD5	PCD6	PCD7	PCD8	PCD9
tion 196: Current o	outgoing re	quest	PCD3	PCD4	10000			PCD8	PCD9
tion 196: Current o CTW SFF4	REF 0000	quest	⊢		10000				PCD9
tion 196: Current o CTW 3FF4 tion 197:	REF 0000	PCD2	⊢		10000				PCD9
tion 196: Current o CTW 3FF4 tion 197: dure	REF 0000	PCD2	ing Request		10000				PCD9
tion 196: Current o CTW 3FF4 tion 197: dure Enter	REF 0000 Values of Co	PCD2	ing Request		10000				PCD9 

Illustration 198: Update Outgoing Request Button

Ð After clicking *Update outgoing request*, the values are the same.

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Plug-ins

CTW	REF	PCD2	PCD3	PCD4	PCD5	PCD6	PCD7	PCD8	PCD9
3FF4	1000	0000	0000	0000	0000	0000	0000	0000	0000
- Current CTW 3FF4	t outgoing re REF 1000	quest PCD2	PCD3	PCD4	PCD5	PCD6	PCD7	PCD8	PCD9

# 8.9.5 Changing the Reference

# Procedure

- 1. Change the reference in 1 of 2 ways:
  - Enter the hex value directly in *Request in hex*.
  - Enter the value in either decimal or percentage.

Values out of range are shown in pink.	
%: -200200	e30bt978.11
Illustration 200: Value Out of Range	
The Update outgoing request button is disabled until a v	alid value is set.

# 8.9.6 Open Drive Control Plug-in

When the Drive Control plug-in is open, the bus is locked, and it is not possible to scan or change parameter values.

It is possible to create a scope folder in a project that allows monitoring of relevant parameters while changing the control word via Drive Control.

ile Edit View	Insert	Commu	nication	Tools	Options
1 🗃 🖬 🕺	D 🔁		B- B-0 B- B-0	E 📺   (	) <b>k?</b> []
🚽 📥 Network					Folde
- 📙 aucom					
🛔 DP-V1					
- E ether					
🕀 📙 Serial					
🕀 📙 USB 1					
H- A USB 2					

Illustration 201: Create Scope Folder in Project

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Once the Drive Control plug-in is closed, the control word is restored to the value it had before starting the plug-in. Also other parameters are only changed temporarily.



Control word and other parameters used by Drive Control are written to flash instead of EEPROM. When power cycling the drive, these values are restored to the values they had before the Drive Control was started. If Drive Control of MCT 10 Set-up Software closes abnormally, the parameter restore process is not done. To restore the values after an abnormal shutdown, power cycle the drive.

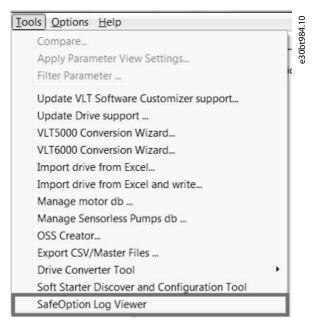
# 8.10 Decoder Plug-in

Use the Decoder plug-in for decoding Safe Option log files. The decoded log files are shown both inline (all information shown in 1 line) and as an overview of a selected line.

# 8.10.1 Starting the Decoder Plug-in

### Procedure

- 1. Click the Tools menu.
- 2. Select SafeOption Log Viewer.



### Illustration 202: Selecting the Plug-in

3. Click *Browse* to select a file.

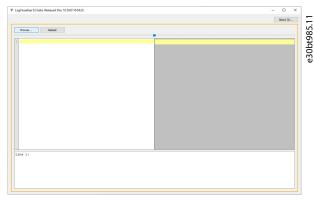


Illustration 203: View of the Log Visualizer

**Operating Guide** 



**Plug-ins** 

4. Click the arrow button to expand the log area or the explanation area.

			Use this small button to move expand
Browse Reload		^	
		~ ~	log area or explanation area
CUST DONE, ADEA, 000001:25:27			-
2 CUST DONE, ADEA, 000001:28:15			
PSND CHNG, 01234567, 000000:08:57			5V01 1111 TION 1051
4 PSND CHNG, 01234567, 000000:44:53	LOG AREA		EXPLANATION AREA

Illustration 204: Expanding the Views

		$\sim$
84 PSWD CHNG,01234567,000000:44:53		0
05 PSWD CHNG, 11111111,0000000:51:57		-
86 GEN RESET, 000000:43:54		~ '
87 GEN RESET, 000000:51:35		· · ·
88 INT FAIL,077,REACT STO ,0002000D35760029,000000:00:00		œ
09 INT FAIL,079, REACT STO ,000000000000000000000000000000000000	Internal Failure No SPI Communication	6
90 INT FAIL,073, REACT STO ,0000000000000000000000000:40:56		£
91 INT FAIL, 074, REACT STO ,000000000000000000000000000000000000	Internal Failure Safe Output Switch 2	0
92 INT FAIL,074, REACT STO ,000000000000000000000000000000000000	Internal Failure Safe Output Switch 2	
93 INT FAIL, 074, REACT STO ,000000000000000000000000000000000000	Internal Failure Safe Output Switch 2	ĕ
94 INT FAIL,077,REACT STO ,0002000D811D9A78,000000:45:53		
95 INT FAIL, 077, REACT STO ,0002000D811D3576,000000:45:53		Ð
96 INT FAIL, 070, REACT STO .0247022D00000000,000000:48:16	Internal Failure Speed Limit SLS A: Monitored Speed high (RFM): 583; SL	
97 INT FAIL,067, REACT STO ,0083007600E80078,000000:53:55	Internal Failure Tolerance Error Exceeded; Measured Speed (RFM): 131; E	
00 INT FAIL OFT PEACE STO	Internal Failure Tolerance Error Exceeded; Measured Speed (RPM): 131; E	

#### Illustration 205: Log File Shown in Log Visualizer

Files that require decoding have a 1-line explanation in the explanation area (right window). To get a better overview of a failure description, select the failure to see an overview of the description at the bottom of the window.

Illustration 206: Failure Shown as Inline Text

101 ENT FALL,007,FEACT STO ,0083007000540078,000001.31.35 101 ENT FALL,007,FEACT STO ,008300000780078,000001:01:03 105	Internal Failure Tolerance Error Exceeded; Measured Speed (RF) Internal Failure Tolerance Error Exceeded; Measured Speed (RF)
Line 103: Internal Fallure Tolerance Error Exceeded Measured Speed (RFM): 31 Falinated Speed (RFM): 0 Filter Error: 120 Param Speed Monitoring tolerance error: 120	

Illustration 207: Overview of Failure Description

# 8.11 Condition-based Monitoring (CBM) Plug-in

The CBM plug-in is an online-only plug-in for intuitive and progressive setup and monitoring of the CBM parameters.

For the plug-in to work and the CBM parameters to be available online, it is required to have a drive with CBM support and a CBM license connected. To use CBM for offline drives, a drive with the same type code and a CBM license must have been connected earlier. This way the license information is cached on the computer and can be used for offline drives.

### Configuration

The CBM parameters can be configured by using either the LCP or the CBM plug-in separately. Thus, it is not possible to edit parameters while using the CBM plug-in.

Once the plug-in is configured, parameter groups 45-\*\* Condition Based Monitoring to 47-\*\* CBM Baseline Data appear in the left view.



30-** Special Features
+ 32-** MCO Basic Settings
🛨 🔁 33-** MCO Adv. Settings
34-** MCO Data Readouts
+ 40-** Special Settings
+ 43-** Unit Readouts
45-** Condition Based Monitoring
46-** CBM Adv. Thresholds
+ 47-** CBM Baseline Data
50-** License
- 📌 Alarms
Clock Functions
<ul> <li>— Immed Actions</li> </ul>
<ul> <li>Preventive Maintenance</li> </ul>
— 📕 Drive File System
Service Log
🕀 🤽 MCO305
- Št. Status
Drive Control
Condition Based Monitoring

e30bi947.10

### The plug-in wizard

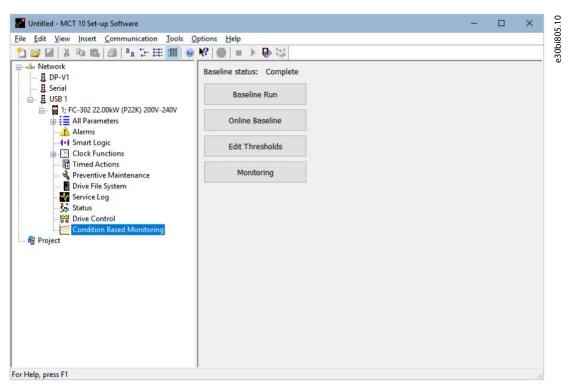
The CBM plug-in contains a wizard with the following 8 pages:

- Home page
- Speed range page
- Speed steps configuration page
- Sensor configuration page
- Auto-configuration setup page
- Baseline progress page
- Thresholds page
- Monitoring page

The value set in *parameter 45-21 Status* selects which page to show.

• Values 0, 3, and 4 select the *Home* page.

**Operating Guide** 



Values 1 and 2 select the Baseline Progress page.

Untitled - MCT 10 Set-up Software		-		×	10
File Edit View Insert Communication Tools					306.
1 😂 🖬   X 🖻 🛍   🚳   💺 🗁 🖽 🔳 🧕	$\mathbf{k}_{\mathbf{k}}   \mathbf{O}   = \mathbf{k} \otimes \mathbf{P}$				bi8
	Baseline Run Baseline creation in progress				e30bi806.10
All Parameters	7%				
- ▲ Alarms - 4+ Formart Logic ⊕ 5 Clock Functions - 國 Timed Actions	Duration 1 Minute	_	Next		
	Home				
For Help, press F1					1

### Navigation

•

It is possible to navigate freely between the pages. Clicking the Home button brings up the Home page.

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Plug-ins

# **Operating Guide**

		2 Hours	Time
- Constant speed		Normal ramping	····· Baseline step ramping
Data sampling		No data sampling	Data sampling for sensor only
Duration	2 Hours	~	
Home			Back Next

The *Thresholds* and *Monitoring* pages can either be opened from the *Home* page or from the various *Thresholds* and *Monitoring* pages.

When baselining, the Baseline Progress page opens automatically.

Available languages

The CBM plug-in is fully translated into German.

ator Last Sensor 1	Sensor 2 Sensor 3 Sensor 4			
				Anzeigeoptionen
100				
e 100 -				
0-0.00 00.00	0.00 00.00 00.00 00.00 00.00 00.00 00.00	\$0.00 \$0.00 \$0.00 \$0.00 \$0	00.00 00.00 00.00 00.00	0.00 00.00 00.00
0.00 0.00 0.0	6 0.00 0.00 0.00 0.00 0.00 0.00 0		1 1 1	00 0.00 0.00
0 - 0.00 0.00 0.00 408 576 74			1 1 1	00 0.00 0.00
408 576 74	4 912 1080 1248 1416 1584 1752 1 	920 2088 2256 2424 2593 Warnung 2	2 2760 2928 3096 32	64 3432 3600 Drehzahl, UPM Warnung 1
408 576 74	4 912 1080 1248 1416 1584 1752 1 	920 2088 2256 2424 259	2 2760 2928 3096 32	64 3432 3600 Drehzahl, UPM
408 576 74	4 912 1080 1248 1416 1584 1752 1 	920 2088 2256 2424 2593 Warnung 2	2 2760 2928 3096 32	64 3432 3600 Drehzahl, UPM Warnung 1
408 576 74 Alarm Baseline	4 912 1080 1248 1416 1584 1752 1 	920 2088 2256 2424 2593 Warnung 2	2 2760 2928 3096 32	64 3432 3600 Drehzahl, UPM Warnung 1
408 576 74 Alarm Baseline	4 912 1080 1248 1416 1584 1752 1 — V Max/Min Messung   Durch	920 2088 2256 2424 259; Warnung 2 hschnitt der Verteilung	2 2760 2928 3096 32	64 3432 3600 Upp 64 3432 3600 Upp Warnung 1 t ± 3 Standard Abweichung
408 576 74 Alarm Baseline	4 912 1080 1248 1416 1584 1752 1 — V Max/Min Messung   Durch	920 2088 2256 2424 259: Narnung 2 Alarm Zeit, s	2 2760 2928 3096 32 Durchschnit	64 3432 3600 Urehzahl, -64 3432 3600 Urehzahl, 
408 576 74 Alarm Baseline	4 912 1060 1248 1416 1584 1752 1 → ↓ Max/Min Messung ◆ Durch ● ~ ○ _ ~	920 2088 2256 2424 259 Warrung 2 hschnitt der Verteilung Alarm Zeit, s Warnung 2 Zeit, s	2 2760 2928 3096 32 Durchschnit 10.00 10.00	64 3432 3600 Drehzahl, UPM Warnung 1 t ± 3 Standard Abweichung (060K) (060K)
408 576 74 Alarm Baseline At der Interpolation	4 912 1080 1248 1416 1584 1752 1 Max/Min Messung ♦ Durd ● ~ O _ ~	920 2088 22:56 24:24 2:59. Warnung 2 Aschnitt der Verteilung Alarm Zeit, s Warnung 2 Zeit, s Warnung 1 Zeit, s	2 2760 2928 3096 32 Durchschnit 10.00 10.00	64 3432 3600 Drehzahl, UPM Warnung 1 t ± 3 Standard Abweichung (060K) (060K)
408 576 74 Alarm Baseline At der Interpolation Grenzwerte erstellen basi Baseline Statistik zur Ver	4 912 1080 1248 1416 1584 1752 1 Max/Min Messung Durd erend auf ausgewählter Baseline wei Mittelwert ± 3 Standard Abweichung	920 2088 2256 2424 259 Warnung 2 Alarm Zelt, s Warnung 2 Zelt, s Warnung 1 Zelt, s	2 2760 2928 3096 32 Durchschnit 10.00 10.00 10.00	64 3432 3600 Drehzahl, UPM Warnung 1 t ± 3 Standard Abweichung (060K) (060K)
408 576 74 Alarm Baseline differentiation Grenzwerte erstellen basi Baseline Statistik zur Ver Alarm	4 912 1080 1248 1416 1584 1752 1 Max/Min Messung    Durch	920 2088 2256 2424 259 Narrung 2 Alarm Zeit, s Warrung 2 Zeit, s Warrung 1 Zeit, s av avenden, % ~ 4.00	2 2760 2928 3096 32 Durchschnit 10.00 10.00	64 3432 3600 Drehzahl, UPM Warnung 1 t ± 3 Standard Abweichung (060K) (060K)
408 576 74 Alarm Baseline differentiation Grenzwerte erstellen basi Baseline Statistik zur Ver Alarm	4 912 1080 1248 1416 1584 1752 1 Max/Min Messung Durd erend auf ausgewählter Baseline wei Mittelwert ± 3 Standard Abweichung	920 2088 2256 2424 259 Warnung 2 Alarm Zeit, s Warnung 2 Zeit, s Warnung 1 Zeit, s 1 200 mwenden, % 5	2 2760 2928 3096 37	64 3432 3600 Drehzahl, UPM Warnung 1 t ± 3 Standard Abweichung (060K) (060K)
Aug 576 74 Aug 576 74 Aurm Baseline Aurm Grenzwerte erstellen bas Baseline Statistik zur Ver Alarm	4 912 1080 1248 1416 1584 1752 1 Max/Min Messung    Durch	920 2088 2256 2424 259 Narrung 2 Alarm Zeit, s Warrung 2 Zeit, s Warrung 1 Zeit, s av avenden, % ~ 4.00	2 2760 2928 3096 32 Durchschnit 10.00 10.00 10.00	64 3432 3600 Drehzahl, UPM Warnung 1 t ± 3 Standard Abweichung (060K) (060K)
Aug 576 74 Aug 576 74 Aurm Baseline Aurm Grenzwerte erstellen bas Baseline Statistik zur Ver Alarm	4 912 1080 1248 1416 1584 1752 1 Max/Min Messung    Durch	920 2088 2256 2424 259 Warnung 2 Alarm Zeit, s Warnung 2 Zeit, s Warnung 1 Zeit, s 1 200 mwenden, % 5	2 2760 2928 3096 37	64 3432 3600 Drehzahl, UPM Warnung 1 t ± 3 Standard Abweichung (060K) (060K)
408 576 74 Alarm Baseline differentiation Grenzwerte erstellen basi Baseline Statistik zur Ver Alarm	4 912 1080 1248 1416 1584 1752 1 Max/Min Messung    Durch	920 2088 2256 2424 259. Warmung 2 Alarm Zeit, s Warmung 2 Zeit, s Warmung 1 Zeit, s a mwenden, %6 für Warmung 2 200	2 2760 2928 3096 37	64 3432 3600 Drehzahl, UPM Warnung 1 t ± 3 Standard Abweichung (060K) (060K)
408 576 74 Alarm Baseline At der Interpolation	4 912 1080 1248 1416 1584 1752 1 Max/Min Messung    Durch	920 2088 2256 2424 259. Warmang 2 hschnitt der Verteilung Alarm Zeit, s Warmung 2 Zeit, s Warmung 1 Zeit, s av mwenden, % v für Warmung 2 2.00 für Warmung 1 1.00	2 2760 2928 3096 37	64 3432 3600 UPA Warnung 1 t ± 3 Standard Abweichung (060K) (060K)

# 8.11.1 Home Page

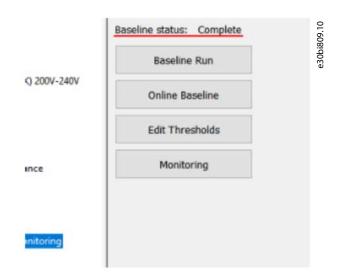
The Home page shows status information and buttons for proceeding with either:

- Baseline setup.
- Thresholds setup.
- Current values monitoring.

The Baseline status label reflects the value of parameter 45-21 Status.

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### **Plug-ins**



#### Illustration 208: Overview of Home Page Functions

#### Functions of the Home page buttons

- Baseline Run and Online Baseline opens the Speed Range page.
- Edit Threholds opens the Thresholds page.
- *Monitoring* opens the *Monitoring* page.

# 8.11.2 Speed Range Page

The Speed Range page contains a slider for setting the range in which the baseline measurement is performed.

Baseline Run	
Speed measurement range, RPM	
Set up new baseline - enter range	
$\bigcirc$ Set up baseline for comparison - use monitoring range	
This range will be divided into 20 speed bins	
100 3600	35700
Home	Next

#### Illustration 209: Speed Range Slider

When opening this page, *parameter 45-20 Type* shows the value [0] *Baseline Off*. This setting is required for *parameter 45-24 Duration* to work. Other settings in *parameter 45-20 Type* may prevent changing the duration. The title of the page corresponds to the baseline type selected on the *Home* page.

e30bj042.10



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**Plug-ins** 

There are 2 selections of prefilled range values:

• Set up new baseline - enter range is the default selection. The range is defined in parameter 45-26 Min. Speed and parameter 45-27 Max. Speed.

Set up new baseline - enter range		3.10
$\bigcirc$ Set up baseline for comparison - use monitoring range		e30bj04
This range will be divided into 20 speed bins		e3
100	35700	
100 3600		

- The minimum and maximum limits of the speed range are set in *parameter 45-26 Min. Speed* and *parameter 45-27 Max. Speed*, respectively.

100 3600		35700
Edit Parameter X	Edit Parameter	×
Value A Max 3.600	4527 Max. Speed Value	
Default ??? Vin 100	3.600           Default           ???         Y Min	

Illustration 210: Entering Minimum and Maximum Speed Values

The Set up baseline for comparison-range is defined by the values in parameter 46-07 and parameter 46-08. The values cannot be edited.

○ Set up new baseline - enter range	4.10
Set up baseline for comparison - use monitoring range	e30bj04
This range will be divided into 20 speed bins	ŝ
100 3570	0
100 3400	

- A baseline must be created for Set up baseline for comparison - use monitoring range to be available.

Set up new baseline - enter range	
O Set up baseline for comparison - use monitoring range	
Selection unavailable: baseline not created	yet

- If the drive does not support *parameter 46-07* and *parameter 46-08*, it is not possible to select *Set up baseline for comparison* - *use monitoirng range*. The range fields are always available and prefilled with the values from *parameter 45-26 Min. Speed* and *parameter 45-27 Max. Speed*.



**Plug-ins** 

Baseline Run		1010
Speed measurement range, RPM This range will be divided into 20 speed bins		010101000
100 3600	35700	
Home	Next	

• The range division comment contains the number of speed bins. It is equal to the index count of parameter 45-28 Speed Points.

The paramDLL determines the limits based on the following:

• If parameter 3-01 Reference/Feedback Unit is set to [2] RPM, parameter 3-02 Minimum Reference and parameter 3-03 Maximum Reference are used, otherwise parameter 4-11 Motor Speed Low Limit [RPM] and parameter 4-13 Motor Speed High Limit [RPM] are used. All 5 parameters are polled from the drive when opening the page.

When clicking Next, the range values are written to parameter 45-26 Min. Speed and parameter 45-27 Max. Speed.

<ul> <li>Set up new baseline - enter range</li> <li>Set up baseline for comparison - use monitoring range</li> <li>This range will be divided into 20 speed bins</li> </ul>		e30bj049.10
100 3600	35700	
Home	Next	
<ul> <li>Set up new baseline - enter range</li> <li>Set up baseline for comparison - use monitoring range</li> </ul>		e30bj050.10
This range will be divided into 20 speed bins		e3(
100	35700	
100 3400		
Home	Next	

If writing to the drive fails, the error description is logged to the MCT 10.log and no navigation is possible. If the failure is caused by invalid range values, the edit box with the invalid value is highlighted with a red frame. The edit box remains highlighted until the value is edited.

If writing to the drive is successful, the Speed Steps Configuration page opens.

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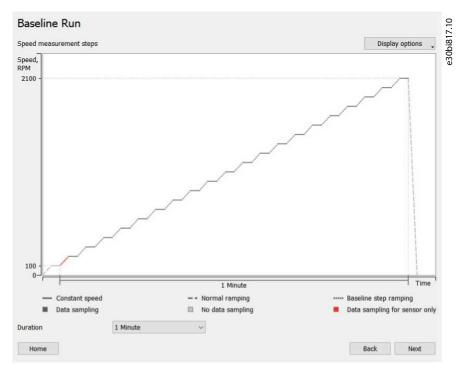
**Plug-ins** 

# 8.11.3 Speed Steps Configuration Page

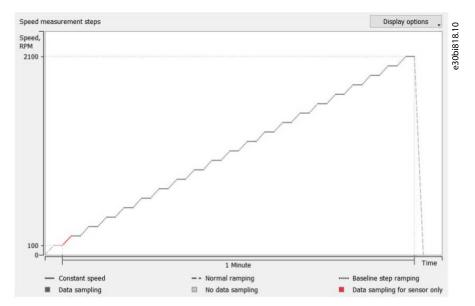
The selected baseline type defines the content of this page. The page shows content for 1 of the following:

- Baseline run
- Online baseline
- All baseline types

# 8.11.3.1 Baseline Run



During baseline creation, the motor speed graph is shown.



The values of the intermediate speed steps can be shown in 2 different ways:

• Mouse-over on the corresponding step.

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e30bi819.10

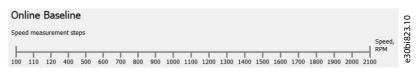
### The duration time is shown under the graph.



# 8.11.3.2 Online Baseline

Online Baselin	e					2
Speed measurement st		50 1325 1500 1675 1850	2025 2200 2375 255	0 2725 2900 307	5 3250 3425	Speed, a RPM 405 5 3600
Duration Speed step band, %	2 Hours 5	~ (05)		Minimum counters Enter the minimun capturing duration speed point (065	(minutes) for	
				Stator fault Load	2	
				Sensor 1 Sensor 2 Sensor 3	2 2 2	
Home				Sensor 4	2 Back	Next

Online Baseline shows the enumeration of all speed steps.



Define the speed step band in parameter 45-25 Online Speed Band.



The valid value range is shown after the edit box.

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**Plug-ins** 

	-	
nd, %	0	(05)

The valid value range is defined by the minimum and maximum limits in *parameter 45-25 Online Speed Band*.

4525	: Online \$	Speed B	Band
Value	^	Max	5
0			
Default			
???	~	Min	0

If an invalid value is entered, a red frame appears around the edit box.

nd, %	6	(05)	oi827.10
			e30b

Even though the value is invalid, the program will still attempt to write the invalid value, as the final validation is performed by the paramDLL and the drive.

Set the minimum counters for the speed points (parameter 45-39 Online Baseline Counter.)

inimum counters	online baseline data
	(minutes) for each
Stator fault	2
Load	2
Sensor 1	2
Sensor 2	2
Sensor 3	2
Sensor 4	2

If the drive supports 1 or 2 vibrations instead of 4 sensors, the vibrations appear instead.

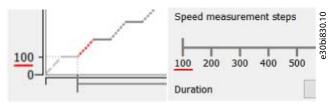
# 8.11.3.3 All Baseline Types

The title corresponds to the baseline type selected on the *Home* page.



Baseline I	Run	e30bi829.10
Speed measure	ment steps	e30t
Speed, RPM 2100 -		

When the page opens, all parameter values on the page are polled. The preliminary speed step for all the baseline types is the value of *parameter 45-26 Min. Speed*.



In Baseline Run, there is no data sampling from speed 0-100.



The rest of the speed steps are equal to the values of the indexed *parameter 45-28 Speed Points*. All speed values are read-only and cannot be edited.

Duration

•

Set the duration parameter 45-24 Duration. The list of duration values depends on the baseline type:

• For Baseline Run, the duration goes from 1 min to 2 h.

Duration	4 Minutes	~
Home	1 Minute 2 Minutes	
	4 Minutes	
	10 Minutes 30 Minutes	
	1 Hour 2 Hours	

For Online Baseline, the duration goes from 2 h to 6 months.



If the current duration value in the drive does not match the expected range for the current baseline type (for example, 6 months is set in the drive, while Baseline Run is being set up), the *Duration* field is left blank.

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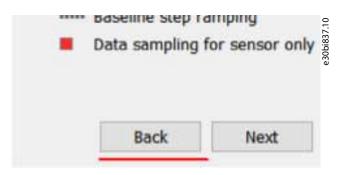
	ç
Duration	▲ 1835
	105

Select a value from the drop-down list to get the value written to the drive. To write parameter changes to the drive, click *Next*.

baseline step i	amping	10
Data sampling	for sensor only	e30bi836.10
Back	Next	
	Data sampling	Back Next

Only changed parameters are written to the drive. Accept of the changes navigates to the *Sensor Configuration Page*. If writing to the drive fails, the program stays on the same page. An error description is written to MCT 10.log, and the parameters causing the error are highlighted with a red frame.

To return to the Speed Range Page, click Back. Doing so discards all changes made on the Speed Steps Configuration page.



# 8.11.4 Sensor Configuration Page

This page contains the sensor configuration parameters.

	Sensor 1		Sensor 2		Sensor 3		Sensor 4	
nsor source	Analog Input 53	~	Analog Input 54	~	Analog Input X48/2	~	None	~
Sensor unit	mm/s ~	$\sim$	mm/s	$\sim$	mm/s	$\sim$	None	~
			AI53 minimum input	0.00	0			

If the drive only supports *Vibration, Sensor source* and *Sensor unit* are only visible for *Vibration*. If the drive supports *Vibration 1* and *Vibration 2*, both are visible. If the drive has *Sensor 1*, *Sensor 2*, *Sensor 3*, and *Sensor 4* as CBM functions, all of those are available here. The title of the page corresponds to the baseline type selected on the *Home* page.

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**Plug-ins** 

Opening the page polls all parameter values of *Sensor source* and *Sensor unit*. If the source value is other than *None*, the corresponding signal and unit parameters for that source are also polled. Furthermore, *parameter 16-61 Terminal 53 Switch Setting* and *parameter 16-63 Terminal 54 Switch Setting* are polled to enable the plug-in to set the default signal selection for Analog Input 53 and Analog Input 54.

If polling fails

• on opening the page, an error message appears and no values are shown.

	Sensor 1	Sensor 2	Sensor 3	Sensor 4
Sensor source	~	~	~	× ·
Sensor unit	~	~	~	~
Input signal value:				ç
min				
max				
Input unit value:				
min				
max				

after source selection, an error message appears and parameters that were not polled are marked with a red frame.

	Sensor 1	Sensor 2		Sensor	2.10
Sensor source	Analog Input X49/1	None	~	None	e30bi052.10
Sensor unit	None	None	~	None	e3
Input signal value:					
	Current ~				
min	4.00				
max	20.00				
Input unit value:					
min	0.000				
max	100.000				

after signal selection, an error message appears and parameters that were not polled are marked with a red frame.

	Sensor 1	Sensor 2	Ser	ns
Sensor source	Analog Input X49/1	None	~ No	ne
Sensor unit	None	None	~ No	
Input signal value:				
	Current ~			
min	4.00			
max	20.00			
Input unit value:				
	0.000			
min	0.000			

Polling failed! Could not update values! Check the connection before continuing.

To recover (and to restore communication if needed), enter the page again or select source or signal again to trigger a new polling. Select the sensor source in *Parameter 45-50 Sensor Source*.

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**Plug-ins** 

e30bi839.10

Sensor source Analog I	nput 53 v	Analog Input 54	~
neter 45-50 Sensor Sourc	e contains the followin	g selections:	
ensor source	None	~	e30bi840.10
	None		30bi
ensor unit	Analog Inpu	Jt 53	Ð
	Analog Inpu		
	Analog Inpu	it X48/2	
it Parameter			
	45	50: Sensor 1 Source	
/alue		Description	
[0] None		Select which	
<ul><li>[1] Analog Input 53</li><li>[2] Analog Input 54</li></ul>		wired to. F	
		supplied by	

Select the signal in the Input signal value field. The list of possible values depends on the selected source.

Sensor 1	Sensor 2	
Analog Input X30/11 ~	Analog Input 53	~
mm/s ~	mm/s	$\sim$
Voltage ~	Voltage ~	
Voltage	Current	
10.00	Voltage 10.00	
	Analog Input X30/11 ~ mm/s ~ Voltage ~ Voltage	Analog Input X30/11  Analog Input 53 mm/s  Voltage Voltage Voltage Voltage Voltage

Set the minimum and maximum values for input signal and input unit in the *Input signal value* field and in the *Input unit value* field, repsectively. The source and signal for the sensor decide which parameters the fields represent.

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# Plug-ins

# **Operating Guide**

	Sensor 1	
Sensor source	Analog Input X30/11	$\times$
Sensor unit	mm/s	~
Input signal value:		
	Voltage v	
min	0.07	
max	10.00	
Input unit value:		
min	0.000	
max	1500.000	

## Table 32: Inputs and Their Related Parameters

Input	Related parameters
Analog input 53 <sup>(1)</sup>	Parameter 6-10 Input Signal Voltage Min
	Parameter 6-11 Input Signal Voltage Max
	Parameter 6-12 Input Signal Current Min
	Parameter 6-13 Input Signal Current Max
	Parameter 6-14 Input Unit Min
	Parameter 6-15 Input Unit Max
Analog input 54 <sup>(2)</sup>	Parameter 6-20 Input Signal Voltage Min
	Parameter 6-21 Input Signal Voltage Max
	Parameter 6-22 Input Signal Current Min
	Parameter 6-23 Input Signal Current Max
	Parameter 6-24 Input Unit Min
	Parameter 6-25 Input Unit Max
Analog input X30/11	Parameter 6-30 Input Signal Voltage Min
	Parameter 6-31 Input Signal Voltage Max
	Parameter 6-34 Input Unit Min
	Parameter 6-35 Input Unit Max
Analog input X30/12	Parameter 6-40 Input Signal Voltage Min
	Parameter 6-41 Input Signal Voltage Max
	Parameter 6-44 Input Unit Min
	Parameter 6-45 Input Unit Max

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# **Plug-ins**

Input	Related parameters
Analog input X42/1	Parameter 26-10 Input Signal Voltage Min
	Parameter 26-11 Input Signal Voltage Max
	Parameter 26-14 Input Unit Min
	Parameter 26-15 Input Unit Max
Analog input X42/3	Parameter 26-20 Input Signal Voltage Min
	Parameter 26-21 Input Signal Voltage Max
	Parameter 26-24 Input Unit Min
	Parameter 26-25 Input Unit Max
Analog X42/6	Parameter 26-30 Input Signal Voltage Min
	Parameter 26-31 Input Signal Voltage Max
	Parameter 26-34 Input Unit Min
	Parameter 26-35 Input Unit Max
Analog input X48/2	Parameter 35-42 Input Signal Voltage Min
	Parameter 35-43 Input Signal Voltage Max
	Parameter 35-44 Input Unit Min
	Parameter 35-45 Input Unit Max
Analog input 49/1 <sup>(3)</sup>	
	Parameter 36-10 Input Signal Voltage Min
	<ul> <li>Parameter 36-12 Input Signal Voltage Max</li> <li>Parameter 36-11 Input Signal Current Min</li> </ul>
	<ul> <li>Parameter 36-11 Input Signal Current Min</li> <li>Parameter 36-13 Input Signal Current Max</li> </ul>
	<ul> <li>Parameter 36-14 Input Unit Min</li> </ul>
	<ul> <li>Parameter 36-15 Input Unit Max</li> </ul>
Analog input X49/3 <sup>(3)</sup>	
5	Parameter 36-20 Input Signal Voltage Min
	Parameter 36-22 Input Signal Voltage Max
	Parameter 36-21 Input Signal Current Min
	Parameter 36-23 Input Signal Current Max
	<ul> <li>Parameter 36-24 Input Unit Min</li> <li>Parameter 36-25 Input Unit Max</li> </ul>
Analog input X49/5 <sup>(3)</sup>	Parameter 36-30 Input Signal Voltage Min
	Parameter 36-32 Input Signal Voltage Max
	Parameter 36-31 Input Signal Current Min
	Parameter 36-33 Input Signal Current Max
	Parameter 36-34 Input Unit Min
	• 36-35 Input Unit Max

<sup>1</sup> The default value for signal selection depends on the switch setting in *parameter 16-61 Pulse Reference*.

<sup>2</sup> Default value for signal selection depends on the switch setting in *parameter 16-63 Feedback [RPM]*.

<sup>3</sup> Default value for signal selection is Current.

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## **Operating Guide**

**Plug-ins** 

If the source selection is set to None, no fields are available for input signal and input unit.

	Sensor 1	
Sensor source	None	~
Sensor unit	None	~
nput signal value:		
min		
max		
max		
	1	

If a selected source is already used for another sensor, an error message appears.

	Sensor 1	Sensor 2		
Sensor source	Analog Input X49/3	Analog Input X49/3 ~		
Sensor unit	None	None ~		
Input signal value:				
	Current ~	This source is		
min	4.00	selected more than once.		
max	20.00			
Input unit value:				
min	0.000			
max	100.000			

Even though the value is invalid, the program will still attempt to write the invalid value as the final validation is performed by the paramDLL and the drive.

Select the sensor unit in *parameter 45-51 Sensor Unit*.

Concor unit	mm/c	~	mm/s	~
Sensor unit	mm/s	~	mm/s	~

Click *Next* to write the parameters to the drive. Accept of the changes navigates to the *Baseline Progress* page. If writing to the drive fails, the program stays on the same page. An error description is written to the MCT 10.log, and the parameters causing the error are highlighted with a red frame.

To return to the Speed Steps Configuration page, click Back. Doing so discards all changes made on the Sensor Configuration page.

## 8.11.5 Auto-configuration Setup Page

Use the Auto-configuration Setup Page for setting the order of the remaining workflow. The page contains 2 radio buttons.

#### **Plug-ins**

Baseline Run			44.10
$\ensuremath{\textcircled{O}}$ Create a baseline, then configure the monitoring settings			e30bi84
$\bigcirc$ Configure the monitoring settings, then apply them automatically once a baseline is created			e3
Home	Back	Create Baseline	

- Create baseline, then configure the monitoring settings: The workflow continues as: Baseline Progress Page⇒Thresholds Page⇒Monitoring Page.
- Configure the monitoring settings, then apply them automatically once a baseline is created: The Baseline Progreass Page and the Thresholds Page are swapped, meaning that the workflow will be: Thresholds Page ⇒ Baseline Progress Page ⇒ Monitoring Page.

If selecting the 1<sup>st</sup> radio button, the *Create Baseline* button appears. Clicking the button sets *parameter 45-45 Thresholds Generation* in the drive to [0] Off.

- If successful, the Baseline Progress Page opens and the baseline creation starts.
- If not successful, the Baseline Progress Page does not open and the error message An error occurred is shown.

If selecting the 2<sup>nd</sup> radio button, the *Next* button appears. Clicking the button opens the *Thresholds Page with Auto-config View*. By default, the 1<sup>st</sup> radio button is selected.

To return to the *Speed Steps Configuration* page, click *Back*. The selection of radio button is remembered and restored when clicking *Next* on the *Speed Steps Configuration* page. The selection is reset to the 1<sup>st</sup> radio button when returning to the *Home* page or when leaving the plug-in.

## 8.11.6 Baseline Progress Page

This page shows the baseline creation progress bar. Other components are visible dependent on the selected baseline type.

## 8.11.6.1 Baseline Run

Baseline Run			30hi845 10
Press [Hand On] on the Local Control Panel to start Baseline Run			
		0%	٥
Duration	1 Minute		
Started:	CTOR.		
Stopped:			
Home			Next

After opening the page and writing *parameter 45-20 Type*, the following message is shown: *Press [Hand On] on Local Control Panel to start Baseline Run*. After selecting hand-on mode, the baseline creation process starts. The progress bar is filled with the value of *parameter 45-22 Progress*, which is polled continuously from the drive.

Once the page opens, the value of the duration is polled from the drive. This value is read-only.

		846.10
Duration	1 Minute	e30bi8

Stop the process by setting the drive mode to Off or Auto On via the LCP.

**Operating Guide** 



## 8.11.6.2 Online Baseline

Online Baseline				.10
Baseline creation in prog	ress			e30bi847
		27%		e30
Duration	2 Hours	~	Stop Baseline Creation	
Started:	07/12/2020 16:29			
Stopped:				
Home			Next	

After the page opens and *parameter 45-20 Type* is written to the drive, the page enters baseline creation mode automatically. Opening the page polls the value of the duration.

Duration	2 Hours	~
o un u cronn	E HOULD	

The duration can be changed during operation and the change is written to the drive instantly.

Baseline creation in p	progress	
Duration	2 Hours	~
	2 Hours	^
Started:	4 Hours	
Stopped:	8 Hours	
ocopped.	1 Day	
Home	2 Days	
nome	5 Days	
	1 Week	
	2 Weeks	
	1 Month	
	2 Months	~

If, for some reason, changing the duration fails, the value is highlighted with a red frame and the previous value is restored. Clicking the *Stop Baseline Creation* button sets *parameter 45-20 Type* to Off. If stopping fails, the page stays in the same state showing the progress. A known reason for failing to stop is the drive being in hand-on mode.

Unless the process is stopped with the Stop Baseline Creation, the Home and Next buttons are inactive.

Duration	2 Hours V	Stop Baseline Creation
Started:	07/12/2020 16:33	
Stopped:		
Home		Next

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#### **Operating Guide**

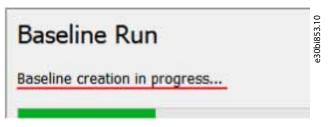
If stopping succeeds, the page state depends on the value of *parameter 45-21 Status*. If enough data was collected during the process, the value is *Baseline completed*, otherwise it is *Baseline failed*. The page state for both cases is described in <u>8.11.6.3 All Baseline</u> <u>Types</u>.

# 8.11.6.3 All Baseline Types

The page title corresponds to the baseline type selected on the *Home* page.



The status message reflects the state of the page, which depends on the current state of the drive. It describes the current state or requests performing an action.



The value of *parameter 45-21 Status*, which is polled continuously from the drive, defines the current state.

Opening the page writes *parameter 45-20 Type* to the drive. The parameter value corresponds to the baseline type selected on the *Home* page ([1] Baseline Run or [2] Online Baseline).

If writing *parameter 45-20 Type* fails, or if the drive refuses to change the parameter value, retry the attempt.

Baseline Run	854.10
The drive is not ready for baseline creation. Probably, the motor is still running. Retry	e30bi854
%	

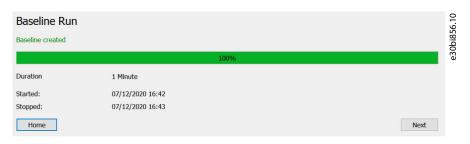
Another possible reason for failure is the drive being in hand-on mode. If baseline creation fails, the status message is read, the progress bar is empty with no numeric percentage, the *Home* button is active, and the *Next* button is inactive.

Baseline Run			5 10
Baseline creation failed			1951
	%		020
Duration	1 Minute		
Started:	07/12/2020 16:39		
Stopped:			
Home		Next	

If baseline creation succeeds, the status message is green, the progress bar is filled and has the value of 100%, and both the *Home* and the *Next* buttons are active.

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**Plug-ins** 



Timestamps are read from the drive and shown only if the drive has *parameter 47-00 Active Start Time* and *parameter 47-01 Active Stop Time*. Also set *parameter 0-70 Date and Time*. A timestamp for *Stopped* is shown once the baseline completes or fails.

e30bi858.10

and the second second second			
aseline creation in	progress		
		0%	
Duration	2 Hours	~	Stop Baseline Creation
Started:	6/26/2020 11:29 AM	4	
ordirecu.			

Clicking Next opens the Thresholds Page.

## 8.11.7 Thresholds Page

Use the *Thresholds* page to generate and/or manually edit the thresholds, which are shown on a graph.

or Load Sensor 1	Sensor 2 Sensor 3 Sensor				
Loud Jondon I	0010012 0010010 00100				Display options
00 -					
					·•
0-0000000000000000000000000000000000000	00.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	900.00 900.00 900.00 90 0.00 0.00 0.00 0	0.00 0.00 0.00 0.00	8.00 008.00 008.00 008.00	0.00 0.00 0.00 0.00 0.00 0.00 0.00
0 - 0.00 0.00 0.00 275 450 625					2250 2425 2600 Spe
275 450 625					
275 450 625 Alarm		.675 1850 2025 220		50 2725 2900 3075 3	3250 3425 3600 Spe RP
275 450 625 Alarm	800 975 1150 1325 1500 1	.675 1850 2025 220	00 2375 25	50 2725 2900 3075 3	3250 3425 3600 Spe 
275 450 625 Alarm Baseline	800 975 1150 1325 1500 1	.675 1850 2025 220	00 2375 25	50 2725 2900 3075 3	3250 3425 3600 Spe 
275 450 625 Alarm Baseline	800 975 1150 1325 1500 1 Max/Min measurement	1675 1850 2025 220 Warning 2 Mean of	of distribution	50 2725 2900 3075 :	3250 3425 3600 Spe PMarni Warni ean ± 3 standard devia
275 450 625 Alarm Baseline	800 975 1150 1325 1500 1 Max/Min measurement	1675 1850 2025 220 Warning 2 Mean of Alarm time	00 2375 25 of distribution e, s time, s	50 2725 2900 3075 : M M	2250 3425 3600 Spe Warni ean ± 3 standard devia (060K)
275 450 625 Narm Jaseline	800 975 1150 1325 1500 1 ◆ Max/Min measurement 9 ~ ○ _	1675 1850 2025 220 Warning 2 Mean of Alarm time Warning 2	00 2375 25 of distribution e, s time, s	50 2725 2900 3075 : M M M 10.00 10.00	2250 3425 3600 Spe — Wami ean ± 3 standard devia (060K) (060K)
275 450 625 Narm Jaseline polation type	800 975 1150 1325 1500 1 ◆ Max/Min measurement 9 ~ ○ _	4675 1850 2025 22 Warning 2 Maan of Alarm time Warning 2 Warning 1	00 2375 25 of distribution e, s time, s	50 2725 2900 3075 : M M M 10.00 10.00	2250 3425 3600 Spe — Wami ean ± 3 standard devia (060K) (060K)
275 450 625 Varm Jaseline polation type	800 975 1150 1325 1500 1 ◆ Max/Min measurement 9 ~ ○	4675 1850 2025 22 Warning 2 Maan of Alarm time Warning 2 Warning 1	00 2375 25 of distribution e, s time, s	50 2725 2900 3075 : M M M 10.00 10.00	2250 3425 3600 Spe — Wami ean ± 3 standard devia (060K) (060K)
275 450 625 Narm Jaseline polation type	800 975 1150 1325 1500 1     Max/Min measurement     ✓	675 1850 2025 22 Warning 2 Marning 2 Alarm tim Warning 2 Warning 1	00 2375 25 of distribution e, s time, s time, s	50 2725 2900 3075 : M M M 10.00 10.00	2250 3425 3600 Spe — Wami ean ± 3 standard devia (060K) (060K)
275 450 625 Narm Jaseline polation type	800 975 1150 1325 1500 1     Max/Min measurement     ✓    ✓    ✓    ✓    ✓     on selected baseline     Mean ± 3 Standard Deviation ✓     Use absolute value, %	675 1850 2025 22 Warning 2 Marning 2 Alarm tim Warning 2 Warning 1	00 2375 253 of distribution e, s time, s time, s	50 2725 2900 3075 : M M M 10.00 10.00	2250 3425 3600 Spe — Wami ean ± 3 standard devia (060K) (060K)
275 450 625 Narm Jaseline polation type	800 975 1150 1325 1500 1     Max/Min measurement     ✓    ✓    ✓    ✓    ✓     on selected baseline     Mean ± 3 Standard Deviation ✓     Use absolute value, %	675 1850 2025 22 Warning 2 Marning 2 Alarm tim Warning 2 Warning 2 Warning 2 Warning 2 Warning 2	00 2375 253 of distribution e, s time, s time, s 77.00 2.00	50 2725 2900 3075 : 1       M 10.00 10.00 (0100)	2250 3425 3600 Spe — Wami ean ± 3 standard devia (060K) (060K)
275 450 625 Narm Jaseline polation type	800 975 1150 1325 1500 1     Max/Min measurement     ✓    ✓    ✓    ✓    ✓     on selected baseline     Mean ± 3 Standard Deviation ✓     Use absolute value, %	675 1850 2025 22 Warning 2 Marning 2 Alarm tim Warning 2 Warning 2 Warning 2 Varning 2 Varning 2 Varning 2 Varning 2 Varning 2	00 2375 253 of distribution e, s time, s time, s 77.00 2.00	50 2725 2900 3075 : 1	2250 3425 3600 Spe — Wami ean ± 3 standard devia (060K) (060K)
	800 975 1150 1325 1500 1     Max/Min measurement     ✓    ✓    ✓    ✓    ✓     on selected baseline     Mean ± 3 Standard Deviation ✓     Use absolute value, %	675 1850 2025 22 Warning 2 Marning 2 Alarm tim Warning 2 Warning 2 Warning 2 Warning 2 Warning 2	00 2375 253 of distribution e, s time, s time, s	50 2725 2900 3075 : 1       M 10.00 10.00 (0100)	2250 3425 3600 Spe — Wami ean ± 3 standard devia (060K) (060K)
275 450 625 Alarm Baseline polation type @	800 975 1150 1325 1500 1     Max/Min measurement     ✓    ✓    ✓    ✓    ✓     on selected baseline     Mean ± 3 Standard Deviation ✓     Use absolute value, %	675 1850 2025 22 Warning 2 Marning 2 Alarm tim Warning 2 Warning 2 Warning 2 Varning 2 Varning 2 Varning 2 Varning 2 Varning 2	00 2375 253 of distribution e, s time, s time, s 77.00 2.00	50 2725 2900 3075 : 1	2250 3425 3600 Spe Warni ean ± 3 standard devia (060K) (060K)

When opening this page, *parameter 45-20 Type* writes the value [0] Baseline Off. This parameter setting is required for the threshold generation to work.

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#### **Operating Guide**

On page open, the following data is polled from the drive to fill in the values of the corresponding parameters on the page or points on the graph:

- Graph speed steps are polled from parameter 46-09 Monitoring Speeds. The values are used on the X axis of the graph.
- Graph threshold points are polled from the following parameter groups:
  - 46-2\* Stator (data is only polled from parameter 46-23 Resonance Active and parameter 46-24 Resonance Load if the drive supports these parameters).
  - 46-3\* Load.
  - 46-4\* Vibration.
- Graph actual baseline data is polled from the active parameters (except for the counter) in the following parameters and parameter groups:
  - 47-0\* Stator.
  - 47-1\* Stator Res. Active and 47-2\* Stator Res. Load, but only if the drive supports these parameter groups.
  - 47-3\* Load.
  - 47-4\* Vibration.
- Parameter 46-13 Interpolation Type.
- Parameter 46-10 Alarm Time.
- Parameter 46-11 Warning S2 Time.
- Parameter 46-12 Warning S1 Time.
- Parameter 45-30 Baseline Statistics.
- Parameter 45-32 Alarm Mode.
- Parameter 45-33 Alarm High.
- Parameter 45-38 Alarm Low.
- Parameter 45-31 Warning Mode.
- Parameter 45-34 Warning S2 High.
- Parameter 45-37 Warning S2 Low.
- Parameter 45-35 Warning S1 High.
- Parameter 45-36 Warning S1 Low.
- If supported by the drive, data is polled from the following parameters:
  - Parameter 45-60 Active Threshold.
    - Parameter 45-61 Load Mode.
    - Parameter 45-62 Load Threshold.

#### Previous baseline data

Select *Previous* to poll the previous baseline data.



The selection is only available if the drive supports thresholds generation from previous baseline (*parameter 45-45 Thresholds Generation* option [3] Generate now - Previous. The page content depends on the selected function. Each function has its own tab.



**Plug-ins** 

Thresh	nolds					50.10
Baseline (	Actual	O Previous	5			e30bi86
Stator	Load	Sensor 1	Sensor 2	Sensor 3	Sensor 4	

Illustration 211: Actual Baseline Tabs

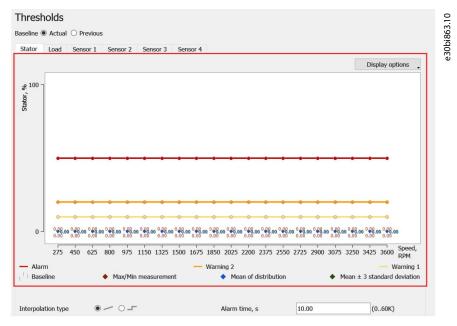
tator Load Vibration 1 Vibration 2

Illustration 212: Tabs for Vibration 1 and Vibration 2

hrest	nolds		e30bi862.10
Stator	Load	Vibration	e30
	-		
e 100 -	1		

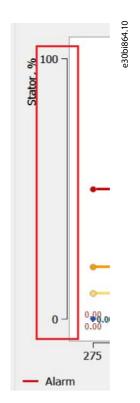
Illustration 213: Tabs for Vibration

The *Stator* tab contains the threshold graph.



The scale of the Y-axis (the function value axis in %) is selected so that any possible value of the shown points fits the graph canvas (based on the minimum and maximum of the point parameters).

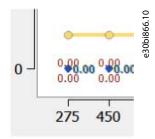
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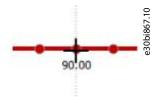
The X-axis is the speed. It is divided into evenly distributed speed step values.



The blank space between the minimum/maximum value and the edge of the canvas is left for the numeric values:



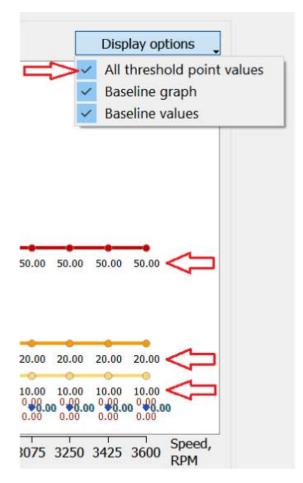
The value of a point is shown on mouse-over on a point.



It is also possible to show all point values at once using a display option:



**Plug-ins** 



Editing a threshold point

There are 2 ways to edit a threshold point:

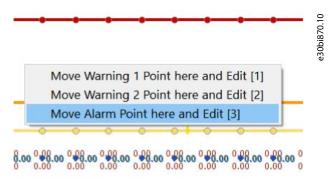
• Left-click the point:

•



Right-click on the canvas where the wanted point should be moved to and select the threshold type from the menu. The numbers in brackets are the shortcut keys (on the keyboard).

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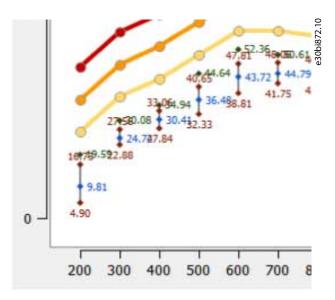
As the result, the point is moved and placed into edit mode.

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The baseline graph is shown as a set of measurement distributions for each speed step.

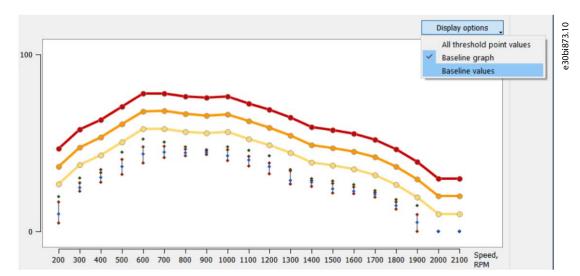


Each distribution consists of a minimum and maximum point (red diamond), mean value (blue diamond), and mean +3 standard deviation (mean ±3 standard deviation for the Load function) (green diamond). The minimum and maximum points are connected with a gray line (not visible on narrow distributions). Each point has its numeric value shown nearby.

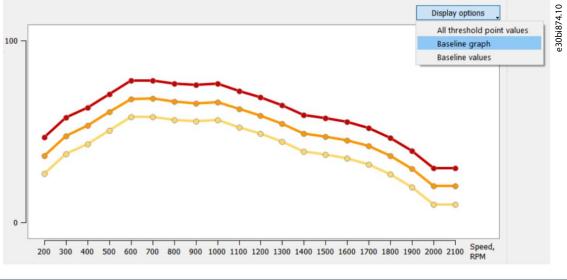
The baseline distributions may be narrow, which causes the numeric values to overlap. For this case, there is a display option to disable the baseline numeric values:

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## **Plug-ins**



Via the display options, it is also possible to hide the entire baseline (both the graph and the values).



NOTICE The values display cannot be selected without the baseline graph display.

Under the graph, there is a legend with the curves and points shown in this particular graph. The legends vary between different functions.

The legends by functions:

- Alarm	-	Warning 2	- Warning 1
Baseline	<ul> <li>Max/Min measurement</li> </ul>	<ul> <li>Mean of distribution</li> </ul>	<ul> <li>Mean ± 3 standard deviation</li> </ul>
ration 214: Stator	Function		
ration 214: Stator	Function	- Warning 2	- Warning 1
		Warning 2	- Warning 1 - Resonance Load

Illustration 215: Stator Function when the Drive Supports Resonance Active and Resonance Load

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## **Operating Guide**

Warning 2 Low	- Warning 1 Low
<ul> <li>Mean of distribution</li> </ul>	<ul> <li>Mean ± 3 standard deviation</li> </ul>
Warning 2	- Warning 1
	<ul> <li>Mean of distribution</li> </ul>

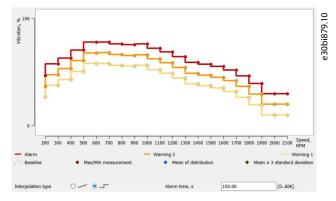
Illustration 217: Vibration/Vibration 1/Sensor 1, Vibration 2/Sensor 2, Sensor 3, Sensor 4

#### Interpolation type for functions

It is possible to select the interpolation type for the current function:

1 Baseline	Max/Min measurement	01 878 10
Interpolation type	•~ •-	Ċ
Generate thresholds	based on selected baseline	

Each function has its own value. Selecting a value different from the current one triggers a write to the drive for *parameter 46-13 Interpolation Type*. During the write, the page is disabled. If the write succeeds, the page is enabled and the interpolation type is applied to the graph of the current function.



If the write fails, the page is enabled, the previous selected type is restored, and a red frame appears around both selections to signal and error. The error is also logged in the MCT 10.log.

Interpolation type	i880.10
	 -30b

Parameter Group 46-1\* Timing contains alarm and warning time parameters.

Alarm time, s	10.00	(060K)	81.10
Warning 2 time, s	10.00	(060K)	30bi88
Warning 1 time, s	10.00	(060K)	Ð

Each function has its own values. The values are decimal with 2 numbers after the point.

There is a set of parameters related to thresholds generation. These parameters are grouped as *Generate thresholds based on selected baseline/Generate thresholds based on baseline*.

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# **Operating Guide**

Generate thresholds based on selected baseline < e30bi882.10 Baseline statistics to use Mean ± 3 Standard Deviation ~ Alarm Copy from baseline statistics applying offset, % < 50.00 (0..100) Copy from baseline statistics applying offset, %  $\,\,{}^{\scriptscriptstyle \vee}$ Warnings for warning 2 20.00 (0..100) for warning 1 10.00 (0..100) Generate using actual baseline Affects all functions

Some of the content depends on the selected function. All parameters are separate for each function, except for the Generate using actual/previous baseline/Generate command parameter.

If the drive does not support thresholds generation from previous baseline, thresholds are always generated using actual baseline.

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nresholds					
tator Load Vibration	1 Vibration 2				
					Display options
100 -					
0	<mark>9988</mark>	0.00 co 0.00 co 0	8 00 - 68 00 - 6	19 00 99 00 99 00 99 00 99 00 99	
0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.	00 0.00 0.0	0.00 0.00 0.00 0.0	10 1000 1000
275 450 625	800 975 1150 1325 1500 1675	1850 2025 22	00 2375 25	50 2725 2900 3075 325	0 3425 3600 Speed
Alarm	-	Warning 2			- Warning
Baseline	<ul> <li>Max/Min measurement</li> </ul>	Mean	of distribution	n 🔶 Mean	± 3 standard deviation
erpolation type	~ 0 -	Alarm tim	e, s	10.00	(060K)
		Warning 2		10.00	(060K)
		Warning 1	time, s	10.00	(060K)
enerate thresholds based	on baseline				
aseline statistics to use	Mean ~				
llarm	Use absolute value, %	~	65.00	(0100)	
Varnings	Use absolute value, %	~			
		for warning 2	40.00	(0100)	
		for warning 1		(0100)	
				(cantod)	
				Generate	
			Affects al	functions	
Home					Manifester
PIORDP					Monitoring

Some parameters are editable for all the functions:

- Valid values in Parameter 45-30 Baseline Statistics:
  - Mean \_
  - Maximum/Minimum. \_
  - Mean ±3 Standard Deviation. \_
- Valid values for Parameter 45-32 Alarm Mode. The values are valid for all generation modes. ٠
  - \_ Use absolute value, %.
  - Copy from baseline statistics applying offset, %. \_
  - -Copy from baseline statistics applying factor.
- Parameter 45-31 Warnings Generation Mode. .
- Parameter 45-45 Generate Button. •

Stator function-specific parameters

Stator function-specific parameters (stator resonance active and resonance load only appear if supported by the drive).

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## **Operating Guide**

Baseline statistics to use Mean Alarm Use absolute value, % ~ 0.00 (0..100) Warnings Use absolute value, % ~ for warning 2 0.00 (0..100) for warning 1 0.00 (0..100) Copy from baseline statistics applying offset, % Stator resonance active 0.00 (0..100) ~ 0.00 Stator resonance load Use absolute value, % (0..160)

- Parameter 45-33 Alarm High.
- Parameter 45-34 Warning S2 High.
- Parameter 45-35 Warning S1 High.
- Parameter 45-60 Active Threshold. This parameter is always on Offset-mode and cannot be changed.
- Parameter 45-61 Load Mode.
- Parameter 45-62 Load Threshold.

Load function-specific parameters

Baseline statistics to use	Mean	~		
Alarms	Use absolute value, %	~		
		for alarm high	0.00	(0160)
		for alarm low	0.00	(0100)
Warnings	Use absolute value, %	~		
		for warning 2 high	0.00	(0160)
		for warning 1 high	0.00	(0160)
		for warning 1 low	0.00	(0100)
		for warning 2 low	0.00	(0100)

- Parameter 45-33 Alarm High
- Parameter 45-38 Alarm Low
- Parameter 45-34 Warning S2 High
- Parameter 45-37 Warning S2 Low
- Parameter 45-35 Warning S1 High
- Parameter 45-36 Warning S1 Low

Vibration/sensor function-specific parameters

Baseline statistics to use	Mean ~		
Alarm	Use absolute value, %	0.00	(0100)
Warnings	Use absolute value, %		
	for warning 3	2 0.00	(0100)
	for warning :	1 0.00	(0100)

- Parameter 45-33 Alarm High
- Parameter 45-34 Warning S2 High
- Parameter 45-35 Warning S1 High

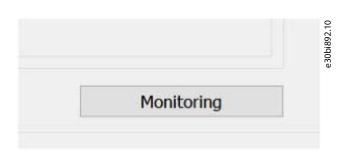
## Monitoring button

The Monitoring button at the bottom of the page opens the Monitoring page.

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**Plug-ins** 



# 8.11.7.1 Thresholds Generation

To initiate the threshold generation in both the plug-in and then drive, click the *Generate using actual/previous baseline* button. The drive generates new thresholds for all functions, not only for the selected one. Generation is performed using the user-provided settings in the *Generate thresholds based on selected baseline* area of the window. The process consists of 3 stages. During the whole process, the page is disabled. The stages are as follows:

• Write stage:

isoline Actual * Previou	п.				
	Sensor 3 Sensor 3 Se				
	3 Mar	ting for generalise compl	etos		
nterpolation type		Alarester		10.00	(0.666)
elerpolation type 8	<b>-</b>	Alares tim Warning 2		10.00	(060K) (060K)
sterpolation type - 8	<del></del>		time, s		
		Warning 2	time, s	10.00	(060K)
Generate thresholds based		Warning 1 Warning 1	time, s	10.00	(060K)
Generate thresholds based Baseline statistics to use	an selected baseline	Warning 2 Warning 1	time, s time, s	10.00	(060K)
eterpolation-type 8 Generate thresholds based Baseline statistics to use Alarm Warnings	on selected baseline Hear & J. Standard Deviation	Warning 2 Warning 1 Acciving officet, %	time, s time, s	10.00 10.00	(060K)
Generate thresholds based Baseline statistics to use Alarm	an selected baseline Hear & 1 Standard Deviation Copy from baseline 32,81280	Warning 2 Warning 1 Acciving officet, %	tima, s tima, s 4.00	10.00 10.00	(060K)
Generate thresholds based Baseline statistics to use Alarm	an selected baseline Hear & 1 Standard Deviation Copy from baseline 32,81280	Warning 2 Warning 1 N applying offsat, % Napplying offsat, %	8ma, s 8ma, s 4.00	10.00 10.00 (0100)	(060K)
Generate thresholds based Baseline statistics to use Alarm	an selected baseline Hear & 1 Standard Deviation Copy from baseline 32,81280	Warning 2 Warning 1 A acciping off-well, % In because off-well, % for evening 2	Urne, 5 Brna, 5 4.00 2.00 1.00	10.00 10.00 (0100) (0100)	(20080) (20080)
Generate thresholds based Baseline statistics to use Alarm	an selected baseline Hear & 1 Standard Deviation Copy from baseline 32,81280	Warning 2 Warning 1 A acciping off-well, % In because off-well, % for evening 2	Urne, 5 Brna, 5 4.00 2.00 1.00	10.00 10.00 (0.100) (0.100) (0.100)	(20080) (20080)

- A status message *Waiting for generate completion...* appears.
- If using the actual baseline, *parameter 45-45 Thresholds Generation* is written to the drive with the value [1] Generate Now.
- If using the previous baseline, *parameter 45-45 Thresholds Generation* is written to the drive with the value [3] Generate Now *Previous*.
- If the write is successful, the next stage activates:

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- Waiting for generating completion stage: While the status message remains, continuous polling of *parameter 45-45 Thresholds Generation* starts. If the polled value is either [1] *Generate Now* or [3] *Generate Now* - *Previous*, polling continues. If the polled value is [0] Off, polling stops and the next stage activates.
- Graph data polling stage:

Thresholds				
aseline 🔿 Actual 🐵 Previo	15			
Stator Load Sensor 1	Sensor 2 Sensor 3 Sensor 4			
	Reading data			
Interpolation type	Alarm 1	ime, s	10.00	(060K)
	Warnin	g 2 time, s	10.00	(060K)
	Warnin	g 1 time, s	10.00	(060K)
Generate thresholds based	on selected baseline			
Baseline statistics to use	Mean $\pm$ 3 Standard Deviation $\sim$			
Baseline statistics to use Alarm	Mean ± 3 Standard Deviation Copy from baseline statistics applying offset, %	4.00	(0100)	
			(0100)	
Alarm	Copy from baseline statistics applying offset, %	~	(0100)	
Alarm	Copy from baseline statistics applying offset, % Copy from baseline statistics applying offset, %	2 2.00		
Alarm	Copy from baseline statistics applying offset, % Copy from baseline statistics applying offset, % for warning	2 2.00	(0100)	us baceline
Alarm	Copy from baseline statistics applying offset, % Copy from baseline statistics applying offset, % for warning	3 2 2.00 3 1 1.00	(0100) (0100) Generate using previo	us baseline
Alarm	Copy from baseline statistics applying offset, % Copy from baseline statistics applying offset, % for warning	2 2.00	(0100) (0100) Generate using previo	us baseline

The status message changes to *Reading data...*. Single polling of the following parameters starts:

- Parameter 46-09 Monitoring Speeds.
- *Parameter groups 46-2\** to 46-7\* if they are present in the drive.

If using previous baseline, also previous baseline parameters are polled as these may have been overwritten. When polling is finished, the status message is replaced by a rebuilt graph with the polled values for each function. The page is enabled.

If errors occur in any of the stages, it is logged to the MCT 10.log. The page is enabled and a generic error message appears.

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**Plug-ins** 

aseline 🖲 Actual 🔘 Previou	JS			
Stator Load Sensor 1	Sensor 2 Sensor 3	Sensor 4		
	Error o	xcurred. Please check logs for details.		
nterpolation type	- 05	Alarm time, s	10.00	(060K)
nterpolation type	- 0-	Warning 2 time, s	10.00	(060K)
Generate thresholds based	on selected baseline	Warning 2 time, s Warning 1 time, s	10.00	(060K)
Generate thresholds based Baseline statistics to use	on selected baseline Mean ± 3 Standard Devia	Warning 2 time, s Warning 1 time, s	10.00	(060K)
Generate thresholds based Baseline statistics to use	on selected baseline Mean ± 3 Standard Devia Copy from baseline statist	Warning 2 time, s Warning 1 time, s tion ~ tics applying offset, % ~	10.00	(060K)
Generate thresholds based Baseline statistics to use Alarm	on selected baseline Mean ± 3 Standard Devia	Warning 2 time, s Warning 1 time, s tion ~ tics applying offset, % ~	10.00	(060K)
Generate thresholds based Baseline statistics to use Alarm	on selected baseline Mean ± 3 Standard Devia Copy from baseline statist	Warning 2 time, s Warning 1 time, s tion ~ tics applying offset, % ~	10.00	(060K)
Generate thresholds based Baseline statistics to use Alarm	on selected baseline Mean ± 3 Standard Devia Copy from baseline statist	Warning 2 time, s Warning 1 time, s tion ~ tics applying offset, % ~ tics applying offset, % ~	10.00 10.00 (0100)	(060K)
	on selected baseline Mean ± 3 Standard Devia Copy from baseline statist	Warning 2 time, s Warning 1 time, s titon ~ tics applying offset, % ~ for warning 2 2.00	10.00 10.00 (0100) (0100)	(060K) (060K)
Generate thresholds based Baseline statistics to use Alarm	on selected baseline Mean ± 3 Standard Devia Copy from baseline statist	Warning 2 time, s Warning 1 time, s titon ~ tics applying offset, % ~ for warning 2 2.00	10.00 10.00 (0100) (0100)	(060K)

Generate using previous baseline is only available if the drive supports [3] Generate Now - Previous in parameter 45-45 Thresholds Generation. If [3] Generate Now - Previous is missing, thresholds are always generated using the actual baseline data.

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**Plug-ins** 

00 (060K)
(oneon)
100)
100)
100)
100)
100) 100)
00 (060K) (060K) (060K)

Illustration 218: Write Stage

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**Plug-ins** 

tator Load Vibration				
	Reading data			
terpolation type	Alarm tim	e, s	6000.00	(060K)
terpolation type	Alarm tim Werning 2		5000.00 0.00	(060K)
terpolation type		2 time, s		
	Warning 1 Warning 1	2 time, s	0.00	(060K)
Generate thresholds based	Warning 3 Warning 1 I on baseline Mean ± 3 Standard Deviation -	2 time, s 1 time, s	0.00	(060K)
Generate thresholds based	Warning 3 Warning 3 I on baseline Mean ± 3 Standard Deviation - Copy from baseline statistics applying offset, % -	2 time, s 1 time, s	0.00	(060K)
Generate thresholds based Baseline statistics to use Alarm	Warning 3 Warning 3 I on baseline Mean ± 3 Standard Deviation Copy from baseline statistics applying offset, % Copy from baseline statistics applying offset, %	2 time, s 1 time, s 60.00	0.00	(060K)
Generate thresholds based Baseline statistics to use Alarm	Warning 3 Warning 3 on baseline Mean ± 3 Standard Deviation Copy from baseline statistics applying offset, % Copy from baseline statistics applying offset, % for warning 2	2 time, s 1 time, s 60.00	0.00 0.00 (0100) (0100)	(060K)
Generate thresholds based Baseline statistics to use Alarm Warnings	Warning 3 Warning 3 on baseline Mean ± 3 Standard Deviation Copy from baseline statistics applying offset, % Copy from baseline statistics applying offset, % for warning 3 for warning 3	2 time, s 1 time, s 60.00 2 40.00 1 20.00	0.00 0.00 (0100) (0100) (0100)	(060K)
Generate thresholds based Baseline statistics to use Alarm Warnings	Warning 2 Warning 3 Con baseline Mean ± 3 Standard Deviation Copy from baseline statistics applying offset, % for warning 1 for warning 1 for warning 1	2 time, s 1 time, s 60.00 2 40.00 2 20.00 56.00	0.00 0.00 (0100) (0100) (0100) (0100)	(060K)
terpolation type : G Generate thresholds based Baseline statistics to use Marm Warmings Stator resonance active Stator resonance load	Warning 3 Warning 3 on baseline Mean ± 3 Standard Deviation Copy from baseline statistics applying offset, % Copy from baseline statistics applying offset, % for warning 3 for warning 3	2 time, s 1 time, s 60.00 2 40.00 1 20.00	0.00 0.00 (0100) (0100) (0100)	(060K)
Generate thresholds based Baseline statistics to use Alarm Warnings Stator resonance active	Warning 2 Warning 3 Con baseline Mean ± 3 Standard Deviation Copy from baseline statistics applying offset, % for warning 1 for warning 1 for warning 1	2 time, s 1 time, s 60.00 2 40.00 2 20.00 56.00	0.00 0.00 (0100) (0100) (0100) (0100)	(060K)

Illustration 219: Graph Data Polling Stage

## 8.11.7.2 Numeric Parameters Editing

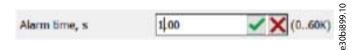
Each numeric parameter is represented by a text label, an edit box, and a valid range display:



The valid range is taken from the minimum and maximum of the corresponding parameter in the ParamDLL. The numbers in the range are shortened by using an SI suffix (K, M, G). If the resulting number is not precisely equal to the original, for example 60K 60200, the number is shown with a  $\approx$  in front.

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When a value is edited, the change is not written to the drive immediately. Instead, the edit box enters edit mode with 2 buttons for committing (green tick) or reverting (the red cross) the change:



This is necessary for freely erasing the current value and entering the new value as the intermediate input can be out of range or invalid.

Clicking the commit button or pressing [Enter], triggers the write to drive. During the write, the page is disabled (grayed out with all the control being inactive). If the write succeeds, the page is enabled, the commit and reject buttons disappear, and the value is normalized (required decimal points are added if missing). If the write fails, the page is enabled and the edit box is surrounded by a red frame. The frame disappears with the next edit.

Clicking the *Revert* button or pressing [Esc], restores the value in the edit box before starting the edit. The commit and reject buttons also disappear.

If the entered value is clearly invalid (empty or cannot be converted to a number), the edit box is surrounded by a red frame and the commit button is disabled:

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Alarm time, s	<b>(060K</b>	100 J 0
Alarm time, s	🗸 🗙 (060К)	Pidus

The entered value can also be out of the valid range. In this case, the edit box is surrounded by a red frame, but the committing is still possible.

60001	(0)	60K)
	60001	e0001

The ParamDLL and the drive decide if the entered value is valid. The committing process is the same as described above.

For threshold point editing on the graph, everything written in this section applies with the following additions:

- The point position on the graph is updated by committing the entered value (not while entering it).
- Reverting restores the previous position of the edited point (before start of the edit) and exits the edit mode.
- Clicking anywhere on the graph canvas is identical to reverting.
- A successful write to the drive exits edit mode. If the write is not successful, the edit box remains surrounded by a red frame.

## 8.11.7.3 Choice List Parameters Editing

Each parameter in a choice list has a text label and a drop-down showing the current value.

Baseline statistics to use	Mean	~
----------------------------	------	---

The drop-down contains the valid values for the parameter.

Baseline statistics to use	Mean 🗸	3.10
	Mean	06id0
Alarm	Maximum / Minimum	e30
Warnings	Mean ± 3 Standard Deviation	t i

When a parameter is selected in the menu, it is automatically written to the drive. During the write, the page is disabled. If the write succeeds, the page is enabled and the drop-down shows the selected value. If the write fails, the page is enabled, the previous value is restored in the drop-down, and a red frame appears around it highlighting the error. The error is also logged to MCT 10.

Making a selection in the Alarms, Warnings, and Stator resonance load menus, triggers more pollings of dependent parameters:

- For Stator, Vibration/Vibration 1/Sensor 1, Vibration 2/Sensor 2, Sensor 3, Sensor 4:
  - On Alarms change: Parameter 45-33.\* Speed Points is polled and limits updated (\* = specific function's index).
  - On Warnings change: Parameter 45-34.\* Threshold Config and Parameter 45-35.\* Baseline Statistics are polled and limits updated (.\* = specific function's index).
- For Load:
  - On Alarms change: Parameter 45-33.1 Speed Points and parameter 45-38.1 Alarm High are polled and limits updated.
  - On Warnings change: Parameter 45-34.1 Threshold Config, Parameter 45-35.1 Baseline Statistics, parameter 45-36.1 Warning Mode, and 45-37.1 Alarm Mode are polled and limits updated, for example as shown below.

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Alarms	Use absolute value, %
	Use absolute value, % for alarm high 144.00 (0≈655) for alarm low 0.01 (0100)
	for alarm low 0.01 (0100)
Warnings	Use absolute value, %
	for warning 2 high 30.00 (0≈655)
	for warning 1 high 20.00 (0≈655)
	for warning 1 low 20.00 (0100)
	for warning 2 low 30.00 (0100)
Alarms	Copy from baseline statistics applying factor v
	Copy from baseline statistics applying factor v for alarm high 2.00 (1.013) for alarm low 1.00 (0.011)
	for alarm low 1.00 (0.011)
Warnings	Copy from baseline statistics applying factor $\qquad \!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!$
	for warning 2 high 1.60 (1.013)
	for warning 1 high 1.40 (1.013)
	for warning 1 low 0.80 (0.011)
	for warning 2 low 0.60 (0.011)

- On Stator resonance load change - *parameter 45-62 Load Threshold* is polled and limits are updated.

Stator resonance load	Use absolute value, %	~ 0.00	(0160)
-----------------------	-----------------------	--------	--------

# 8.11.7.4 Thresholds Page when Auto-configuration is Selected

The following view appears when the function Configure the monitoring settings, then apply them automatically once a baseline is created has been selected on the Auto-configuration setup Page.

**Operating Guide** 

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Plug-ins

erpolation type 🛛 🔍 –	- 0	Alarm time, s	10.00		(060K)
		Warning 2 time, s	10.00		(060K)
		Warning 1 time, s	10.00		(060K)
Generate thresholds based	on selected baseline				-
Baseline statistics to use	Mean ± 3 Standard Deviation ~	*			
Alarm	Copy from baseline statistics ap	oplying offset, % ~ 6.0	00	(0100)	
Warnings	Copy from baseline statistics ap	oplying offset, % ~			
		for warning 2 4.0	00	(0100)	
		for warning 1 2.0	00	(0100)	
			After Decel		l, these settings

As baseline has not yet been run, there is no graph.

Clicking Create Baseline, sets parameter 45-45 Thresholds Generation to option [2] Auto Generate.

- If writing to the drive is successful, the Baseline Progress Page opens and the baseline creation starts.
- If writing to the drive fails, no navigation is done, and an error message (An error occurred) is shown.

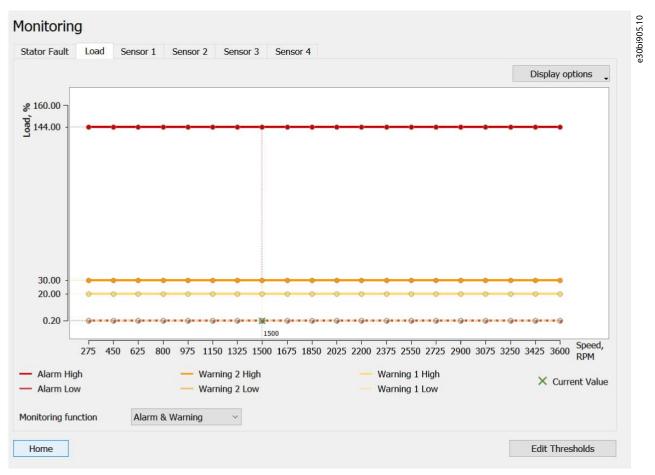
Clicking the *Back* button will not discard any changes made on this page.

## 8.11.8 Monitoring Page

Use the functions on the Monitoring page to track the current value of a function on a graph.

**Plug-ins** 

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On page open, the following data is polled from the drive to fill in the value of the *Monitoring function* field on the page and creating the points on the graph.

- Graph speed steps (the values on the X axis): Parameter 46-09 Monitoring Speeds.
- Graph threshold points: All the parameters from *parameter groups 46-2\* Stator (46-23 Resonance Active* and 46-24 Resonance Load only if available in drive), 46-3\* Load, and 46-4\* Vibration. Parameter groups 46-5\*, 46-6\*, and 46-7\* are also included if they are available in the drive.
- Parameter 46-13 Interpolation Type (applies to the graph).
- Parameter 45-00 Monitoring Function.

The first 2 bullets in the previous list include array parameters indexed by speed steps, while the last bullet includes array parameters indexed by vibration function.

### Parameters indexed by speed step

- 0 = Stator
- 1 = Load
- 2 = Vibration/Vibration 1/Sensor 1
- 3 = Vibration 2/Sensor 2 (if present in drive)
- 4 = Sensor 3 (if present in drive)
- 5 = Sensor 4 (if present in drive)

#### Parameters indexed by vibration function

- 0 = Vibration 1/Sensor 1
- 1 = Vibration 2/Sensor 2
- 2 = Sensor 3 (if present in drive)
- 3 = Sensor 4 (if present in drive)

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The content on the Monitoring Page depends on the selected function. The available functions are:

- Stator Fault
- Sensor 1
- Sensor 2
- Sensor 3
- Sensor 4

Stator Resonance Active and Stator Resonance Load only appear if supported by the drive. To distinguish these functions from the ones on the Thresholds page, those are referred to as CBM functions, whereas the functions on the Monitoring Page are referred to as monitoring functions. Each monitoring function has its own tab:

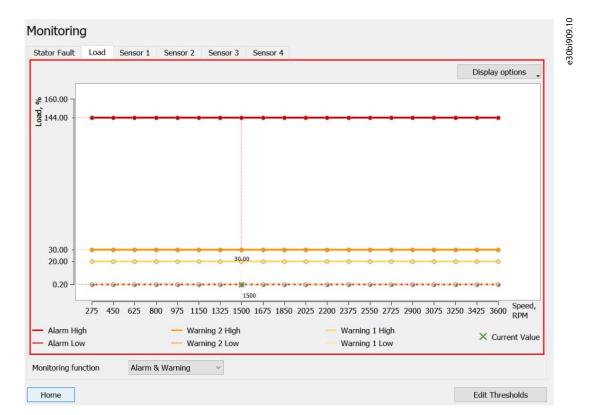
Monitorin	g					i906.10
Stator Fault	Load	Sensor 1	Sensor 2	Sensor 3	Sensor 4	e30bi

If the drive only has Vibration 1 and Vibration 2, the corresponding tabs appear:

Stator Fault Stator Resonance Active Stator Resonance Load Vibration 1 Vibra	Vibration 2
------------------------------------------------------------------------------	-------------

Stator Fault Stator Resonance Active Stator Resonance Load Vibration

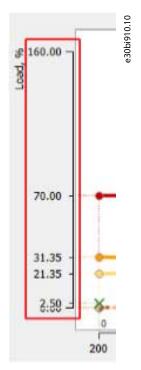
The monitoring graph is at the top of the tab.



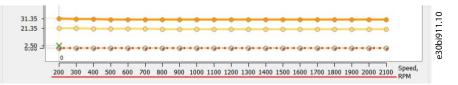
The scale of the Y axis is selected so that any possible value of the shown points and current data fits the graph canvas (based on the minimum and maximum of the point parameters).



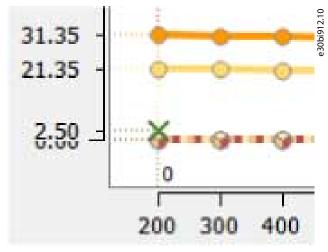




The X axis is the speed. It is divided into evenly distributed speed step values:



The blank space between the minimum/maximum value and the edge of the canvas is left for the current speed value and callout lines of the current data.



Doing a mouseover on a point shows the value of that exact point.



It is also possible to show all point values at once using a display option:



**Plug-ins** 

					olay o I three		•	t value	25	)	e30bi936.10
70.00	70.00	70.00	70.00	70.00	70.00	4	_				
		30.20 20.20	-	-							
0.00	0.00	0.00	0.00	0.00	0.00	4	eed,				

Under the graph, there is a legend showing the curves and points in the particular graph. The legends vary between different functions.

e30bi937.10

Nette	waraaj 2	Warning 3	X Oavent Value
-------	----------	-----------	----------------

Illustration 220: Legend for Stator Fault, Vibration/Vibration 1/Sensor 1, Vibration 2/Sensor 2, Sensor 3, Sensor 4

× Carent Volue	

Illustration 221: Stator Resonance Active, Stator Resonance Load (Only Appear if Supported by the Drive)

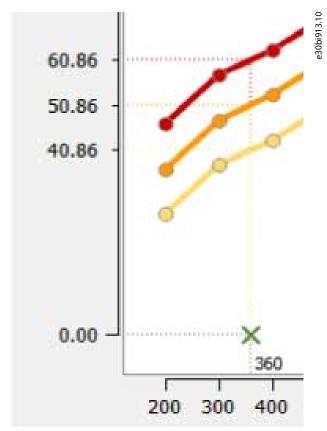
- Alarm High	- Warning 2 High	- Warning 1 High	× Current Value
- Alarm Low	- Warning 2 Low	Warning 1 Low	~ Current value

#### Illustration 222: Load

The graph shows the current data which is continuously polled from the drive.

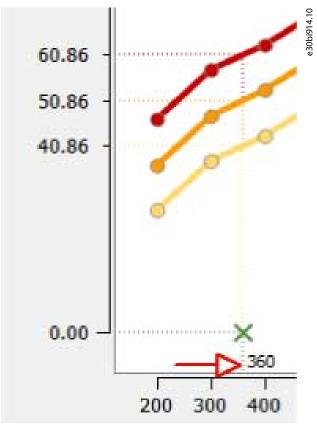
**Operating Guide** 





The data consists of:

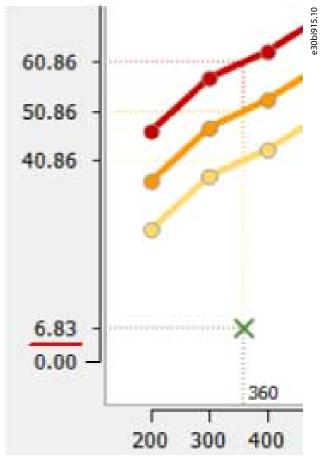
• The current speed in RPM (parameter 16-17 Speed RPM, common for all functions).



The current function value (parameter 45-13 Actual Monitor Value with the index of the selected function).

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**Plug-ins** 

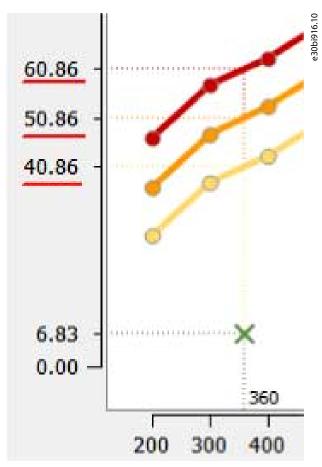


The alarm and warning thresholds for the current speed (*parameters* 45-10 – 45-12 and *parameters* 45-14 – 45-16 with the index of the selected function. If the current function does not support a threshold (for example, the "low" thresholds for all the functions except for Load), it is not polled.

•



**Plug-ins** 



There are dashed callout lines of corresponding color that visualize the position of each threshold or the current value for the current speed. In the intersection of the current speed and value, a green cross is drawn.

#### Monitoring function indexes

- 0 = Stator Fault
- 1 = Stator Resonance Active
- 2 = Stator Resonance Load
- 3 = Load
- 4 = Vibration/Vibration 1/Sensor 1
- 5 = Vibration 2/Sensor 2 (if present in the drive)
- 6 = Sensor 3 (if present in the drive)
- 7 = Sensor 4 (if present in the drive)

Below the graph, select the monitoring function. The values in the dropdown list reflect the options in *parameter 45-00 Monitoring Function*.



The monitoring function dropdown list works in the same way as the choice list parameters on the Thresholds Page. The parameter is indexed by CBM function:

- 0 = Stator (common value for Stator Fault, Stator Resonance Active, and Stator Resonance Load functions)
- 1 = Load
- 2 = Vibration/Vibration 1/Sensor 2
- 3 = Vibration 2/Sensor 2 (if present in the drive)

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- 4 = Sensor 3 (if present in the drive)
- 5 = Sensor 4 (if present in the drive)

The Edit Thresholds button at the bottom of the page opens the Threshold Page.

1800 1900 20	000 2100 Speed, RPM	e30bi918.10
	X Current Value	
	Edit Thresholds	

## 8.12 Service Log

The Service Log plug-in is available offline. It enables reading from the drive in the right view of the MCT 10 screen. Pressing *Read from drive* overwrites any log files that are already in the log.

"Read from drive" causes S	ervice Log folder contents in MCT10 to be overwritten
Read from drive	

Illustration 223: Read from Drive Overwrites Log Files

# 9 Support of VLT<sup>®</sup> Wireless Communication Panel LCP 103

## 9.1 Introduction

MCT 10 Set-up Software supports the VLT® Wireless Communication Panel LCP 103. There are 2 different approaches depending on the MCT 10 version used.

# 9.1.1 Using LCP 103 with MCT 10 Set-up Software Basic Version

#### Procedure

- 1. Right-click the drive that has the LCP 103 plugged in.
- 2. Select Update WIFI LCP firmware.
- 3. In the dialog box, select a file (\*.bin is already selected).

le <u>n</u> ame:	▼ Binary files (*.bin) ▼
	<u>Q</u> pen <b> </b> ▼ Cancel

#### Illustration 224: Dialog for Selecting \*.bin Files

#### 4. Press [OK].

When the procedure is completed, the writing starts and the progress is visible.

Status		
Value Value of the trive of tri		
ending file WIFIGateway.bin to drive		100%
	61%	

#### Illustration 225: Progress Bar Showing While Writing to the Drive



## 9.1.2 Using LCP 103 with MCT 10 Set-up Software Advanced Version

With the advanced version of the MCT 10 Set-up Software, the Drive File Manager Plug-in can be used for connecting the LCP 103. **Procedure** 

1. In the offline drive, select *Drive File System*.

2. Right-click in the right window and select *Import File* from the context menu.



3. In the dialog box, select binary files (\*.bin).

File name:	
	CSIV Files (*.csiv) Binary files (*.bin)
	Language files (".lng) Smart Application Setup Wizard files (*.sas) Splash Screen Files (*.splash)
	All Files (*.*)

4. Select the correct binary file.

MCT 10 Set-up S	Soft		
🛞 Inv	alid File		
	ок		
r a successful file impo	rt, the Drive File System shows	information about the file.	
A STRUCTURE OF A			e30bt876.10
File Name	Туре	Size	30bt8
	wifilcp	105360 bytes	

5. Click the Drive File Manager icon.



6. Via the Drive File Manager, write the \*.bin file to the drive.

# 10 VLT<sup>®</sup> Software Customizer

## 10.1 Introduction

The VLT<sup>®</sup> Software Customizer is available from MCT 10 Set-up Software version 4.00. The tool enables customization of the drive by modifying or creating unique splash screens, initial values, and SmartStart wizards.

The plug-in contains 3 independent features:

- SplashScreen: Add a custom logo that is shown during initialization of the drive. The SplashScreen supports:
  - jpeg.
  - png.
  - bmp.
  - gif.
- InitialValues: Define unique parameter default values based on application needs in a customer-specific initial values (CSIV) format. Every time the drive is initialized, it starts with the custom values.
- SmartStart: Create custom SmartStart wizards that guide through predefined application steps, which simplifies the commissioning process.

Furthermore, it is possible to write to the drive and test in the simulator. The *Write to drive* function writes files that have been created or imported into VLT<sup>®</sup> Software Customizer. *Test in simulator* launches the LCP simulator for simulating a connection to a drive. In the *Settings* menu, it is possible to show or hide the disclaimer.





Illustration 227: A Mouse-over Highlights the Area Pointed at

When doing a mouse-over on 1 of the 3 features, the feature is highlighted, and a button is available. Click the button to open the functions currently available for the selected feature.



Illustration 228: Button for Opening Available Functions





Illustration 229: Example of Available Options for a Feature

# 10.1.1 Activation Key

The VLT<sup>®</sup> Software Customizer is an advanced tool that requires an activation key. To obtain the activation key, contact the local Danfoss representative.

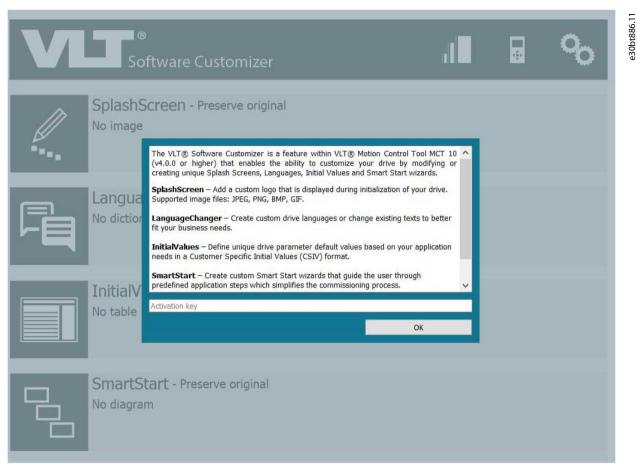


Illustration 230: Dialog Box for Entering the Activation Key

# 10.1.2 Disclaimer

When the activation key is active, a disclaimer appears.

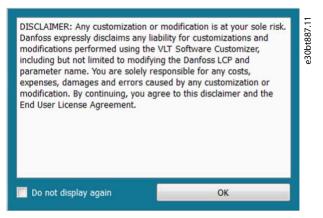


Illustration 231: Disclaimer

Click *OK* to make the disclaimer disappear until the next restart of MCT 10 Set-up Software. To avoid seeing the disclaimer at each start-up, tick the *Do not display again*.

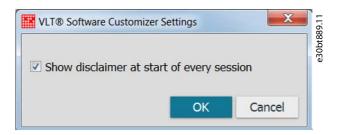
# 10.1.2.1 Changing the Disclaimer Settings

The settings for the disclaimer can be set at a later point. Procedure

1. Select *Settings* in the top menu.



- Tick and click OK to show the disclaimer at each start-up.
- Remove the check mark and click OK not to show the disclaimer at each start-up.



# 10.2 SplashScreen

Use the SplashScreen tool to create images to be shown on the LCP while the drive initializes. Either create a splash screen from new, import an existing SplashScreen file, or import a picture.

# 10.2.1 Creating New from Blank

# Procedure

1. Select *New from blank* to open the editor with an empty project.

VL	® Software Customizer	¢	°0
	SplashScreen - Preserve original No image	New from b Edit Select from li	
	LanguageChanger - Preserve originals No dictionaries	Import Rename Open Fold Remove	e Jer
	InitialValues - Preserve original No table	Wipe Origi	inal
	SmartStart - Preserve original No diagram		

Illustration 232: Selecting New From Blank

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		splashS								0		ntinue	>	( Cano	el				
າໄ	2	Width	: 2	٥	/	s.	*	Zoon	n: 10	٢	ł								

Illustration 233: Empty Project in Editor

2. Use the different tools in the menu to create the drawing. *Width* increases/decreases brush line thickness, left mouse button is for freehand line, right mouse button for straight lines.

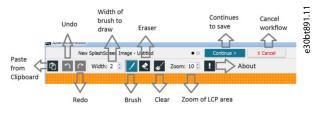


Illustration 234: Drawing Tools

- 3. When finished, click Continue.
- 4. In the dialog box, enter a file name and click *Finish*. Clicking *Back* returns to the editor, clicking *Cancel* cancels saving of the file.

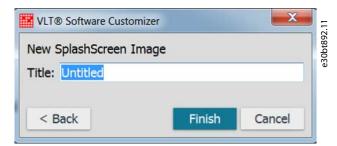


Illustration 235: Dialog Box for Saving a SplashScreen Image

# 10.2.2 Selecting from Library

#### Procedure

1. Click Select from Library to open an already saved SplashScreen file (\*.spla).

Select from Library is also used for editing already saved SplashScreen files.

# 10.2.3 Import

The import function allows import of:

- jpeg.
- jpg.
- bmp.
- png.
- tif.
- gif.

- spla.
- splash.

At import, the picture resizes to fit the LCP. If the entire picture is not visible, set the threshold value of the imported image.

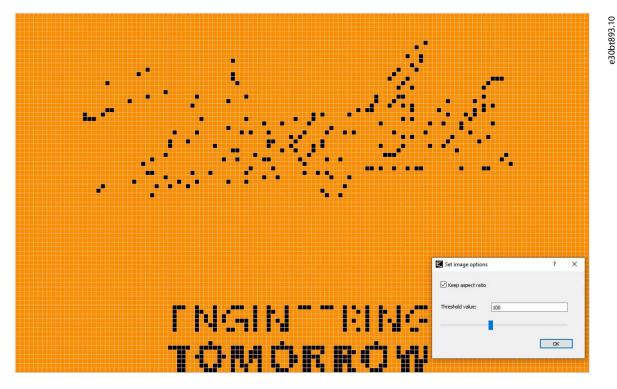


Illustration 236: SplashScreen with Original Threshold Value



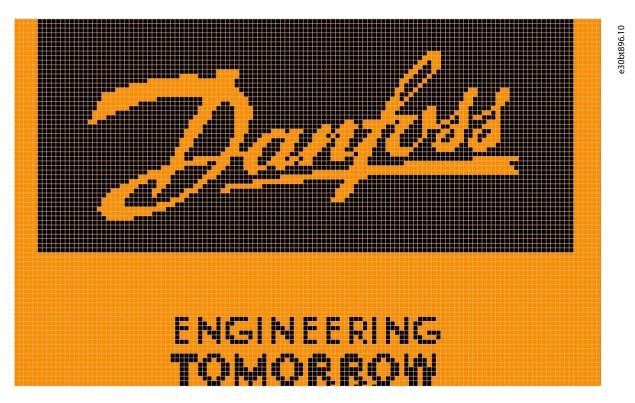
Illustration 237: SplashScreen Improved with Higher Threshold Values

The quality of the picture can be improved further by using the brush.

**Operating Guide** 



# VLT<sup>®</sup> Software Customizer



#### Illustration 238: SplashScreen Improved with the Brush Tool

When the picture is saved, the SplashScreen is added into the VLT<sup>®</sup> Software Customizer project along with a date and time stamp. It is possible to edit and save more SplashScreen files, but only 1 appears in the project.



#### Illustration 239: SplashScreen and Preview Added to Project

Adding a SplashScreen to the project, changes the menu to offer the functions in <u>Illustration 240</u>.





Illustration 240: Functions in the SplashScreen Menu

# 10.3 LanguageChanger

The LanguageChanger enables editing or creating a language by translating group names, subgroup names, help texts, and parameter names.

When there is no file in the project, the menu is the same as in SplashScreen.

**Operating Guide** 

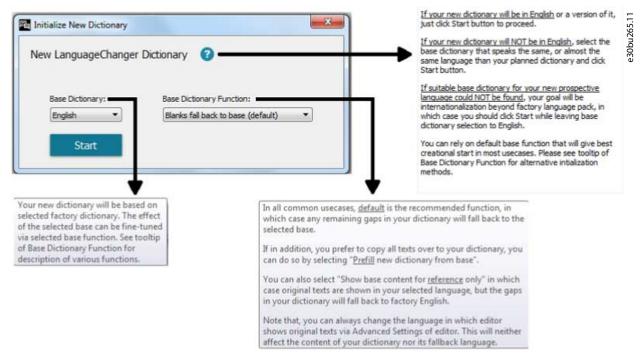
Software Customizer	
SplashScreen - Preserve original No image	New from blank Edit
LanguageChanger - Preserve originals No dictionaries	Select from library Import Rename Open Folder
InitialValues - Preserve original No table	Remove Wipe Originals Export as LNG
No diagram	

Illustration 241: Overview of the LanguageChanger Menu

# 10.3.1 New from Blank

Selecting *New from Blank* opens the editor.

The editor contains tooltips about the Base Dictionary and the Base Dictionary Function.



#### Illustration 242: Tooltips in the Editor

**Operating Guide** 

**Base Dictionary** 

Use the *Base Dictionary* for selecting which dictionary (LNG file) the LanguageChanger should load. For example, for translating into Spanish, select Spanish in the *Base Dictionary*. The LanguageChanger then loads parameter names, help texts, and other texts in Spanish.

**Base Dictionary Function** 

Use the Base Dictionary Function for defining if the LanguageChanger should prefill the translations with texts from the Base Dictionary. If selecting Blanks fall back to base, the LanguageChanger leaves the translation field empty.

Fallback to factory English	
	Fallback to factory English

Illustration 243: Example of Base Dictionary set to English

Parameter group display na	me:	
Hauptmenü	Fallback to factory German	

#### Illustration 244: Example of Base Dictionary set to German

If selecting Prefill new dictionary from base, the LanguageChanger prefills the translation field with texts from the Base Dictionary.

Parameter group display na	me:	1
Main Menu	Main Menu	8901140Ea

#### Illustration 245: Example of Prefilled Translation Field with English Base

Parameter group display name:		.10
Hauptmenü	Hauptmenü	e30bu 269

#### Illustration 246: Example of Prefilled Translation Field with German Base

After selecting Base Dictionary and Base Dictionary Function, and after pressing Start, the LanguageChanger opens.

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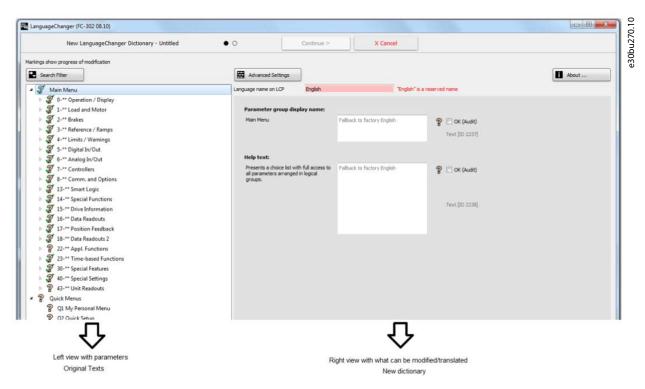


Illustration 247: Overview of the LanguageChanger



Language name on LCP comes from Base Dictionary. The name English is reserved for Danfoss. The name can be changed, for example to English\_Australia. This name is then shown in the LCP.



#### Illustration 248: Language Name on LCP



Illustration 249: Language Name Shown on the LCP

Once Language Name on LCP is set, it is possible to start modifying and translating.

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Not all parameters can be modified/translated. Parameters shown are the ones that can be modified or translated.

If clicking Cancel, a dialog appears.

VLT® Software Customizer		×	4.10
Are You Sure you want to cance Your edits will be lost.	el?		e30bu274.10
	ОК	Back	

Illustration 250: Cancel Dialog

Clicking *OK* closes the LanguageChanger without saving any changes. Clicking *Back* goes back to the LanguageChanger editor. When editing is done, press *Continue* and assign a name to the new dictionary file.

VLT® Software Customizer		×
dit LanguageChanger I	Dictionary	
itle:		

Illustration 251: LanguageChanger Project Name

The name is for the specific LanguageChanger project and is shown on the dashboard.



Illustration 252: LanguageChanger Dashboard with Project Name

# 10.3.2 Search Filter

To easily find parameter names or texts to be translated, click the Search filter button.

Close Filter				78.10
Search text:			Match case	
Search from:	Original texts and my dictionary	•	]	b'

Select to search in:

- Original texts and new dictionary,
- Original texts only, or
- New dictionary only.

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For example, searching for *motor power* only shows the parameters that contain *motor power* in the name or in the help text.

Close Filter			Advanced Settings		
iearch text:	Motor power	Match case	Language name on LCP English_	Australia	
earch from:	Original texts and my dictionary	•	Parameter display name:		
X Main Me	ะกม		Motor Power [kW]	Fallback to factory English	V OK (Audit)
	Load and Motor				Text [ID 773]
· 3 1	-2" Motor Data [120] Motor Power [kW]				
3			Help text: Enter the nominal motor power in kV	V Fallback to factory English	0 -
-	limits / Warnings		from the motor nameplate data. Note: Changing this parameter will	<ul> <li>Pailback to factory English</li> </ul>	8 🖂 OK (Audit)
-	Smart Logic Data Readouts		affect the settings of other parameters.		
•					Text [ID 774]

#### Illustration 254: Search Result for Motor Power

# 10.3.3 Advanced Settings

Advanced settings contains tooltips for each possible setting and is helpful when creating a dictionary.

Hide Settings		
anguage name on LCP	English_Australia	
Show original texts in:	English	•
Markings show progress of	Modification	
Markings ignore audit		
Enable audit trail of rea	d only texts	
Show only parameters	of project drive	
Set language number [	201254]	
C++Locale ID	english-uk	
Windows Locale ID	2057	
Unicode Lanugage ID	9	
🔲 Increase line height		

#### Illustration 255: Overview of the Advanced Settings

Show original texts in: Choose the language in which editor shows original texts for your reference. This does not affect the content of you dictionary ie. texts on LCP.

Illustration 256: Tooltip Example

# 10.3.4 Audit

Clicking Audit accepts the original text as it is and marks it completed without modifications or translations.

# 10.3.5 Markings

To visualize the progress of translation or creation of a dictionary, LanguageChanger shows different markups.

8	Text has not been modified or translated.
~	Text has been modified or translated.
<b>√</b> !	Text has been accepted as is via the <i>Audit</i> function.

If Markings ignore audit is selected in the advanced settings, the marking only shows modified texts. All other texts are shown as



# 10.4 InitialValues

Use *InitialValues* to create CSIV files. Without a CSIV file, all parameters are reset to default values during initialization of the drive. With a CSIV file, parameter values are initialized with the values defined in the CSIV file.

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Software Customizer		¢	<b>0</b> 0	e30bt899.10
SplashScreen - Preserve original No image				
LanguageChanger - Preserve originals No dictionaries	B	New from I Edit	blank	
		Select from	library	
InitialValues - Preserve original No table		Import		
		Renam		
		Open Fol		
		Remov		
SmartStart - Preserve original No diagram		Wipe Orig		

# Illustration 257: InitialValues Menu

# 10.4.1 Creating New from Blank

# Procedure

1. Select *New from Blank* to open an empty project in the editor.

	Ne	w InitiaNalues Tab	le - Untitled		• • (	Continu	ie >		X Cancel		
arame	ter filter	1						Initial Val	ues		
ID	Name	Setup 1	Setup 2	Setup 3	Setup 4	Unit	•			Apply project values	
001	Language	English	English	English	English						
002	Motor Speed Unit	RPM	RPM	RPM	RPM			-			
003	Regional Settings	International	International	International	International			ID	Setup	Value	
004	Operating State at Po	Forced stop, ref=old	Forced stop, ref=old	Forced stop, ref=old	Forced stop, ref=old						
010	Active Set-up	Set-up 1	Set-up 1	Set-up 1	Set-up 1						
012	This Set-up Linked to	Not linked	Not linked	Not linked	Not linked						
020	Display Line 1.1 Small	Speed [RPM]	Speed [RPM]	Speed [RPM]	Speed [RPM]						
021	Display Line 1.2 Small	Motor current	Motor current	Motor current	Motor current						
022	Display Line 1.3 Small	Power [kW]	Power [kW]	Power [kW]	Power [kW]						
023	Display Line 2 Large	Frequency	Frequency	Frequency	Frequency						
024	Display Line 3 Large	Reference %	Reference %	Reference %	Reference %						
025.0	My Personal Menu	1	1	1	1						
025.1	My Personal Menu	20	20	20	20						
025.2	My Personal Menu	21	21	21	21						
025.3	My Personal Menu	22	22	22	22						
025.4	My Personal Menu	23	23	23	23						
025.5	My Personal Menu	24	24	24	24						
025.6	My Personal Menu	67	67	67	67						
025.7	My Personal Menu	1551	1551	1551	1551					Reset selected parameter values to default	

Illustration 258: Example of Empty Project

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VLT<sup>®</sup> Software Customizer

2. To add parameters, double-click in a parameter and change a value. For example, add German to the CSIV.

	Ne	w InitiaNalues Tab	ole	Edit Parameter	X
Parame	eter filter			001: Language	
ID	Name	Setup 1	s	Value	
001	Language	English	Ε	English	
002	Motor Speed Unit	RPM	R	Deutsch Français	E
003	Regional Settings	International	Ir	Dansk	
004	Operating State at Po	Forced stop, ref=old	F	Español	*
010	Active Set-up	Set-up 1	s		
012	This Set-up Linked to	Not linked	N		
020	Display Line 1.1 Small	Speed [RPM]	s		
021	Display Line 1.2 Small	Motor current	N	Description	
022	Display Line 1.3 Small	Power [kW]	Ρ	Select the display language.	
023	Display Line 2 Large	Frequency	F		
024	Display Line 3 Large	Reference %	R		
025.0	My Personal Menu	1	1		
025.1	My Personal Menu	20	2		
025.2	My Personal Menu	21	2		
025.3	My Personal Menu	22	2		<b>*</b>
025.4	My Personal Menu	23	2 2 2 6		
025.5	My Personal Menu	24	2	OK Cancel	
025.6	My Personal Menu	67	6		

Illustration 259: Setting a Value for the CSIV File

3. Click OK to add the value to the CSIV file.

aramet	er filter							Initial Values			
ID	Name	Setup 1	Setup 2	Setup 3	Setup 4	Unit	•				Apply project values
001	Language	Deutsch	Deutsch	Deutsch	Deutsch		Ξ				
002	Motor Speed Unit	RPM	RPM	RPM	RPM						
003	Regional Settings	International	International	International	International			ID	Setup	Value	
004	Operating State at Po	Forced stop, ref=old	Forced stop, ref=old	Forced stop, ref=old	Forced stop, ref=old			001	Setup 1	Deuts	ich
010	Active Set-up	Set-up 1	Set-up 1	Set-up 1	Set-up 1						
012	This Set-up Linked to	Not linked	Not linked	Not linked	Not linked						

Illustration 260: Value Added to CSIV File

Initia	al Values Editor						
	Ne	w InitiaNalues T	able - Untitled		• 0	Contin	ue >
arame	eter filter	Motor					
ID	Name	Setup 1	Setup 2	Setup 3	Setup 4	Unit	
002	Motor Speed Unit	RPM	RPM	RPM	RPM		10
101	Motor Control Princi	VVC+	VVC+	VVC+	VVC+		
102	Flux Motor Feedback	24V encoder	24V encoder	24V encoder	24V encoder		
107	Motor Angle Offset	Manual	Manual	Manual	Manual		
110	Motor Construction	Asynchron	Asynchron	Asynchron	Asynchron		
111	Motor Model	Std. Asynchron	Std. Asynchron	Std. Asynchron	Std. Asynchron		1
120	Motor Power [kW]	0.25	0.25	0.25	0.25	kW	
121	Motor Power [HP]	0.34	0.34	0.34	0.34	hp	
122	Motor Voltage	230	230	230	230	V	
123	Motor Frequency	50	50	50	50	Hz	
124	Motor Current	1.39	1.39	1.39	1.39	Α	
125	Motor Nominal Speed	1400	1400	1400	1400	RPM	
126	Motor Cont. Rated T	5.0	5.0	5.0	5.0	Nm	
129	Automatic Motor Ad	Off	Off	Off	Off		
139	Motor Poles	4	4	4	4		
141	Motor Angle Offset	0	0	0	0		
150	Motor Magnetisation	100	100	100	100	%	
168	Motor Inertia	0.0000	0.0000	0.0000	0.0000	kgm <sup>2</sup>	
190	Motor Thermal Prote	No protection	No protection	No protection	No protection		

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To import a parameter available in the offline MCT 10 Setup Software project, click Apply project values.

Apply project values
Illustration 262: Apply Project Values Button

# 10.4.2 Removing Parameters

#### Procedure

- 1. Select the parameter to be removed.
- 2. Click Reset selected parameter values to default.

ID	Setup	Value	0
110	Setup 1	PM, non salient SPM	L L L L L L L L L L L L L L L L L L L
125	Setup 1	1500	
413	Setup 1	1980	4

#### Illustration 263: Removing a Parameter



# 10.4.3 Saving the CSIV File

All values must be entered in the Initial Values editor before saving the CSIV file. **Procedure** 

- 1. Click Continue.
- 2. In the dialog box, enter a file name.

VLT® Software Customizer	X	6.10
New InitialValues Table		=30ht906 10
Title: CSIV		a
< Back	Finish Cancel	

3. Click Finish.

Clicking *Back* returns to the editor, clicking *Cancel* cancels saving of the CSIV file.

When saving the CSIV file has completed, a preview of the file is shown in the project along with a date and time stamp.

InitialValues CSIV Revision: #1 09.06.2017 02:13:41	P001 Setup1 P413 Setup1	e30bt907.10
-----------------------------------------------------------	----------------------------	-------------

Illustration 264: Preview of CSIV File in Project

# 10.4.4 Validation of Parameters During Import

Parameters are validated during import of a CSIV file. Incompatible parameters cannot be imported and are highlighted. Incompatibilities can be caused by, for example, missing parameters or a CSIV file created for a different product series.

	I Values Editor											
Se	elect other		Import InitiaNa	alues Table - FC10	2		0.	•	Continue >	X Cancel		
me	ter filter	I						Initial Va	lues			
	Name	Setup 1	Setup 2	Setup 3	Setup 4	Unit	<b>^</b>			Apply project v	values	
	Language	Deutsch	Deutsch	Deutsch	Deutsch		1					
	Motor Speed Unit	RPM	RPM	RPM	RPM			-	0.1	Value		
	Regional Settings	International	International	International	International			ID	Setup			
	Operating State at Po	Forced stop, ref=old	Forced stop, ref=old	Forced stop, ref=old	Forced stop, ref=old			001	Setup 1	Deutsch		
	Active Set-up	Set-up 1	Set-up 1	Set-up 1	Set-up 1							
	This Set-up Linked to	Not linked	Not linked	Not linked	Not linked							
	Display Line 1.1 Small	Speed [RPM]	Speed [RPM]	Speed [RPM]	Speed [RPM]							
	Display Line 1.2 Small	Motor current	Motor current	Motor current	Motor current					Reset selected parameter	values to default	
-	atibilities	6 8148										
rip	ition		e narameter may dener	id on the presence of a	n option, or the file is a	enerated	for ano	ther version	of the drive.			
rip			e parameter may deper	nd on the presence of a	in option, or the file is g	enerated	l for ano	ther version	of the drive.			
rip	ition		e parameter may deper	id on the presence of a	in option, or the file is g	enerated	l for ano	ther version	of the drive.			
rip	ition		e parameter may deper	nd on the presence of a	in option, or the file is g	enerated	l for ano	ther version (	of the drive.	-		
rip	ition		e parameter may depen	id on the presence of a	in option, or the file is g	enerated	l for ano	ther version (	of the drive.			
rip	ition		e parameter may deper	id on the presence of a	in option, or the file is g	enerated	l for ano	ther version	of the drive.			
rip	ition		e parameter may deper	id on the presence of a	in option, or the file is g	enerated	i for ano	ther version	of the drive.			
rip	ition		e parameter may deper	id on the presence of a	n option, or the file is g	enerated	for anot	ther version	of the drive.			
rip	ition		e parameter may deper	id on the presence of a	in option, or the file is g	enerated	i for ano	ther version i	of the drive.			
rip	ition		e parameter may deper	id on the presence of a	n option, or the file is g	enerated	for ano	ther version i	of the drive.			
rip	ition		e parameter may deper	id on the presence of a	n option, or the file is g	enerated	i for ano	ther version i	of the drive.			
rip	ition		e parameter may deper	id on the presence of a	n option, or the file is g	enerated	for ano	ther version	of the drive.			

#### Illustration 265: Example of Incompatible Parameter

To copy the shown incompatibilities into Word or Notepad, click Copy incompatibilities.

To remove the incompatible parameters, click Remove incompatibilities.

It is possible to check the content of multiple CSIV files at import. Click *Select other* in the top left corner to open a Windows folder for selecting other CSIV files.

# 10.5 SmartStart

Use SmartStart to create set-up wizards that make commissioning of the drives easier and faster. The SmartStart wizard is a series of steps ensuring accurate and efficient motor control.

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VLT<sup>®</sup> Software Customizer

Software Customizer	ıl.	¢	<b>°</b> о	e30bt909.11
SplashScreen - Preserve original No image				
LanguageChanger - Preserve originals No dictionaries		New from	blank	
InitialValues - Preserve original	- 12	Edit		
No table		Select from	library	
		Impor		
		Renam	ie	
SmartStart - Preserve original		Open Fo	lder	
No diagram		Remov	/e	
		Wipe Ori	ginal	

#### Illustration 266: SmartStart Menu in Project

NOTICE In SmartStart, it is not possible to import existing binary files (\*.sas files). First, create a wizard model. This model is converted into WDL scripting language, which is then compiled into a .sas binary file.

The SmartStart feature is based on the Model Drive Architecture® (MDA) standard by Object Management Group (OMG). MDA



Illustration 267: MDA Logo

MDA® is a set of guidelines for structuring specifications that are expressed as models.

MCT 10 Set-up Software allows OEMs to participate in the process of SAS engineering and specifying Smart Set-up behavior as model. MDA defines 4 model layers, where the wizard designer operates on layer M1.

#### VLT<sup>®</sup> Motion Control Tool MCT 10

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OMG



OBJECT MANAGEMENT GROUP

#### Illustration 268: OMG Logo

OMG<sup>®</sup> is an international non-profit technology standards consortium and is best known for standards distributed computing (COR-BA) and modeling (UML).

OMG develops standards for a wide range of technologies and industries but does not provide implementations of them.

# 10.5.1 Creating New from Blank

The SmartStart tool is organized in the following areas:

- Palette.
- Menu.
- Overview.
- Properties.
- Main/design area.

#### Procedure

1. Select *New from Blank* to open an empty project in the editor.

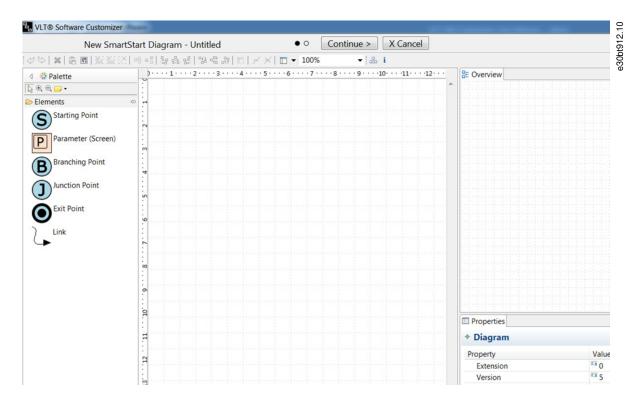


Illustration 269: Empty Project

VLT<sup>®</sup> Software Customizer

antoss

2. Create the diagram in the main/design area.

# 10.5.1.1 Palette

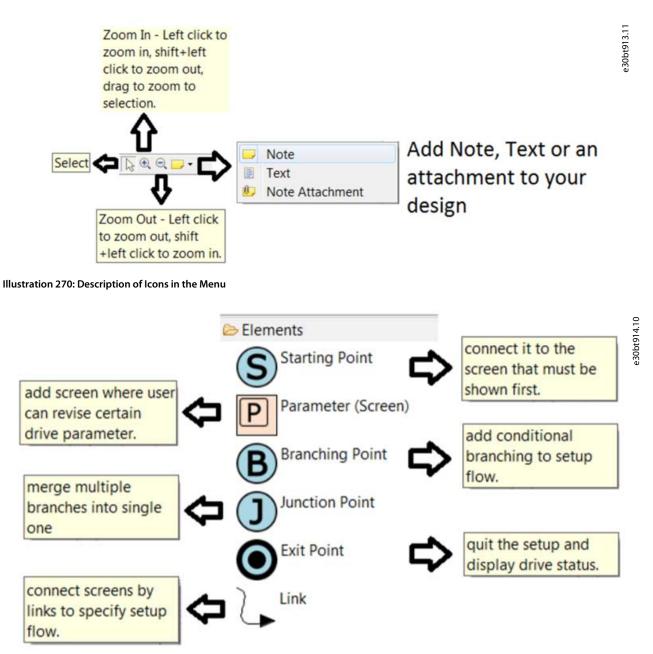


Illustration 271: Description of the Elements for Creating Diagrams

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10.5.1.2 Menu

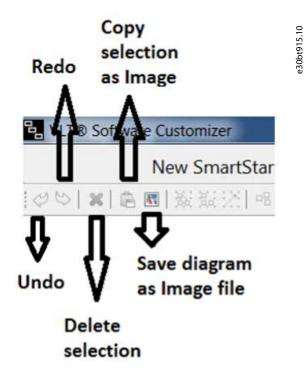


Illustration 272: Description of the Elements for Creating Diagrams

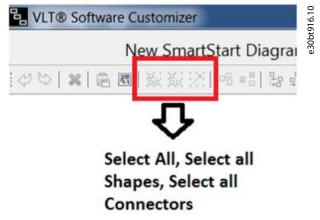


Illustration 273: Description of the Select Section in the Menu

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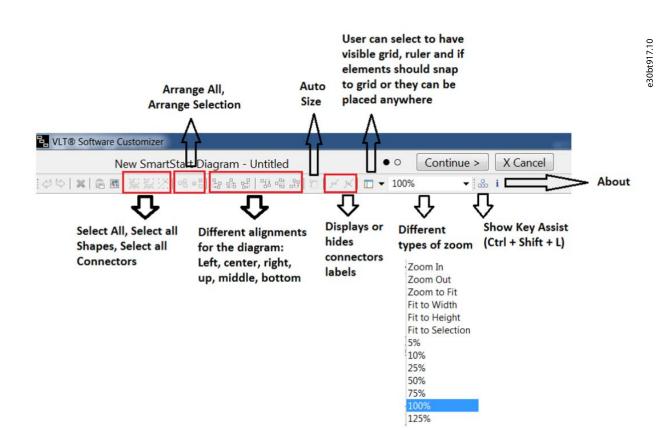


Illustration 274: Description of Icons the Menu

# 10.5.1.3 Overview

The overview section gives an overview of the diagram as it starts to grow. The overview makes it easier to navigate.

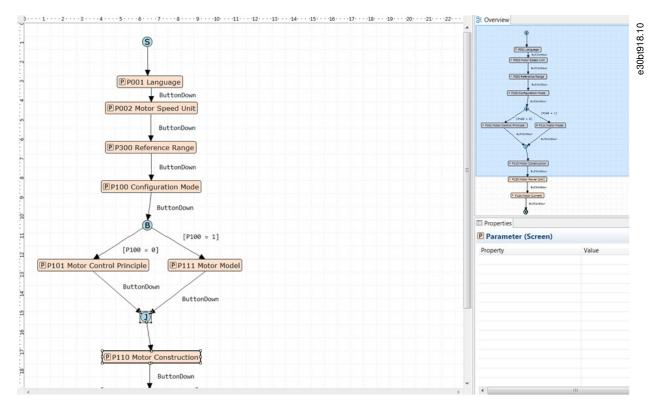


Illustration 275: Example of Diagram Shown in the Main/Design Area and in the Overview

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# 10.5.1.4 Properties

The Properties view shows the property of a selected element in a diagram.

Properties		:
P Parameter (Screen)		11 010+010
Property	Value	000
Choice List Filter	12	
Custom Name	12	
Entering	℃ Link	
Exiting	Link	
Help Text	12	
Index Filter	12	
Label Text	P001 Language	
Parameter Id	** 1	

#### Illustration 276: Example of Properties for Parameter (Screen)

Properties		
Link		
Property	Value	
Action	12	
Guard	12	
Label	*** ButtonDown	
Source	Parameter Screen	
Target	Parameter Screen	
Trigger	Auto	

#### Illustration 277: Example of Properties for Link

# 10.5.2 Create Diagram

Create a diagram in any of 3 ways:

- Drag and drop the element into the Design area.
- Select an element by clicking it and then click in the Design area where the element should be placed.
- Leave the mouse cursor for 1 s on the Design area and small elements appear. Then select the needed element.



#### Illustration 278: Elements for Creating Diagrams



It is only possible to have 1 starting point. Once a starting point is inserted in the diagram, the element is grayed out in the element list.

Jantoss

# 

# 10.5.3 Create Parameter Screen

After selecting or dropping a parameter screen into a diagram, a Create parameter screen dialog appears.

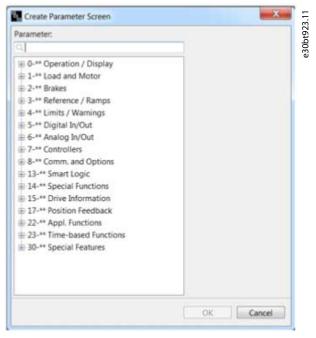
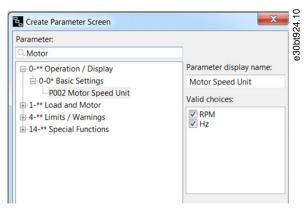


Illustration 279: Create Parameter Screen Dialog

# 10.5.3.1 Filter

Filter parameters by typing the parameter name or ID.



# Illustration 280: Example of Filtering

Filtering the 1<sup>st</sup> parameter that matches the search and the groups and subgroups where the match is available.

While creating *Parameter Screen*, it is possible to filter choice lists and index parameters available in the wizard. Make the selection from *Valid choices*.

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Parameter:	
Q lang	
-0-** Operation / Display	Parameter display name:
– 0-0* Basic Settings – P001 Language	Language
	Valid choices:
	<ul> <li>✓ English</li> <li>✓ Deutsch</li> <li>✓ Francais</li> <li>Dansk</li> <li>Español</li> <li>Italiano</li> <li>Svenska</li> <li>Nederlands</li> <li>Suomi</li> </ul>

Illustration 281: Example Showing Available Languages

For index parameters, an index filter dialog box is shown. By default, all possible indices are selected. Use "-" for a range of filters, or use "," for selecting individual indices. It is also possible to combine the selections.

🔍 compa	
-13-** Smart Logic	Parameter display name:
☐ 13-1* Comparators	Comparator Value
<ul> <li>P1310 Comparator Operand</li> <li>P1311 Comparator Operator</li> </ul>	Index filter:
P1312 Comparator Value	0-4

Illustration 282: Example of Index Parameter with Index Filter



Illustration 283: Example of Individual Selection



Illustration 284: Example of Combined Selection

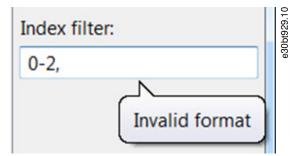


Illustration 285: Error Message when Filter is Wrong

antoss



When the filter is wrong, it is not possible to click OK until the error has been corrected.

# 10.5.3.2 Customize Parameter Display Name

Parameter names can be customized and shown in the wizard. Type the new parameter name in the field Parameter display name.

Parameter:		
Q	_	
🖶 0-** Operation / Display		Parameter display name:
0-0* Basic Settings		MyLanguage
<ul> <li>P001 Language</li> <li>P002 Motor Speed Unit</li> </ul>		Valid choices:
- P003 Regional Settings		English *

Illustration 286: Example of a Customized Parameter Name

Smart Setup	e30bt931.11
MyLanguage English	
-	

Illustration 287: Customized Parameter Name Shown in the LCP



Illustration 288: Example of Customized String Shown in the LCP

A customized name is shown in the diagram and in Properties.

PP001 Select Language of the wizard

Illustration 289: Customized Name Shown in the Diagram

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Properties		0
Parameter (Screen)		e30ht934_1
Property	Value	20h
Choice List Filter	15	ď
Custom Name	Select Language of the wizard	
Entering	Դ Link	
Exiting	└→ Link	
Help Text	This is my help text	
Index Filter	12 1	
Label Text	P001 Select Language of the wizard	
Parameter Id	<sup>14</sup> 1	

Illustration 290: Customized Name Shown in Properties

# 10.5.3.3 Help Text

It is possible to define help texts for the parameter screens. The maximum character number for a help text is 511. To show a help text, press the [Info] key on the LCP.

	Help text:
	Select the display language for the SmartStart wizard
•	OK Cancel

Illustration 291: Example of Help Text



Illustration 292: Help Text Shown in LCP After Pressing Info

# 10.5.4 Link Screens

Link between screens can be created in 2 ways:

- Select the *Link* icon from the palette.
- Use connectors to link elements.

# 10.5.4.1 Linking via the Palette Procedure

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 Drag the *Link* icon and drop it on the element to link from. Drag down to the element to link to.

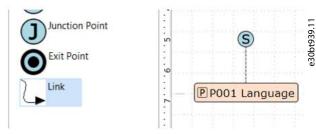
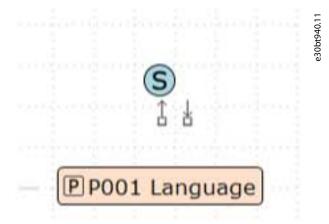


Illustration 293: Link from the Palette

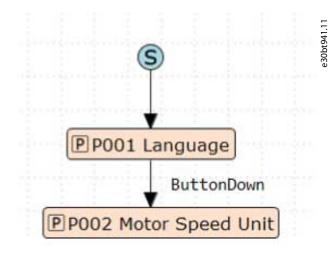
# 10.5.4.2 Linking via Connectors

#### Procedure

1. Select the elements to connect (leave the cursor over the element for connectors to appear).



2. When the connector is shown, drag and drop it on the element to connect to. When the connection is established, an arrow is shown and a label is added.



#### Illustration 294: Established Connections with Label Added

Double-clicking the link opens the link properties. Use the link properties to add action scripts.

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Link Properties × e30bt942.11 P=? Action script: P≡? ig Assistant: Insert parameter init OK Cancel

Illustration 295: Link Properties

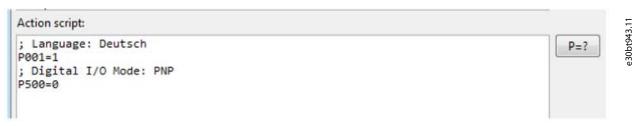
# 10.5.4.3 Action Scripts

Action scripts are for advanced users. Knowledge of the expected format is required.

Use the scripting assistant to create an action script for parameter initialization in any place where parameters are selected from a list.

Example

- Initialize parameters: P=value.
- Comments: Comments start with ";".



#### Illustration 296: Example of Action Script

The action script is added to the diagram as a label.

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# ButtonDown /; Language: Deutsch P001=1 ; Digital I/O Mode: PNP P500=0

Illustration 297: Action Script Added to Diagram as Label

# 10.5.5 Branching

Use branching for having 1 point with several options. Each point has a guard condition that must be fulfilled for that option to be selected. Click [TODO] to specify the guard condition.

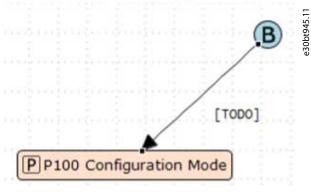


Illustration 298: Click [TODO]

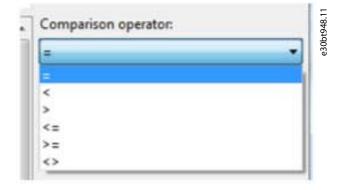
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Link Properties	×
Guard:	P=?
Action script:	P=?
	OK Cancel

Illustration 299: Window for Defining Guard Conditions

The scripting assistant for guard conditions opens a dialog. Procedure

- **1.** Select the parameter number.
- 2. Select the comparison operator.



#### 3. Select value.

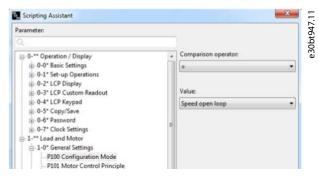


Illustration 300: Example of the Guard Scripting Assistant

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#### Example

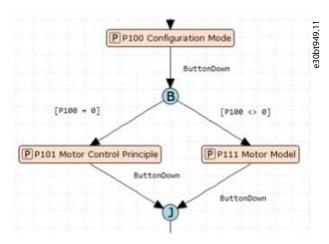


Illustration 301: Example of Branching with 2 Options

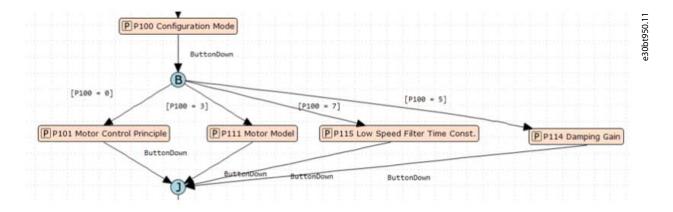


Illustration 302: Example of Branching with 4 Options

# 10.5.6 Junction

Junction is used for chaining multiple transitions. A single junction can have 1 or more incoming transitions.

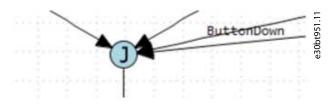


Illustration 303: Example of Junction with Several Transitions

# 10.6 Writing to Drive

ΝΟΤΙΟΕ

#### TURN OFF THE DRIVE

*Writing to drive* puts the drive in test monitor mode. This is a special mode where it is possible to write files to flash the file system. It is important to turn off the drive.

*Writing to drive* writes files from the VLT<sup>®</sup> Software Customizer. If a file is already in the drive, it is overwritten by the new file.

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# 10.6.1 Preserve Original vs. Wipe Original

*Write to drive* writes all files. If a feature does not contain any files, select either to keep the original file in the drive, or to delete it (*Wipe Original*). By default, *Preserve Original* is selected. To change this setting, select it from the menu of the given feature.



Illustration 304: Menu for SplashScreen

Changing from Preserve Original to Wipe Original issues a notification.



Illustration 305: Notification when Changing Setting

After clicking [OK], the new setting is shown in the project.



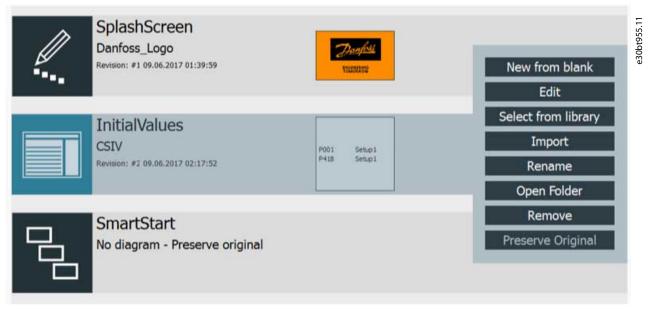
Illustration 306: New Setting Shown in Project

The settings are individual for each feature. If a feature has a file in the project, this setting is irrelevant and therefore grayed out.

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#### Illustration 307: Example of Grayed-out Setting

ΝΟΤΙΟΕ

To make back-up of files in the file system, use the Drive File System and the Drive File Manager.

# 10.6.1.1 Removing Files

#### Procedure

1. Select *Remove* from the given feature menu in the project.



Illustration 308: Removing a File

# 10.7 Testing in Simulator

Use the simulator to test created files without being connected to a real drive and a real LCP. The simulator is an app that emulates LCP behavior.

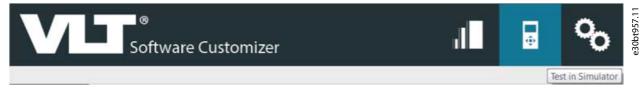


Illustration 309: Select Test in Simulator in the Top Menu

Each drive series and each software version have different simulators.

If the simulator is not available when selecting Test in Simulator, a message is shown.

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Illustration 310: Warning Message - Simulator is not Installed

If the simulator is not available, contact a local Danfoss representative who can provide a zip file.

# 10.7.1 Installing the Simulator

# Procedure

Save the zip file locally on a PC.
 Open the *Tools* menu in MCT 10 Set-up Software.
 Select *Update VLT Software Customizer support....*

Compare	
Apply Parameter View Settings Filter Parameter	
Update VLT Software Customizer support	
Update Drive support VLT5000 Conversion Wizard VLT6000 Conversion Wizard Import drive from Excel Import drive from Excel and write Manage motor db Manage Sensorless Pumps db OSS Creator Export CSV/Master Files Drive Converter Tool Soft Starter Discover and Configuration Tool SafeOption Log Viewer	•

Illustration 311: Selecting the Update VLT Software Customizer Support

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#### Example



Illustration 312: LCP Simulator

# 11 Tool Calling Interface (TCI)

## 11.1 Introduction

The TCI is an interface between the programming tool (TIA/Step 7) for the PLC and the MCT 10 Set-up Software and it supports fieldbus communication over network boundaries.

The TCI is available in the MCT 10 Set-up Software from version 4.20.

When installing the MCT 10, a program interface description (PID) file is created. This file acts as an interface between the TIA portal and MCT 10. When MCT 10 is opened via the PLC, information about the drive and the parameter database are placed in a temporary parameter (TPF) file.

Benefits

- Data is inside the programming file of the PLC.
- There is no risk of selecting the wrong MCT 10 project file.
- Exact match between the controller hardware configuration and MCT 10.
- The PLC calls MCT 10.
- Reduction of faults.

## 11.2 Installing the GSD/GSDML File

The GSD/GSDML file is required for the TCI interface to work. Danfoss provides the file.

Procedure

- 1. Unzip the file.
- **2.** Open the TIA portal.
- 3. Click the Options menu.
- 4. Click Manage.
- 5. Select the file and install it.

anage general sta	and the second	a deserve a second			>
Installed GSDs	GSDs in the p	project			
Source path: C:V	Users\u323726\De	sktop\Demol	TestProject\Additi	onalFiles\GSD	
Content of import	ed path				
File		Version	Language	Status	Info
GSDML-V2.31-Dar	nfoss-FC-201702	V2.31	English, Ger	Already installed	Danfoss FC
<			000		>
				Delete Install	Cancel

Illustration 313: Installing the GSD/GSDML File

## 11.3 Creating a Project in TIA

The following files must be installed before creating projects:

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- TIA Portal tool version 14 or higher, or Step 7 version 5.6 or higher.
- VLT<sup>®</sup> Motion Control Tool MCT 10 version 4.20 or higher.
- GSD/GSDML file provided by Danfoss.

#### Procedure

- 1. Click Create project.
- 2. Expand the project in the project tree.
- 3. Click Devices & Networks.
- 4. Click Add new device.
- 5. Select the PLC.

< <u>1</u>			
Controllers	<ul> <li>Controllers</li> <li>SIMATIC 57-1200</li> <li>SIMATIC 57-1500</li> <li>SIMATIC 57-1500</li> <li>SIMATIC 57-300</li> <li>CPU 312</li> <li>CPU 312</li> <li>CPU 312C</li> <li>CPU 313C</li> <li>CPU 313C</li> <li>CPU 313C-2 DP</li> <li>CPU 314C-2 PH</li> <li>CPU 315C 2 DP</li> <li>CPU 315C 2 DP</li> <li>CPU 314C-2 PH</li> <li>CPU 315C 2 DP</li> <li>CPU 314C-2 PH</li> <li>CPU 314C-2 PH</li> <li>CPU 315C 2 DP</li> <li>CPU</li></ul>	PROFINET into FBs/FCs): PRI port; PROFINI transport pro (MPI or DP mi configuration cycle time; ro	CPU 315-2 PN/DP 6E57 315-2EH13-0AB0 V2.6 V2.6 V256KB; 0.1ms/1000 instructions; erface; 57 communication (loadable OFINET IO controller; supports RT; 1 ETCBA; PROFINET CBA Proxy, TCP/IP procol; combined MPI/DP interface aster or DP slave); multi-tier in up to 32 modules; constant bus outing; firmware V2.6; also available odule with article number 6AG1 315 A

Illustration 314: Add New Device

## 11.4 Use Cases

## 11.4.1 Doing the Initial Connection

The PLC must be added before the initial connection can be established.

#### Procedure

- 1. Click the *Network* icon at the top left corner of the right view.
- 2. Enter *Danfoss* in the search field.

The GSD file appears.

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3. Build the drive network in the PLC via drag and drop.

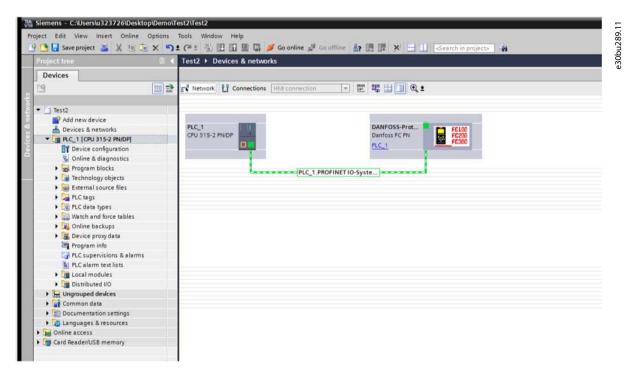


Illustration 315: Initial Connection

## 11.4.2 Configuring the TCI

The PLC must be programmed before starting the configuration. Procedure

1. Right-click the drive icon and start the device tool.

Se	lect tool or acc	ess point		e30bu290.10
•	Configure VLT Open MCT10			
Too	l for configuring D	anfoss drives		
		Start	Cano	el

Danfoss

Tool Calling Interface (TCI)

Eile Edit View Insert Communication Tools C			
Network     DP-V1     E eth     Serial     TCL_ProfiNet     Project     Deleted TIA Portal or STEP 7 drives     TIA Portal or STEP 7 drives	Bus:     TCI_ProfiNet       IP Address:     192.168.0.2       Identify drive from network       Set drive manually	Identify all drives from network Set all drives manually	
For Help, press F1	¥ [	m	

- 2. For online network: Select the network, for example TCI\_Profinet.
  - The tool scans drives which are mapped to the TCI interface. A drive appears if it is connected to the PLC.
- 3. For offline project: Identify all drives in offline mode.

 This step is applicable for creating a project with drives that are not physically connected.

 Image: Set Drive Manually

 Set Drive Manually

 Set Drive Manually

 Set Drive Target Drive

 Set Drive Manually

 Set Drive Manually

 Clear Target Drive

 Set Drive Manually

 Int: select multiple drives with Ctrl+Click or by dragging the selection

 OK

 Cancel

Once the MCT 10 parameters are configured and the tool is closed without saving the MCT 10 project, data goes to the TIA portal and is saved as a TIA project.

When opening the drive from TIA, MCT 10 opens with the saved data and appears in MCT 10.

# 12 SyncPos

## 12.1 SyncPos Handling

The VLT<sup>®</sup> 5000 and VLT<sup>®</sup> 5000 FLUX series have a SyncPos application option, which consists of a print card with a processor. For detailed information, refer to *Programmable SyncPos Motion Controller Operating Instructions*.

MCT 10 Set-up Software can directly modify, read from, and write to SyncPos files. SyncPos files are stored within the MCT 10 Set-up Software files and do not require separate handling.

When a VLT® 5000 has a SyncPos option installed, the MCT 10 Set-up Software shows 2 icons after the drive has been selected:

- An All parameters folder icon.
- A separate SyncPos icon.

Parameter group 7-\*\* Controllers is incorporated under All Parameters and applies to SyncPos.



MCT 10 Set-up Software does not fully support the SyncPos application versions 1.xx and 2.xx. The SyncPos folder is available due to the lack of functionality in these initial versions.

# 12.2 Programs and Configuration File

The SyncPos program consists of 2 main parts:

- Configuration file (\*.cnf).
- Program files (\*.m).

A configuration file consists of a series of SyncPos parameters which can be programmed. MCT 10 Set-up Software allows importing, exporting, and setting up SyncPos configuration files.

## 12.2.1 Programs

Programs can be inserted in the MCT 10 Set-up Software Project folder. When a new SyncPos program is selected, an untitled program is inserted in the SyncPos folder. The program can be edited, written, and exported as in the standalone SyncPos program. If a SyncPos program exists, it can be imported into the MCT 10 Set-up Software project.

# 12.2.2 Viewing the Configuration File

#### Procedure

- 1. Select Configuration to view the drive configuration file in the right view of the screen.
- 2. To change the SyncPos settings, select the relevant drive in the right view to open a new editor (Cam Editor).

Refer to the Programmable SyncPos Motion Controller Operating Instructions for details on using the editor.

- 3. Change the settings.
- 4. Select Compile (in Settings in the main menu) or Exit Program (in File in the main menu).
- 5. When selecting Exit Program, select Read or Write.

Ð

The Confirm SyncPos write (or read) window pops up with 2 options for saving the SyncPos card.

6. Select the wanted option and select *Yes* or *No*.

When selecting Yes, the information is written to the drive.

ΝΟΤΙΟΕ

If *Write to Drive* is selected at the root of the drive, the MCT 10 Set-up Software also writes the SyncPos files to the SyncPos options. This can lead to an unattended stop of the SyncPos card.

# 12.2.3 Importing and Exporting a Configuration File

This procedure describes how to import a configuration file to a SyncPos card. Exporting a file is done in the same way, but select *Export* instead of *Import*.

Procedure

**SyncPos** 

1. Click the configuration file shown in the right view.

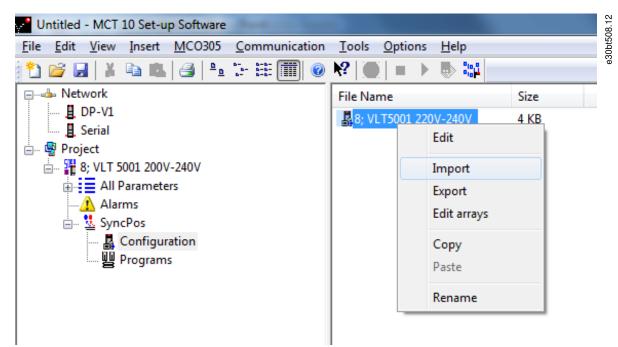
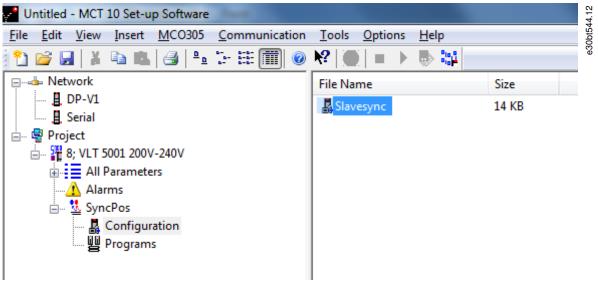


Illustration 319: Import Configuration File



#### Illustration 320: Import Configuration File

- 2. Select a configuration file for import from the computer directory.
- 3. Select the desired file and click *Open* to import the file to the Configuration folder.

## 12.2.4 Editing and Saving a Configuration File

#### Procedure

1. Select the configuration file to view and edit.

The configuration editor opens.

- 2. Make the required changes to the configuration file.
- **3.** Close the SyncPos application.

The SyncPos Application Closed dialog appears.



**Operating Guide** 



SyncPos



4. Select

- *Read* to save changes to the MCT 10 Set-up Software.
- Write to save changes to the drive.

Reading or writing can take some time.

## 12.2.5 Importing Program Files

#### Procedure

1. Click a program shown in the right view.

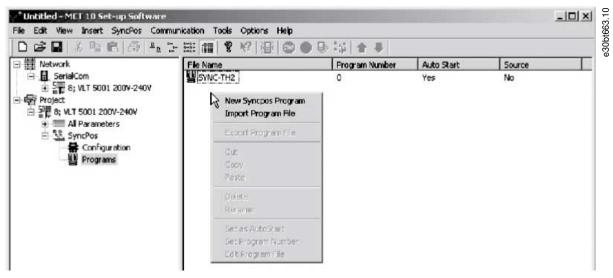


Illustration 322: Import Program to SyncPos Card

2. Browse the computer to find the program to import.

Select Syncpos i	ile				Sobrifod 12
Look in:	🔄 SyncPos		•	+ 🗈 💣 🎫	200 100 100 100
History History Desktop My Documents My Computer	변 dummy.m 변 Enc-5.m 편 marker.m 편 Move-5.m 편 slavesync.m 편 slavesync.m 편 sub1.m	43			
	File name:			•	Open
My Network P	Files of type:	Syncpos Files (*.m)		-	Cancel

#### Illustration 323: Browse

- 3. Select the wanted program.
- 4. Click Open to import the program in the Programs folder.

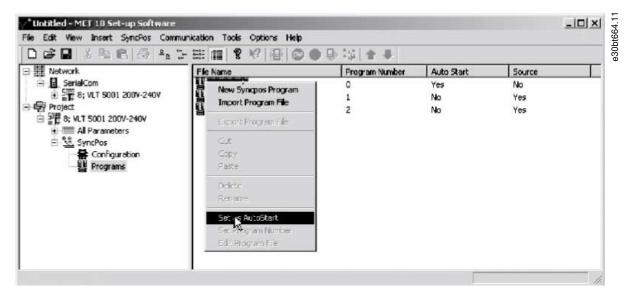
The import is now complete.

#### 12.2.6 Setting a Program to Auto Start

If more than 1 program is stored in the Programs folder, it is possible to set 1 of them to start automatically when the device is turned on.

#### Procedure

- 1. Select the start-up program in the right view of the screen.
- 2. Right-click and select Set As Auto Start.



#### Illustration 324: Auto Start



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The program selected is then indicated with Yes in the Auto Start column.

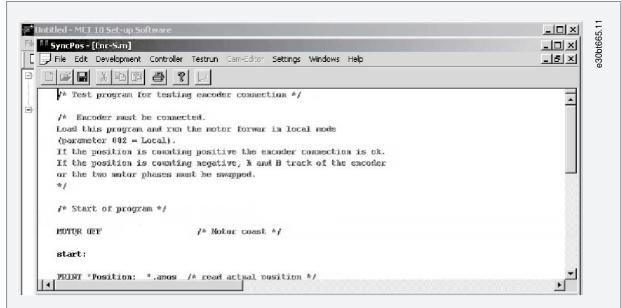
#### 12.2.7 Editing Source Code

For detailed information about the source code, refer to Programmable SyncPos Motion Controller Operating Instructions. To view or edit the source code, follow this procedure:

#### Procedure

**Operating Guide** 

1. Double-click *Program* in the right view.



#### Illustration 325: View/Edit Source Code

A range of editing operations are possible, described in detail in the Programmable SyncPos Motion Controller Operating Instructions.

#### 12.2.8 Saving and Exiting Program

When editing a configuration file, a *SyncPos Application Closed* dialog box pops up. Select *Read* or *Write* according to the instructions in the box.

ΝΟΤΙΟΕ	
NOTICE	
If there are programs in the SyncPos card, they are deleted without further warning.	
Confirm Syncpos Write	12
It may be necessary to stop the Synoposicard, and the Synopos programs on your drive(s) will be overwriten with the ones you have in your project. This may take several minutes. Do you want to continue?	e30bt546.12
L <sup>2</sup>	
I Delete Existing Programs on Drive Belove Writing	
Yes No	

#### Illustration 326: Confirm SyncPos Write

#### Procedure

1. Select *File Save* in the menu bar to save the changes to the program file opened from the MCT 10 Set-up Software project.

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SyncPos

2. Select  $File \Rightarrow Exit program$  in the menu bar to exit SyncPos.

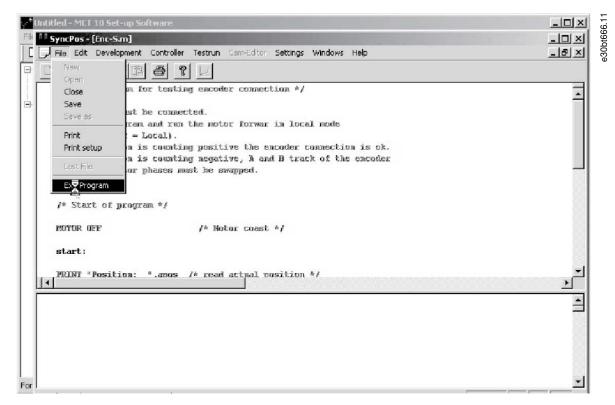


Illustration 327: Exit Program

### 12.3 SyncPos Read From Drive

Parameters and SyncPos files can be read from a drive to a project. **Procedure** 

1. Right-click the root drive.

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2. Select Read from Drive.

	<b>6666</b> 45≅≣≣	🕈 🕅 🗐 🚇 🖗 🖗	▶ \$#   <b>▲ ↓</b>	
III Network 日日 日日 「日日 「日日 「日日 「日日 「日日 「日日	T 5001 200V-240V	Drive Series Drive Type Voltage Basic SW Version Communication Option Application Option	Connected Drive Information           VLT 5000 Flux           5001           200V-240V           5.22           None           [4.21 SYNC-POS	▲ Database Information  VLT 5000  5001  200V-240V  5.22  None  4.21 SYNC-POS
	Properties	Drive Address Driver Name Region	8  SerialCom  International (50Hz)	

Illustration 328: SyncPos Read From Drive

ΝΟΤΙΟΕ	
Files in the project can be permanently lost as files of the same name are overwritten:	
Compared want to replace the sympos programs in your project with the ones read from the drive(s)? This may take several minutes. If necessary, any running Sympos programs will be stopped.	

3. Select Yes to start reading and saving the configuration files and programs from the drive to the project.

## 12.4 SyncPos Write to Drive

All parameters and SyncPos files can be written to a drive.

#### Procedure

1. Right-click the root drive.

SyncPos

2. Select Write to Drive.

Network	r			
E 30 8; VLT SOU Project 白 50 같 8: VLT 500	01 200V-240V	Drive Series	Connected Drive Information	Database Information
	w Fint Selected Folder(s)	Drive Type	5001	<b> </b> 5001
	ad from Drive	Voltage Basic SW Version	200V-240V	200V-240V
Co	mpare py Parameter View Settings	Communication Option	5.22 None 4.21 SYNC-PDS	5.22 None 4.21 SYNC-POS
	t Ipy ste		J#213110-03	pier of Nor 03
	elete ename			
Pro	operties	Drive Address	8	
		Driver Name Region	SerialCom International (50Hz)	

Illustration 330: Write to Drive

se this feature with caution. If incorrectly used, files or ears, explaining that files of the same name are overw	the drive can be permanently lost. The following warning a itten:
It may be necessary to stop the Syncpos card, and the Syncpos programs on your drive(s) will be overwritten with the ones you have in your project. This may take several minutes. Do you want continue? Write SyncPos Program Source Files to the Drive Delete Existing Programs on Drive Before Writing Yes No Ustration 331: Warning Files Overwritten	e30bt669.11

**4.** Select *Yes* to start writing.

For the above settings, the existing programs are deleted. Then the SyncPos program source files are written to the drive. Once the write is complete, check the contents of the Network folder to confirm that the write to drive was successful.

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# 13 Troubleshooting

## 13.1 Save Error Dialog

When an error dialog appears on the screen, MCT 10 Set-up Software can save the error to a text file to record the error message for later reference, for example to obtain help from support. Within the error dialog window, select *Save As* to record the error message as a text file with free choice of file name and location.

For example, when scanning the network for drives, an error dialog appears, showing the drives which are not detected.

Jerminal Drive et eddrees	1 was not found		
/arning! Drive at address /arning! Drive at address			
/arning! Drive at address			
/arning! Drive at address			
/arning! Drive at address			
/arning! Drive at address			
/arning! Drive at address			
/arning! Drive at address /arning! Drive at address			
/aming! Drive at address /aming! Drive at address			
ranning: Enric al address	To was noticulia.		
			10004
			100%
		100%	100%

#### Illustration 332: Drives not Detected

To store the error log, select Save As.

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Troubleshooting

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Save in:	I Testfolder			•	\$ E	₫ 🗐 🕶	
C.	Name	Date modif	Туре	Size			
ecent Places			This fold	er is empt	y.		
Danfoss							
Computer							
Network							
	File name:	EnorLog				•	Save
	Save as type:	Text Files (*)	- 41			-	Cancel

Illustration 333: Store Error Log

## 13.2 Common Problems and Solutions

#### 13.2.1 Changes are not Saved to PC

Check that changes made in the Network folder have been copied to the Project folder and then saved to a hard disk. Changes made in the Network folder are implemented in the field device only and are not automatically saved to a PC.

#### 13.2.2 Error Message While Installing MCT 10 Set-up Software

A message such as MCT 10 SET-UP SOFTWARE ERROR OPENING FC DRIVER may occur, if there is another PC program installed using the same COM port of the PC. Such a program could be a PLC programming tool, palm pilot driver, or cellular phone driver. Investigate whether other programs use the same COM port. If so, ensure that the other PC tool does not lock or reserve the COM port.

#### 13.2.3 Error Message Communication Failed

#### Sporadic communication errors

This type of communication error typically occurs when cables are inadequately shielded, in which case EMC noise can affect the communication. Check that the cables are installed according to the guidelines in the *operating guide* for the drive.

#### The communication error is permanent

This type of communication error is typically due to an error in network configuration. Check that the network configuration is in accordance with the drive operating guide.

#### Communication failed

The Communication failed error message appears in the status bar.

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#### Troubleshooting

Edit View Insert Communication Tools							
22   X Pa K.   21   Pa Da EE 🛲   (	0 12 0						
- Network	ID	Name	1	2	3	4	Unit
	1500	Operating hours	742	742	742	742	h
	1501	Running Hours	0	0	0	0	h
All Parameters     Operation / Display	1502	kWh Counter	0	0	0	0	kWh
	1503	Power Up's	77777777	77777777	77777777	77777777	
(•) 2-** Brakes	1504	Over Temp's	77777777	77777777	77777777	77777777	
3-** Reference / Ramps	1505	Over Volt's	77777777	7777777	77777777	77777777	
🗈 🖉 4-** Limits / Warnings	1506	Reset kWh Counter	77777777	7777777	77777777	77777777	
🐵 🖳 5-** Digital In/Out	1507	Reset Running Hours	77777777	7777777	77777777	77777777	
⊕	1510.0	Logging Source	77777777	7777777	77777777	77777777	
🗈 🗠 🔁 7-** Controllers	1510.1	Logging Source	77777777	77777777	77777777	77777777	
	1510.2	Logging Source	None	None	None	None	
	1510.3	Logging Source	None	None	None	None	
in ∴ ∴ 14-** Special Functions	1511.0	Logging Interval	00:00:00.001	00:00:00.001	00:00:00.001	00:00:00.001	
🖬 🗐 15-** Drive Information	1511.1	Logging Interval	00:00:00.001	00:00:00.001	00:00:00.001	00:00:00.001	
16-** Data Readouts	1511.2	Logging Interval	00:00:00.001	00:00:00.001	00:00:00.001	00:00:00.001	
🗈 🖷 🍎 17-** Position Feedback	1511.3	Logging Interval	00:00:00.001	00:00:00.001	00:00:00.001	00:00:00.001	
攝 18-** Data Readouts 2	1512	Trigger Event	False	False	False	False	
主 🍥 22-** Appl. Functions	1513	Logging Mode	Log always	Log always	Log always	Log always	
au and a so-** Special Features	1514	Samples Before Trigger	50	50	50	50	
	1520.0	Historic Log: Event	0	0	0	0	
	1520.1	Historic Log: Event	0	0	0	0	
🕹 Status	1520.2	Historic Log: Event	0	0	0	0	
Serial	1520.3	Historic Log: Event	0	0	0	0	
USB 1	1520.4	Historic Log: Event	0	0	0	0	
Project	1520.5	Historic Log: Event	0	0	0	0	
	1520.6	Historic Log: Event	0	0	0	0	

Illustration 334: Error Message: Communication Failed

## 13.2.4 Communication Errors

If an erroneous/illegal action has been attempted, an error highlight appears in the status bar at the bottom of the MCT 10 Set-up Software window.

When a communication error occurs, the status bar at the bottom of the MCT 10 Set-up Software window is highlighted and shows a *Communication failed* error message.

Edit View Insert Communication Tools							
22 日 本 和 本 る 単 注 注 前 ●	_						11.5
	ID	Name	1	2	3	4	Unit
- 🖓 1; FC-302 0.37kW (PK37) 200V-240V	1500	Operating hours	742	742	742	742	h
All Parameters	1501	Running Hours	0	0	0	0	h
🗄 🖉 0-** Operation / Display	1502	kWh Counter	0	0	0	0	kWh
🕕 🖷 🗐 1-** Load and Motor	1503	Power Up's	135	135	135	135	
	1504	Over Temp's	0	0	0	0	
🚁 🔁 3-** Reference / Ramps	1505	Over Volt's	0	0	0	0	
🕂 🖓 4-** Limits / Warnings	1506	Reset kWh Counter	Do not reset	Do not reset	Do not reset	Do not reset	
🖶 🕂 5-** Digital In/Out	1507	Reset Running Hours	Do not reset	Do not reset	Do not reset	Do not reset	
⊕ ↔ 6-** Analog In/Out	1510.0	Logging Source	None	None	None	None	
표··· 한 7-** Controllers	1510.1	Logging Source	None	None	None	None	
a 8- Comm. and Options	1510.2	Logging Source	None	None	None	None	
a = 13-** Smart Logic	1510.3	Logging Source	None	None	None	None	
i → 2 14-** Special Functions	1511.0	Logging Interval	00:00:00.001	00:00:00.001	00:00:00.001	00:00:00.001	
🗒 🗐 15-** Drive Information	1511.1	Logging Interval	00:00:00.001	00:00:00.001	00:00:00.001	00:00:00.001	
🛨 🖫 16-** Data Readouts	1511.2	Logging Interval	00:00:00.001	00:00:00.001	00:00:00.001	00:00:00.001	
🐵 📲 17-** Position Feedback	1511.3	Logging Interval	00:00:00.001	00:00:00.001	00:00:00.001	00:00:00.001	
⊪… 猫 18-** Data Readouts 2	1512	Trigger Event	False	False	False	False	
22-** Appl. Functions	1513	Logging Mode	Log always	Log always	Log always	Log always	
	1514	Samples Before Trigger	50	50	50	50	
A Alarms	1520.0	Historic Log: Event	3	3	3	3	
	1520.1	Historic Log: Event	0	0	0	0	
	1520.2	Historic Log: Event	0	0	0	0	
	1520.3	Historic Log: Event	0	0	0	0	
L USB 1	1520.4	Historic Log: Event	0	0	0	0	
Project	1520.5	Historic Log: Event	0	0	0	0	
· · · · · · · · · · · · · · · · · · ·	1520.6	Historic Log: Event	0	0	0	0	
	1520.7	Historic Log: Event	0	0	0	0	

Illustration 335: Error Message: Communication Failed

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Troubleshooting

When no communication error has occurred, the same window appears as:

) 😂 🖬   X 🖻 💼   🍜   🏪 🔚 🚟	11 ?	M 🗐 💿 🌒 🖗	- 編   合 ♥		
Metwork	ID	Name	Setup 1	Unit	
È,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	618	Reset kwh count	Do not reset		
□	619	Reset run, hour	Do not reset		
All Parameters	620	Operation mode	Normal operation		
🔄 🔛 Operation and display	635	Sw. part no.	195C0045		
Inputs and outputs     Special functions     Serial communication     Group 8     Group 9     Group 9     G; VLT 5001 200V-240V     FTCD 307 380V-480     All Parameters     Project					

#### Illustration 336: Communication OK

Communication errors typically occur due to inadequate shielding of cables, that is the cable is not installed in accordance with the installation instructions.

#### 13.2.5 Help

Select  $Help \Rightarrow Help$  in the main menu. A help file opens and shows the MCT 10 Set-up Software manual in .pdf format. Acrobat Reader software is required to open the manual. It can be downloaded free of charge at www.adobe.com.

#### 13.3 Safe Plug-in

This section contains common troubleshooting and descriptions of known errors.

#### 13.3.1 Troubleshooting Communication Errors

During commission, the communication between MCT 10 Set-up Software and the drive can fail. Failed communication issues an error message.

Confirm the status of the communication devices and the drive and the status of the drive to guarantee proper communication.

#### 13.3.2 Troubleshooting CRC Errors

CRC errors can occur during the write-to-drive procedure. If a CRC error occurs, try to write to the drive again. When the CRC errors persist, verify the integrity of the devices and communication.

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# 13.3.3 Warnings and Alarms

ΝΟΤΙΟΕ

The errors are listed numerically.

#### Table 33: LED Indications, Errors 1–68

Error num- ber	Descrip- tion	LED indicators							
	Internal	Reason	Action	LED1	LED2	LED4			
	failure	Reason	Action						
1	Diagnostic in pro- gress			Status of LED pends on safe tion state assi and DI2.		Green con- stant			
67	Int Fail tol- erance er- ror excee- ded: Reac- tion STO	<ul> <li>Check that data for feedback (PPR, type of feedback, and gear ratio) is entered correctly.</li> <li>Direction of feedback is wrong.</li> <li>Due to use of feedback filter the dynamic of the system does not match with dynamic of feedback filter (<i>parameter 42-15 Feedback Filter</i>). System is ramping too fast.</li> <li>Feedback signals are not received at all.</li> <li>No proper shielding of feedback cables.</li> </ul>	<ul> <li>Make a recustomization with correct data if nee- ded.</li> <li>Set <i>parameter 42-12 En- coder Direction</i> to the op- posite value.</li> <li>Decrease the ramping time on the drive.</li> <li>Try to run the system at, for example, 60 RPM. If <i>er- ror 99, Int Fail Feedback er- ror</i> occurs, this is the rea- son.</li> <li>Improve shielding of feed- back cables and motor ca- bles.</li> </ul>	- and DI2.		Red con- stant			
68	Int fail Speed lim- it SS1a Ramp: Re- action STO	<ul> <li>The value of Delta V is too small. For closed-loop sys- tem, it must often be larg- er than the recommended value.</li> <li>Due to use of feedback fil- ter the dynamic of the sys- tem does not match with dynamic of feedback filter (<i>parameter 42-15 Feedback</i> <i>Filter</i>).</li> <li>Load change takes place during ramping.</li> </ul>	<ul> <li>If running in closed loop, try to adjust PID setting and if needed increase SS1 ramping time.</li> <li>Try to increase parameter 42-15 Feedback Filter, but this might cause error 67, Int Fail tolerance error ex- ceeded: Reaction STO to occur.</li> <li>Otherwise increase pa- rameter 42-45 Delta V.</li> </ul>			Red con- stant			

Troubleshooting

#### Table 34: LED Indications, Errors 69–72

Error num- ber	Description	LED indicators						
				LED1	LED2	LED4		
	Internal fail- ure	Reason	Action					
69	Int fail Speed limit SS1b Ramp: Reac- tion STO	See 68.	See 68.	Status of LED 1 and LED 2 depends on safety sub-function state as- signed to DI1 and DI2.		Red con- stant		
70	Int fail speed limit SLSa: Reaction STO	<ul> <li>Happens during ramping to SLS limit, see 68.</li> <li>Happens during speed below SLS limit:</li> <li>If speed is above cut-off speed at activation point and parameter 42-53 Start Ramp is set to No, this error occurs.</li> <li>Noise on the feed- back signal (incl. quantization noise) is larger than expected.</li> <li>Load change takes place, do as in above point.</li> </ul>	<ul> <li>Change parameter 42-53 Start Ramp to Yes and set parameter 42-54 Ramp Down Time ac- cordingly.</li> <li>Increase parameter 42-50 Cut Off Speed or de- crease parameter 42-51 Speed Limit to get a larg- er tolerance.</li> </ul>			Red con- stant		
71	Int fail speed limit SLSb: Reaction STO	See 70.	See 70.			Red con- stant		
72	Internal fail- ure MCB 150/151		<ul> <li>First, power cycle the drive or restart the safe-ty option via <i>parameter</i> 42-90 Restart Safe Option. Second, try to make a general reset of the safe-ty option with the Administration button (safety option goes back to blank initial state).</li> <li>If the problem persists, contact Danfoss.</li> </ul>			Red con- stant		



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#### Table 35: LED Indications, Errors 73–77

Error num- ber	Description	LED indicators				
				LED1	LED2	LED4
	Internal failure	Reason	Action			
73	Internal fail- ure MCB 150/151		<ul> <li>First, power cycle the drive or restart the safety option via parameter 42-90 Restart Safe Option.</li> <li>If the problem persists, con- tact Danfoss.</li> </ul>	Status of LED 1 a pends on safety state assigned to	sub-function	Red con- stant
74	Internal fail- ure MCB 150/151		<ul> <li>First, power cycle the drive or restart the safety option via parameter 42-90 Restart Safe Option.</li> <li>If the problem persists, con- tact Danfoss.</li> </ul>			Red con- stant
75	Int Fail DI2 in PUST: Re- action STO	<ul> <li>Safety input connected to DI2 has illegal signal level.</li> <li>Sensor is broken.</li> </ul>	<ul> <li>Check that the configuration of Dl2 parameter 42-21 Type is set correctly or that the con- nected sensor is installed ac- cording to specification.</li> <li>Extend discrepancy time on the safe input tab in the MCT 10 Safe Plug-in via parameter 14-22 Operation Mode.</li> </ul>			Red con- stant
76	Int Fail DI1 in PUST: Re- action STO	<ul> <li>Safety input connected to DI1 has illegal signal level.</li> <li>Sensor is broken.</li> </ul>	<ul> <li>Check that the configuration of DI1 <i>parameter 42-21 Type</i>, sub-index [0], is set correctly or that the connected sensor is installed according to specifi- cation.</li> <li>Extend discrepancy time on the safe input tab in the MCT 10 Safe Plug-in via <i>parameter</i> <i>14-22 Operation Mode</i>.</li> </ul>			Red con- stant
77	Int Fail fail- safe data CRC mis- match: Re- action STO	The CRC of the safety option does not match the stored CRC value on the drive.	Configure the safety option with MCT 10 Safe Plug-in or by CRC se- lect/LCP copy.			Red con- stant

Troubleshooting

#### Table 36: LED Indications, Errors 78–85

Error num- ber	Descrip- tion								
				LED1	LED2	LED4			
	Internal failure	Rea- son	Action						
78	Internal failure safe- ty option		<ul> <li>First, power cycle the drive or restart the safety option via <i>parameter</i> <i>42-90 Restart Safe Option</i>.</li> <li>If the problem persists, contact Dan- foss.</li> </ul>	Status of LED 1 and LED 2 depends on safe- ty sub-function state assigned to DI1 and DI2.		Red con- stant			
79	Internal failure safe- ty option		Contact Danfoss.			Red con- stant			
80	Internal failure safe- ty option		Contact Danfoss.			Red con- stant			
81	Internal failure safe- ty option		<ul> <li>First, power cycle the drive.</li> <li>If the problem persists, contact Danfoss.</li> </ul>			Red con- stant			
82	Internal failure safe- ty option		<ul> <li>First, power cycle the drive.</li> <li>If the problem persists, contact Danfoss.</li> </ul>			Red con- stant			
83	Internal failure safe- ty option		<ul> <li>First, power cycle the drive.</li> <li>If the problem persists, contact Danfoss.</li> </ul>			Red con- stant			
84	Internal failure safe- ty option		<ul> <li>First, power cycle the drive.</li> <li>If the problem persists, contact Danfoss.</li> </ul>			Red con- stant			
85	Internal failure safe- ty option		<ul> <li>First, power cycle the drive.</li> <li>If the problem persists, contact Danfoss.</li> </ul>			Red con- stant			



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#### Table 37: LED Indications, Errors 86–93

Error num- ber	Descrip- tion	rip- LED indicators							
		LED1 LED2				LED4			
	Internal failure	Rea- son	Action						
86	Internal failure safety op- tion		<ul> <li>First, power cycle the drive.</li> <li>If the problem persists, contact Danfoss.</li> </ul>	Status of LED 1 and safety sub-function DI1 and DI2.		Red con- stant			
87	Internal failure safety op- tion		<ul> <li>First, power cycle the drive.</li> <li>If the problem persists, contact Danfoss.</li> </ul>	-		Red con- stant			
88	Internal failure safety op- tion		<ul> <li>First, power cycle the drive.</li> <li>If the problem persists, contact Danfoss.</li> </ul>	-		Red con- stant			
89	Internal failure safety op- tion		<ul> <li>Perform a general reset of the safety option with the <i>Administration</i> button.</li> <li>If the problem persists, contact Danfoss.</li> </ul>	-		Red con- stant			
90	Internal failure safety op- tion		<ul> <li>Perform a general reset of the safety option with the <i>Administration</i> button.</li> <li>If the problem persists, contact Danfoss.</li> </ul>	-		Red con- stant			
91	Internal failure safety op- tion		<ul> <li>First, power cycle the drive.</li> <li>If the problem persists, contact Danfoss.</li> </ul>	-		Red con- stant			
92	Internal failure safety op- tion		<ul> <li>First, power cycle the drive.</li> <li>If the problem persists, contact Danfoss.</li> </ul>			Red con- stant			
93	Internal failure safety op- tion		<ul> <li>First, power cycle the drive.</li> <li>If the problem persists, contact Danfoss.</li> </ul>			Red con- stant			

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#### Table 38: LED Indications, Errors 94–102

Error num- ber	Descrip- tion								
				LED1	LED2	LED4			
	Internal failure	Reason	Action						
94	Internal failure safe- ty option		<ul> <li>First, power cycle the drive.</li> <li>If the problem persists, contact Danfoss.</li> </ul>	Status of LED 1 and safety sub-function DI1 and DI2.	Red con- stant				
95	Internal failure safe- ty option		<ul> <li>First, power cycle the drive.</li> <li>If the problem persists, contact Danfoss.</li> </ul>			Red con- stant			
96	Internal failure safe- ty option		<ul> <li>First, power cycle the drive.</li> <li>If the problem persists, contact Danfoss.</li> </ul>			Red con- stant			
97	Internal failure safe- ty option		Contact Danfoss.	-		Red con- stant			
98	Int fail inva- lid custom- er file ver- sion	Version of customi- zation file of safety option stored in EE- PROM does not match the customi- zation file suppor- ted by the SW ver- sion of safety op- tion.	Do a new configuration with MCT 10 Safe Plug-in, which supports the SW version of safety option.						
99	Int Fail Feedback error	The connected feedback source does not give any signal.	Check that the connection is done according to the specifi- cation or if the feedback source is broken.	-		Red			
102	Int Fail Speed Lim- it SMS: Re- action STO	<ul> <li>Speed is above cut-off speed.</li> <li>Noise on the feedback signal (incl. quantiza- tion noise) is larger than ex- pected.</li> </ul>	Check the value of <i>parameter</i> 42-71 Cut Off Speed.			Red con- stant			



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#### Table 39: LED Indications, Errors 113–135

Error num- ber	Description	LED indicators				
				LED1	LED2	LED4
	Internal fail- ure	Reason	Action			
113	Ext Fail DI1: Reaction STO	<ul> <li>Safety input connected to Dl1 has illegal signal level.</li> <li>Sensor is broken.</li> </ul>	• Check that config- uration of Dl1 <i>pa- rameter 42-21 Type</i> is set correctly or the connected sensor is installed according to the specification.	Red constant	Status depends on safety sub- function state assigned to DI2.	Red flash- ing, cycle (on 500 ms, off 500 ms)
114	Ext Fail DI2: Reaction STO	<ul> <li>Safety input connected to DI2 has illegal signal level.</li> <li>Sensor is broken.</li> </ul>	<ul> <li>Check that configuration of Dl2 parameter 42-21 Type is set correctly or the connected sensor is installed according to the specification.</li> <li>Extend discrepancy time on safe input tab in MCT 10 Safe Plug-in parameter 14-22 Operation Mode.</li> </ul>	Status depends on safety sub- function state assigned to DI1.	Red constant.	Red flash- ing, cycle (on 500 ms, off 500 ms)
115	Ext Fail Prec Thresh Timer Elapsed: Re- action STO	The drive has been run- ning below 120 RPM for more than the time en- tered in <i>parameter 42-18</i> <i>Zero Speed Timer</i> with safe function SLS active.	Increase speed to above 120 RPM.	Status of LED 1 an on safety sub-fun signed to DI1 and		Red flash- ing, cycle (on 500 ms, off 500 ms)
116	Ext Fail SF ac- tivation Speed Sus- pension: Re- action STO	The drive has been run- ning below 120 RPM for more that 1 year and a safety sub-function that needs speed feedback is activated.	Increase speed to above 120 RPM.			Red flash- ing, cycle (on 500 ms, off 500 ms)
134	Int fail speed limit SLSa: Re- action SS1a	See 70.	See 70.			Red con- stant
135	Int fail speed limit SLSb: Reaction SS1a	See 70.	See 70.			Red con- stant



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#### Table 40: LED Indications, Errors 177–252

Error num- ber	Description	LED indi	cators			
				LED1	LED2	LED4
	Internal failure	Reason	Action		1	
177	Ext Fail DI1: Reaction SS1a	See 113.	See 113.	Red constant.	Status depends on safety sub-function state assigned to DI2.	Red flashing, cy- cle (on 500 ms, off 500 ms)
178	Ext Fail DI2: Reaction SS1a	See 114.	See 114.	Status depends on safety sub-function state assigned to DI1.	Red constant.	Red flashing, cy- cle (on 500 ms, off 500 ms)
179	Ext Fail Prec Thresh Timer Elapsed: Reac- tion SS1a	See 115.	See 115.	Status of LED 1 and LED sub-function state assign	Red flashing, cy- cle (on 500 ms, off 500 ms)	
180	Ext Fail SF activation Speed Suspension: Reaction SS1a	See 116.	See 116.			Red flashing, cy- cle (on 500 ms, off 500 ms)
198	Int fail speed limit SLSa: Reaction SS1b	See 70.	See 70.	_		Red constant
199	Int fail speed limit SLSb: Reaction SS1b	See 70.	See 70.	_		Red constant
241	Ext Fail DI1: Reaction SS1b	See 113.	See 113.	Red constant.	Status depends on safety sub-function state assigned to DI2.	Red flashing, cy- cle (on 500 ms, off 500 ms)
242	Ext Fail DI2: Reaction SS1b	See 114.	See 114.	Status depends on safety sub-function state assigned to DI1.	Red constant.	Red flashing, cy- cle (on 500 ms, off 500 ms)
243	Ext Fail Prec Thresh Timer Elapsed: Reac- tion SS1b	See 115.	See 115.			Red flashing, cy- cle (on 500 ms, off 500 ms)
244	Ext Fail SF activation Speed Suspension: Reaction SS1b	See 116.	See 116.			Red flashing, cy- cle (on 500 ms, off 500 ms)
252	Internal failure safety option		Power cy- cle the drive. If the prob- lem per- sists, con- tact Dan- foss.			

# 13.3.3.1 Safety Option Warning

A warning message notifies that an issue exists on the safety option. It is not handled as an internal or external failure. These messages are defined to indicate that a manual user action is required.



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At any possible failure or warning indicated from the safety option, the LCP shows warning, !Safe Option Failure [W252] at the least.

## 13.3.3.2 Safety Option Reset Message

For some messages, the safety option requires an acknowledgement of an ongoing action or failure on the safety option. The safety option uses *Safe Option RESET* as a *Restart and Failure Acknowledgement*.

#### Table 41: LCP Reset Messages

LCP message	Description
Status (1) 0 RPM None 0.00 KW SO Reset required! ISafe Stop [W68] Off Remote SO Req.RESET	<ul> <li>In the following cases, the safety option requests a restart and failure acknowledgement signal:</li> <li>The safety option is in safety sub-function pending-state (remark: Occurs only if reset behavior is set/configured to <i>Manual</i>).</li> <li>After a power cycle with a safety sub-function.</li> <li>In PUST (power up self-test), if an external failure occurred before power cycle.</li> <li>When an external failure occurred.</li> <li>When customization was aborted or completed.</li> <li>At the reception of a general reset (required after blank initial state or in the customization state).</li> </ul>
Status (1(1)) 0 RPM None 0.00KW SOin Self-test Safe Stop [W68] Off Remote SO Req.RESET	<ul> <li>The safety option indicates that it is in PUST State (power up self-test).</li> <li>Ensure that no safe function is active after a power cycle.</li> </ul>
Status 0 RPM None 0.00KW SOin Self-test Safe Stop [W68] Off Remote SO Req.RESET	A safety sub-function is pending at the start-up, if the drive was powered down while a safety function was active. It is also pending, when the drive was powered down while the safety option has detected a failure during an active safety sub-function.
Status (1(1)) O RPM None 0.00 KW SafeOpt. initialised ISafe Stop [W68] Off Remote SO Req.RESET	The safety option requests a Restart and Failure Acknowledge signal, which is always required after a PUST and when a safety sub-function gets released and is configured to be confirmed that the motor is able to run.

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LCP message	Description
Status (11(1)) 0 RPM None 0.00KW SO General Reset ISate Stop [W68] Off Remote SO Req.RESET	Occurs only if general reset is performed from MCT 10. It is an indication to the user. The safety option is set to blank initial state and safe parameters are set to default.
Status (11(1)) 0 RPM None 0.00KW SO Suspend-SpeedMon ISafe Stop [W68] Off Remote SO Req.RESET	Zero speed timer contains the remaining time until the fail prec thresh timer elapsed after the monitoring time expires. The safety option signals Warning.
Status (111) 0 RPM None 0.00KW SO Warning PUST Safe Stop [W68] Off Remote SO Req.RESET	PUST warning has occurred. Warning cause: Expiry of PUST timer. Memory test required, per- form power cycle.
Status (1) 0 RPM None 0.00 KW SO Warning DI1 Safe Stop [W68] Off Remote SO Req.RESET	DI1 offline warning has occurred. Warning cause: Expiry of offline timer for DI1.
Status 0 RPM None 0.00KW SO Warning DI2 Safe Stop [W68] Off Remote SO Req.RESET	DI2 offline warning has occurred. Warning cause: Expiry of offline timer for DI2.
Status (1(1)) 0 RPM None 0.00KW SO Suspend-SpeedMon ISte Stop [W68] Off Remote SO Req.RESET	Speed monitoring suspension warning has occurred. Warning cause: Suspension of speed monitoring for a certain duration.

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