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1

1 Safety Precautions

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With this software package you can remote-control the frequency converter, thereby starting an electric motor which may act as a drive for dangerous machinery.
Therefore the necessary caution must always be observed when using the software, and suitable measures should be taken to prevent injury and damage to machinery and equipment.

1

1.2 Safety Precautions



The voltage of the frequency converter is dangerous whenever connected to mains. Incorrect installation of the motor, frequency converter or fieldbus may cause damage to the equipment, serious personal injury or death. Consequently, the instructions in this manual, as well as national and local rules and safety regulations, must be complied with.

Safety Regulations

1. The mains supply to the frequency converter must be disconnected whenever repair work is to be carried out. Check that the mains supply has been disconnected and that the necessary time has elapsed before removing motor and mains supply plugs.
2. The [OFF] button on the control panel of the frequency converterr does not disconnect the mains supply and consequently it must not be used as a safety switch.
3. The equipment must be properly earthed, the user must be protected against supply voltage and the motor must be protected against overload in accordance with applicable national and local regulations.
4. The earth leakage current exceeds 3.5 mA.
5. Protection against motor overload is not included in the factory setting. If this function is desired, set par. 1-90 *Motor Thermal Protection* to data value ETR trip 1 [4] or data value ETR warning 1 [3].
6. Do not remove the plugs for the motor and mains supply while the frequency converter is connected to mains. Check that the mains supply has been disconnected and that the necessary time has elapsed before removing motor and mains plugs.
7. Please note that the frequency converter has more voltage sources than L1, L2 and L3, when load sharing (linking of DC intermediate circuit) or external 24 V DC are installed. Check that all voltage sources have been disconnected and that the necessary time has elapsed before commencing repair work.

Warning against unintended start

1. The motor can be brought to a stop by means of digital commands, bus commands, references or a local stop, while the frequency converter is connected to mains. If personal safety considerations (e.g. risk of personal injury caused by contact with moving machine parts following an unintentional start) make it necessary to ensure that no unintended start occurs, these stop functions are not sufficient. In such cases the mains supply must be disconnected or the *Safe Stop* function must be activated.
2. The motor may start while setting the parameters. If this means that personal safety may be compromised (e.g. personal injury caused by contact with moving machine parts), motor starting must be prevented, for instance by use of the *Safe Stop* function or secure disconnection of the motor connection.
3. A motor that has been stopped with the mains supply connected, may start if faults occur in the electronics of the frequency converter, through temporary overload or if a fault in the power supply grid or motor connection is remedied. If unintended start must be prevented for personal safety reasons (e.g. risk of injury caused by contact with moving machine parts), the normal stop functions of the frequency converter are not sufficient. In such cases the mains supply must be disconnected or the *Safe Stop* function must be activated.



NB!
When using the *Safe Stop* function, always follow the instructions in the *Safe Stop* section of the Design Guide.

4. Control signals from, or internally within, the frequency converter may in rare cases be activated in error, be delayed or fail to occur entirely. When used in situations where safety is critical, e.g. when controlling the electromagnetic brake function of a hoist application, these control signals must not be relied on exclusively.



Touching the electrical parts may be fatal - even after the equipment has been disconnected from mains.

Also make sure that other voltage inputs have been disconnected, such as external 24 V DC, load sharing (linkage of DC intermediate circuit), as well as the motor connection for kinetic back up.

Systems where frequency converters are installed must, if necessary, be equipped with additional monitoring and protective devices according to the valid safety regulations, e.g law on mechanical tools, regulations for the prevention of accidents etc. Modifications on the frequency converters by means of the operating software are allowed.

Hoisting applications:
The frequency converter functions for controlling mechanical brakes cannot be considered as a primary safety circuit. There must always be a redundancy for controlling external brakes.

Protection Mode
Once a hardware limit on motor current or dc-link voltage is exceeded the drive will enter "Protection mode". "Protection mode" means a change of the PWM modulation strategy and a low switching frequency to minimize losses. This continues 10 sec after the last fault and increases the reliability and the robustness of the drive while re-establishing full control of the motor.
In hoist applications "Protection mode" is not usable because the drive will usually not be able to leave this mode again and therefore it will extend the time before activating the brake – which is not recommendable.
The "Protection mode" can be disabled by setting par. 14-26 *Trip Delay at Inverter Fault* to zero which means that the drive will trip immediately if one of the hardware limits is exceeded.



NB!
It is recommended to disable protection mode in hoisting applications (par. 14-26 *Trip Delay at Inverter Fault* = 0)



The DC link capacitors remain charged after power has been disconnected. To avoid electrical shock hazard, disconnect the frequency converter from mains before carrying out maintenance. When using a PM-motor, make sure it is disconnected. Before doing service on the frequency converter wait at least the amount of time indicated below:

Voltage	Power	Waiting Time
380 - 500 V	0.25 - 7.5 kW	4 minutes
	11 - 75 kW	15 minutes
	90 - 200 kW	20 minutes
	250 - 800 kW	40 minutes
525 - 690 V	37 - 315 kW	20 minutes
	355 - 1000 kW	30 minutes

For further information, please see *http://www.danfoss.com/BusinessAreas/DrivesSolutions/Documentations/Technical+Documentation.htm*

1.2.1 Connectivity



NB!
It is recommended not to use a PC power cable with a ground plug when the PC is connected to the frequency converter trough USB.

2

MG.10.R5.02 - VLT® is a registred Danfoss trademark

2 Introduction

2.1 About this Manual

This manual provides the user with the basic knowledge required to use the MCT 10 Set-up Software with Danfoss Drives VLT frequency converters. Familiarity with the following is assumed:

- MS®-Windows™ at user level
- Set-up and operation of frequency converters, including knowledge of processes of which the drives forms part
- 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 frequency converter. Instead, please refer to the Operating Instructions and Design Guide of the frequency converter. An update of the manual and instructions related to the MCT 10 Set-up Software are available on the Danfoss Drives Homepage:
http://drives.danfoss.com

2.2 What is MCT 10 Set-up Software?

MCT 10 Set-up Software is designed as an interactive commissioning tool for quick and easy commissioning. The MCT 10 Set-up Software can be used as follows:

- For planning a new communication network off-line. The MCT 10 Set-up Software contains a complete database with all Danfoss Drives products.
- For commissioning frequency converters online.
- If a frequency converter requires replacement.
- If a communication network is to be expanded with more frequency converters.
- For back-up of all parameter settings of frequency converters in a communication network.
- The MCT 10 Set-up Software supports Profibus DP-V1 communication via a Master class 2 connection, which makes it possible to go online on a Profibus network and read from/write to parameters. This will eliminate the need for an extra communication network.
- The MCT 10 Set-up Software supports VLT 2800, VLT 4000, VLT 5000, VLT 6000, VLT 8000, FCD 300, FC 100, FC 200, FC 300 and FCM 300 series frequency converters from Danfoss Drives.

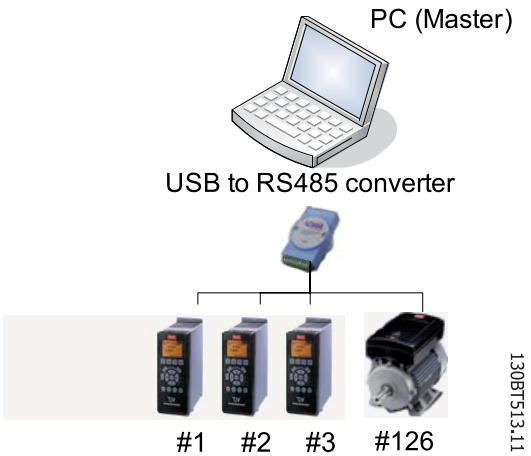


Illustration 2.1: With for example an Advantech ADAM 4510 repeater you can connect up to 126 nodes. Without a repeater you can connect up to 31 nodes.

With the MCT 10 Set-up Software PC software tool you can control and configure your system simultaneously, and monitor the entire system more effectively for faster diagnosis, and better preventive maintenance. Simplify commissioning, maintenance and documentation using MCT 10 Set-up Software.

2.2.1 Features of MCT 10 Set-up Software

- Project-oriented PC tool, one tool for all series
- Links to all Windows applications possible
- Supports Siemens CP PCMCIA- and PCI cards, for Profibus DP-V1 Master Class 2 connection
- Support of standard interfaces: COMx, USB, RS 232 (Flux)
- Siemens PG / Field PGs already have the necessary hardware
- View is highly individually configurable
- Downwards compatibility with Dos-Dialog (*.mnu) and WinDialog (*.vlt)

2.2.2 Help

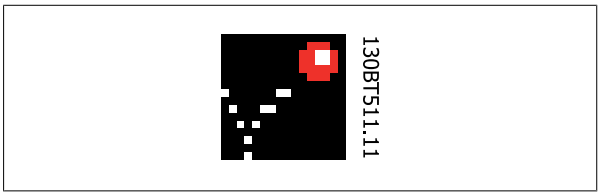
The Help feature is located in the main menu, at the far right. Select Help from the main menu, then Help again, and a Help file will be opened, displaying the MCT 10 Set-up Software manual in .pdf format. To open the Help file you will require Acrobat Reader software. If you do not have this software installed, it can be downloaded free of charge at www.adobe.com.

2.3 The MCT 10 Set-up Software Modules

The MCT 10 Set-up Software is supplied in two modules:

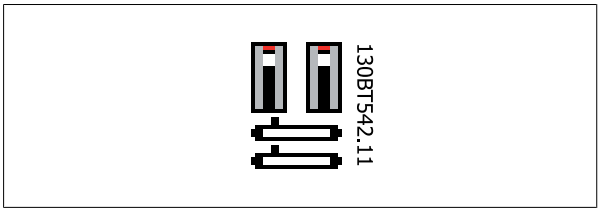
MCT 10 Set-up Software for

- setting of the frequency converter parameters
- copying of parameter sets to and from a frequency converter
- documentation/print-out of set-up, including diagrams
- servicing and fault analysis



APoss program for

- creating APoss programs.



2.4 Two Versions

MCT 10 Set-up Software is available in two versions: Basic and Advanced.

MCT 10 Set-up Software Basic is available free of charge, downloadable from http://www.vlt-software.com.
MCT 10 Set-up Software Advanced can be purchased under the order-number 130B1000.

The features of each version are listed in the table below.

Version supports:	**MCT 10 Set-up SoftwareAdvanced**	**MCT 10 Set-up Software Basic**
Frequency converters per project	Unlimited	Four
FC protocol	Yes	Yes
USB	Yes	Yes
Profibus DP-V1	Yes	Yes
Profibus DP-V1 Handling Multiple Danfoss Nodes Concurrently	Yes (improved performance)	N/A
Ethernet-TSC	Yes	N/A
Logging and Scope function	8 Channels	2 Channels
Real Time Logging from Drive	4 Channels	N/A
Alarm display	Yes	View only
MCO 305	Yes	Yes
Graphical Smart Logic Contr.	Yes	Yes
VLT5000 to FC 302 Conversion Wizard	Yes	Yes
FC to FC Conversion Wizard		
Import 3000.XLS to FC 302	Yes	N/A
Motor Database	Yes	N/A
Extended Cascade Controller	Yes	No

2.5 System Requirements

In order to use the MCT 10 Set-up Software, your IBM-compatible personal computer must meet the following minimum system requirements:

- a Pentium PIII 350Mhz or compatible microprocessor
- 256 MB of RAM (512 MB of RAM Recommended)
- a CD-ROM drive
- 200 MB of available space on the hard drive;

Recommended system:

- a Pentium PIII 450Mhz microprocessor
- 256 MB of RAM (512 MB of RAM Recommended)
- a CD-ROM drive
- 200 MB of available space on the hard drive;

MCT 10 Set-up Software runs under MS Windows versions:
Windows™ 2000 (with service pack 3 or higher)
Windows™ XP (Professional when using Siemens Profibus CP Cards).

2.6 Background Knowledge

2

Familiarity with the PC or PLC you intend to use as a master in your 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.

If you have questions regarding set-up of master-to-master communication, or communication to a non-Danfoss slave, please consult the appropriate manuals.

2.7 Related Literature

The following literature related to MCT 10 Set-up Software is available.

Title	Literature no.
SyncPos manual	MN50V102
Profibus DP-V1	MG90E102
Design Guide for the relevant frequency converter(s)	-

Please also refer to drives.danfoss.com for frequently asked questions and additional information.

3 Installation and De-installation

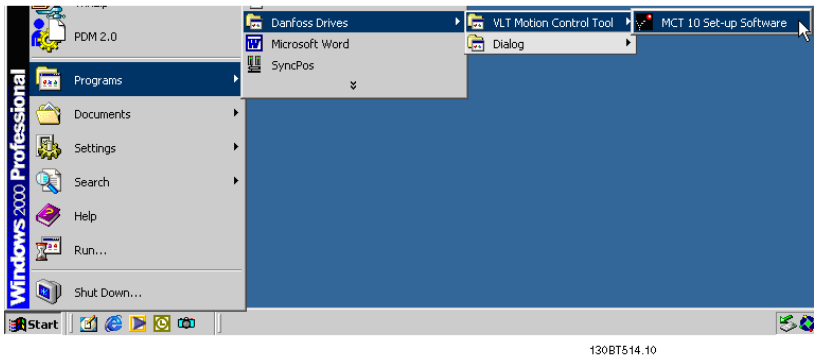
3.1 Installation and De-installation

The MCT 10 Set-up Software and SyncPos modules are installed by means of a multilingual, self-explanatory installation program.

3.1.1 How to Start the Installation Program

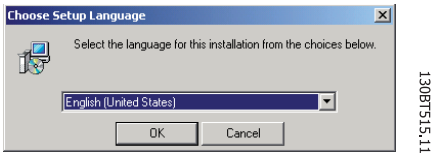
1. Choose the sub-menu Run from File in Windows programming control.
2. In the command line you enter: [DRIVELETTER]:\SETUP and press the <Return> key.
3. Then you just follow the instructions of the installation program.

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



3.1.2 How to Change Language after Installation

During installation, select the language version required in the installation program. After installation, programs will start with the same language version.
After installation you can change the menu texts of the programs to different languages.



NB!
The parameter language will also be changed. If an LCP display is connected to the frequency converter, the change of program language version does not affect the display language.

3.1.3 De-installation of MCT 10 Set-up Software under a Windows® Operating System

1. Click the Start button
2. Select Settings
3. Select Control Panel
4. Double-click on Remove/Add Programs icon
5. Select MCT 10 Set-up Software
6. Choose the Remove option

4 Introduction to User Interface

4.1 MCT 10 Set-up Software Features

4.1.1 MS® Windows™ Explorer-like Interface

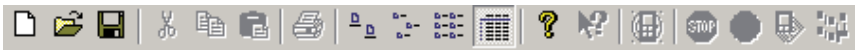
MCT 10 Set-up Software has a familiar MS® Windows™ Explorer-like interface, to make it quick and easy for you to get started and find your way around the software.

4.1.2 MCT 10 Set-up Software Language

The default language for the MCT 10 Set-up Software is English. If desired, you can change the language of operation as follows.
Select the language you wish MCT 10 Set-up Software to be displayed in, by selecting Options from the main menu, then Select Language…. Choose the desired language from the scrollbar and close the window. The new language setting will be activated when MCT 10 Set-up Software is closed and restarted.

4.1.3 Toolbar

A toolbar displays icons for the most commonly used functions.



130BT712.10

The toolbar can be activated by selecting *Toolbar* under *View* from the main menu bar, whereupon the Toolbar will be marked with a tick to show it is active. To deactivate the Toolbar, again select *View* and then *Toolbar*, and after this the tick will be removed, indicating that the toolbar is no longer active.

4.1.4 Display

The MCT 10 Set-up Software is displayed in two parts, Left View and Right View.

4.1.5 Left View

The Left View shows the Network (real, online) and Project (simulated, offline) views of the frequency converter network. In the Left View new folders and network elements can be added or existing folders and elements deleted.

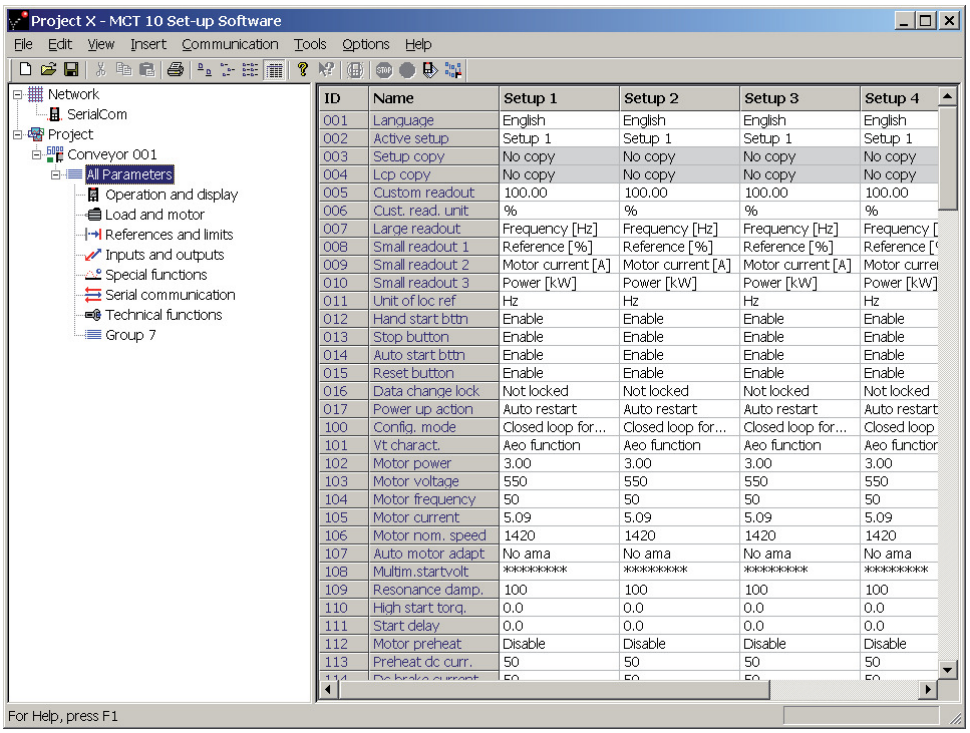
It is also in the Left View that the user records changes made to the real online set-up into the Project folder, thus storing the changes in the simulated, offline set-up for later use.

For more information on saving data, please refer to the chapter *Saving Data*.

4

4.1.6 Right View

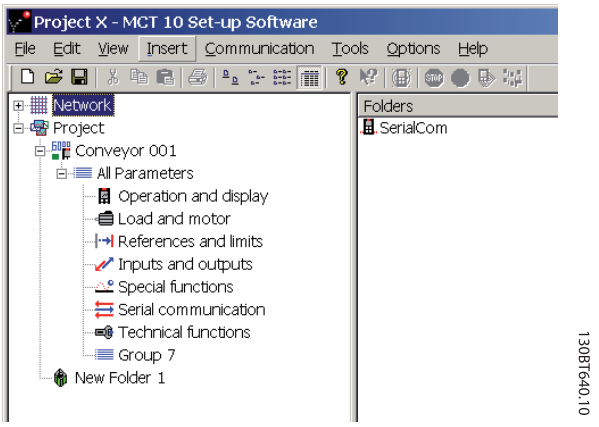
The Right View displays details of the element highlighted in the Left View. In the Right View the elements of the frequency converter network can be programmed.



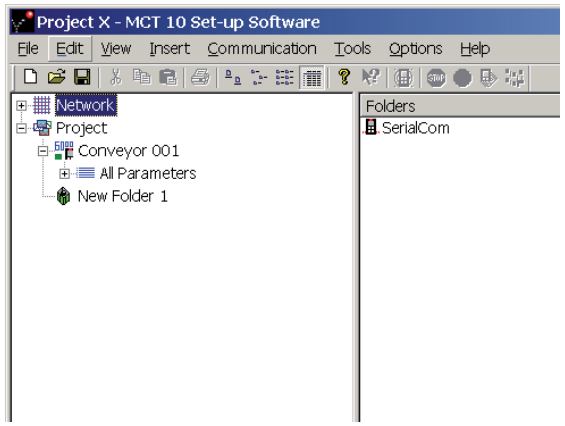
ID	Name	Setup 1	Setup 2	Setup 3	Setup 4
001	Language	English	English	English	English
002	Active setup	Setup 1	Setup 1	Setup 1	Setup 1
003	Setup copy	No copy	No copy	No copy	No copy
004	Lcp copy	No copy	No copy	No copy	No copy
005	Custom readout	100.00	100.00	100.00	100.00
006	Cust. read. unit	%	%	%	%
007	Large readout	Frequency [Hz]	Frequency [Hz]	Frequency [Hz]	Frequency [
008	Small readout 1	Reference [%]	Reference [%]	Reference [%]	Reference [
009	Small readout 2	Motor current [A]	Motor current [A]	Motor current [A]	Motor curre
010	Small readout 3	Power [kW]	Power [kW]	Power [kW]	Power [kW]
011	Unit of loc ref	Hz	Hz	Hz	Hz
012	Hand start bttn	Enable	Enable	Enable	Enable
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
100	Config. mode	Closed loop for...	Closed loop for...	Closed loop for...	Closed loop
101	Vt charact.	Aeo function	Aeo function	Aeo function	Aeo functior
102	Motor power	3.00	3.00	3.00	3.00
103	Motor voltage	550	550	550	550
104	Motor frequency	50	50	50	50
105	Motor current	5.09	5.09	5.09	5.09
106	Motor nom. speed	1420	1420	1420	1420
107	Auto motor adapt	No ama	No ama	No ama	No ama
108	Multim.startvolt	*********	*********	*********	*********
109	Resonance damp.	100	100	100	100
110	High start torq.	0.0	0.0	0.0	0.0
111	Start delay	0.0	0.0	0.0	0.0
112	Motor preheat	Disable	Disable	Disable	Disable
113	Preheat dc curr.	50	50	50	50

4.1.7 Tree View

The Left View can be expanded or compressed according to the level of detail the user wishes to view. The Left View has a tree structure, where folders containing un-displayed content are marked with +. By clicking on the + with the mouse, the folder will open and its contents display in a tree structure.



Folders containing content which is on display in a tree structure are marked with -. By clicking on the - with the mouse, the folder will close and its contents will be hidden.



4

4.1.8 Network Mode - Online

The Network folder contains the frequency converter(s) and/or softstarter(s) online connected to the PC. The user can monitor and make changes in the parameter settings exactly as if operating on the control panel.

Data entered from online will be stored in the frequency converter or softstarter only, not on the hard disk. For information on saving data to the hard disk, please refer to the chapter *Saving Data*.

4.1.9 Project Mode - Offline

The Project folder contains the frequency converter and/or softstarter network inserted by the user, opening a project file or from an online backup.

1. Data entered from offline will be stored on the hard disk. The Project folder is also where to insert folders or store other files related to the project. These other files can be in any format, for example Word, *.pdf, etc.
2. Mark the location in offline and insert a drive, softstarter or a specific foler.

Drive

Inserting a frequency converter into the project folder can be done in two ways:

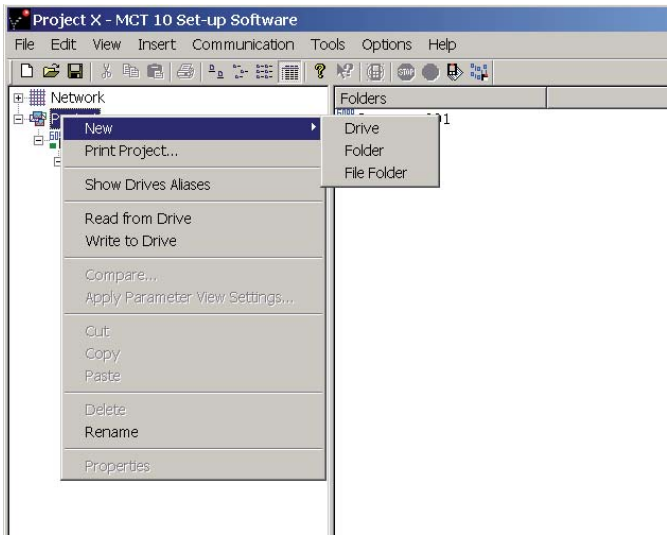
1. Right clicking at the offline location and choose *New Drive*
2. Mark the location in offline and select *New Drive* under *Insert*, on the main menu bar.

Softstarter

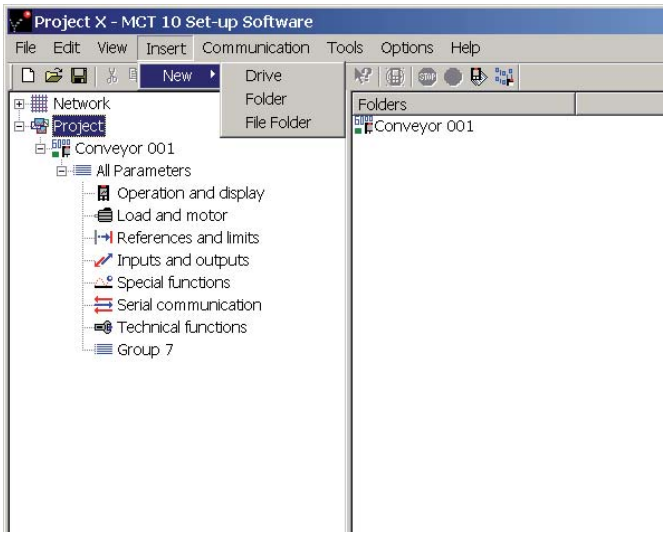
Inserting a softstarter into the project folder can be done in two ways:

1. Right clicking at the offline location and choose *New Softstarter*.
2. Mark the location in offline and select *New Softstarter* under *Insert*, on the main menu bar.

4.1.10 Folders

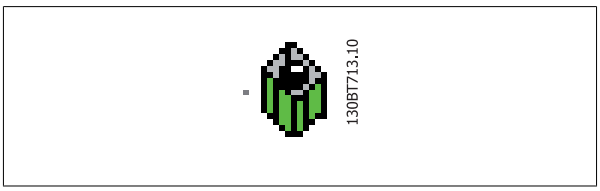


Alternatively, you can select Insert on the menu bar, then New, and then Drive, Folder or File Folder:



Folder

Is a group of frequency converters and/or softstarters forming part of a machine or of a system. Folders are used for organising a large system into several smaller systems.

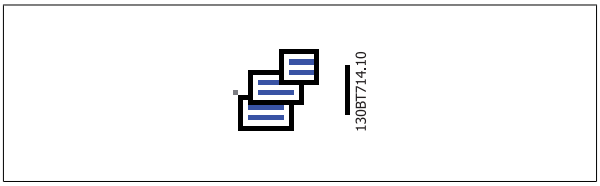


Inserting a folder in offline can be done in two ways:

1. Right clicking at the Project or an existing folder and choose *New Folder*.
2. Mark the Project or an existing folder and select *New Folder* under *Insert*, on the main menu bar.

File Folder

Is a folder for storing files belonging to the Project. These files can be in any format, Word documents, PDF files etc.

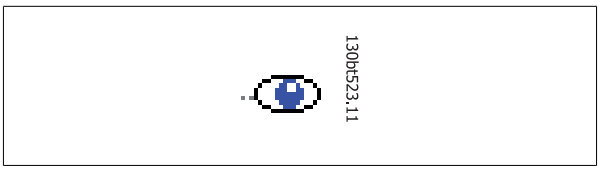


Inserting a file folder in offline can be done in two ways:

1. Right clicking on the location and choose *New File Folder*.
2. Mark the offline location and select *File New Folder* under *Insert*, on the main menu bar.

Parameter Folder

Is a folder for storing parameter settings temporary or for documentation purposes. The folder can contain a single parameter, subgroup, parameter group or the entire parameter database.

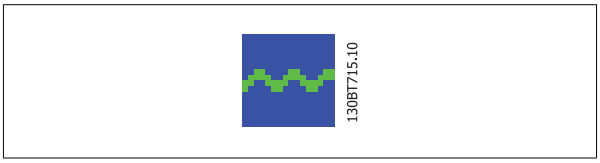


Inserting a parameter folder in offline can be done in two ways:

1. Right clicking on the frequency converter or softstarter and choose New Parameter Folder.
2. Mark the frequency converter or softstarter and select File Parameter Folder under Insert, on the main menu bar.

Scope Folder

Is a folder for diagnostic purposes analysing the behavior of one or several parameters by visualising as a curve(s).



Inserting a scope folder in offline can be done in two ways:

1. Right clicking on the location and choose *New Scope Folder*.
2. Mark the offline location and select *Scope Folder* under *Insert*, on the main menu bar.

5

5 Set-up of Communication

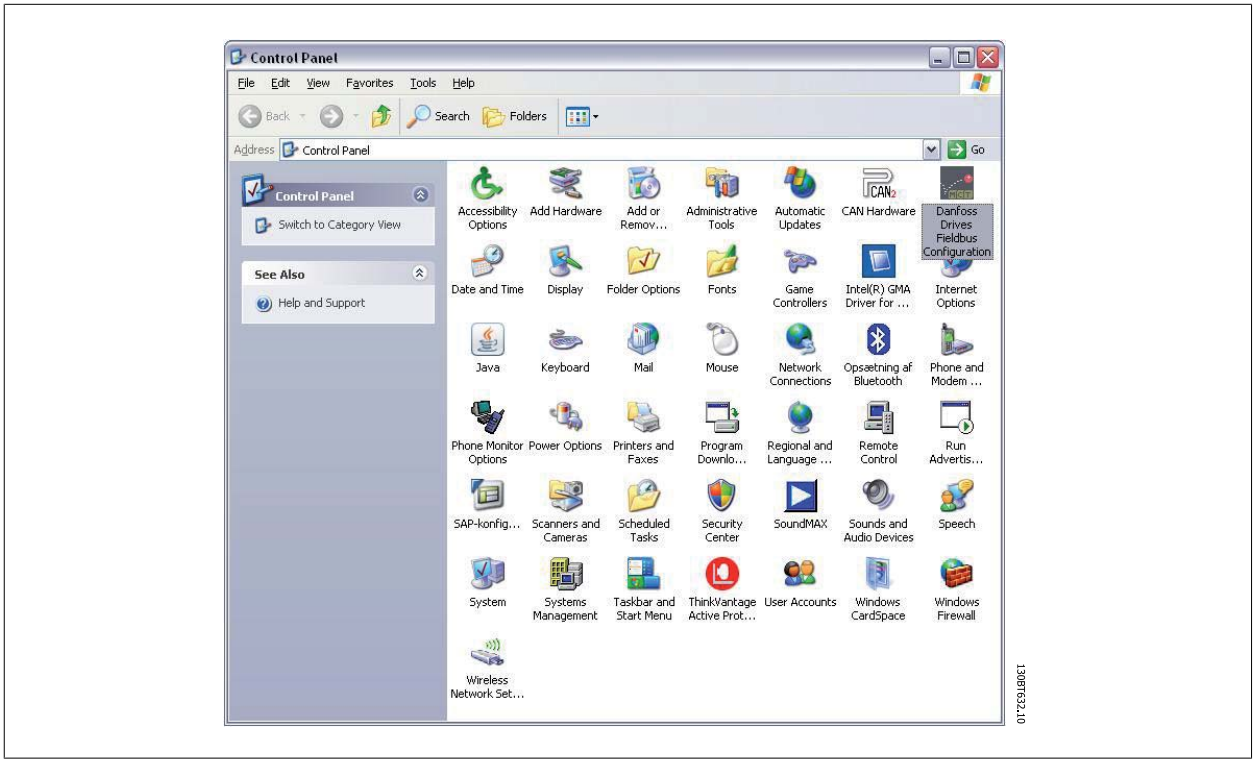
5.1 How to Establish Communication

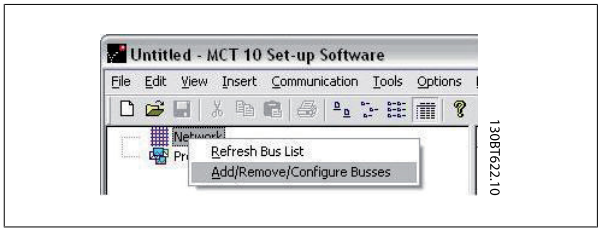
Data communication between a PC and the frequency converter(s) and Softstarter can be established via a hardwired connection. The hardwired connection can be via the standard built-in RS485 or USB port. If the MCA101 or MCA121 fieldbus option is mounted in the frequency converter(s), the connection can be obtained via a Profibus Master Class 2 connection (MSAC 2) or an Ethernet based network. The Softstarter can only be connected through a USB cable.

The USB interface socket is controlled by the Microsoft operating system providing plug-and-play capabilities by allowing devices to be connected and disconnected using hot swapping. Connecting a frequency converter using USB MCT 10 Set-up Software will automatically add on to the bus list.

The communication framework part of MCT 10 Set-up Software is handling the control of the fieldbusses. It provides enhanced capabilities allowing multiple concurrent fieldbus communication. Several fieldbuses can be configured and combined in the same Network within MCT 10 Set-up Software. If several fieldbusses are created with the same type, please make sure they are configured with different scan ranges.

Starting MCT 10 Set-up Software the first time after installation the non plug-and-play fieldbusses must be manually configured from the fieldbus configuration dialog. This is available from the standard Windows Control Panel or from the 10 Network.

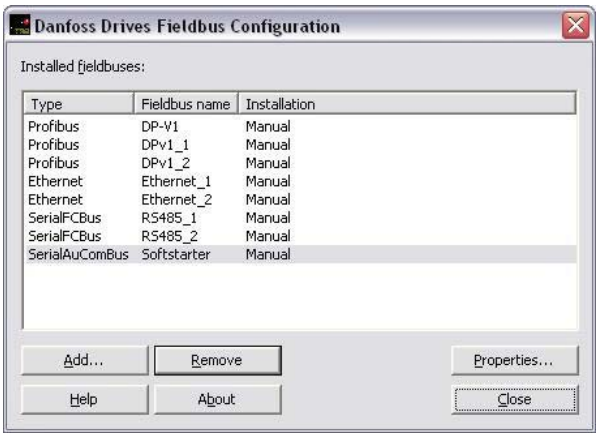




From the fieldbus configuration dialog non plug-and-play fieldbusses can be added, removed or reconfigured from the installed list.

If the installed fieldbus list is updated from the Windows Control Panel while MCT 10 Set-up Software is running the user needs to refresh the bus list by right clicking on *Network*.

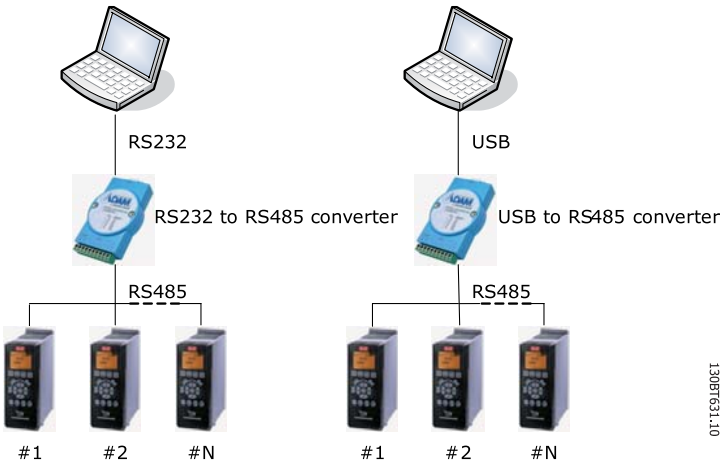
For MCT 10 Set-up Software to indicate the available frequency converter(s) on the non plug-and-play fieldbusses the user manually has to scan the network for active drives. The scanning is available from a right click on the appropriate fieldbus.



130BT630.11

5.2 RS485 Data Communication

The majority of Danfoss Drives products have the FC protocol as standard RS485 data communication. Communication from a PC can be established via RS232 to RS485 converters or via USB to RS485 converters.



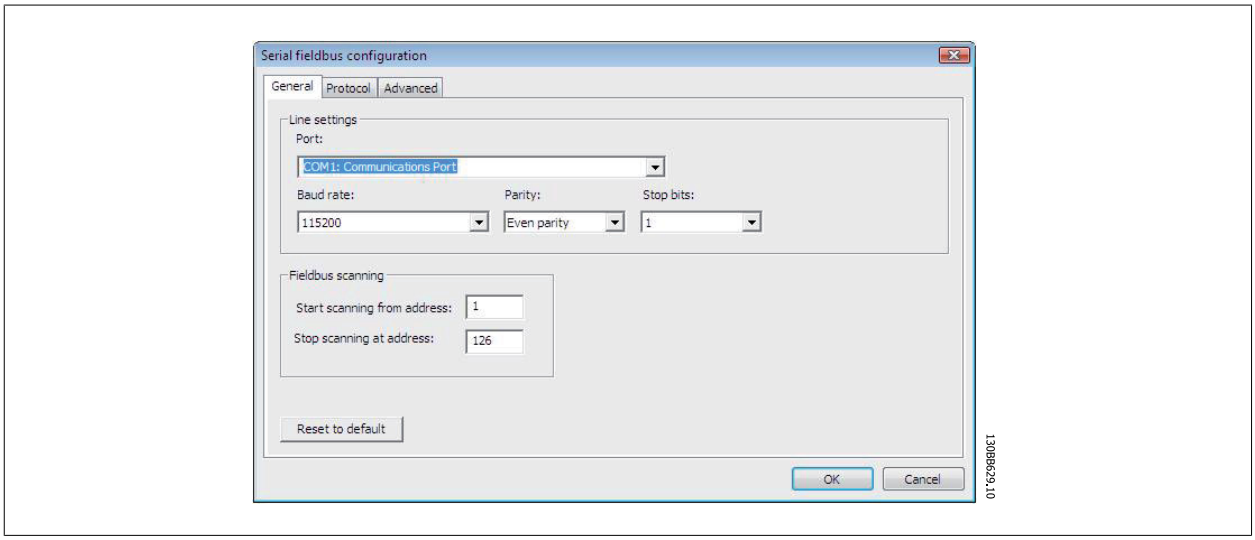
All frequency converters are default set to 9600 baud, but can also be configured to 300, 1200, 4800, 19200, 38400, 57600 or 115200 baud. The serial configuration is always configured with 8 data bits, 1 stop bit and even parity.

NB!
Choose a relevant scan range. It takes too much time to scan all available addresses (1-126).
Using the VLT FC 100, FC 200 and FC 300 series: FC MC Protocol (par. 8-30 "FC MC") is required for correct functionality. The parameter is only available from the LCP.

5.2.1 Serial Configuration

When using a RS485 converter as the Advantech ADAM converter, MCT 10 Set-up Software will indicate online frequency converter(s) available on the serial bus after scanning the bus.

The bus can be configured from the Fieldbus Configuration dialog or from *right-click* on the appropriate serial bus.

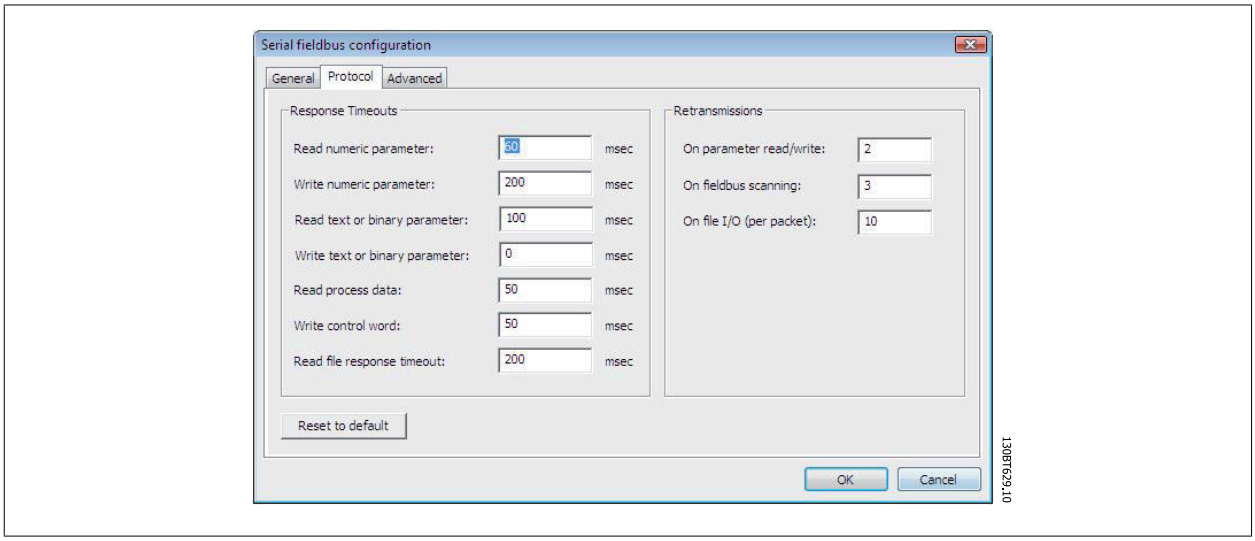


The COM port number must be set to the appropriate one used. When using USB to RS485 converters, the actual comport number can be identified from the Device Manager part of the Windows Control Panel.

The Baud rate, Parity and the number of Stop bits must match the settings in the drive.

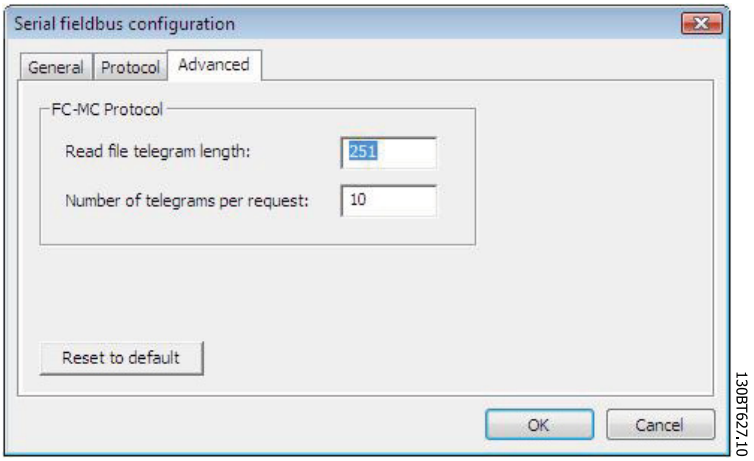
The Fieldbus scanning range should be set to the available addresses only to limit the time scanning for active drives.

Reset to default bottom restores the Line settings and Fieldbus scanning to factory configuration values.



The Response Timeouts and Retransmissions are settings editable for performance optimization, but should normally not be changed.

Reset to default bottom restores the Protocol settings to factory configuration values.



The FC-MC Protocol are settings editable for performance optimization, but should normally not be changed.

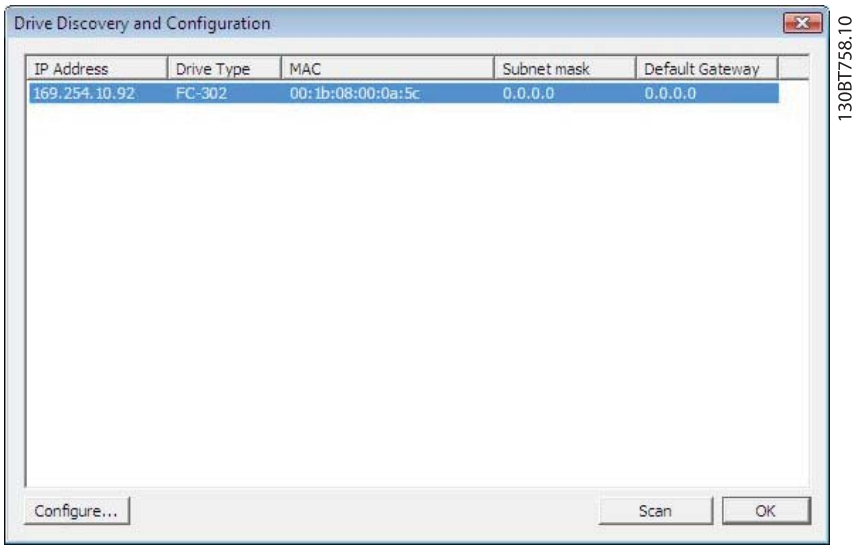
Reset to default bottom restores the Protocol settings to factory configuration values.

5.3 Softstarter

Setting up connectivity to the MCD 500, requires the USB communication module mounted on the Softstarter. 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 one USB port or a USB HUB, several Softstarters can be connected.

5.3.1 Serial Configuration

All Softstarters are default set to 9600 baud, but can also be configured to 300, 1200, 4800, 19200, 38400, 57600 or 115200 baud. The serial configuration is always configured with 8 data bits, 1 stop bit and no parity.



The bus must be added and configured from the Fieldbus Configuration dialog. If the bus is already added to the Network, it can be reconfigured right-clicking on the appropriate Softstarter serial bus.

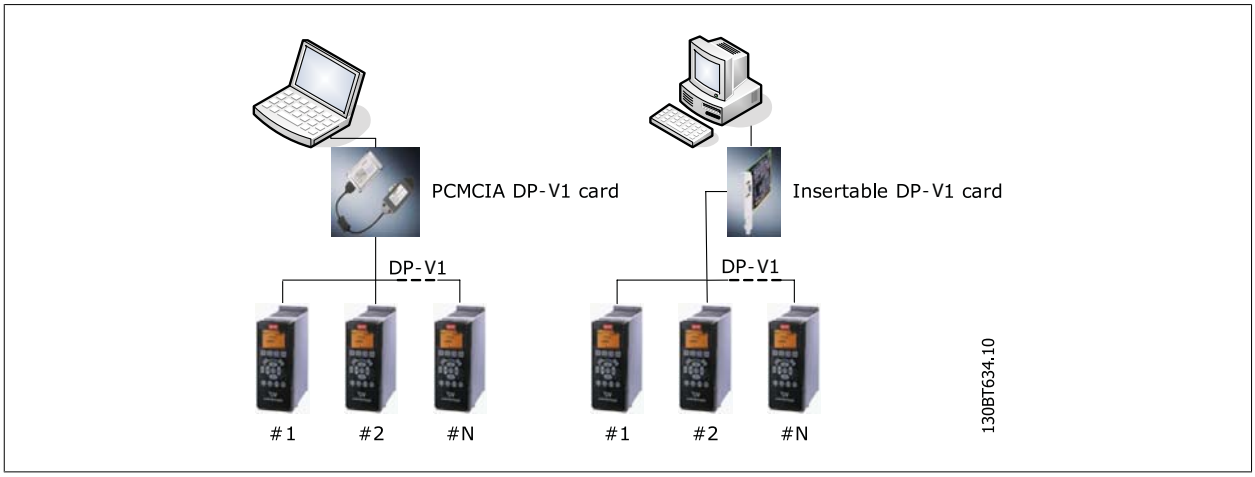
The COM port number must be set to the appropriate one used. The actual comport number can be identified from the Device Manager part of the Windows Control Panel.

The Baud rate, Parity and the number of Stop bits must match the settings in the Softstarter.

Reset to default botton restores the General settings and Fieldbus scanning to factory configuration values.

5.4 Profibus DP-V1 Data Communication

To setup a Profibus DP-V1 communication, the MCA101 Profibus option module is required. 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 frequency converter is connected to the 9-pin sub D socket connector located on the card.



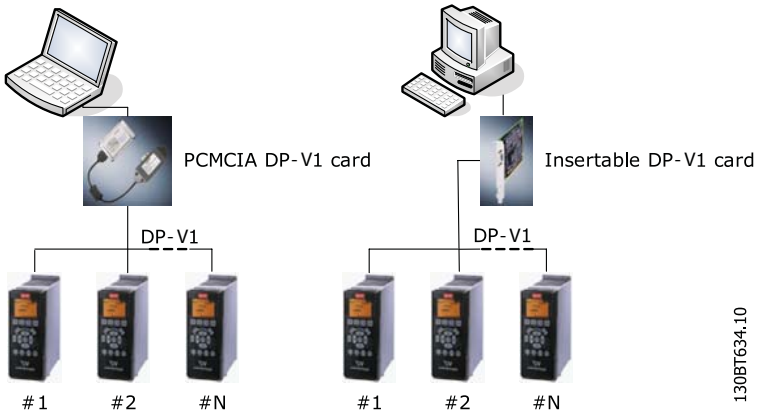
The following Master class 2 cards are currently supported from Siemens:

- CP 5411
- CP 5511
- CP 5512
- CP 5611
- CP 5613
- CP 5614

(Please also consult the Siemens website for latest supported cards for PC's.)

NB!
Please consult the chapter: *Guide to DP-V1 connection and Simatic Manager*, covering more details about setting up the Simatic Manager.

To setup a Profibus DP-V1 communication, the MCA101 Profibus option module is required. 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 frequency converter is connected to the 9-pin sub D socket connector located on the card.



The following Master class 2 cards are currently supported from Siemens:

- CP 5411
- CP 5511
- CP 5512
- CP 5611
- CP 5613
- CP 5614

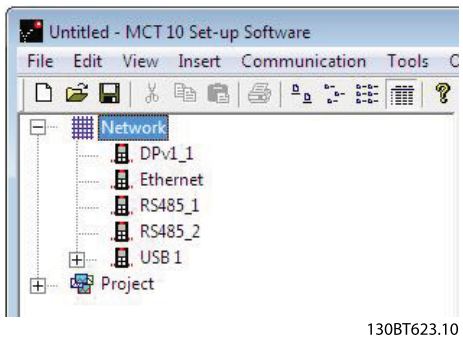
(Please also consult the Siemens website for latest supported cards for PC's.)

NB!
Please consult the chapter: *Guide to DP-V1 connection and Simatic Manager*, covering more details about setting up the Simatic Manager.

NB!
Connectivity via Profibus DPv1 to a FC302 utilizing the Profibus Converter MCA114 with option firmware version 2.03 is not possible from MCT10. It is advised to use the serial or USB bus.

5.5 USB Data Communication

Danfoss frequency converters in the FC 100, FC 200 and FC 300 series are standard 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 frequency converter. No extra hardware or bus configuration is required. If the PC is equipped with more than one USB port several frequency converters can be connected. The USB bus will in MCT 10 Set-up Software automatically be add on to the Network bus list.



When the USB cable is disconnected, the frequency converter connected via the USB port will be removed from the Network bus list.

NB!
A USB bus has no address-setting capacity and no bus name to configure. Connecting more than one frequency converter through USB, the bus name will be auto incremented in the MCT 10 Set-up Software Network bus list.
Connecting more than one drive through a USB cable often causes computers installed with Windows XP to throw an exception and crash. Therefore it is advised only to connect one drive via USB to the PC.

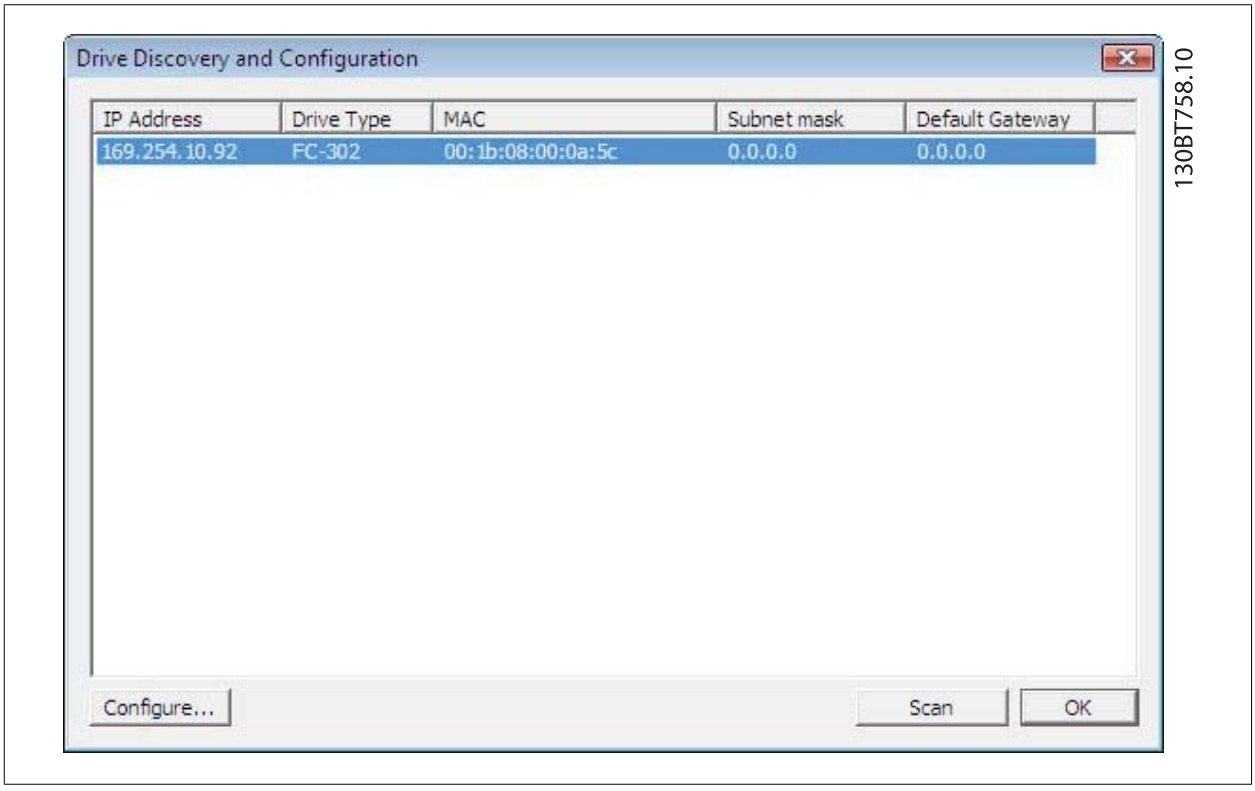
5.6 Ethernet-TSC Data Communication

To setup an Ethernet-TSC (Transparent Socket Channel) communication, the MCA121 option module is required within the drive. Communication from a PC can be established using a standard Ethernet cable connected to the drive.

5.6.1 Ethernet-TSC Configuration

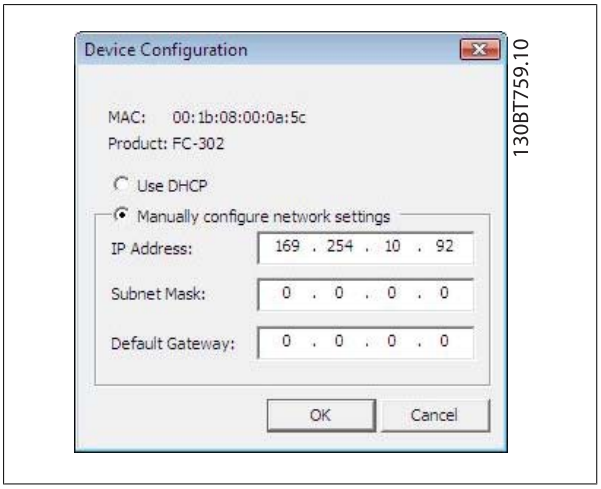
Ethernet-TSC bus is scanned using ADDP (Advanced Digi Discovery Protocol). The protocol does not require an IP Port number and IP scan range. It is capable to identify drives even without an IP address configured and in this case it is identified based on the MAC address.

All active drives scanned from the Ethernet bus are listed in the *Drive Discovery and Configuration* dialog when pressing the *Scan* button.



Drive types without any IP configuration uses per default its Auto IP Class B address, which is 169.254.yy. xx, with *yy.xx* corresponding to the last two segments in the MAC address. Several uncommissioned drives without any IP configuration can be scanned on the same network. MCT 10 Set-up Software will signal a warning when identifying a drive(s) with the Auto IP address, requiring the user to setup the IP configuration.

The Configure button is used to assign the drive a static *IP address*, *Subnet Mask*, *Default Gateway* or to setup using DHCP (Dynamic Host Configuration Protocol) lookup.



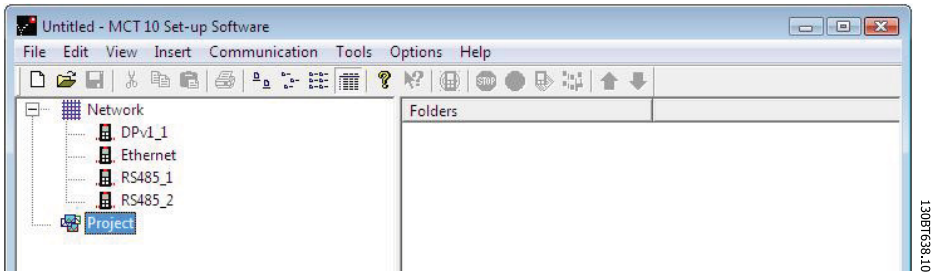
Scanning a bus, all active drives are per default identified. It is possible by using a corresponding offline drive to read or write to a single drive without requiring the time for MCT 10 Set-up Software to scan and identify all drives. The user opens the project file or manually creates the offline drive and configures the connection properties. Then the user can right click on the offline drive and choose to read or write to the drive without scanning the bus.

NB!
Identification of drives utilising the Ethernet/IP option MCA121 is possible only from option firmware version 1.03 or neWer. Using options with firmware versions earlier than 1.03, the "Transparent Socket Channel Port" parameter 12-89 must be configured to 0 to avoid option from stop operation.

6 Parameter Handling

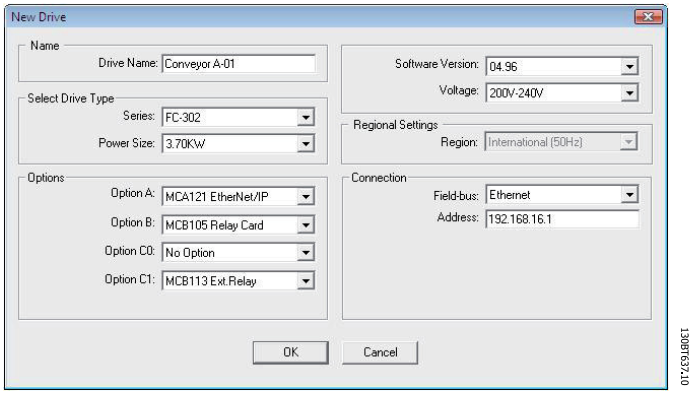
6.1 Set-up

This chapter explains how to control a frequency converter using the MCT 10 Set-up Software. After starting the MCT 10 Set-up Software, the main window looks like this:



Insert a new drive, folder or file folder by selecting the Project icon with a right-click on the mouse. Alternatively, you can select Insert on the menu bar, then select New, then Drive, Folder or File Folder.

Drive refers to the type of frequency converter you wish to set up. Inserting a frequency converter will bring up the drive selector window.



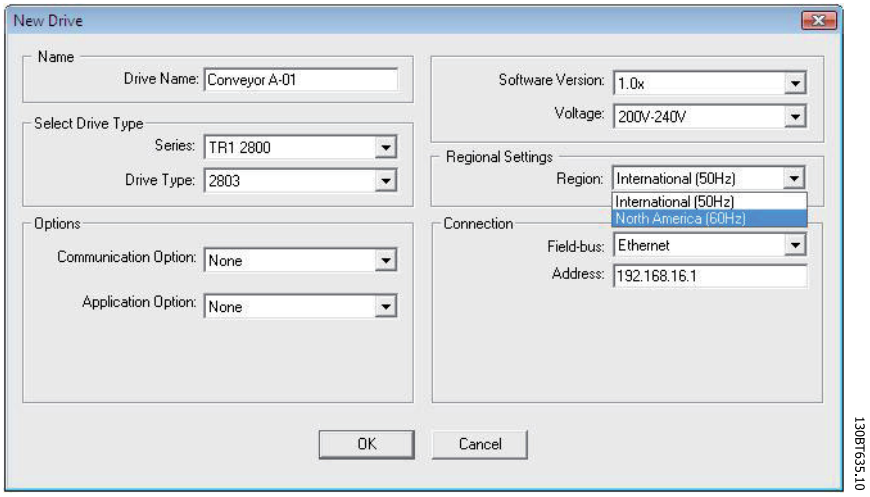
The New Drive window consists of four main parts; Name, Drive Identification, Regional Settings and Connection. All parts are mandatory to be Fill in:

Name is the name you want to identify the frequency converter with. This can be any text/number combination.

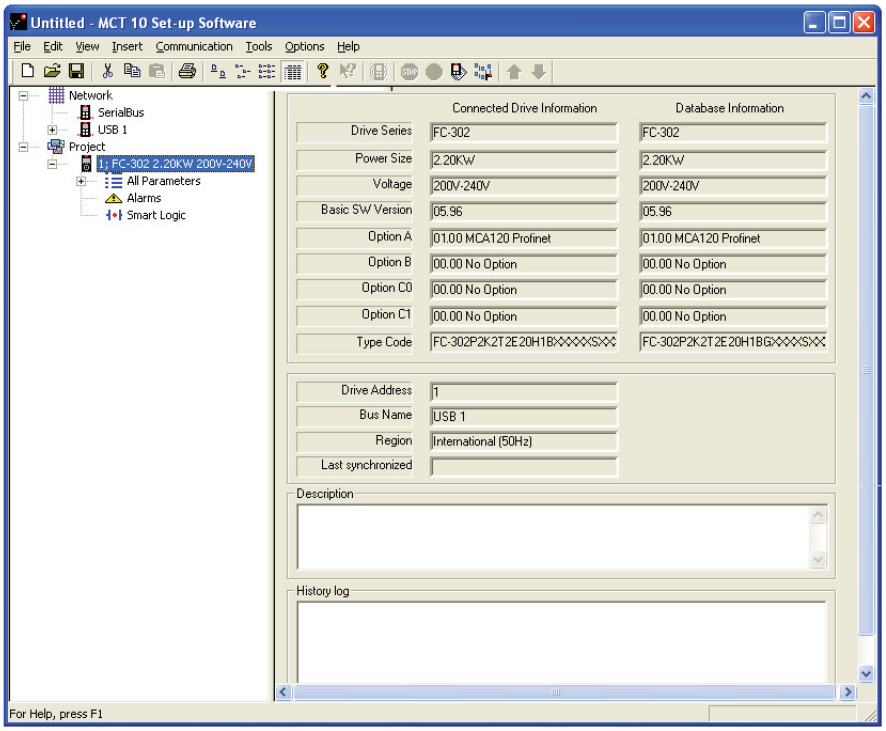
Drive Identification is the information regarding the frequency converter series, power size, options installed, software version and voltage level. The different selections are available from the drop down menus.

Regional Settings is configurable for International 50Hz or North America 60Hz settings. These discriminate mainly between horse power, kW and voltage level. The following screen shot shows an example of regional settings for a VLT 2800 frequency converter.

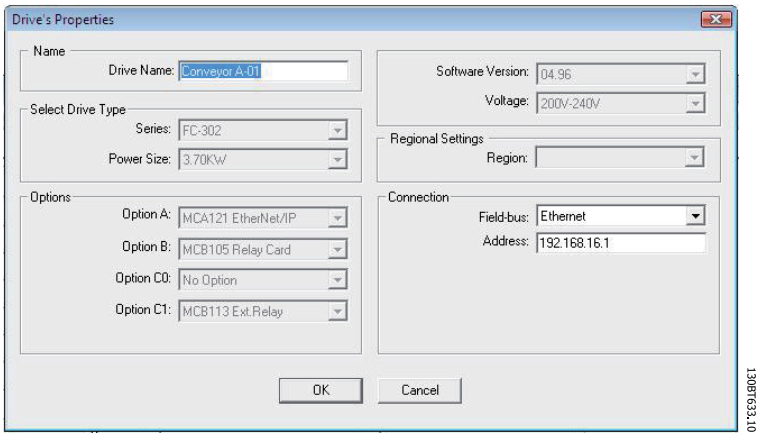
Connection means the fieldbus used between the PC and the frequency converter associated with the address to communicate. The specific fieldbus type is available from the drop down menu.



Once the new frequency converter is added in the Project folder, the drive icon is selectable to display the database information as entered above:



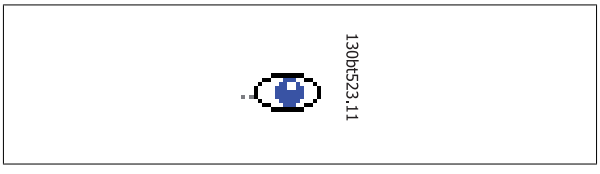
The frequency converter(s) located in the offline project folder are reconfigurable right click on the specific drive icon and choose Properties. The Drive's Properties dialog appears providing the possibility to rename the drive Name and reconfiguring the Connection Set-up.



Note that the Connected Drive Information fields are empty. This is because at this point, you have not yet accessed the online frequency converter represented by the new frequency converter created offline. To view information from the online frequency converter, please refer to the Read From Drive feature.

6.1.1 Parameter Folders

When you have set up a drive within the Project folder, you can create new parameter folders within that drive. Create a new Parameter Folder by right-clicking on the Drive icon, then selecting New, then Parameter Folder. The default name for the new parameter folder will be New Folder 1, New Folder 2, etc.



6.1.2 Custom Parameter Folders

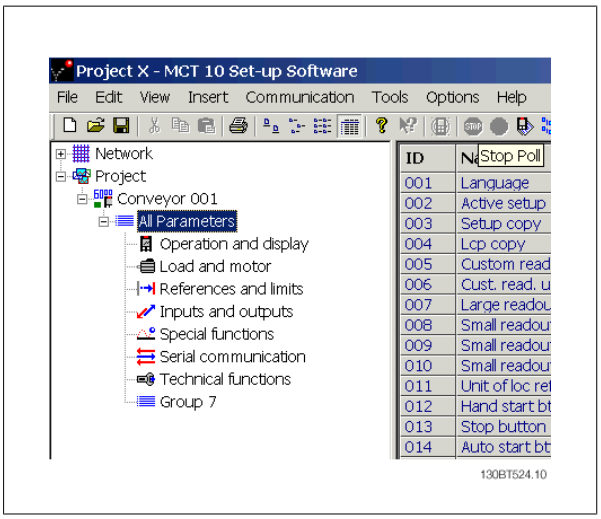
You can give the new parameter folder the desired identity using the Rename function, accessible by right-clicking on the New Folder icon.

6.1.3 Generic Folders

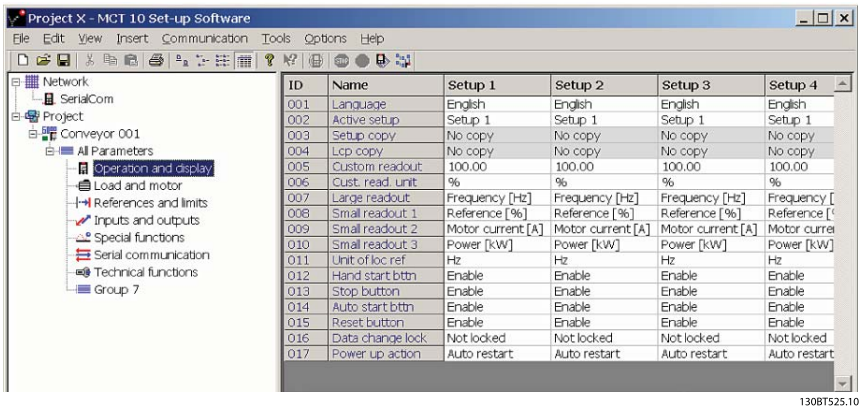
When a new drive is set up according to drive, it will take the form of a folder named by the user, containing an All Parameters folder, which comprises a series of inner folders with generic names. These generic names cannot be changed or personalised, i.e. there is no rename function for these folders. The generic folders within most frequency converters are as follows:

- 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 frequency converter selected.



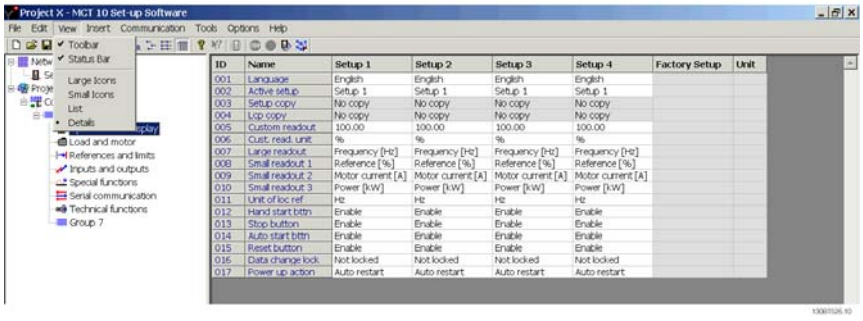
The contents of the generic folders are fixed, and comprise the parameters relevant to the frequency converter type selected. The ID, name and settings of these parameters become visible in the Right View, with a left-click on the generic folder icon or name in the Left View.



6.1.4 Display Options

Display Options By selecting View in the main menu bar, a range of display options are presented. The user can choose to display or hide the Toolbar and the Status Bar.
The user can also select the desired form of the Right View:

- **Large icons**
- **Small icons**
- The Right View display can be presented in the form of a **List** of folders and elements
- The Right View display can present **Details** of Network and Project elements



The final four display options (Large icons, Small icons, List and Details) are also accessible by clicking on the toolbar, options 8 through 11 from the left.



6.1.5 Parameter View Settings

You can apply the chosen parameter view settings described above to subfolders, to an entire project, or to the entire application, i.e. all MCT 10 Set-up Software folders in Network or Project mode.

Right-click on the parameter cell or set-up column then select Apply Parameter View Settings. Alternatively, select Apply Parameter View Settings under Tools on the main menu bar. The following pop-up will appear:



Select the option you wish to apply then click OK to activate that option.

6.2 Filters

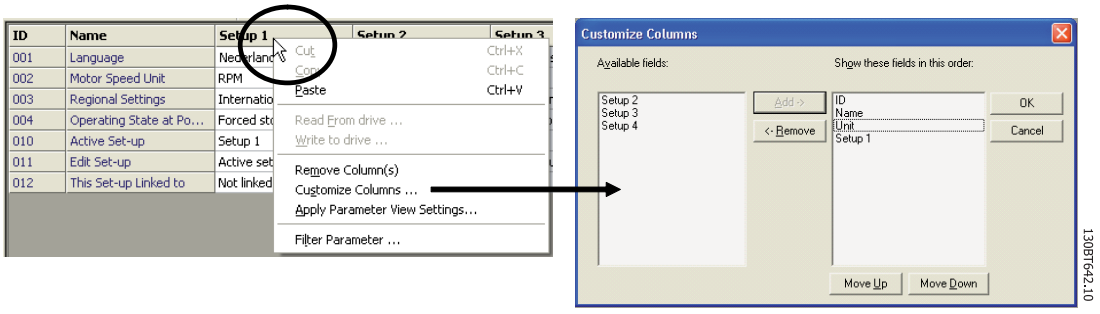
The MCT 10 Set-up Software can be configured by view filters to display parameters in a special way or to display parameters of interest. This is a powerful tool in maintaining an overview of the drive, without becoming confused by irrelevant parameters.
Filters can be applied to the parameter set-ups, which are displayed in the Right View when highlighting a generic folder in the Left View, i.e. one of

- Operation and Display
- Load and Motor
- References and Limits
- Inputs and outputs
- Special functions
- Serial communication
- Technical functions

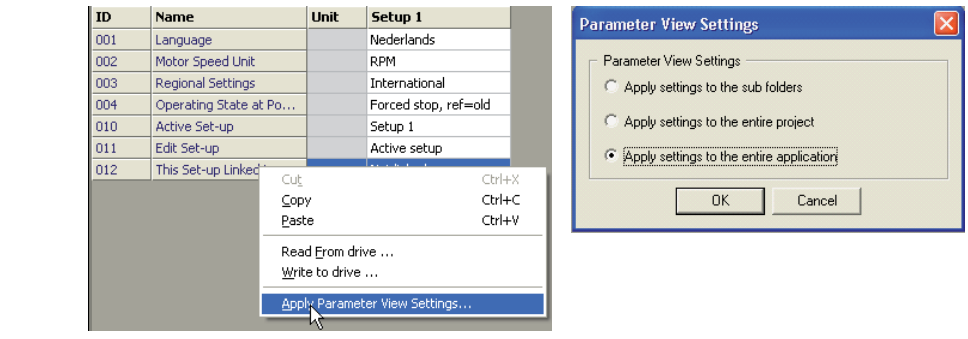
The parameters displayed in the Right View are presented in a series of columns, containing ID, parameter name, four set-ups, units and factory set-up.

6

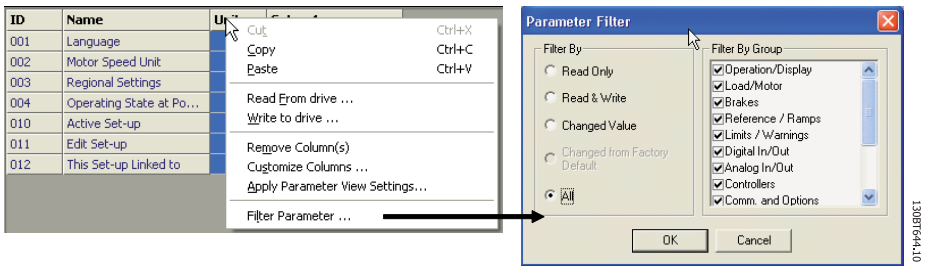
Each set-up can be hidden by removing it. This is done by selecting the set-up in the parameter view and then selecting the remove menu. Changes made to the removed set-up are still stored inside the MCT 10 Set-up Software and can be displayed again by selecting Customize Columns.
By adding or removing columns the user can decide which information he wants to view.



The actual view can also be made valid for the complete Project or for the Folder only. This allows the user to adjust his view setting quickly for parts or the complete Project.



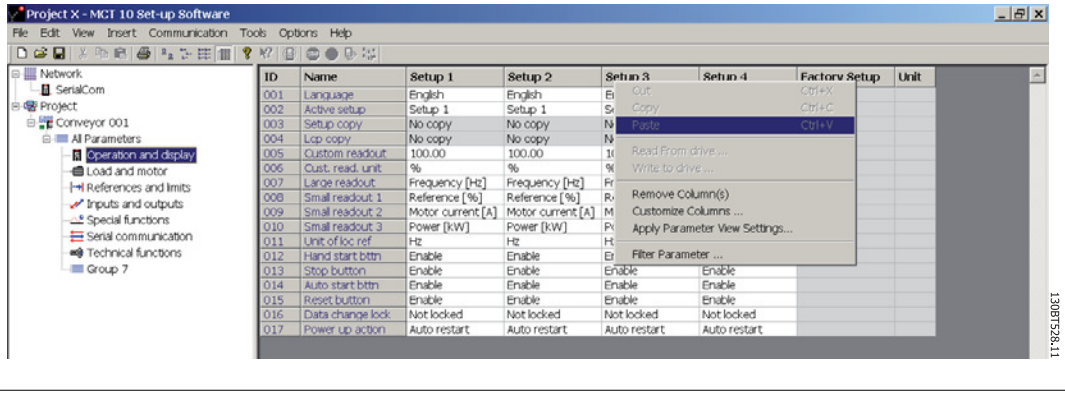
Another flexible way to adjust the display is via the Filter function.

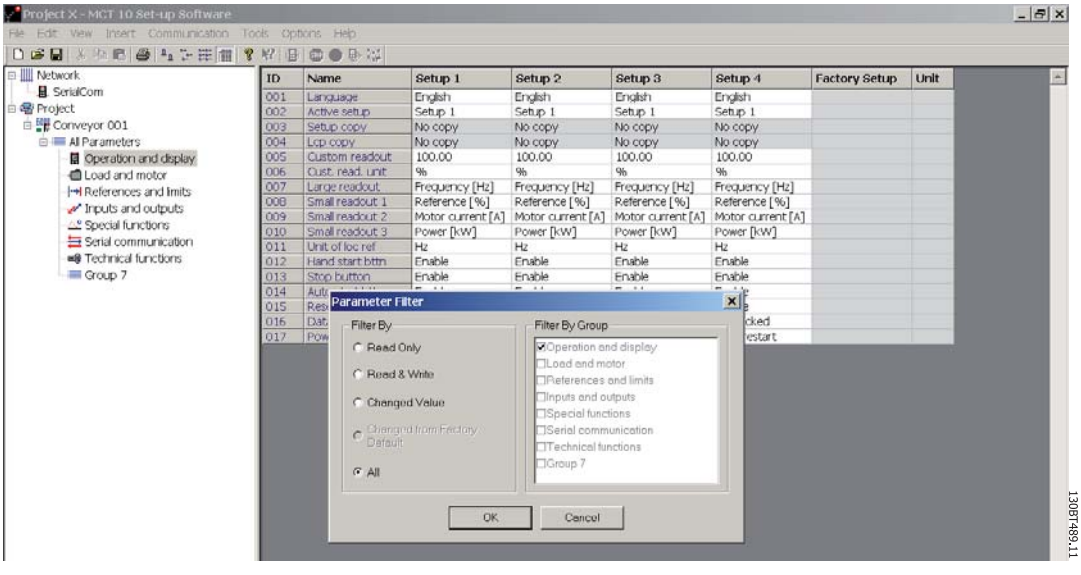


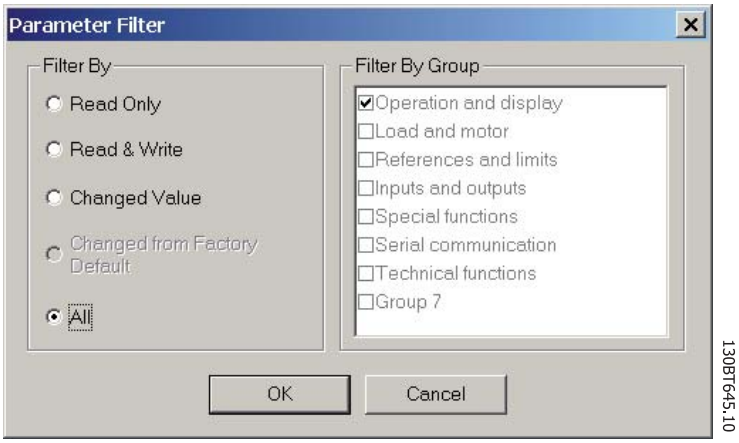
Just by selecting Change Parameters, the number of Parameters displayed is reduced to 5 Parameters in this example.

6.2.1 Parameter Filters

To find the Parameter Filter dialog:
Right-click on any column in Right View, then select Filter Parameter.







6

6.2.2 Read Only

In the Right View showing details of parameter set-ups, the user can select the Read Only filter to display those parameters which are read only and cannot be changed by the user. Right-click on any parameter column in the Right View, and then select the Filter Parameter option. Under Filter By, the user can then mark Read Only, and the display will show only those parameters which are read only.

6.2.3 Read & Write

In the Right View showing details of parameter set-ups, the user can select the Read & Write filter to display those parameters which are read/write and can thus be changed by the user. Right-click on any parameter column in the Right View, then select the Filter Parameter option. Under Filter By the user can then mark Read & Write, and the display will show only those parameters which are read/write, i.e. can be changed by the user.

6.2.4 Changed

In the Right View showing details of parameter set-ups, the user can select the Changed Value filter to display those parameters which have been changed by the user in the current session. Right-click on any parameter column in the Right View, and then select the Filter Parameter option. Under Filter By, the user can then mark Changed Value and the display will show only those parameters which have been changed during the current session.

6.2.5 All

To display all parameters in the Right View, following a filtering which has hidden some of the parameters, right-click on any parameter column in the Right View, and then select the Filter Parameter option. Under Filter By, the user can then mark All, and the display will show all parameters.

6.2.6 Filter By Group

To display only parameters from a particular group or groups in the Right View, the user can right-click on any parameter column in the Right View, and then select the Filter Parameter option. Under Filter By Group, the user can then mark the desired group or groups to be displayed and the Right View display will show only those group(s).

6.2.7 Column Select

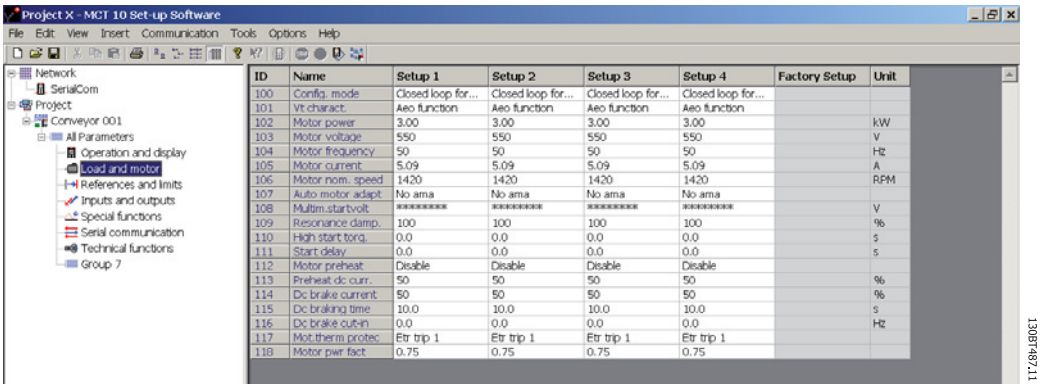
Select a column in the Right View by left-clicking on the column title cell.

6.2.8 Folder Select

Select a folder in the Left View by left-clicking on the folder name or folder icon.

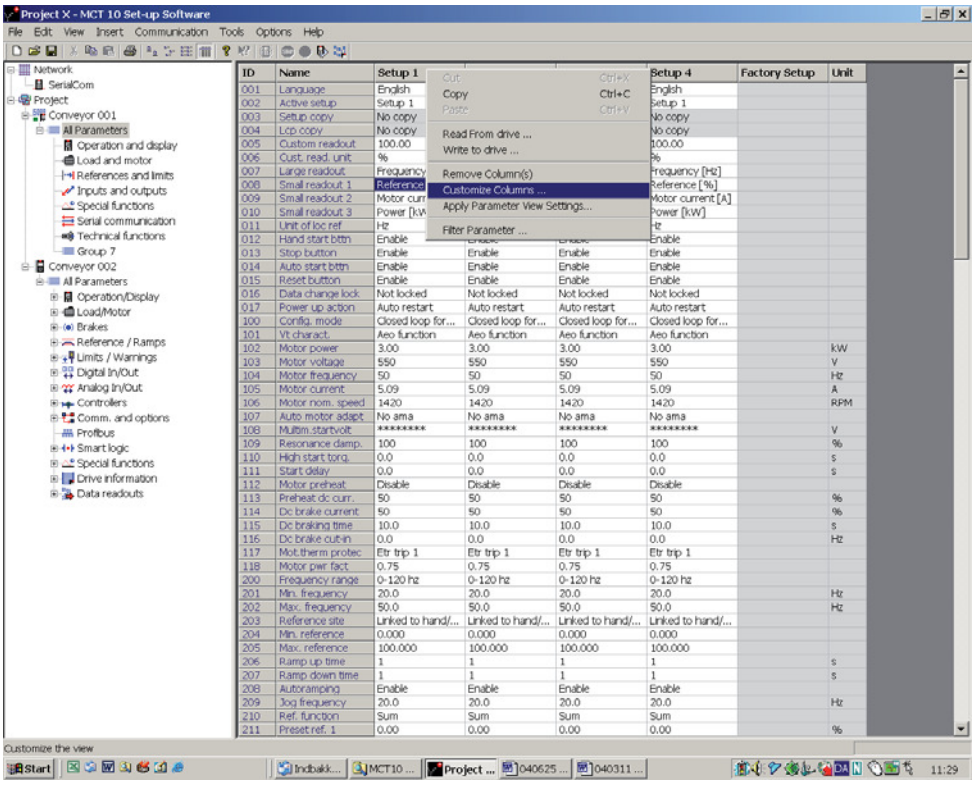
6.2.9 Parameter Display

By selecting a parameter folder in the Left View you can view the parameters in the Right View, including their ID code, name and configuration details.



6.2.10 Customize Columns

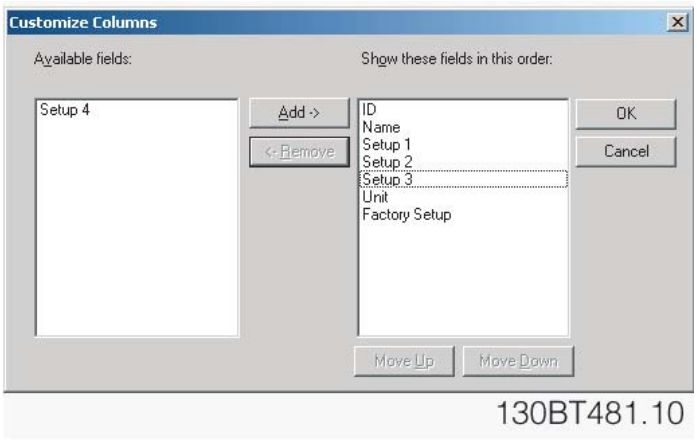
The user can rearrange the display of columns in the Right View display by right-clicking on any column title, then selecting Customize Columns.



The Customize Columns window will be displayed and there, the user can change the order of fields in the display by highlighting a field, then selecting Move Up, Move Down or Remove.



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



6

6.2.11 Read/Write Parameters

The majority of parameters are read/write, i.e. they can be configured by the user. Use the Filter function to view which parameters are read/write.

6.2.12 Read Only Parameters

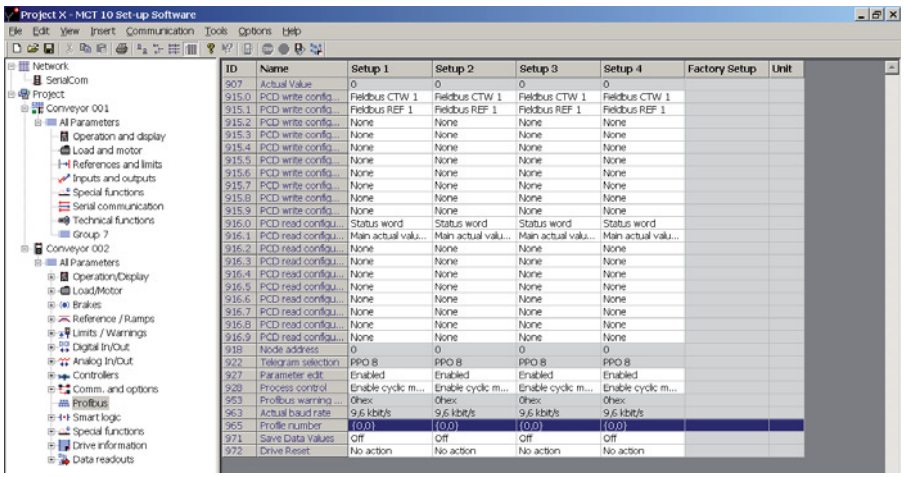
A few parameters are read only, i.e. they provide data only and cannot be configured by the user. Use the Filter function to view which parameters are read only.

6.2.13 Factory Defaults

The parameter factory defaults are viewable by highlighting the parameter folder in the Left View, whereupon the parameter details will be displayed in the Right View. The factory defaults will be displayed in the Set-up columns unless a user has changed the parameter configuration. If the parameter configuration has been changed since factory supply, the factory defaults are displayed in the Factory Set-up column.

6.2.14 Array Parameters - MCT 10 Set-up Software

Parameters containing data in the form of an array are displayed as a matrix in the Right View, where the rows of the matrix are identified as ID.1, ID. 2, etc. For example, in the view below, array parameters 9-15 and 9-16 are displayed over several entries as 915.1, 915.2, 915.3, and 916.1, 916.2, 916.3,. in the Right View below.



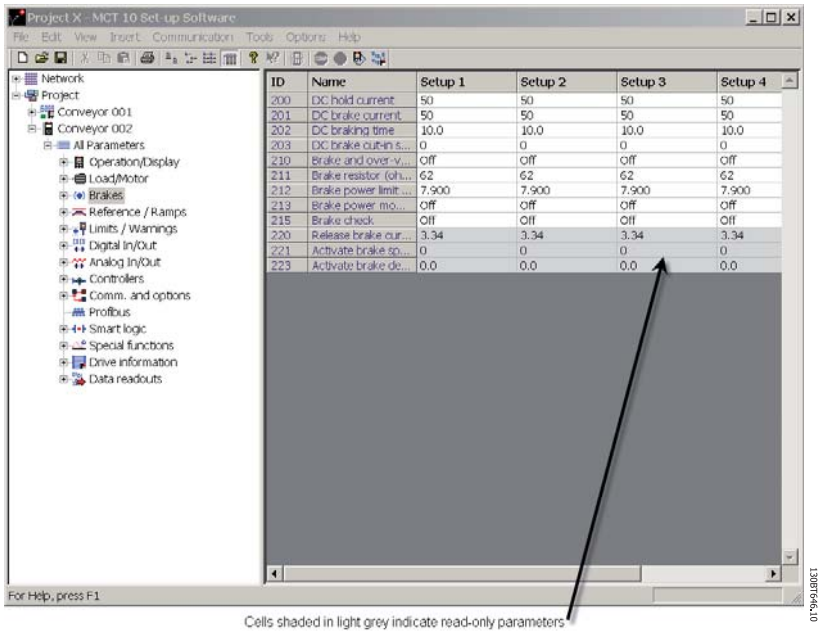
6.3 Special Parameters

6.3.1 Edit Set-up

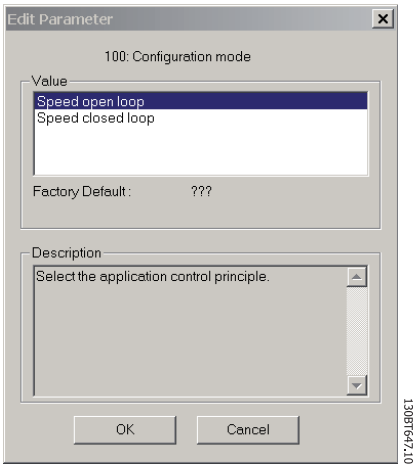
The user can change parameter set-up by manually entering new value(s) into the cells in the Right View.
Alternatively, the parameter set-up can be altered by importing values from an active drive, using the Read From Drive function.

6.4 Parameter Edit

Parameters are organized into the same groups found on the LCP of the drive. A parameter can easily be modified by simply double-clicking on the desired parameter entry. If an entry cell is shaded in light grey it means that it is read only, and cannot be modified.



The settings of a parameter are checked for correct value upon their entry. If a parameter value is set to an illegal value the MCT 10 Set-up Software displays an error. Parameters can be edited in two different modes, dialog-based and inline. In dialog-based edit mode MCT 10 Set-up Software will make a window pop up explaining the usages of the parameter.



6.4.1 Inline Edit

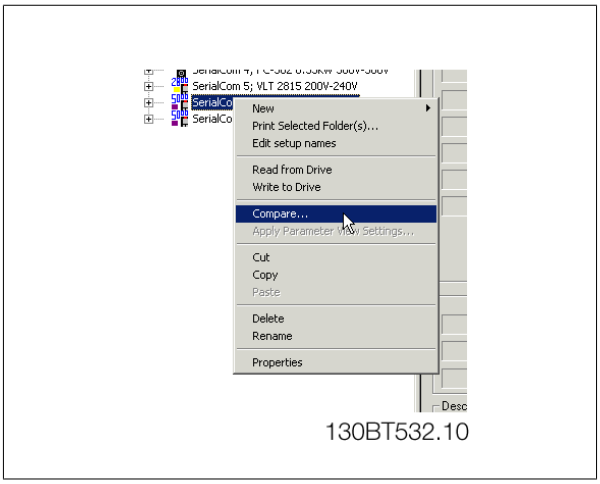
In inline edit mode, MCT 10 Set-up Software displays only the setting options available for a parameter. This works faster but is recommended only for the experienced user, since each possible setting is not followed by a detailed description of the setting.

6.4.2 Dialog Based Edit

If you would prefer to have details of parameters available whilst editing, use Dialog Based Edit. Parameter options, ranges and functions will be displayed whilst you edit the parameters. You will automatically enter Dialog Based Edit if you de-select Inline Edit.

6.5 Comparison of Parameters

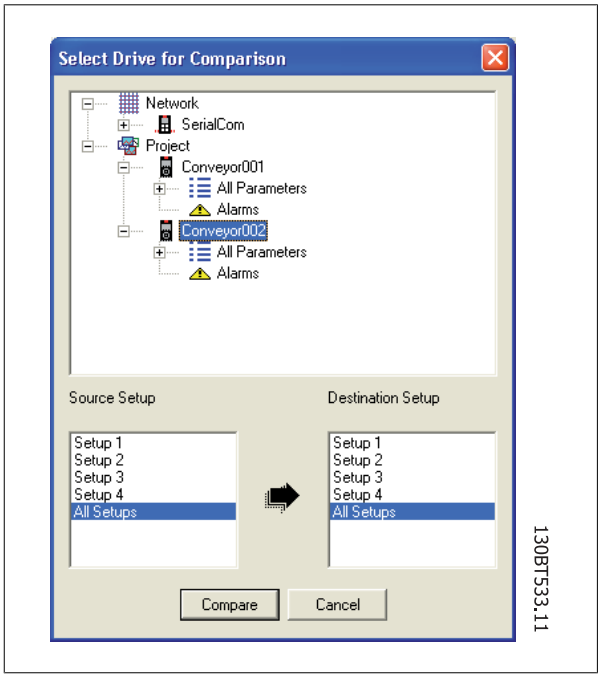
Parameter settings can be compared to the parameter settings in another drive. Comparisons can be made either to another drive inside the project or to an online drive. The comparison function is a powerful tool that evaluates whether settings inside the drive have been changed, or checks if two or more drives have the same settings. The compare function is activated by highlighting the desired drive and selecting Compare.

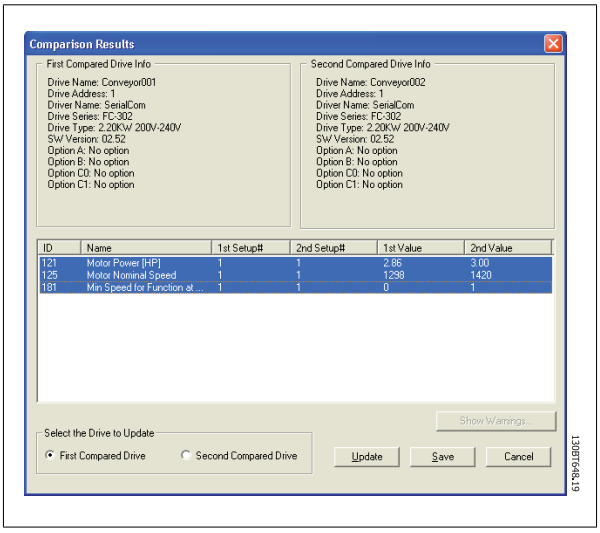


The compare window asks the user for a drive with which to make the comparison. This can be an online drive from the network, or it can be a drive in the offline folder (Project folder).

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 one set-up against another. The result of a comparison could look like this:

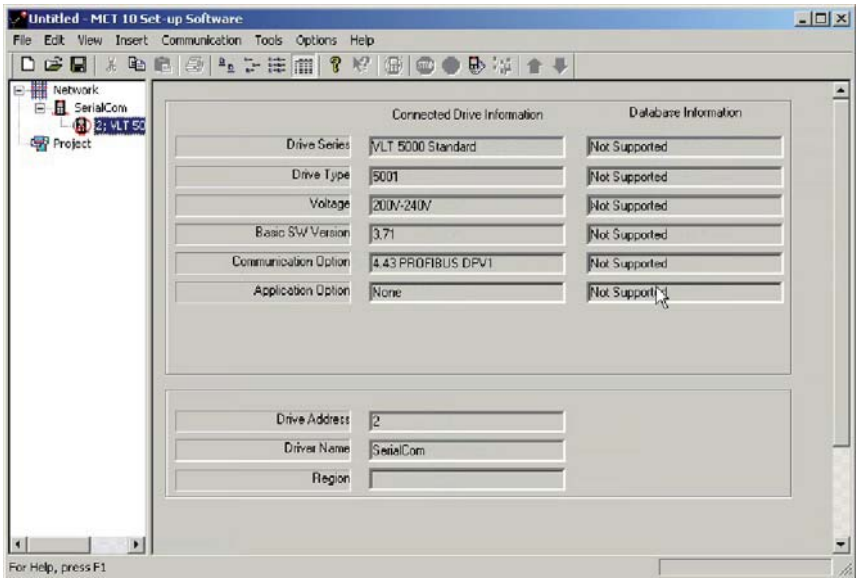




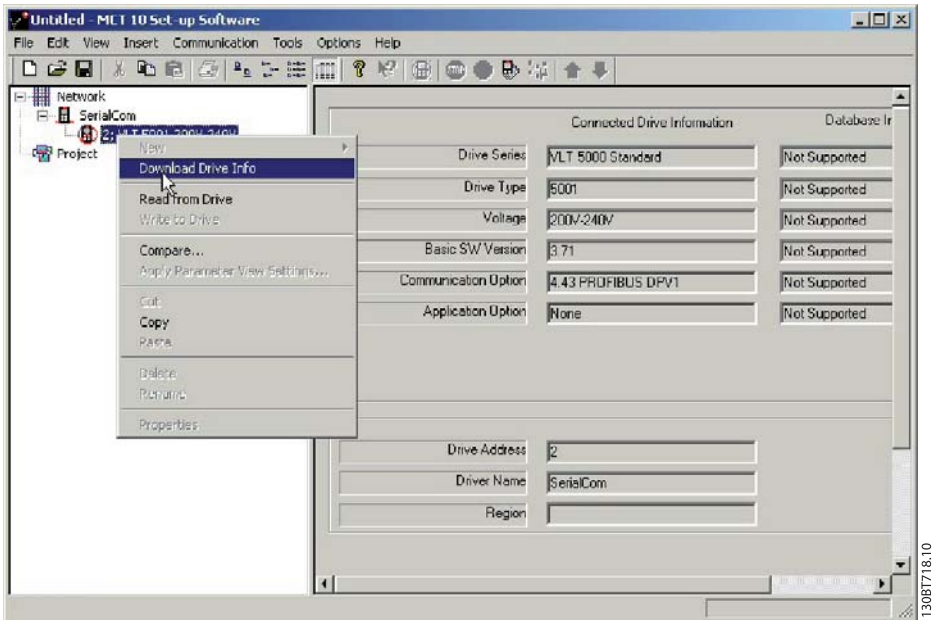
6.6 Read Frequency Converter Database

In the event that the MCT 10 Set-up Software database information is outdated, for example when a drive newer than the software version is introduced to the network, the MCT 10 Set-up Software database can be updated either by download from Internet or when this is not possible, by reading from the frequency converter itself.

When the MCT 10 Set-up Software database for a frequency converter is outdated, the frequency converter icon will be displayed with a red line through it and the Database Information cells will display the message Not supported, as shown:



Update the database by uploading the DLL file as follows:
Right-click on the frequency converter icon and select Download Drive Info.

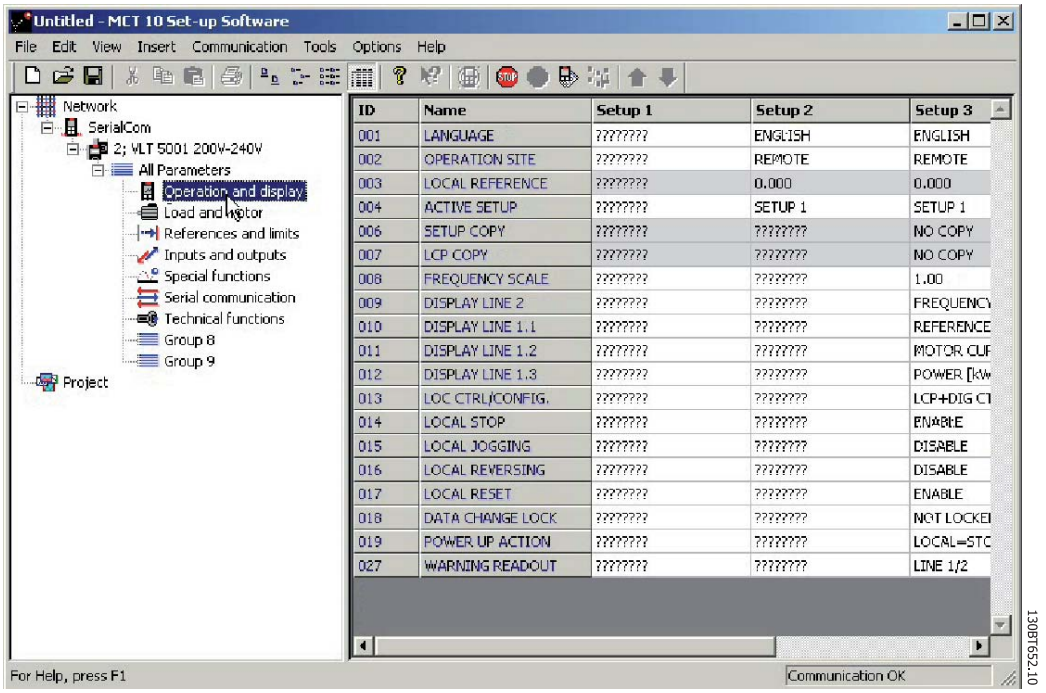


The following message will appear. To read from the frequency converter select Yes and reading from the frequency converter will commence.



When reading from the frequency converter is complete, the frequency converter icon will no longer have a red line through it and the Database Information in the Right View will display settings identical to the Connected Drive Information.

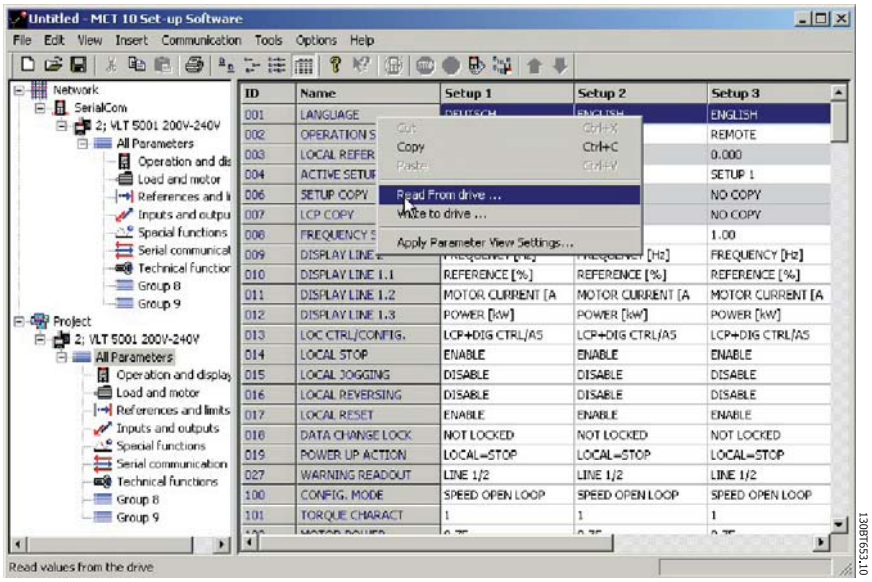
In addition, the parameter settings will be displayed in capital letters.



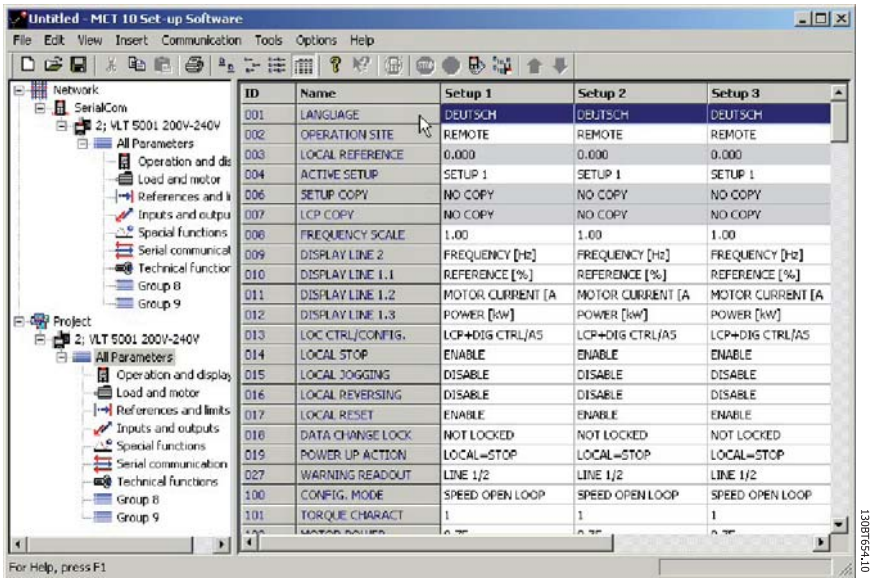
The capital letters indicate data which has been read directly from the frequency converter. Copy the frequency converter from the Network folder and paste into the Project folder to save the data.

NB!
When the data is displayed in capital letters, a change of parameter settings in one set-up will not automatically be transferred to the other set-ups:

In order to ensure that changes in settings are transferred to all set-ups, perform a Write to drive then Read From drive as the final step in updating parameter settings.



The change(s) in setting will then be transferred and displayed in all set-ups.



7 Read/Write between MCT 10 Set-up Software and Frequency Converter

7.1 Reading and Writing Parameters

Parameter settings can be read from or written to an online connected frequency converter. The options for reading from or writing to parameters are manifold.
One single set-up value can be read/written.
All four set-ups of a parameter can be read/written.
A group of parameters can be read/written and so on.

The user performs reading or writing by selecting the value(s) to be read/written and then selecting the *Read From drive or Write to drive* menu.

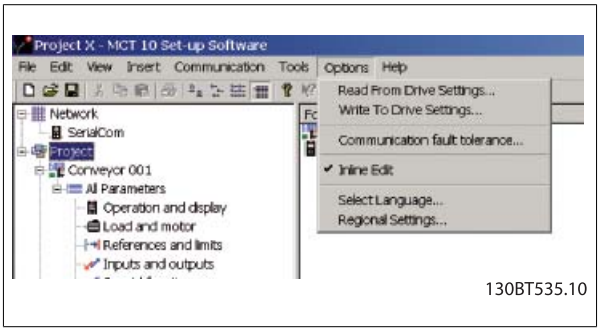
You can select

- A single parameter in the Right View
- All Parameters in the Left View
- One group of parameters in the Left View, e.g. Load and Motor group

and the Read From drive and Write to drive functions will apply to the whole selection.

7.2 Read/Write Settings

Access a range of functions by selecting Options on the main menu bar:



7.2.1 Read From Drive Settings

Select the desired options for reading from an active frequency converter, which will then become applicable for all reading from frequency converter(s).

Include Factory Set-up

If this option is selected, the factory set-up data (i.e. default values) will be included in the data read from the frequency converter. The factory set-up is not always standard, it can be changed, and therefore this can be a useful option when needing to check the actual default values.

Set-ups

Select whether you wish to read only visible set-ups or wish to read all set-ups.

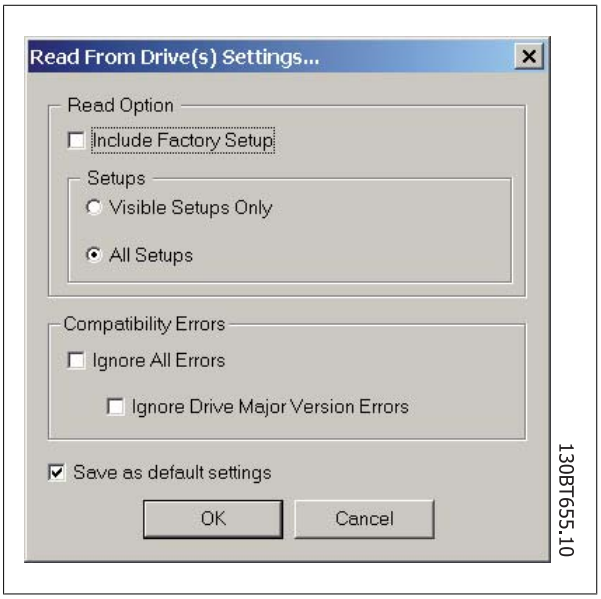
Compatibility Errors

If the field device software is not exactly identical with the MCT 10 Set-up Software version of the device, this is where you can specify what level of compatibility is acceptable. You can choose to *Ignore All Errors*, i.e. ignore all compatibility errors.

Alternatively, if this is unacceptably broad, you can choose *Ignore Drive Major Version Errors* to restrict the acceptable compatibility errors to those occurring in a major software version. Minor version differences such as v3.1 to v3.4 will be ignored, but major version differences such as v3.1 to v4.1 will not be accepted.

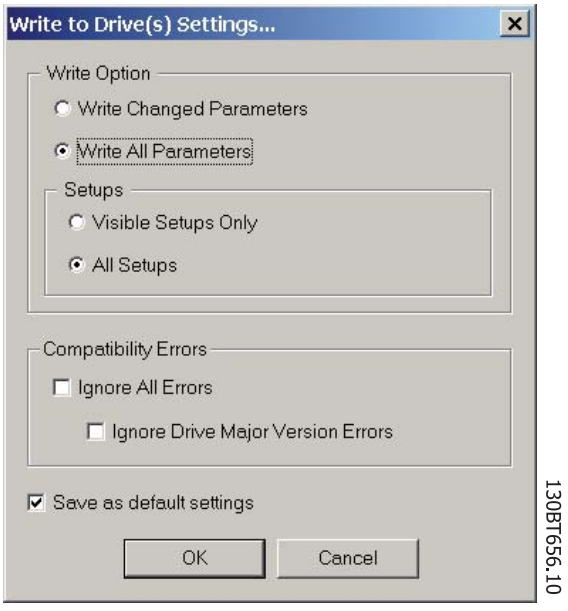
Save as Default Settings

Selecting this option will activate the above settings for all reads from drive.



7.2.2 Write to Drive Settings

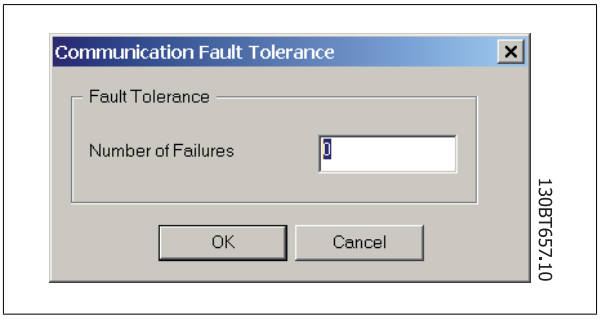
Select the desired options for writing to an active drive, which will then become applicable for all writing to drive(s).



7.2.3 Communication Fault Tolerance

Here you can set up the number of communication faults tolerable before breaking off the connection. The default Number of Failures value is 0 or 1, which in practice is usually too low a fault tolerance for smooth communications, i.e. the connection will constantly be cut off.

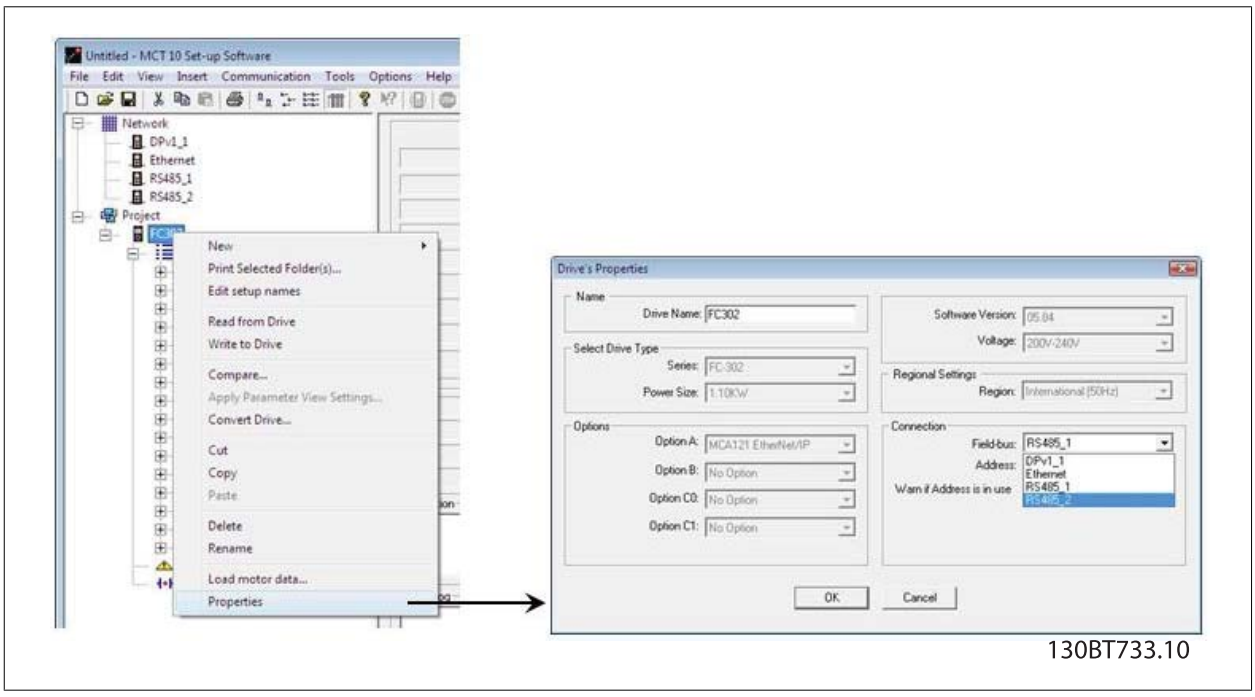
For normal operating conditions, set Number of Failures to 3 to achieve reasonably smooth communications. For operating conditions where the electrical noise level is high, or where the standard of the installation is low, set Number of Failures to 5.



7.3 Connection Properties

To read or write between on- and offline drive(s), the connection properties must be correct configured in the offline project. If the fieldbus do not refer to one available in the Network tree, MCT 10 will not be able to identify the online drive.

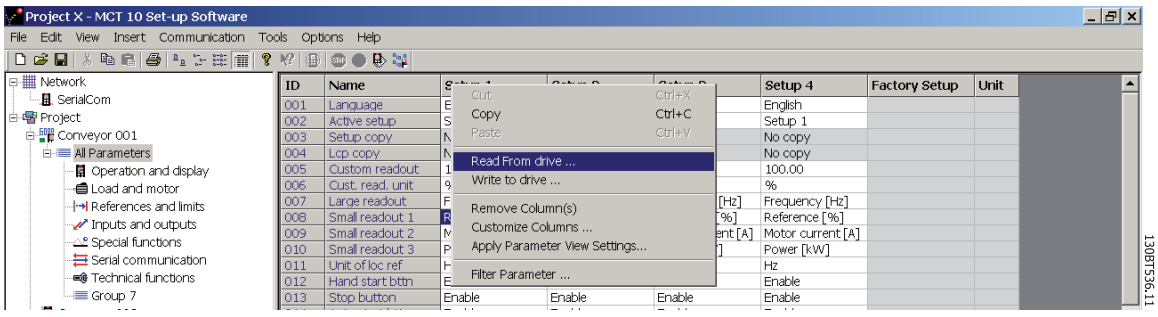
The fieldbus can be reconfigured by right clicking on the offline project and choose Properties.



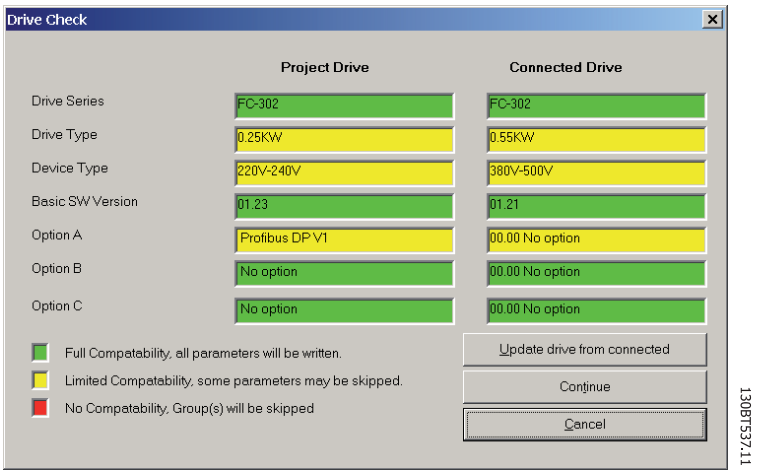
From the Drive's Properties dialog, the fieldbusses added to the Network tree can be configured in the Fieldbus dropdown.

7.4 Read From Drive

Values can be read from an active frequency converter by right-clicking on the desired selection (in this example a parameter column title in the Right View), then selecting Read From Drive.



Once Read From Drive is selected, the software accesses the online device and the Drive Check window pops up, showing the compatibility of the properties of the offline Project drive (where the properties are based on database information) with the online device, i.e. Connected Drive, as in the following example:

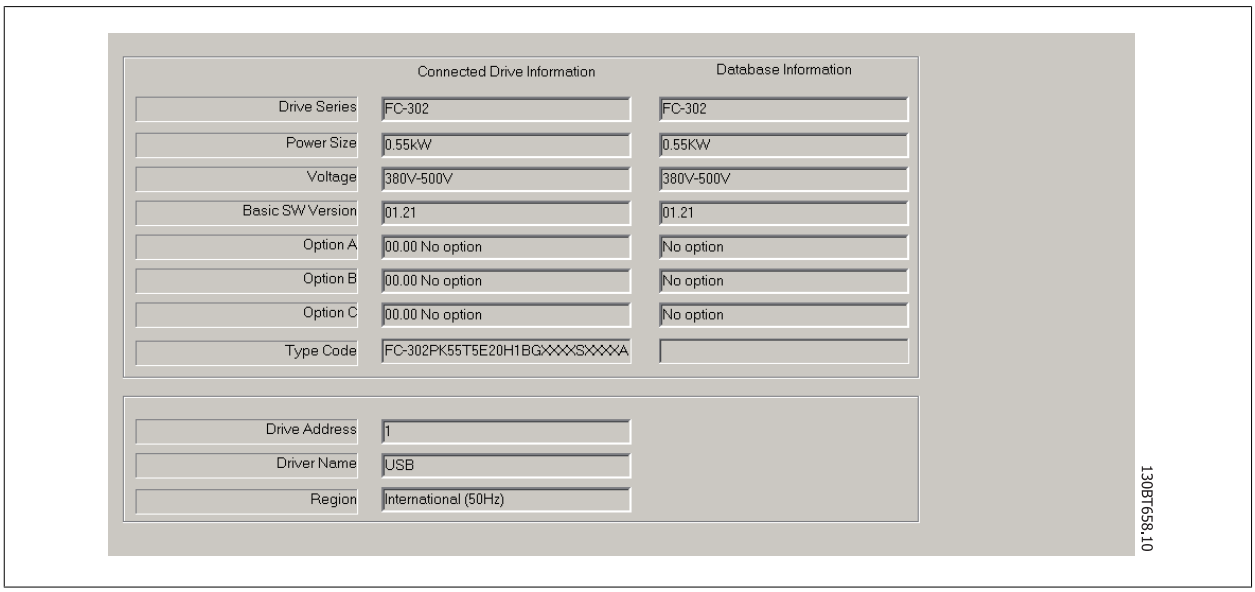


The colour codes indicate the level of compatibility between the theoretical Project Drive and the actual Connected Drive, for each property.

In the Drive Check pop-up you can select one of three options: Cancel, Continue, or Update drive from connected.
Cancel will stop the Read From Drive process, for example if the level of compatibility between Project drive and Connected drive is unacceptably low.
Continue will activate the Read From Drive process to show the properties of the connected drive.
Update drive from connected will activate the Read From Drive process, deleting the data in the Project drive and replacing it with the data from the Connected drive.

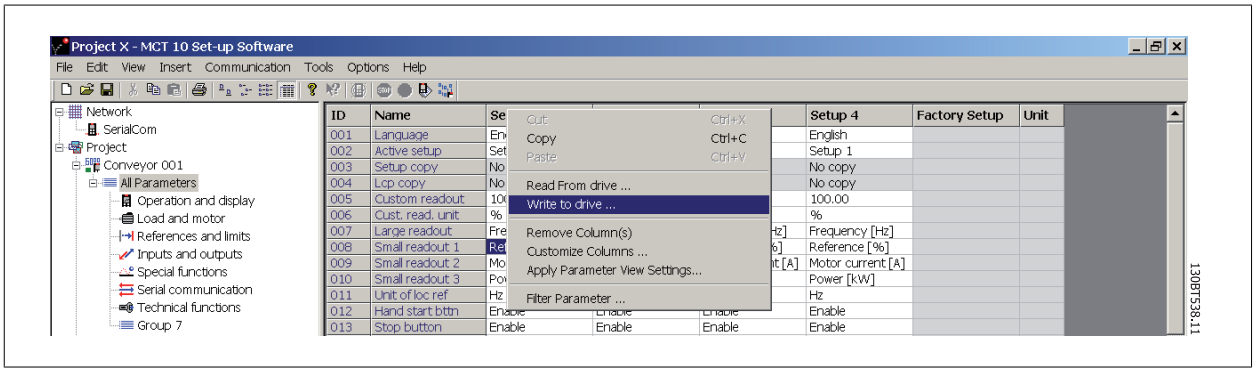
NB!
The Update *drive from connected* selection will cause all information stored in the Project Drive to be deleted and then replaced in the Read From Drive process. If you wish to retain the information entered into the Project Drive, *Continue* is the appropriate selection.

Once the Read From Drive process is completed, the display shows details of both the Connected Drive Information and the Database Information.

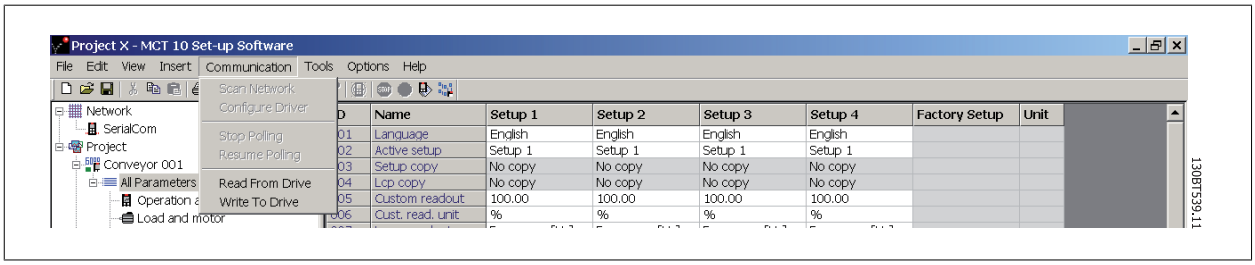


7.5 Write to Drive

Values can be written to an active frequency converter by right-clicking on a parameter column title in the Right View and then selecting Write To Drive.



Alternatively, access Read From Drive and Write To Drive by selecting Communication in the main menu:



7.6 Views

The MCT 10 Set-up Software can be configured by view filters to display parameters in a special way or to display parameters of interest. This is a powerful tool when wanting to maintain an overview of the frequency converter, without becoming confused by irrelevant parameters.
Each set-up can be hidden by removing it. This is done by selecting the set-up in the parameter view and then selecting the remove menu. Changes made to the removed set-up are still stored inside the MCT 10 Set-up Software and can be displayed again by selecting "Customize Columns".
By adding or removing columns the user can decide which information he wants to view.

The actual view can also be made valid for the complete Project or for the Folder only. This allows the user to adjust his view setting quickly for parts or the complete Project.
Another flexible way to adjust the display is via the Filter function.

Just by selecting Change Parameters, the number of parameters displayed is reduced to 5 in this example.

7.7 Scan

Only the USB fieldbus is automatically scanned when a drive is connected to the PC. For all the none plug-and-play fieldbusses, it is required manually to scan the bus for active drives.

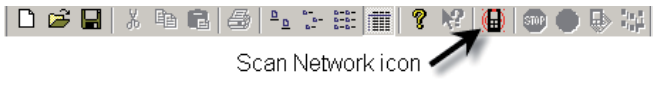
7.7.1 Scan Configuration

You can enter your preferred scan settings by right-clicking on SerialCom
and then selecting Configure Driver.

Adding a Standard bus RS485 or Profibus to the Network tree, the scan range is per default configured 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 three ways:

- Right click on the fieldbus icon in the Network tree and select Configure Bus
- Mark the fieldbus icon in the Network tree and select Configure under Communication on the main menu bar.
- Open the Fieldbus Configuration dialog, right clicking on the Network icon and select Add/Remove/Configure Busses or from the Windows Control Panel.



130BT495.11

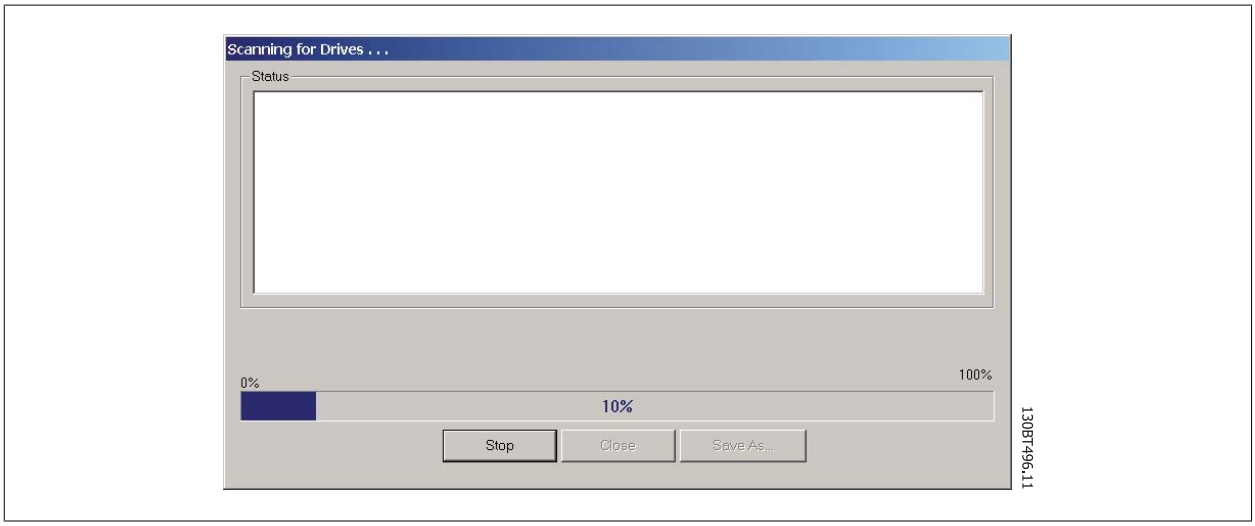
MG.10.R5.02 - VLT® is a registred Danfoss trademark

7.7.2 Scan Network

A fieldbus can scanned in three ways:

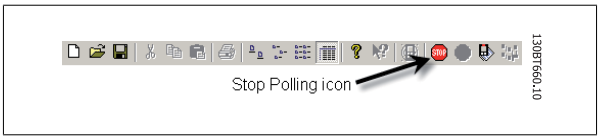
- Right click on the fieldbus icon in the Network tree and select Scan Bus for active Drives.
- Mark the fieldbus icon in the Network tree and select Scan/Refresh under Communication on the main menu bar.
- Mark the fieldbus icon in the Network tree and select the Scan icon on the toolbar.

The Scanning for Drives window will pop up, and will indicate the progress of the scan:



7.8 Poll

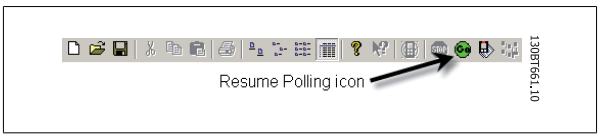
When in Network mode, MCT 10 Set-up Software will automatically poll the parameters in the Right View to continuously update their status to reflect live operation.



However, if you wish to stop polling, for example to freeze and analyse a particular moment, you can do this in two ways:

1. Select Stop Polling under Communication on the main menu bar
2. Select Stop Polling from the toolbar

You can also resume polling in two ways:



1. Select Resume Polling under Communication on the main menu bar.
2. Select Resume Polling from the toolbar:

8

8 Saving Data

8.1 Network and Project Folders

It is important to note the difference between Network and Project folders in the Left View.

Through the Network folder the user gains access to physical devices operating in the field. Here the user can configure the physical frequency converters just as if he were configuring them on the LCD panel of the device. 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 those data saved to the user's hard disk, remote from the field. The Project folder therefore contains offline data.



NB!
Changes made in the Network folder are not automatically saved to the Project folder. That is, the user must actively save changes to his hard disk.

8.2 Changing the Set-up of a Device in the Field

In order to change settings for a field device, the user opens the Network folder and selects the relevant device. The configuration window will pop up, showing where the user sets the scan range, scans for frequency converters and finds the device he is seeking.

The user can stop polling by selecting the stop icon on the tool bar, and then make changes to settings directly in the set-up columns in the Right View.

At this point the changes will be implemented online in the field device, but are not recorded elsewhere.

8.3 How to Save Data

8.3.1 Save Changes to a Hard Disk

To record online changes to a hard disk, select the relevant device in the Network folder. Right-click on the device and select *Copy*.
Select the Project folder, right-click and select *Paste*.
Then select *File* from the main menu bar, and select *Save As*.
The user can then save the device file under the desired title into a directory on his hard disk.

8.3.2 Save a Project

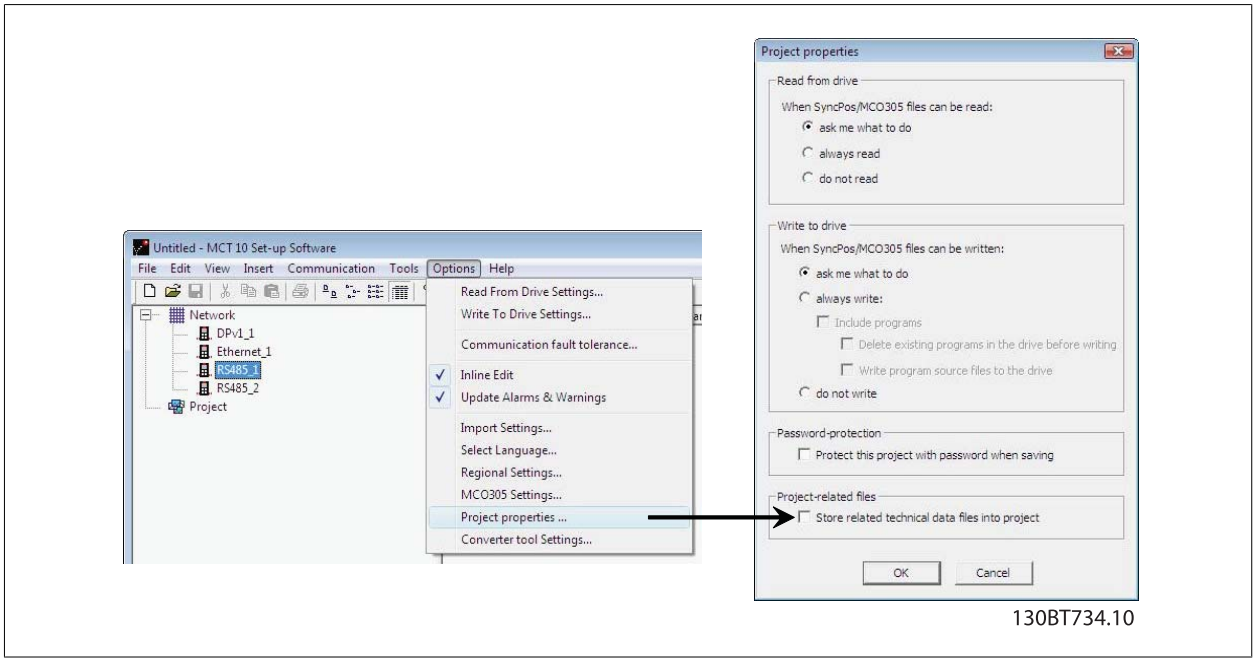
Save a project by selecting *File* from the main menu bar, then *Save*. Alternatively, select the *Save icon* on the toolbar, the third icon from the left.

Include Drive Information
If a project file is open including a firmware version not supported by MCT 10, it cannot be open. Including the drive information in the project file, makes it possible to open in other MCT 10 installations without having the firmware installed. Opening the project file, the drive information is updated similar to:

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

8

The drive information is per default saved in the project file. From Project properties under Options on the main menu bar, the user can setup not the include the drive information in the project file.



8.3.3 Archive / Unarchive

Projects that include links to other documents, can store not only the drives but also 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 will get a copy of the linked files on his computer.

9 SyncPos

9.1 SyncPos Handling

The VLT 5000 and VLT 5000 FLUX series have a SyncPos application option, which consists of a print card with processor. This manual does not describe the SyncPos functionality in detail. For detailed information please consult the separate SyncPos program manual.

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 therefore not require separate handling.

When a VLT 5000 has a SyncPos option installed, the MCT 10 Set-up Software will display two icons upon selection of the frequency converter: an All Parameters folder icon and a separate icon for the SyncPos option. A group 7 series of parameters is incorporated under All Parameters. The group 7 parameters apply to SyncPos.

NB!
MCT 10 Set-up Software has not true support for SyncPos application options ver 1.xx and 2.xx. The Syncpos folder will be available due to the lag of functionality in these initial versions.

9.2 Programs and Configuration File

Select the SyncPos icon and two more folders will become visible. The SyncPos program consists of two main parts: Configuration file (*.cnf) and Program Files(s) (*.m). A configuration file consists of a series of SyncPos parameters which can be programmed. MCT 10 Set-up Software can import or export SyncPos Configuration files. If no Configuration file exists it can be set up.

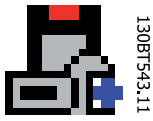
9.2.1 Programs

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 just as in the stand alone SyncPos program. If a SyncPos program already exists it can be imported into the MCT 10 Set-up Software project.



9.2.2 Configuration

Select the Configuration icon to view the available frequency converter configuration file in the Right View. Select the icon for the relevant frequency converter in the Right View to open a new editor (Cam Editor), which is used to change the SyncPos settings. Details of how to use the editor are dealt with in the separate SyncPos manual.



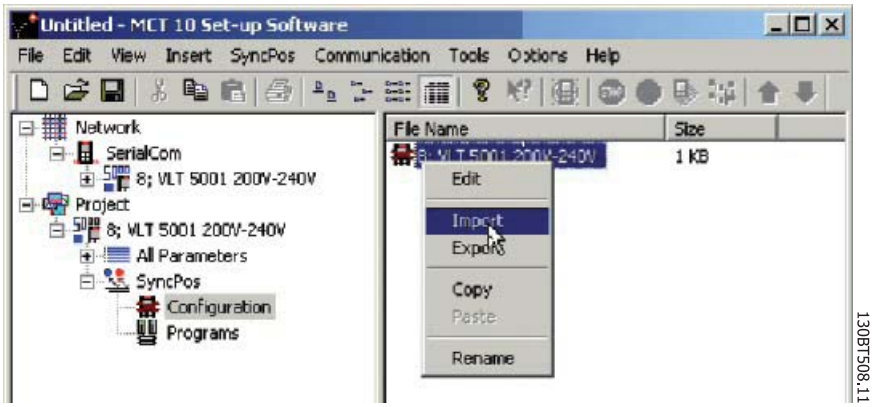
Once the desired settings are made, you can either Compile (under Settings in the main menu) or Exit Program (under File in the main menu).

Upon selecting Exit Program, a window will pop up: SyncPos Application Closed, providing you with two options for how to save and exit, including an explanation. Select Read or Write. A Confirm SyncPos Write (or Read) window will pop up, with two options for saving to the SyncPos card. Mark the desired selection and select Yes or No. Upon selecting Yes, the information will be written to the frequency converter.

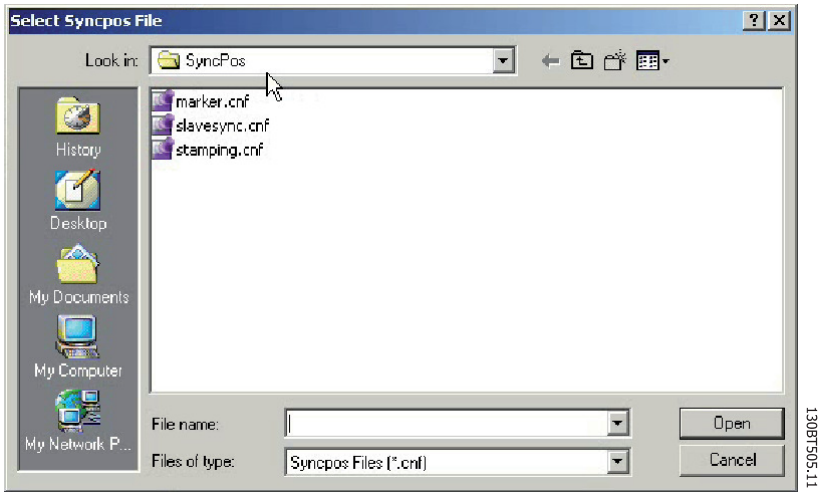
If Write to Drive is selected at the root of a frequency converter, the MCT 10 Set-up Software also writes the SyncPos Files to the SyncPos options. If this function is called, the MCT 10 Set-up Software warns the user for unattended stop of the SyncPos Card.

9.2.3 Import and Export of a Configuration File

To import a configuration file saved elsewhere, for example in another project, to the SyncPos card, left-click on the configuration file displayed in the Right View as shown below.

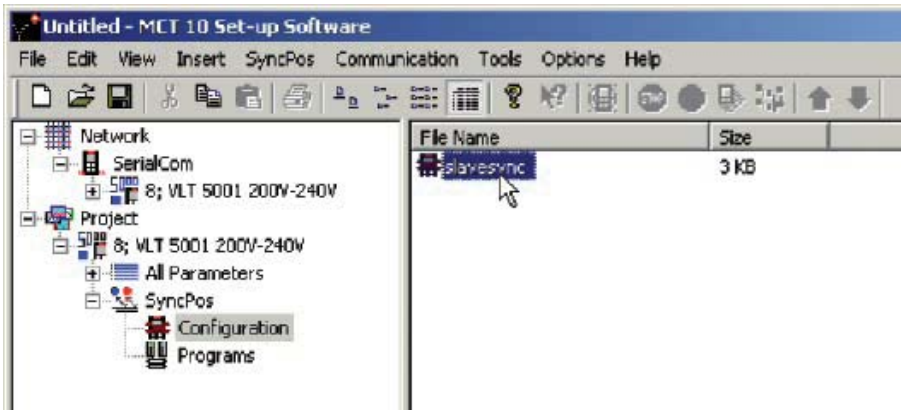


A window will pop up enabling you to select a configuration file for import from your computer directory:



9

Select the desired file, click Open, and the file will be imported to the Configuration folder.



Export of configuration files is performed in the same manner.

9.2.4 Edit and Save Configuration File

View and edit the content of the configuration file by selecting it, whereupon the configuration editor will open.

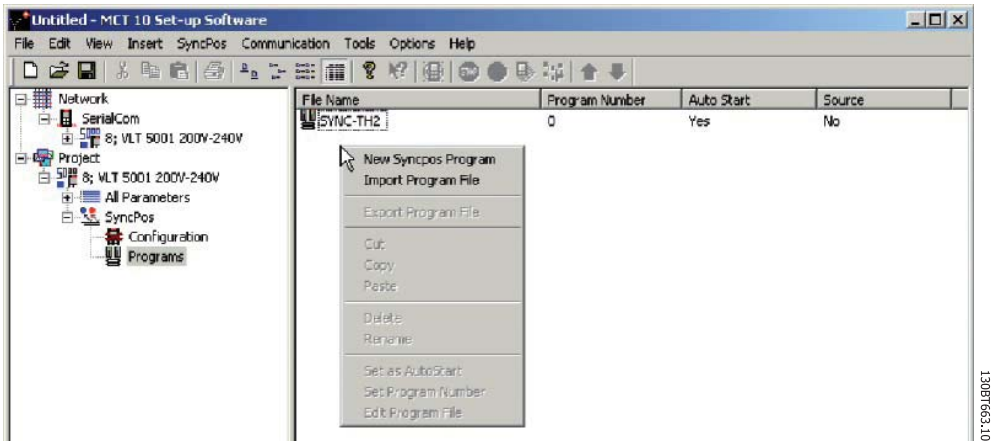
After editing is complete, close the SyncPos application and the following window will pop up:



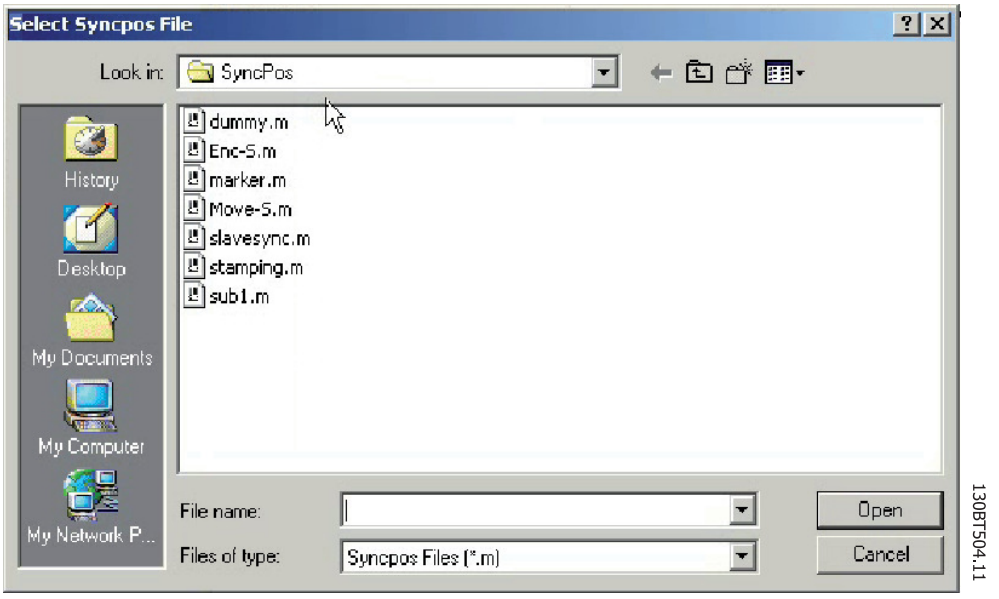
To save your changes, select Read or Write to save changes to the MCT 10 Set-up Software project or to the frequency converter, respectively. Reading or Writing can take some time.

9.2.5 Import and Export of Programs

To import a program to the SyncPos card, left-click on a program displayed in the Right View as shown below.



A window will pop up enabling you to find the desired program for import in the computer directory.

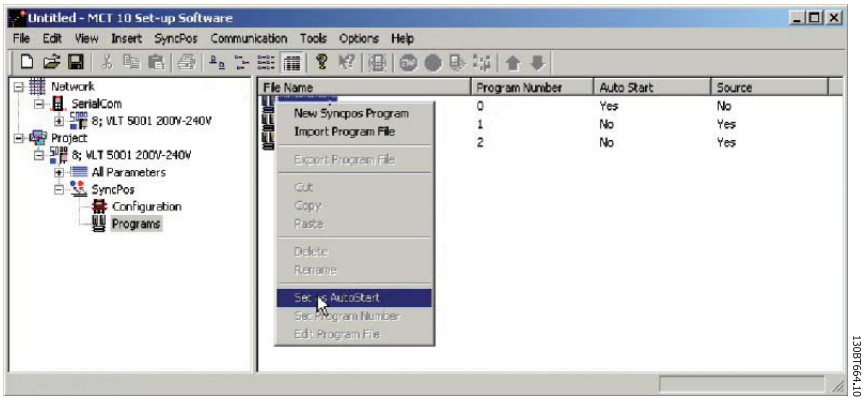


Select the desired program, click Open, and the program will be imported to the Programs folder. The import is now complete.

9.2.6 Autostart

If more than one program is stored in the Programs folder, you can set one of them to start automatically when the device is turned on.

In the Right View, select the program you wish to be the start-up program, and then right-click to select Set As Autostart. The program selected is thereafter indicated with Yes in the Autostart column.

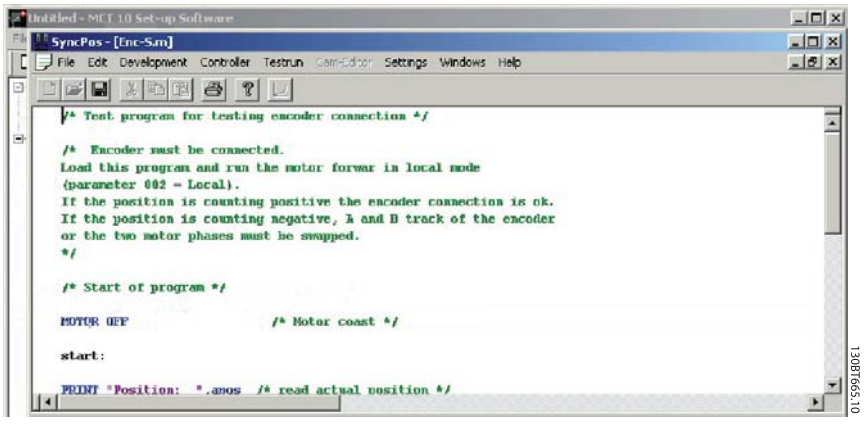


9.2.7 Source Code

Refer to SyncPos manual.

9.2.8 Edit Source Code

Double-click on the program icon in the Right View to view and edit the source code.

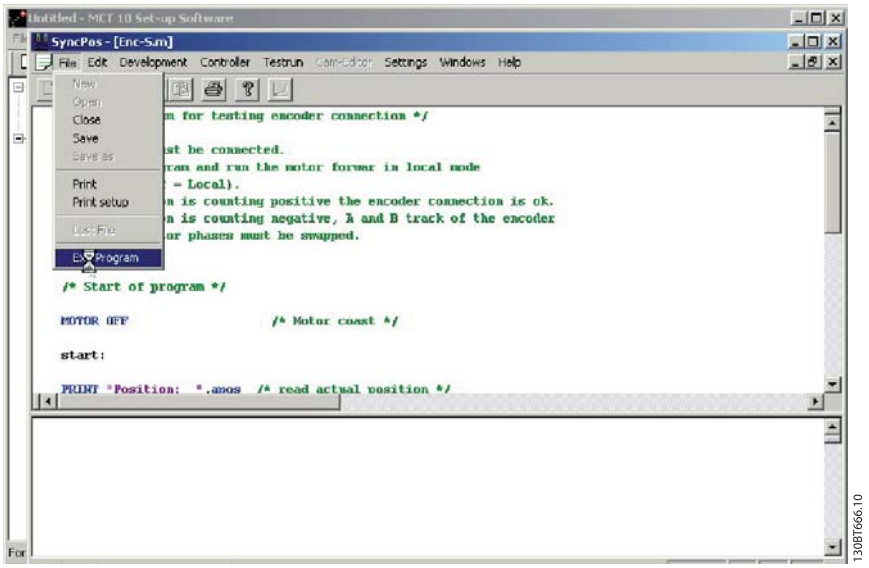


A range of editing operations are possible, described in detail in the SyncPos manual.

9.2.9 Save and Exit Program

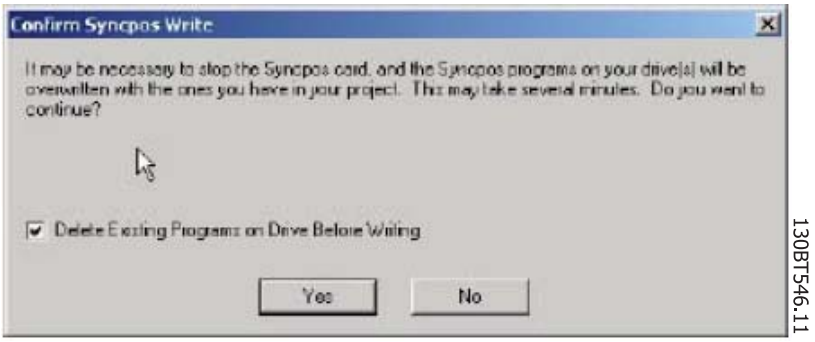
If you wish to save your work when editing is complete, select Save under File in the menu bar. This will save the changes to the program file opened from the MCT 10 Set-up Software project.

To leave SyncPos, select Exit Program under File in the menu bar:



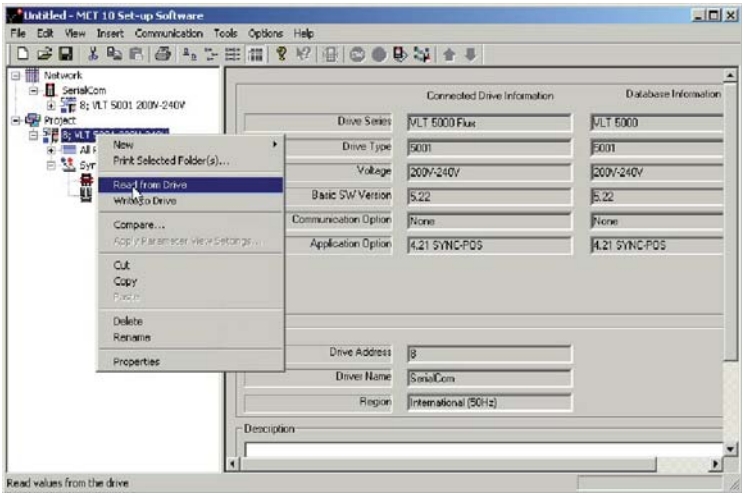
As for editing of a configuration file, a SyncPos Application Closed dialog box will pop up and you should select Read or Write according to the instructions in the box.

NB!
If there are programs in the SyncPos card they will be deleted without further warning.



9.3 SyncPos Read From Drive

Read all parameters and SyncPos files from a frequency converter to a project in one step by selecting Read from Drive. Select the root drive and then right-click to find Read from Drive:



NB!

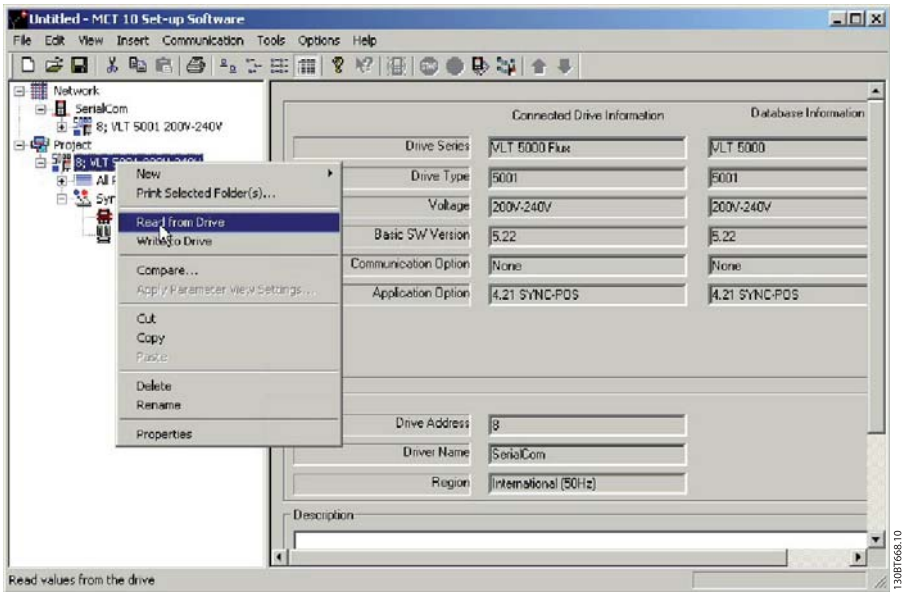
Use this feature with caution. Files in the project can be permanently lost. The following warning will appear, explaining that files of the same name will be permanently overwritten:



If you select Yes, reading from the frequency converter will commence, and Configuration Files and Programs from the frequency converter will be saved to the Project.

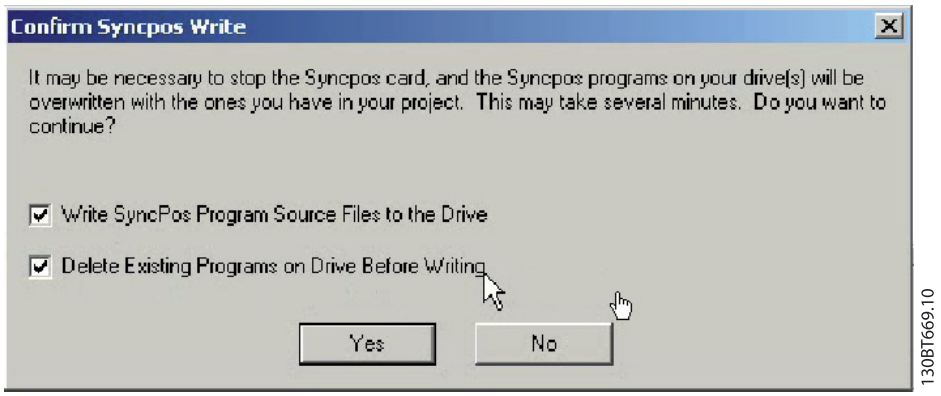
9.4 SyncPos Write to Drive

Write all parameters and SyncPos files from a project to a frequency converter in one step by selecting Write to Drive. Select the root drive and then right-click to find Write to Drive:



NB!

Use this feature with caution. If incorrectly used, files on the drive can be permanently lost. The following warning will appear, explaining that files of the same name can be permanently overwritten:



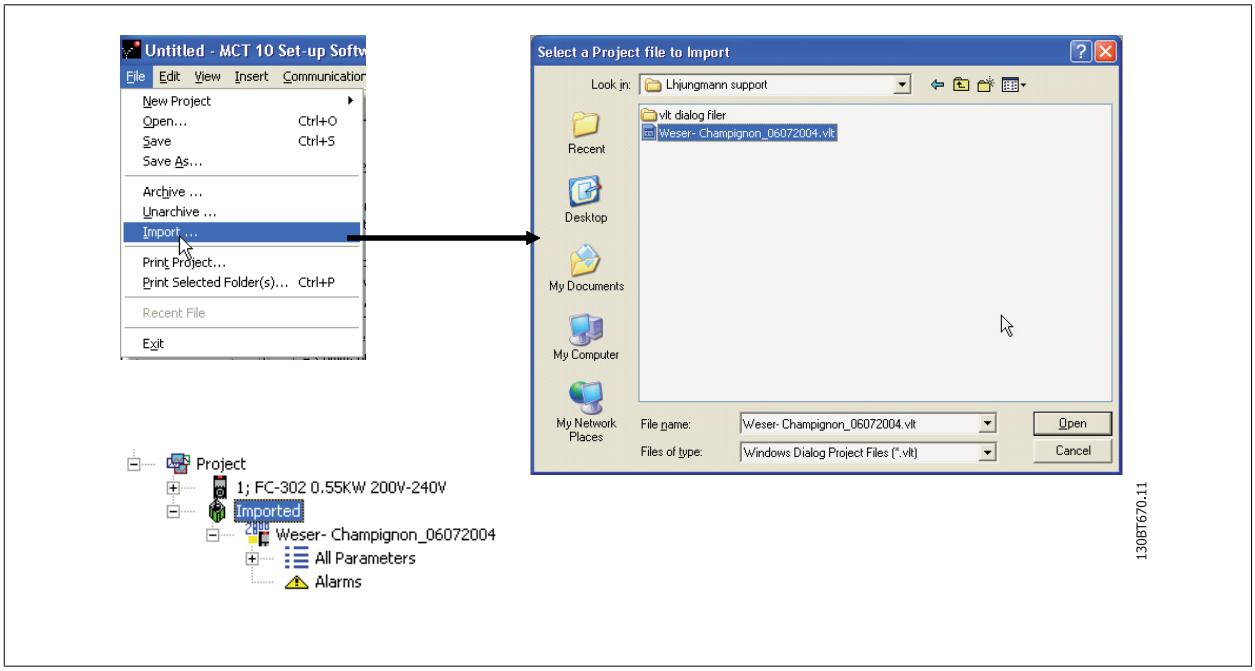
Choose the settings you require. Then to write, select Yes. For the above settings, the existing programs will first be deleted, and then the SyncPos Program Source Files will be written to the frequency converter. Once the write is complete, you can check the contents for the Network folder to confirm that the Write to Drive was successful.

10 Import of Files

10.1 Import of Older Dialog Files

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

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



Due to limitations in some of the former PC tools some functionality is not importable. Functions such as displaying changed values only, are not available in MCT 10 Set-up Software.

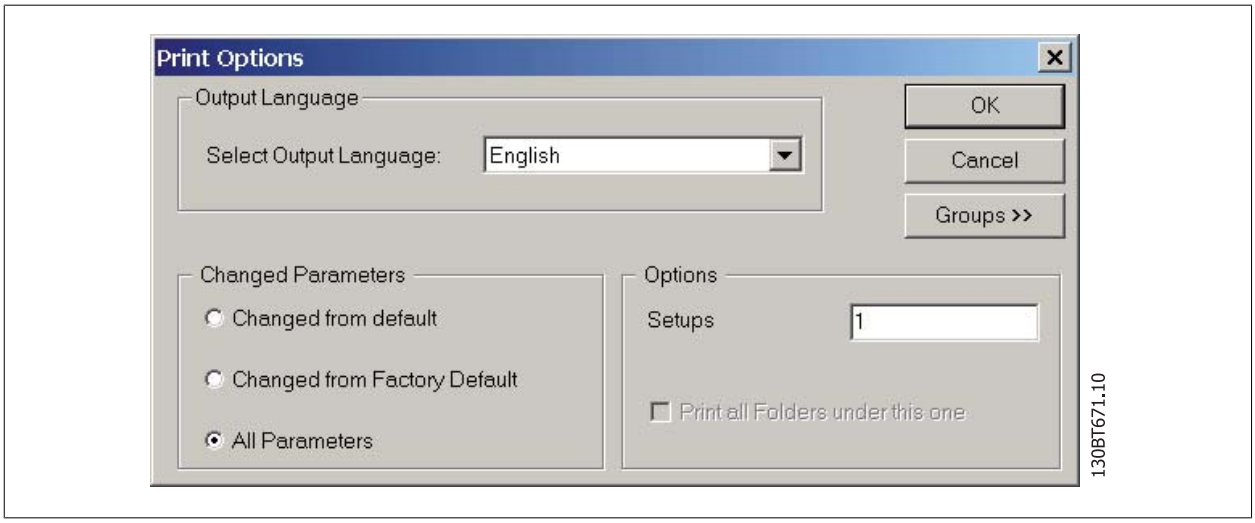
11

11 Printing

There are two options for printing from MCT 10 Set-up Software: Print Project or Print Selected Folders.
Both options are located under File in the main menu bar.
Alternatively, Print Project can be selected by right-clicking on the Project icon. Print Selected Folders can be selected by right-clicking on the icon for a folder within the Project.

If you wish to print parameter settings for an entire project, select Print Project.
If you wish to print parameter settings for part of a project, select Print Selected Folders

The following dialog box will pop up:



In this box you can set the options as follows.

11

11.1.1 Output Language

Select the desired print language from the list, which appears by left-clicking on the default language displayed.

11.1.2 Changed Parameters

Select this option to print all parameters, or if you only wish to print the parameters which have changed. Select between parameters

- Changed from default
- Change from factory default
- All parameters

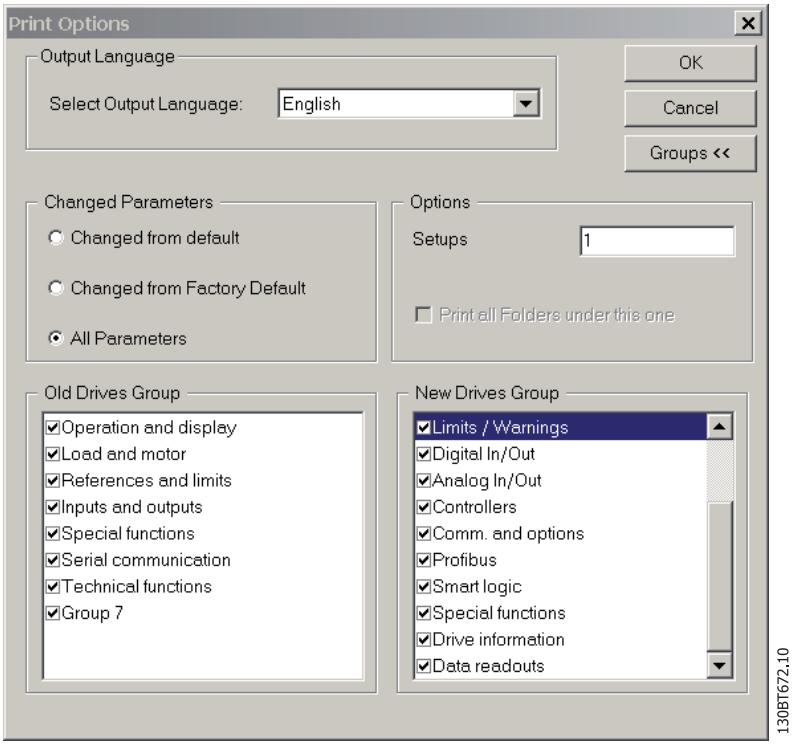
Make your selection, and then press ok for printing to begin.

11.1.3 Options

Specify which set-up you wish to print.

11.1.4 Groups

You can choose to print only selected parameter groups.
If you select Groups >> the Print dialog box will expand to look like this:



Make your selection of which parameter groups to print.

To return to the original unexpanded Print dialog box, select Groups <<.

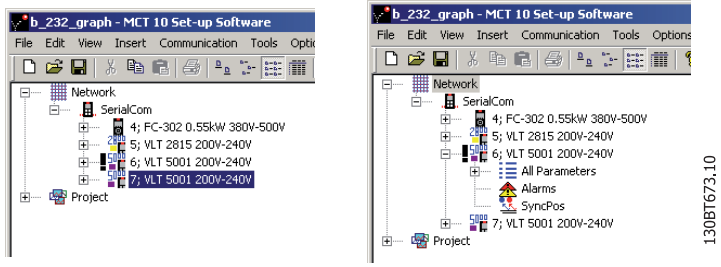
To print, select OK.

12 Alarm, Warning and Fault Log Readout

From Version 2.0, MCT 10 Set-up Software supports the feature of reading out the alarms, warnings and fault logs of the online frequency converters. This allows the user to quickly locate alarms and warnings in the connected drive system, and investigate the fault log for previous trips. This feature also allows the user to gather and store events in the project file for later evaluation or the project file can be sent to a remote specialist for further investigation.

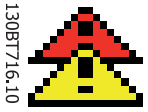
12.2 Localisation of Alarms and Warning

After a complete scanning of a Drive Network, the MCT 10 Set-up Software indicates if the connected drives have active warnings or alarms. Both warnings and alarms are indicated by a ! sign in front of the drive icon. A missing ! indicates that no alarms or warnings are present at the time the Network was scanned.
The picture below shows a small network with four drives, where the VLT 5000 at address 6 has an active Alarm or Warning.

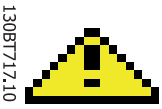


By selecting the + sign the view of the VLT 5000 is expanded. In this view the user has the active alarm/warning icon, which is represented by the double triangle icon. The single triangle icon indicates no warning/alarms.

Active Alarms/Warnings

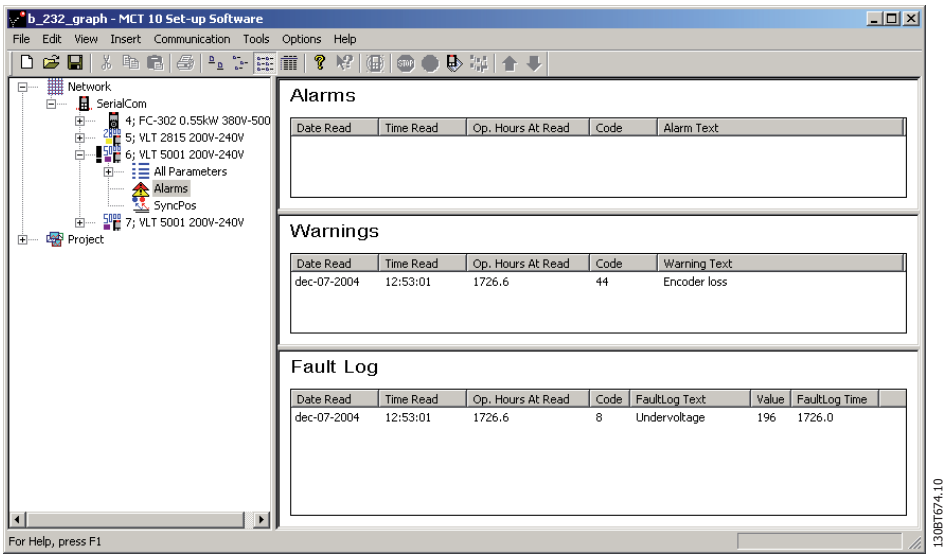


No Active Alarms/Warnings



12

Selecting the active alarm/warning icon will split the right view into three main areas:



The alarms and warnings are displayed at the top of the Right View. Both views consist of five columns. The first two columns are the date and time of the PC at the time the information was read from the drive. The third column is the Drives Operating Hours counter. Column for is the code for the warning/alarm. For a more detailed description of the code, please consult your Operating Instructions for the particular drive. The last column is the warning in clear text.

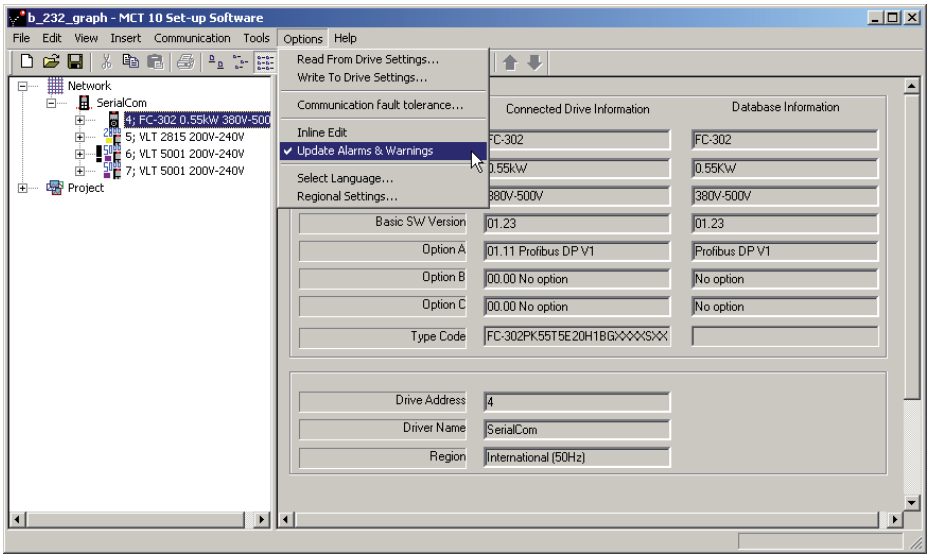
In case of a trip the drive stores the reason for the trip in a fault log buffer. The log consist of three values; code, value and time. When MCT 10 Set-up Software reads the fault log it displays the PC's time and date at the time where the log was read.

NB!

Since the drives do not have a built-in real time clock, the actual time of when a fault occurs can only be estimated. This requires that the user knows exactly the total amount of time in which the drive has been disconnected, between the time the fault occurred and the time the loggings were read.

12.3 Handling Alarms/Warnings in Project Files

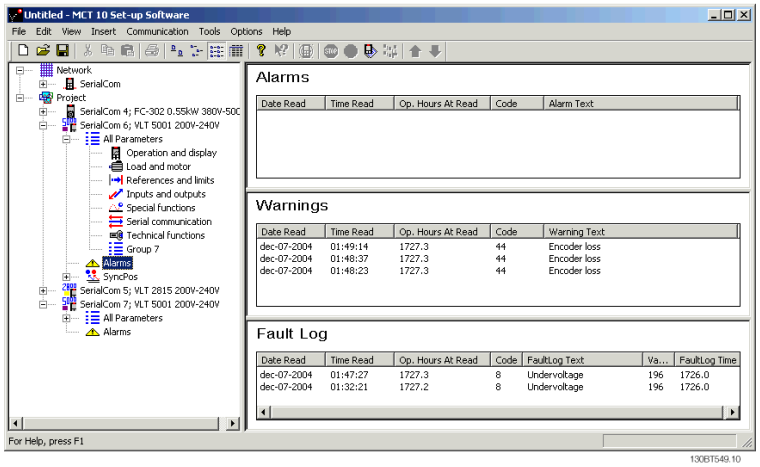
Before alarms/warnings and the fault loggings are stored into the Project File, the user has to enable this function in MCT 10 Set-up Software. This is done under the main menu Options Updating Alarms and Warnings. By simply adding the checkmark, the MCT 10 Set-up Software now automatically reads the alarms, warnings and fault loggings at every read from/write to the drive.



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12.4 Handling the Alarms and Warning Loggings

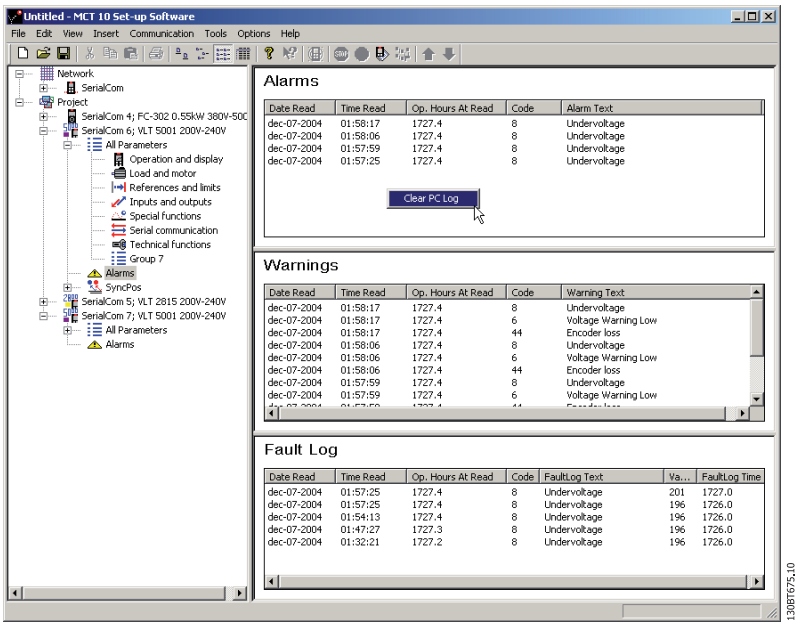
Every time the MCT 10 Set-up Software reads from or writes data to a connected drive the loggings are updated. Since the drive has no real time clock built-in there is no way to evaluate if a fault has occurred only once or if it has occurred twice or more. Due to this behaviour in the drive, MCT 10 Set-up Software consequently stores active alarms and warnings in the project file at each read/write command. These functions ensure that no alarm is lost, but can lead to a situation where one alarm has multiple entries in the log.



130BT549.10

12

MCT 10 Set-up Software stores space for more than 200 alarms and warnings for each drive in the project. The loggings can be individual cleared. This is done by entering the loggings you wish to clear, and right-click with the mouse. Clearing the log only clears the PC log, the drives onboard information is unaffected by this handling.

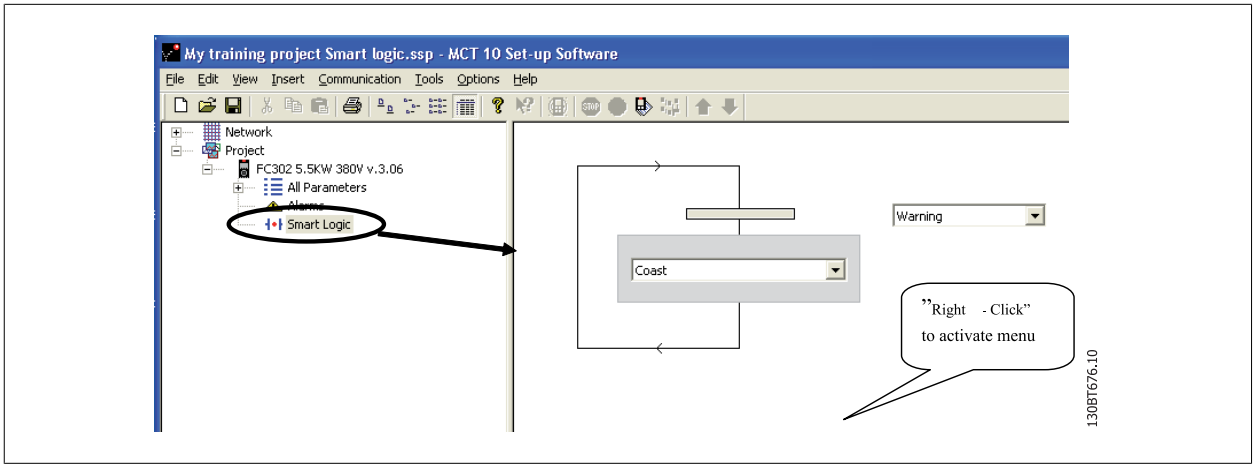


12

13 Smart Logic Controller Plug-in

13.1.1 Smart Logic Controller Plug-in

From Version 2.13, MCT 10 Set-up Software supports the Smart Logic Controller Plug-in for the AutomationDrive series. This feature enables the user to do very quick set-up of logical sequence programs by means of a graphical user interface, instead of setting up each single parameter by hand.



This plug-in is easy to use, and items can be added, just by performing a right-click in the sequence tree area.
It is recommended to consult the AutomationDrive's Design guide to get a full overview of the Smart Logic Controller features.

One of the great advantages of the built-in Logic Condition Controller is its easy-to-use programmability. You can easily configure it without previous training and it enables a host of advanced functionalities.

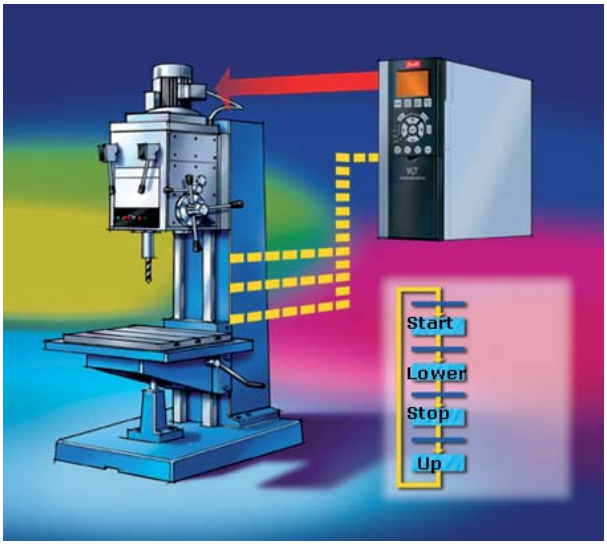
The condition controller is a simple, but at the same time very clever way to have your drive, motor and application work together. The principle is this: The controller monitors a pre-determined event. When the specified event occurs, it performs a pre-determined act and starts monitoring the next predetermined event – and continues that way in up to twenty different steps until it returns to step one – monitoring the first specified event.

The logic controller is able to monitor any parameter that can be characterised as "true" or "false". This includes digital commands and also logic expressions, which allows sensor outputs to determine the operation. Temperature, pressure, flow, time, load, frequency, voltage and other parameters combined with the operators ">", "<", "=", "and" and "or" forms logic expressions that controls the drive logically in any application. That is why Danfoss calls it a "logic" controller.

- Makes the drive act according to your specific application
- Standard feature
- Simple to programme
- Easy to correct
- Program via MCT 10 Set-up Software or LCP

13.1.2 Components Simple to Learn

- Comparators
- Logic rules
- Events
- Actions
- Done!



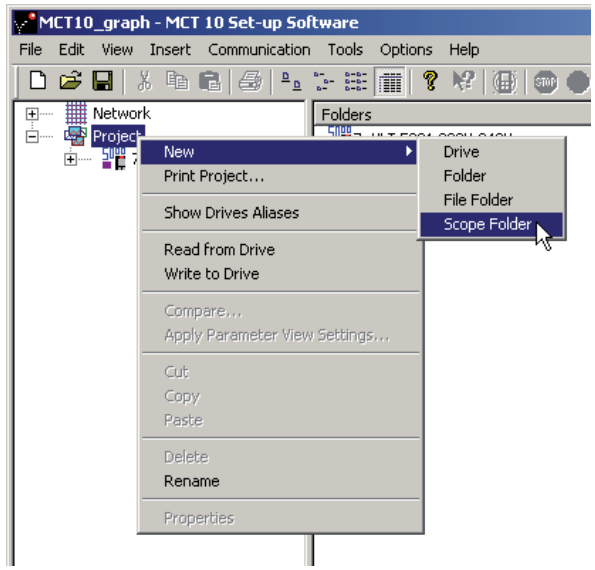
14 Scope Function

14.1 Introduction to the Scope Function

In many situations the use of viewing a variable as a curve provides a better and faster way to understanding your system. Curves also give you the possibility to graphically evaluate if a system is unstable e.g. PID loops.
Many faults that exist in a very short time (e.g. over current) can also be traced by this function, and thus be a valuable feature to the user.

14.2 Activating the Scope

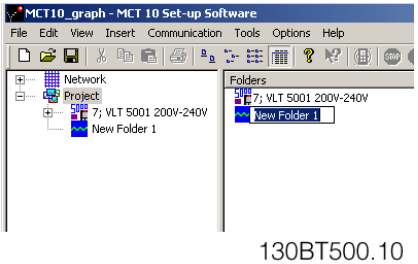
The Scope is inserted like a new File folder or a new Parameter Folder, by right-clicking the mouse cursor over the Project Folder, Drive Folder or a drive.

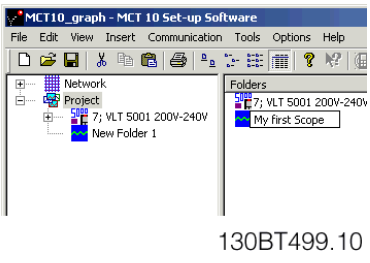


The Scope folder can be inserted at any place, under the Project, under a Drive folder or under a drive. There are no limitations related to the place where a Scope is inserted. As soon as the Insert new Scope folder has been selected, the icon is inserted.



The default name of the Scope folder can be renamed.





14.3 Channel Types

Using the scope function in MCT 10 Set-up Software gives by default the possibility to use two different channel types, depending on what the actual drive supports.

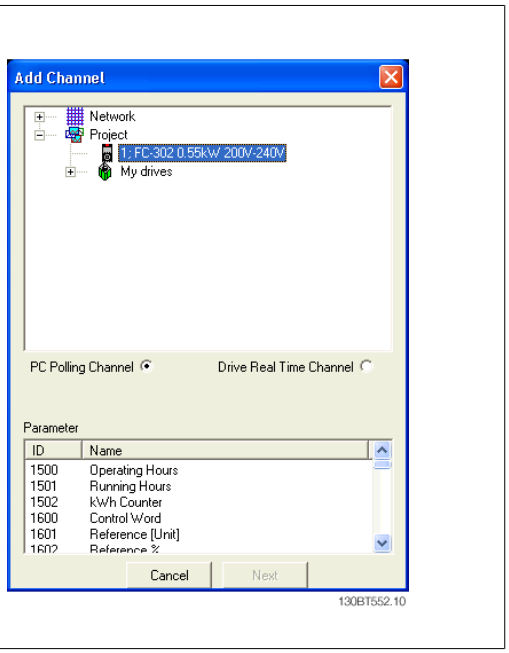
The normal channel is selected as a PC polling channel, a channel where the PC-SW itself request values from the drive to, through this channel.

The second channel type, which for instance is available in specific FC30x drives, is called Drive Real Time Channel. This channel is started when filling up a buffer in drive, the data here can be set up with a very precise sample-rate. The rate is depending on what the single drive supports.

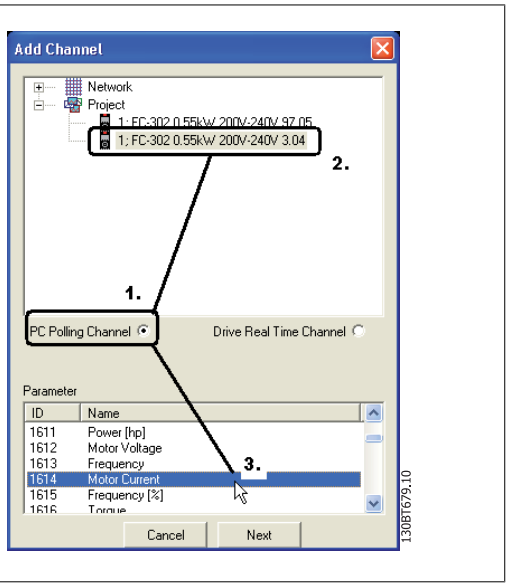
14.4 Initial "Add Channel" (PC Polling Channel)

The first time you select the Scope Folder, MCT 10 Set-up Software will pop-up with the Add new Channel Box.

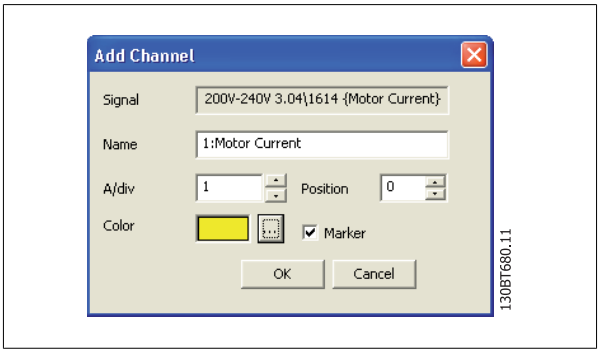
In this Box you will be able to browse your Network for the drives and signal that you want to add to your Scope view. The first task is to select the channel type and to locate the drive that you want to monitor. The default channel type is PC Polling Channel.



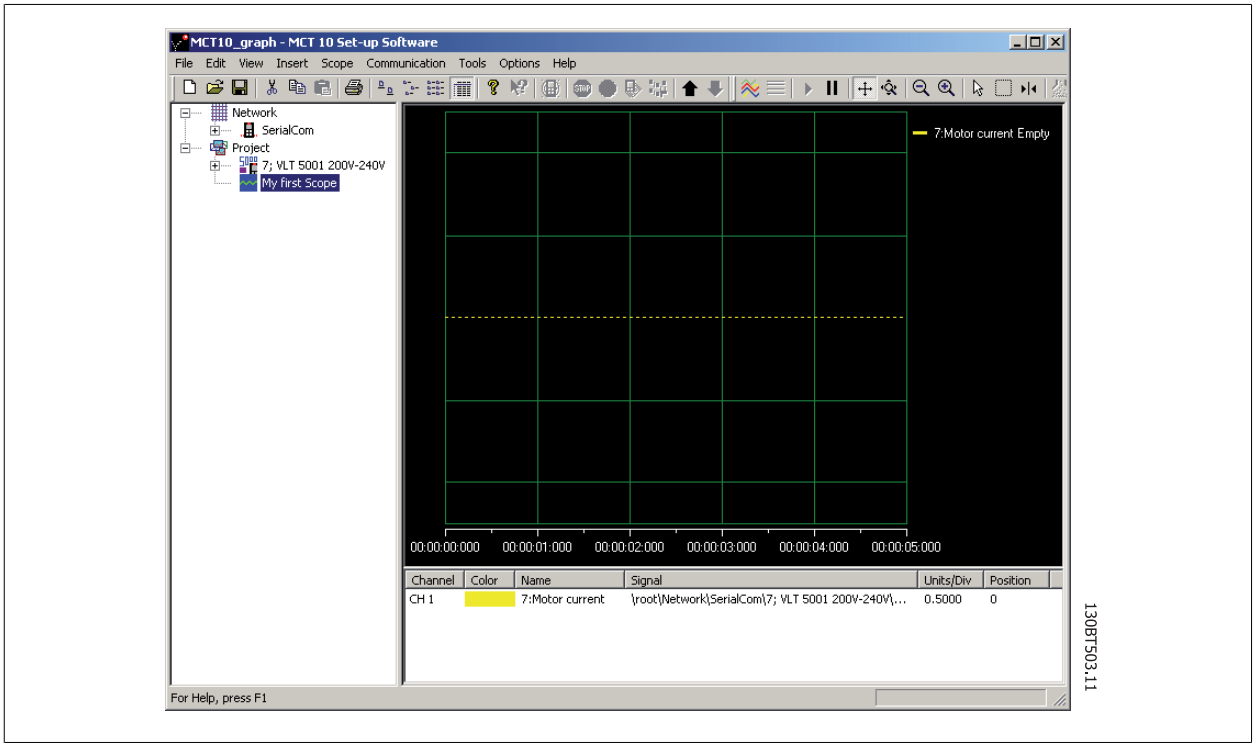
By selecting the drive (2) the available Signals will be shown in the box with Parameter ID number and the parameter name (3). Selecting the Signal and pressing OK brings up the add channel box again, and the setting for value/divisions (in this case Amps/Div) can be set. Setting a wrong value is not critical. MCT 10 Set-up Software stores the values, but the value may not be shown within the visible area. You can adjust the Amps/Div later to fit the level inside the visible area without losing information.



The position number is vertical Zero line (on the Y Axis). If you have many signals on top of each other it is useful to have them plotted apart. The marker allows you to differentiate the different curves in a black and white printout. Each curve gets a marker as box, triangle, cross etc. Colour sets the colour of the curve.

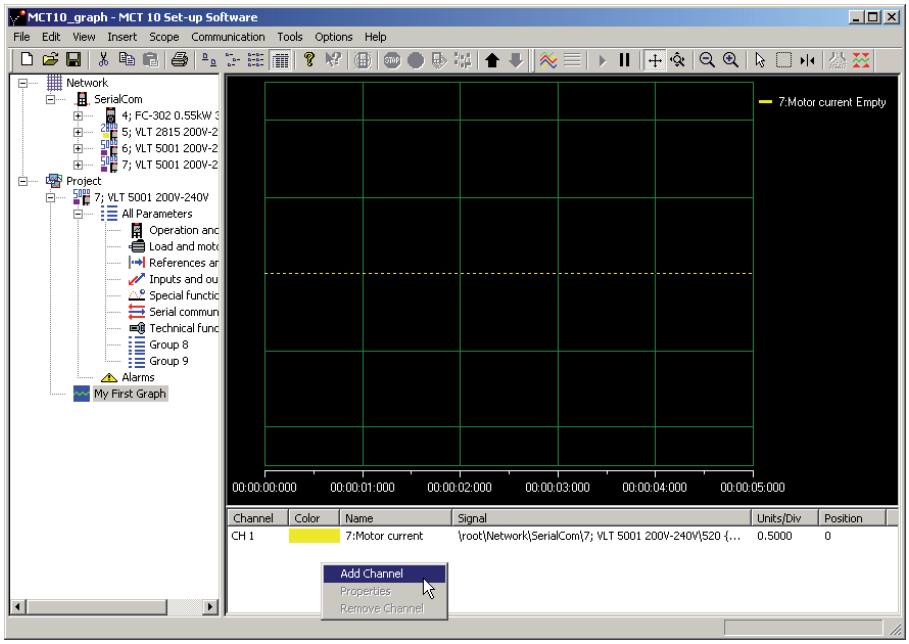


The selection done by now, gives the following graph window:



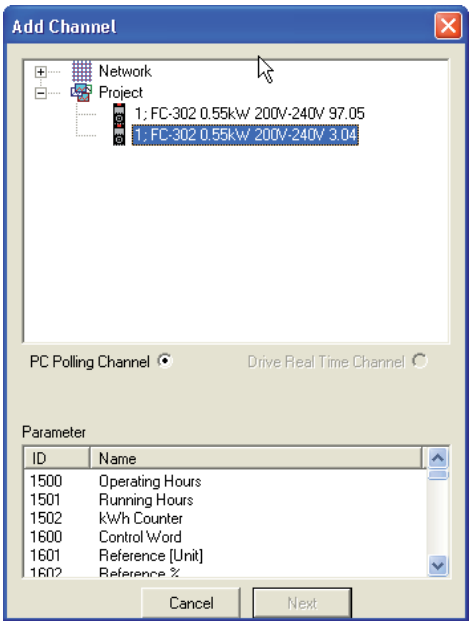
If more channels are needed, the user can insert more channels by right-clicking the mouse cursor in the channel box:

14



130BT502.11

This will activate a new Add Channel Box, which will be handled like the first channel insert.

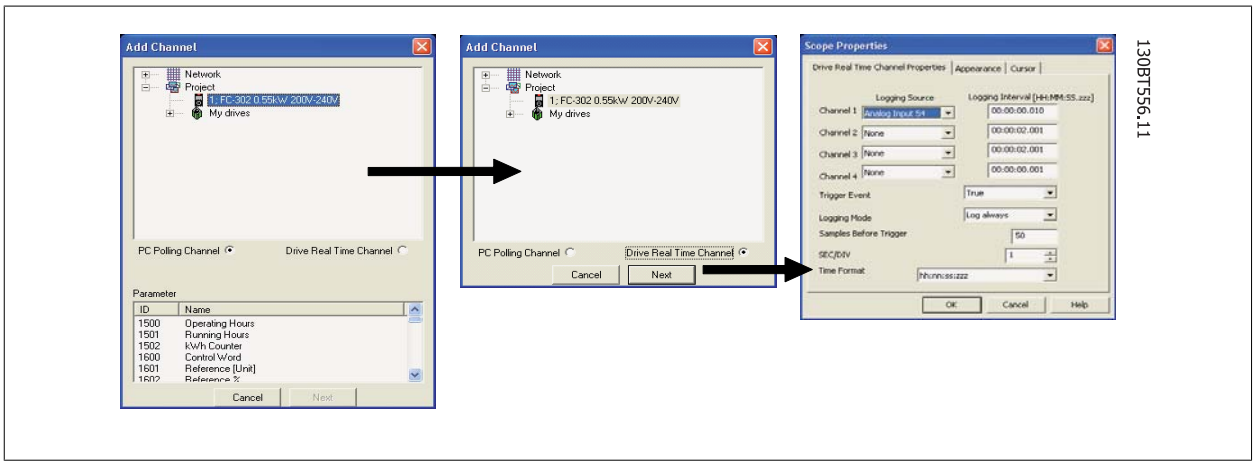


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14

14.5 Initial "Add Channel" (Drive Real Time Channel)

The first time you select the Scope Folder, MCT 10 Set-up Software will pop up with the Add new Channel Box.

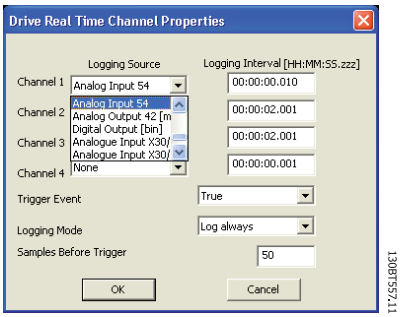


In this box you will be able to browse your Network for the drives and signal that you want to add to your Scope view.
The first task is to select the channel type and to locate the drive that you want to monitor. The default channel type is PC Polling Channel, which must be set to Drive Real Time Channel.

By selecting the drive and Drive Real Time Channel, the scope properties dialog will be shown. In this dialog it is possible to set up a specific number of channels, depending on what the actual drive supports.

In this example four channels can be configured. In the selection lists under the Logging source column, the available signals will be shown by parameter name. In the logging interval column, the sample rate for the channel can be set.

The trigger set-up is in this example set up to be in continuous mode, which will have the drive to read data into its internal buffer continuously. The Samples before Trigger can in this example be ignored.

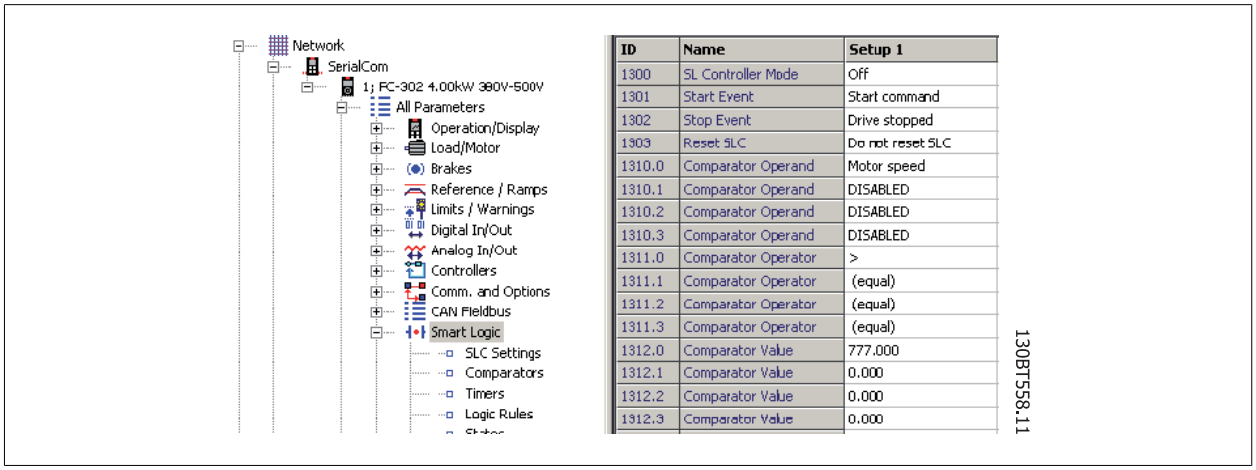


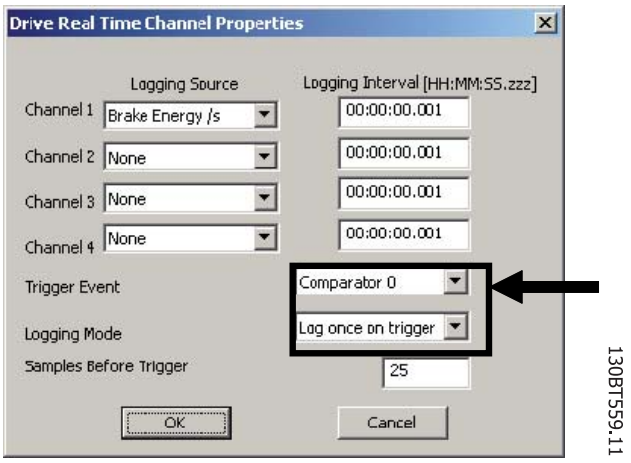
14.6 Using Advanced Triggers in a "Drive Real

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.

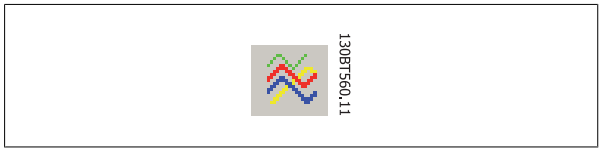
First we need to set up a comparator in the Smart Logic Control in order to be able to have a trigger signal when the motor speed exceeds a certain limit.

1. Select the Smart Logic group
2. Select a free available comparator not in use, 1310.0, and set it up to motor speed
3. Select Comparator operate 1311.0 to greater than >.
4. Select Comparator Value 1312.0 to the needed value.
5. Set up the trigger event in the Drive Real Time Channel Properties dialog to Comparator 0, and set the Logging mode to log once on trigger. Press OK to enable the set-up.





Now the MCT 10 Set-up Software logging can be started by pressing Start (resume) Poll:



14.7 Communication Control

By now we have pointed out the variable that will be shown. The next vital part of MCT 10 Set-up Software Scope is the control of the Communication Driver. The toolbar of the Scope has four main buttons for the communication.

Start (Data Acquisition):

This icon controls the driver of MCT 10 Set-up Software. By pressing this button the driver of MCT 10 Set-up Software starts collecting the requested data from the drive network.



Stop (Data Acquisition):

The driver of MCT 10 Set-up Software is stopped no communication to the drive network while the Scope part is active on the screen.



Start (resume) all tracking:

Activating the tracking mechanism of MCT 10 Set-up Software starts the readout of variables to the screen and to the buffer of MCT 10 Set-up Software. Variables are checked up against the trigger settings. If the buffer has been partially filled (use of the Pause All Tracking button), MCT 10 Set-up Software will continue to fill data into the buffer.



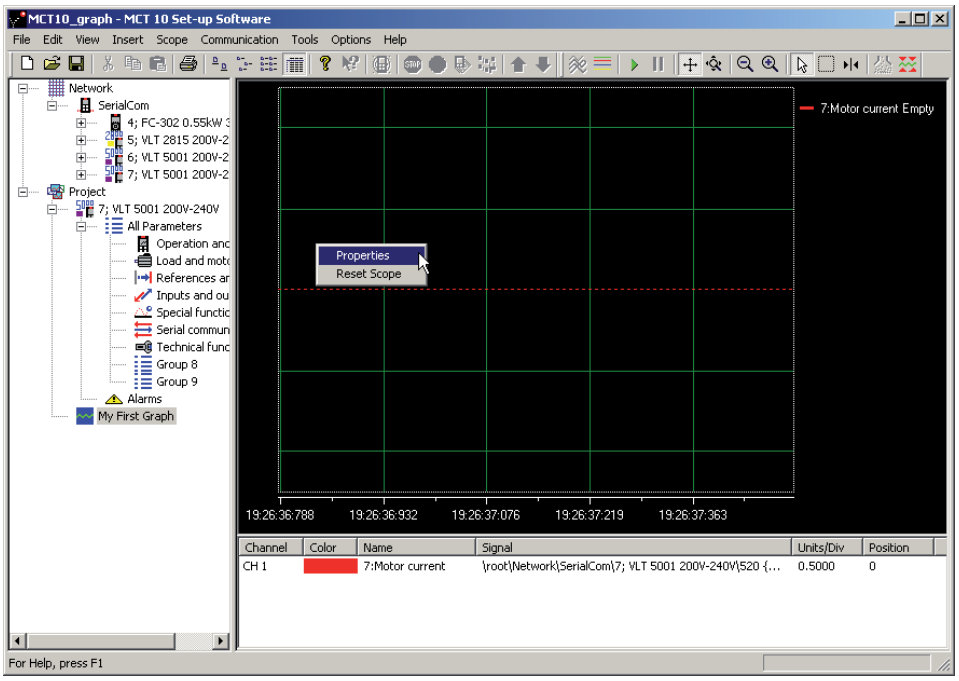
Pause All Tracking:

Deactivates the tracking. Buffer remains at its current state, no new data is entered into the buffer. The buffer pointer keeps its current value. The screen remains at its current state, no new data is visualised.



14.7.1 Additional Settings

The Scope tool has more settings, which can be adjusted by right-clicking on the Scope window, and selecting Properties (depending on channel type the scope properties dialog will differ):

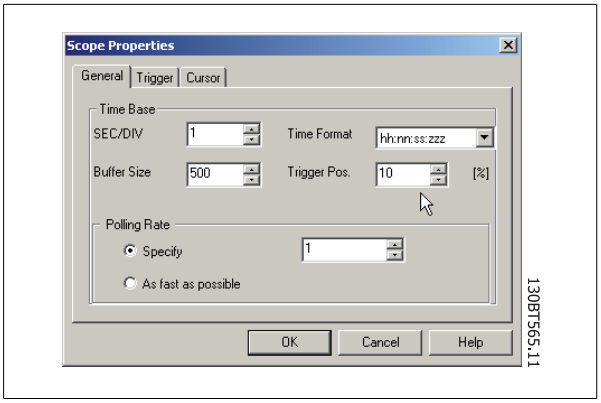


The General tab holds four basic settings for the Scope, seconds per division (SEC/DIV), Time Format, Buffer Size and Polling Rate.

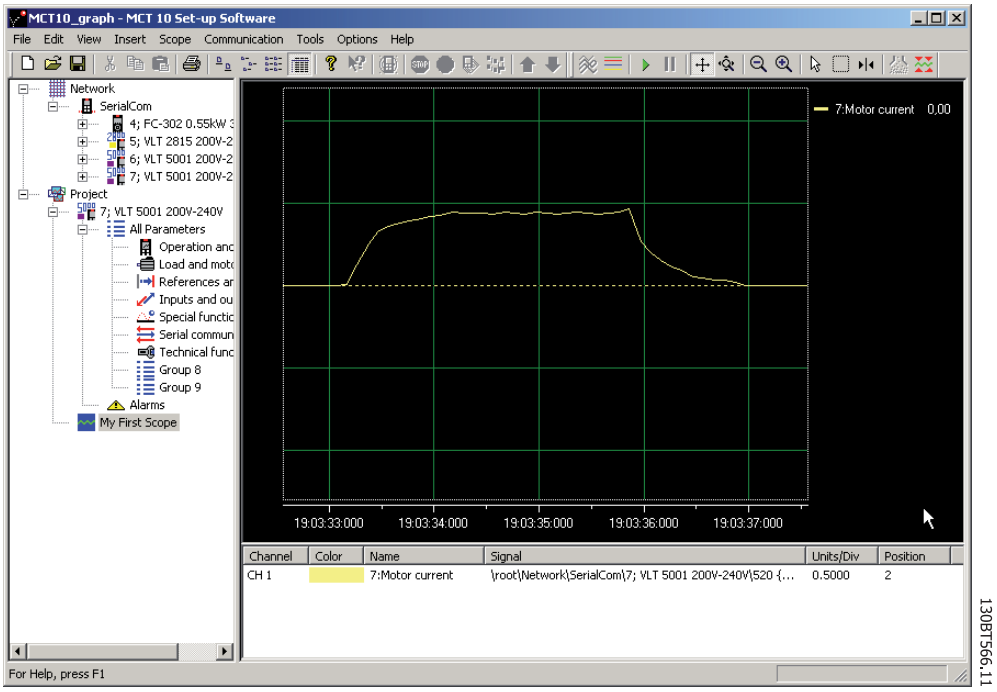
The SEC/DIV sets the time base on the X-axis. The number can be set between 0.01 sec and 100000 sec. Time format can be set to contain year, month, date, hour, seconds and milliseconds in eight different formats. The buffer size is the number of data sets in the buffer. The number can be set to a number between 0 and 1 .000.000

The last of the General setting for the Scope is the Polling Rate. Polling rate is time in milliseconds between two samples.

For systems with large inertia a high time may be used, since the value changes slowly. For systems with low inertia a high polling rate (low time between the samples) is needed. Setting the polling rate to As fast as possible, lets MCT 10 Set-up Software run without a fixed sample time between each sample. By doing so, MCT 10 Set-up Software does not control the actual time between each sample and this can lead to a high jitter between two samples.

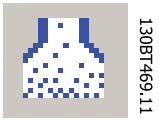


Knowing the first four buttons allows the user to generate a graph out of one drive variable. By selecting the Resume Poll button, MCT 10 Set-up Software starts tracing the motor current, which based on the motor load can generate a current curve like this:

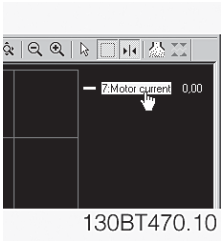


To stop the tracing press the Stop Poll button or Pause All Tracking. The tracking will continue until the buffer is filled (default 1000 samples). If the tracing stops due to a filled buffer, the buffer has to be emptied before a new trace can be activated. To clear the buffer and to reset the Scope, the following two buttons are defined:

Clear all buffer for the channel:

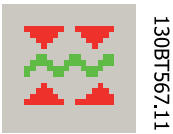


By selecting the trace with:
The buffer for this channel can be individually emptied.



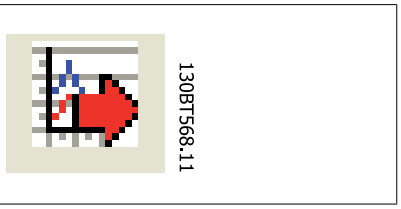
Reset Scope

The reset Scope works in the same way in that it clears all buffers for the channel. The difference is that it clears all buffers 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.



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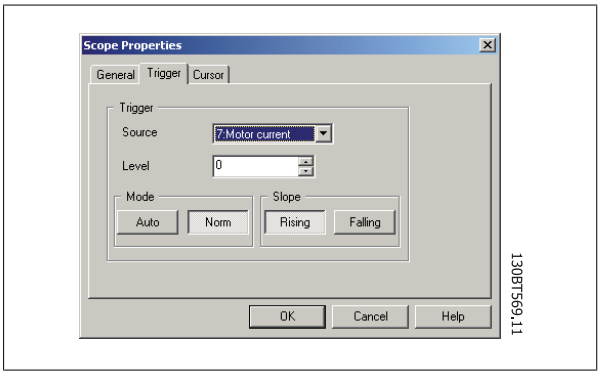
Export to Excel
The export to Excel enables the user to have the scope data stored in a file which Microsoft Excel can open.
A save file dialog will appear, so the user can store the file in an appropriate place.



14.8 Triggers

A trigger is a tool that allows only starting the sampling of values when a certain value is reached. This will reduce the need for large buffer sizes. A trigger is also a valuable tool to see if values cross border where the drive does not store any warnings.
Setting up Trigger:
By right-clicking on the Scope window and selecting Properties (See under Polling Rate) the property for the Scope is brought up.

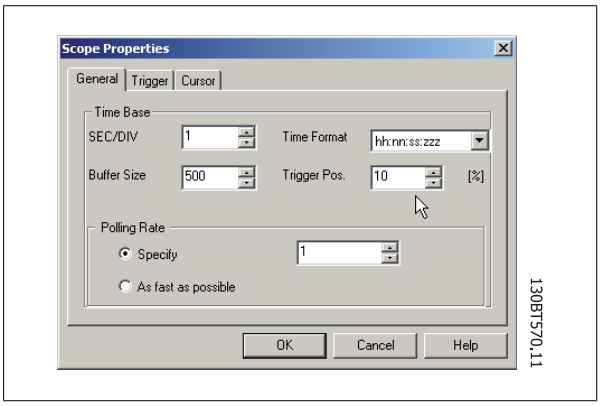
Under the Trigger tab the Source for triggering, the level for activating, Mode and Slope for the trigger can be set.



The source is selected out of the channels that are currently active. The level is the level for the source where the Trigger has to be activated. For Mode, there are two different modes, Auto and Normal. With Auto the user will trigger the trigger automatically by pressing the Resume All button. This means that the trigger line will be set to the time when the user pressed the Resume button. Selecting Normal (Norm) the trigger is activated when the level and the slope settings are fulfilled. The slope sets if the value has to be rising (source value goes from low values to higher values) or the slope has to be falling (source value goes from high values to low values).

14.8.1 Trigger Position

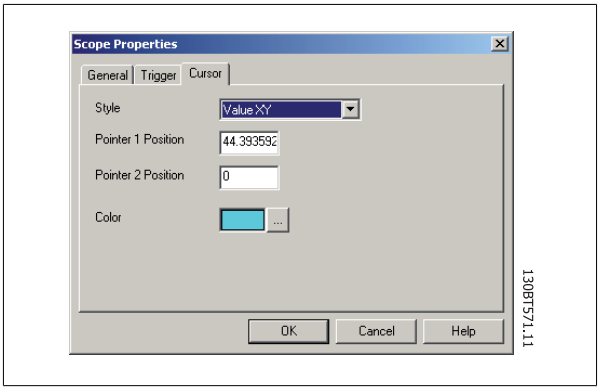
In many cases it is worth knowing what happens before the trigger is activated. This can be achieved by setting the trigger position value to a value different from the default, which is 0%. If the buffer has a size of 1000 samples and the trigger position is set to 10%, the buffer will contain 100 samples before the triggering point and 900 after the triggering point.



14

14.8.2 Cursors

To evaluate a trace or show the actual values of the buffer, the cursor is used to point out the data. The Cursor tab contains four different settings:



The style contains six different possibilities:
Value XY
Value X
Value Y
Delta X
Delta Y
Inverse Delta X

Value XY shows the time and value of each signal at the cursor location, Value X the time alone. Value Y the value alone. Delta X shows two cursors, and the time between the two cursors are calculated. Delta Y works like Delta X, but this time the difference between two levels is calculated.

14

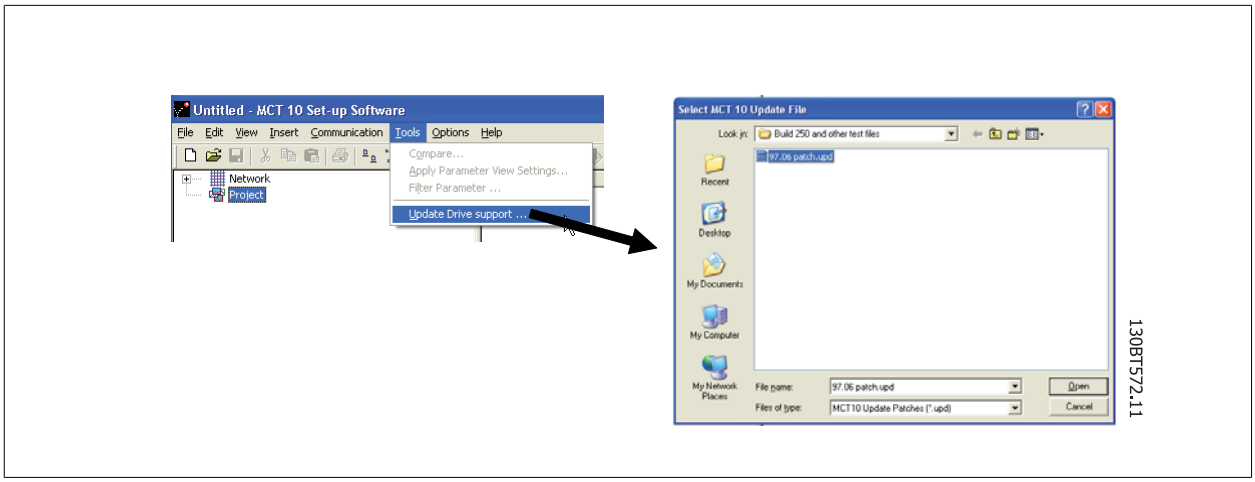
15

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15 Update Drives Firmware Support in MCT 10 Set-up Software

MCT 10 Set-up Software can be updated, regarding what firmware versions of drives are supported.

The updates must manually be downloaded from the Danfoss web-site http://www.vlt-software.com for storage on local disk drive. It is also possible to find video training material on this site for operating MCT 10 Set-up Software.



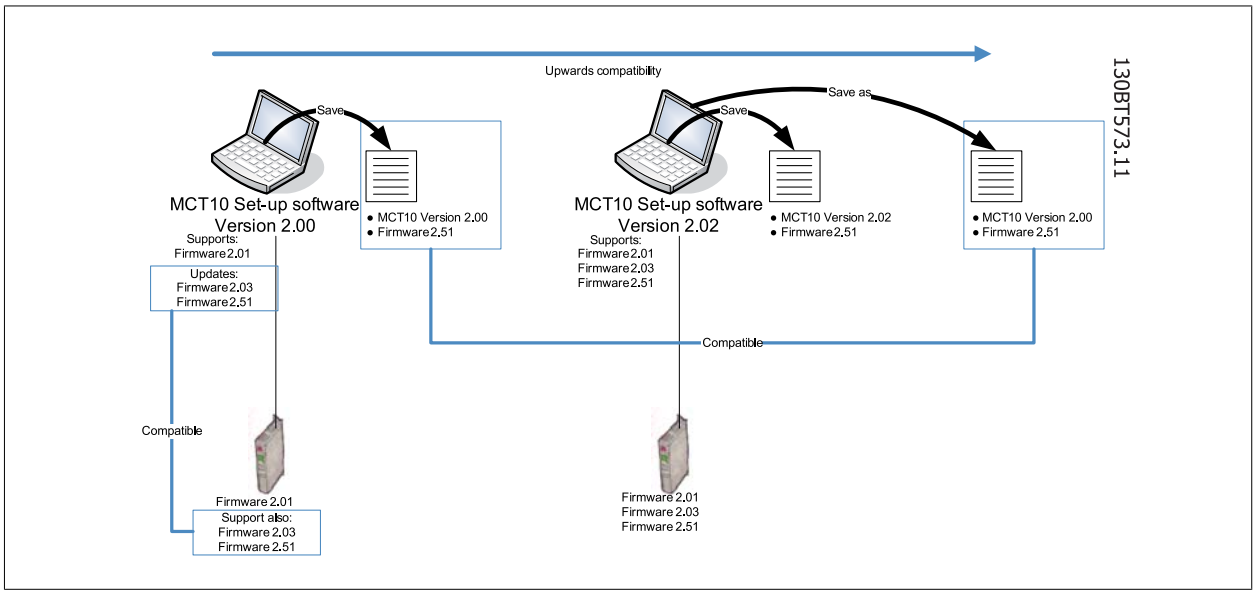
The update files can be installed without the user having administrator rights in Microsoft operating systems, which has been a major disadvantage for standard users which were not allowed to install software on their computers (laptops).

15

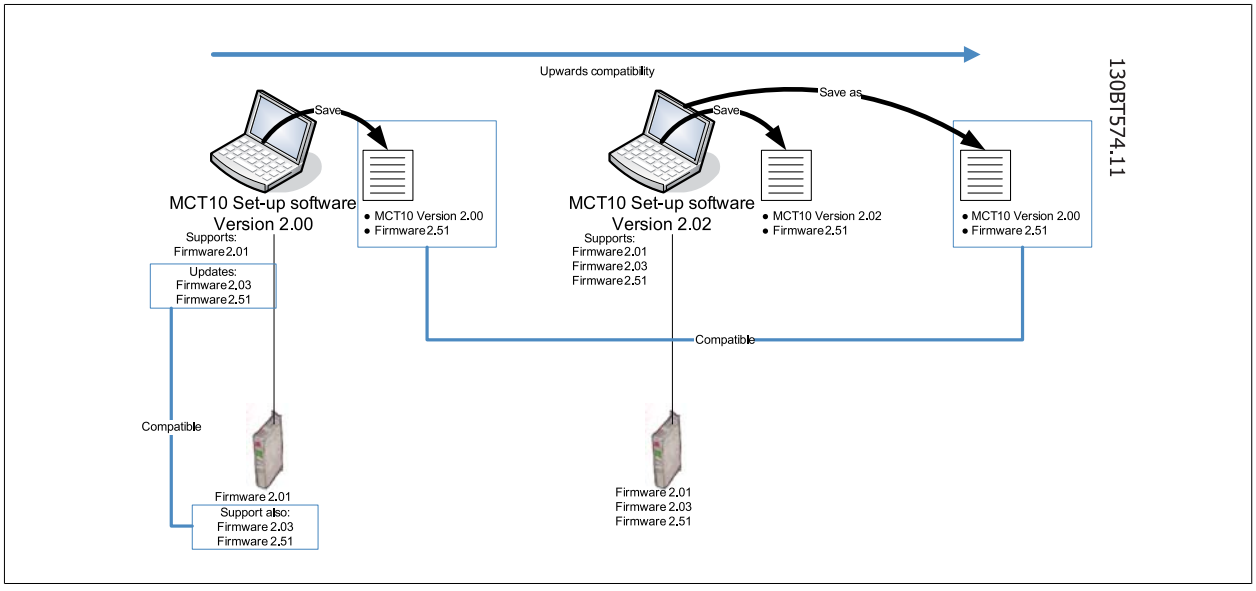
15.2 Background Details

MCT 10 Set-up Software project files are in principle having the same features as Microsoft Office Word. Newer versions of MCT 10 Set-up Software can open legacy version project files.

The example in the illustration below visualises a version 2.00 of MCT 10 Set-up Software supporting offline the firmware version 2.01 of FC 302. This file can be used by the newer version 2.02 of MCT 10 Set-up Software. However, if a project file from the newer version 2.02 of MCT 10 Set-up Software containing firmware version 2.51 of FC 302 cannot be opened or used offline by the legacy version 2.00 of MCT 10 Set-up Software, since the firmware is unknown.



When MCT 10 Set-up Software has been updated, project-files saved as with newer version firmware can be opened and used. This scenario is shown in the below example.



15

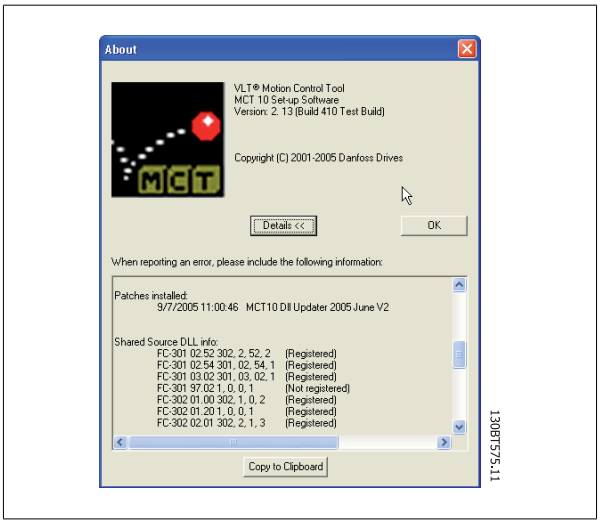
To establish connectivity to a FC-202 with firmware version 1.10, it is required to modify the MCT10 drive database mapping to firmware version 1.05 as reference.

- Start the MS Explore and open the path "C:\Program Files\Common Files\Danfoss Drives\SharedSource\"
- Open the text file "ss_version_mapping.txt" in Notepad by right clicking on the file and choose Edit.
- Change "Series="FC-202",AOC="01.10",Database="01.10" to Series="FC-202",AOC="01.10",Database="01.03"
- Save and close the file

15.3 How to Find Out if MCT 10 Set-up Software Has Been Updated

Finally MCT 10 Set-up Software can be checked in the About box, regarding what updates the user has installed.

Also when contacting the hot-line support, system information can be copied directly to the Windows Clipboard.



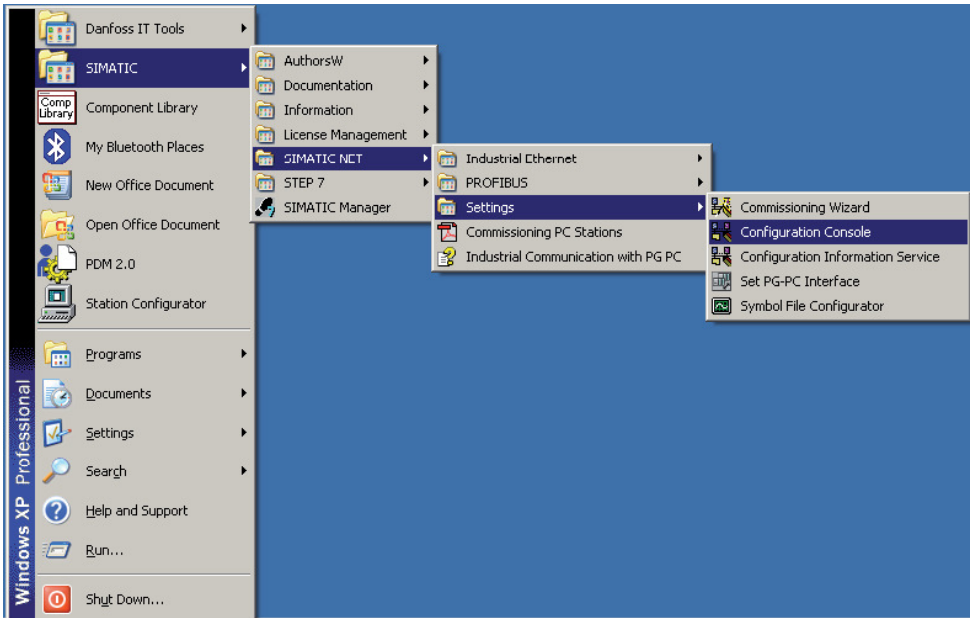
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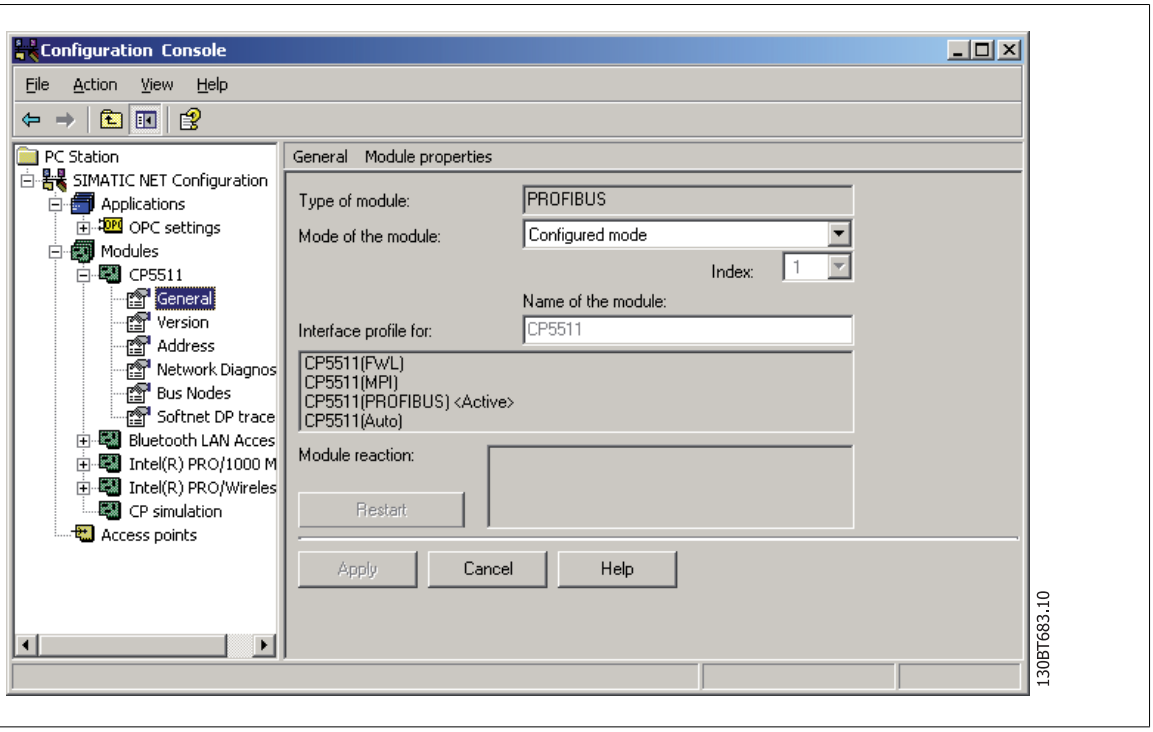
16 Guide to DP-V1 Connection and Simatic Manager

The following guide explains how set-up SIMATIC NET to work together with MCT 10 Set-up Software.

Start Configuration Console:

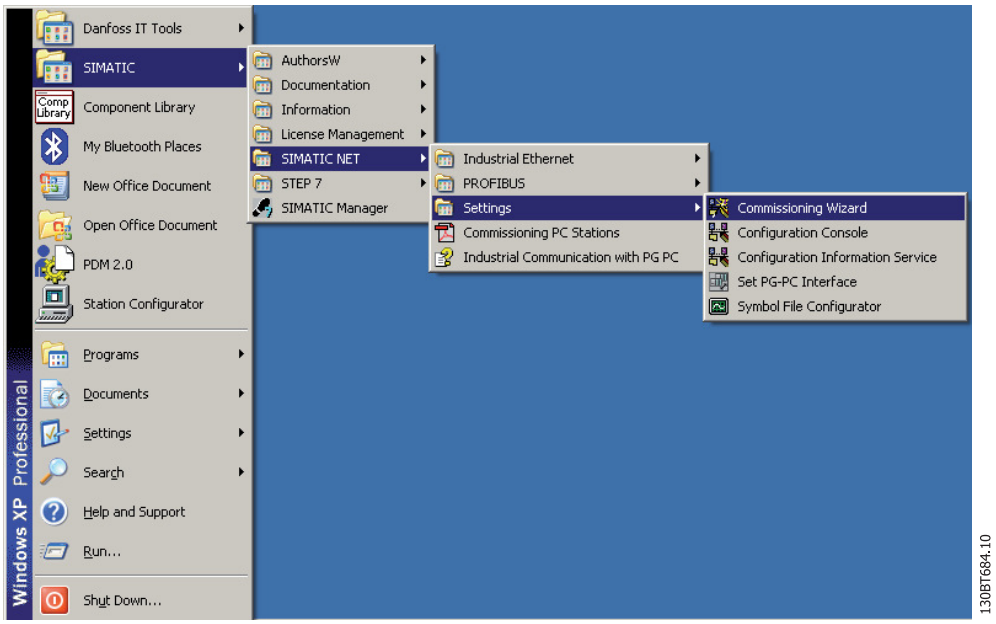


Set the Mode of the module to Configure mode and press apply:

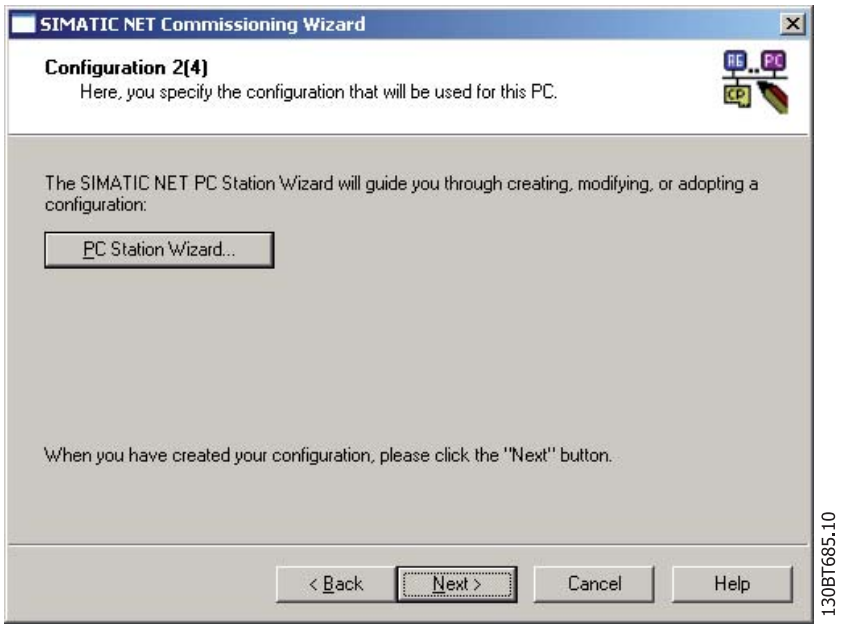


Close the Configuration Console.

Start *Commissioning Wizard*:

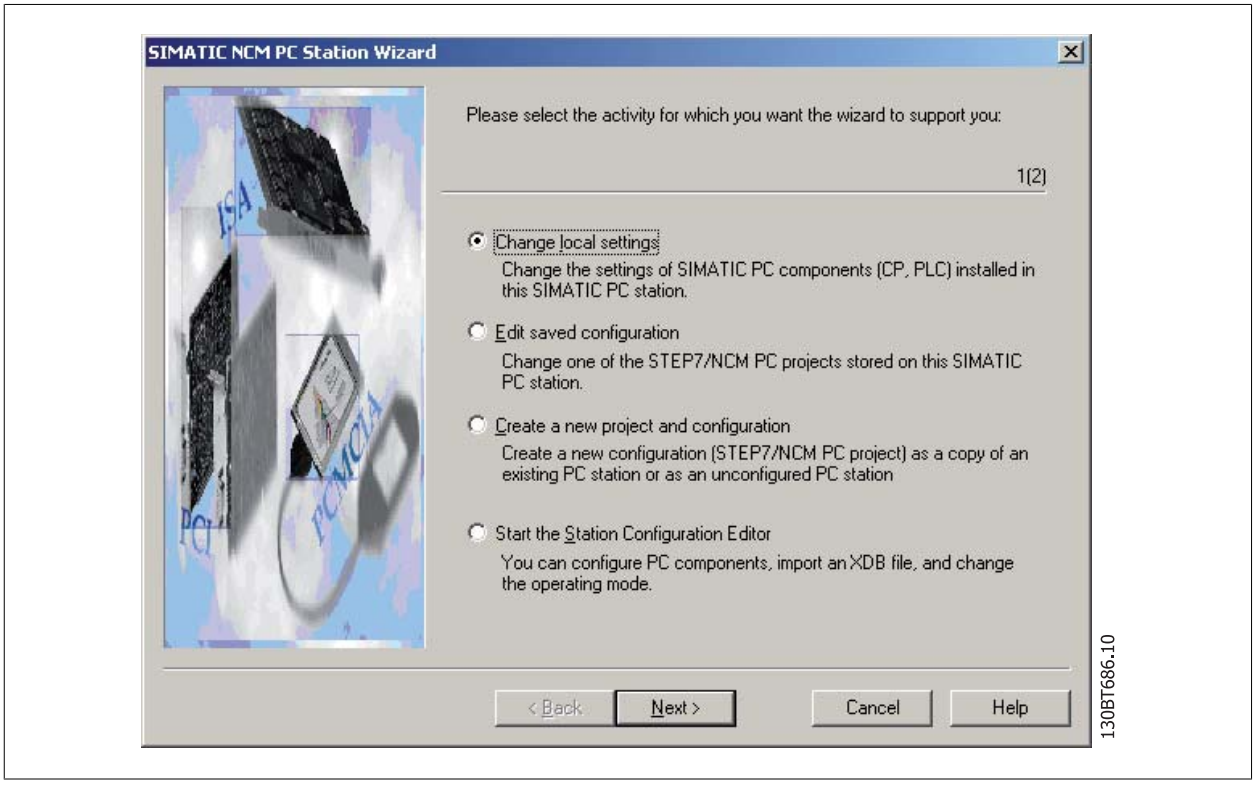


Press *Next* and the following screen is shown:

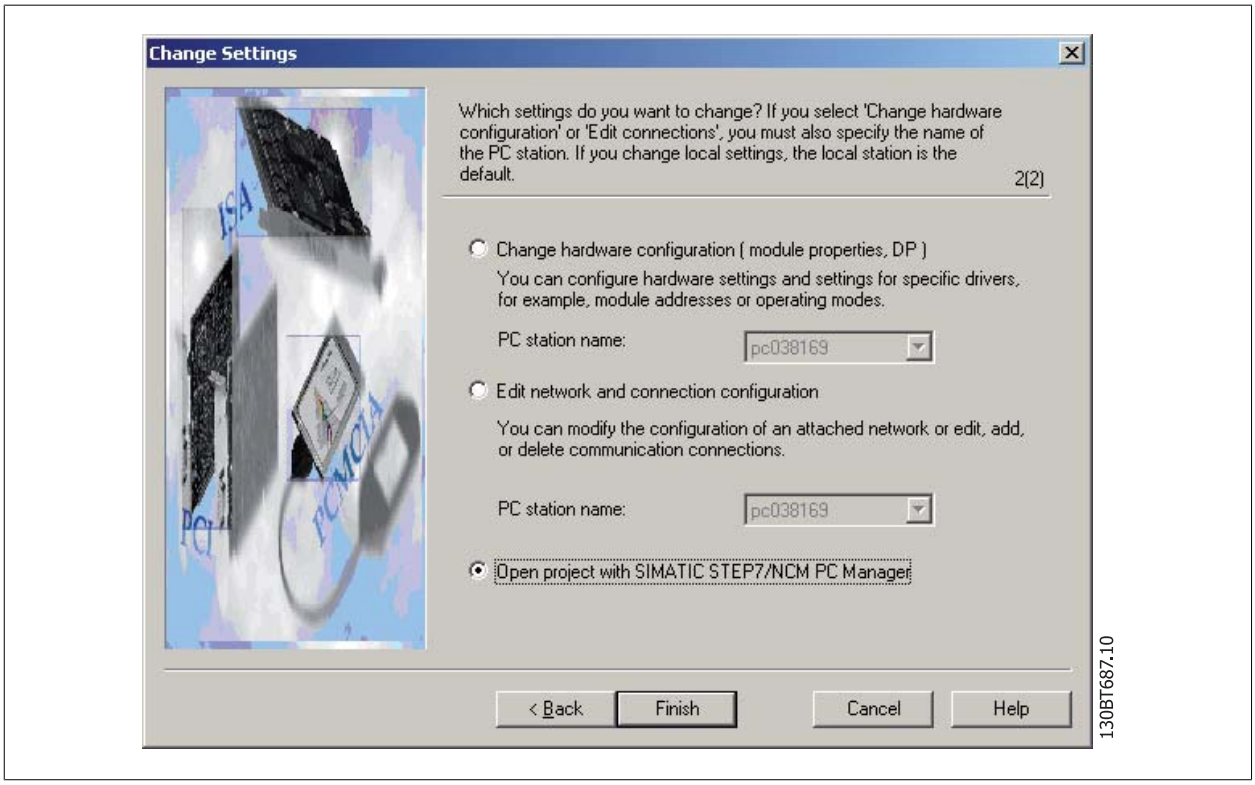


16

Press on *PC Station Wizard* and *Change local setting* and then on *Next*:

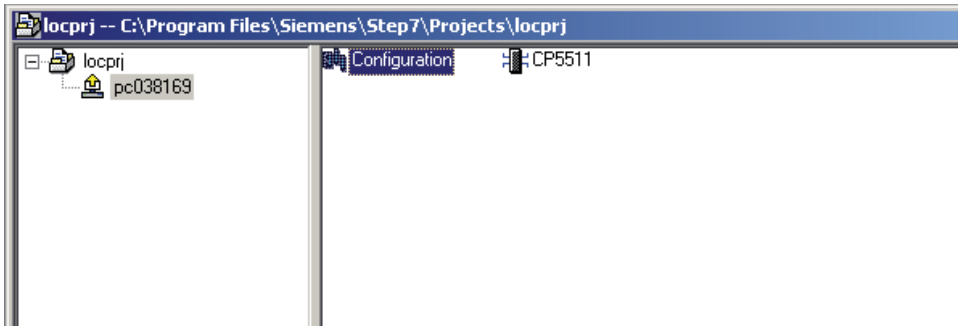


Choose *Open project with Simatic Step7/NCM PC Manager*:

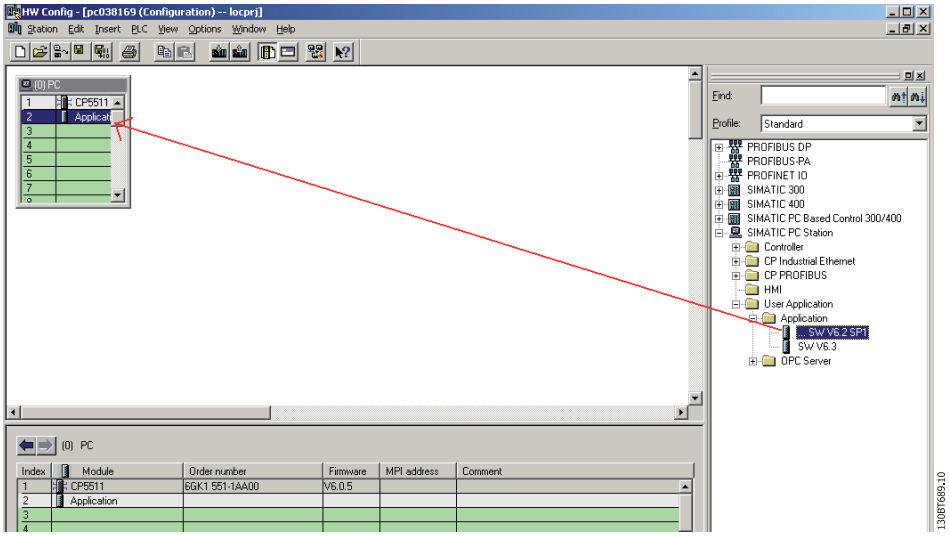


Simatic Manager is now opening a new project.

Open *Configuration*:

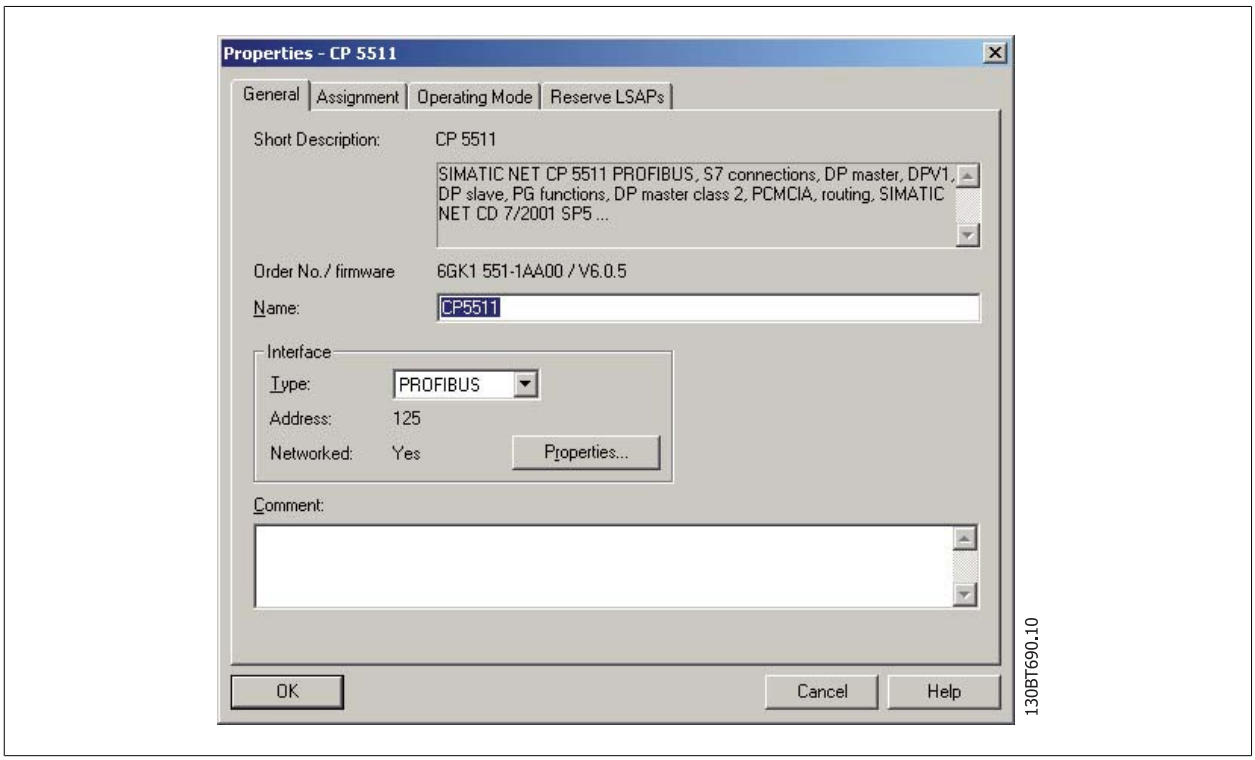


Drag and Drop a Application to the PC index 2.

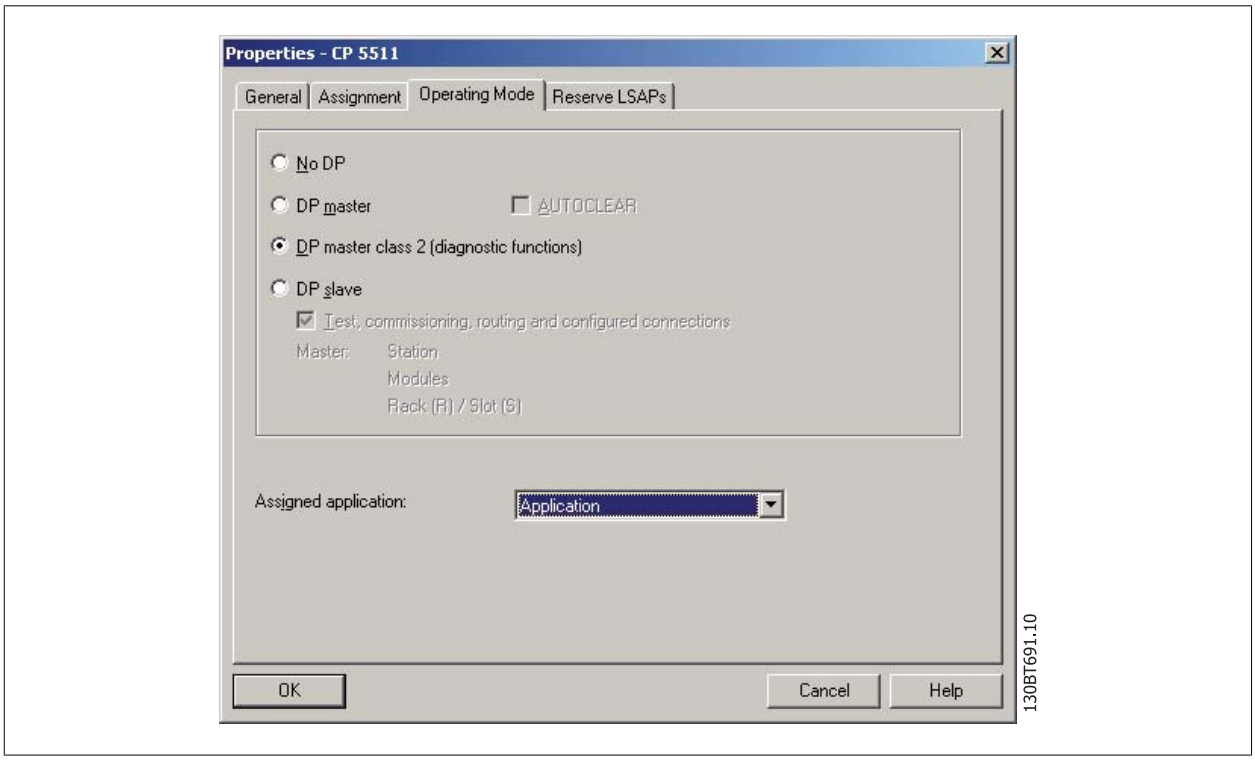


16

Open the properties on your Master Class 2 card (here shown as a CP5511 card).

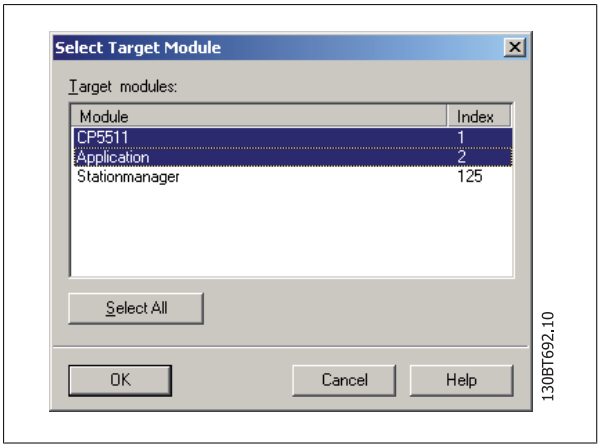


Press on *Operating Mode* and select *DP master class 2* and assign an Application. Press on *OK* and on *Save and Compile*.

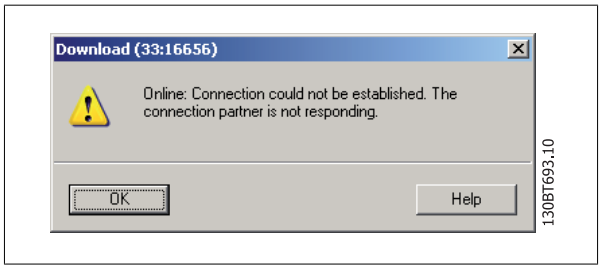


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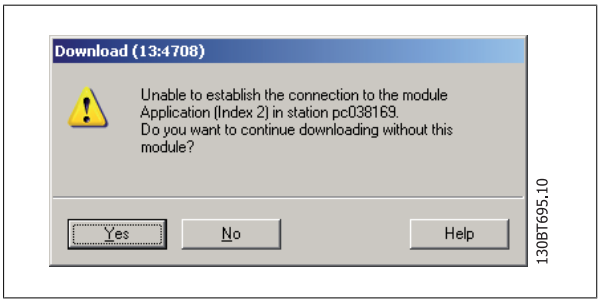
Press on Download and select to download CP5511 (index 1) and the Application (index 2).



Press OK and also OK to the Warning:

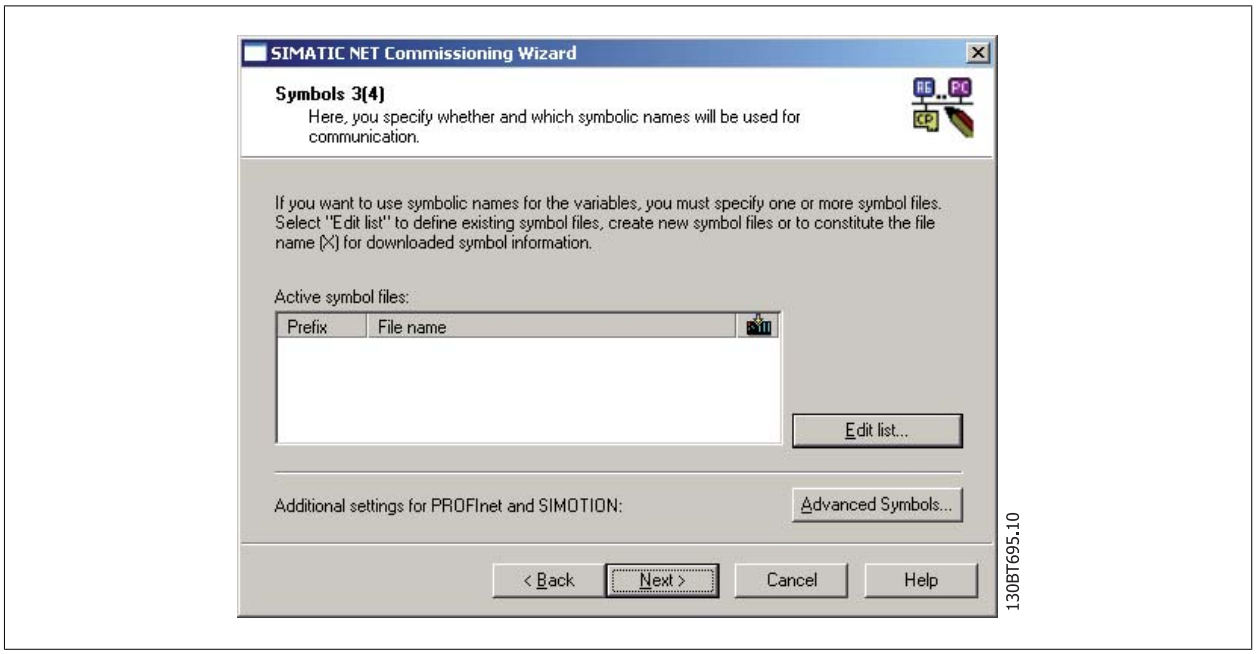


Press Yes to this Warning:



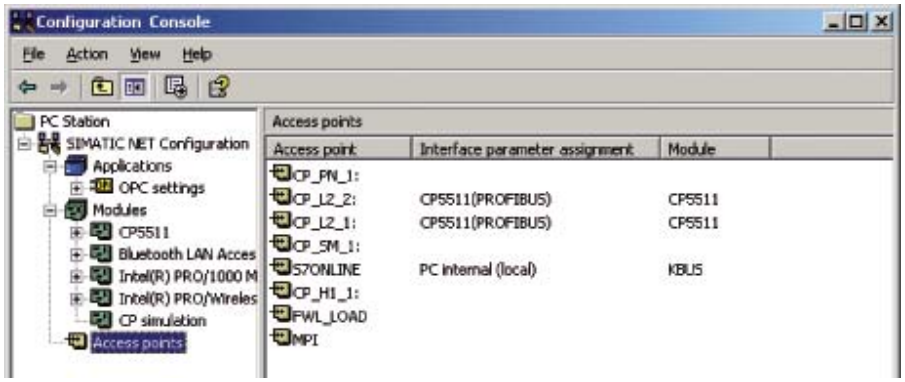
Press OK to Stop Target Modules and the download and set-up of the CP5511 card is completed. Close Simatic Manager.

Click on Simatic Net Commissioning Wizard and on *Next*.

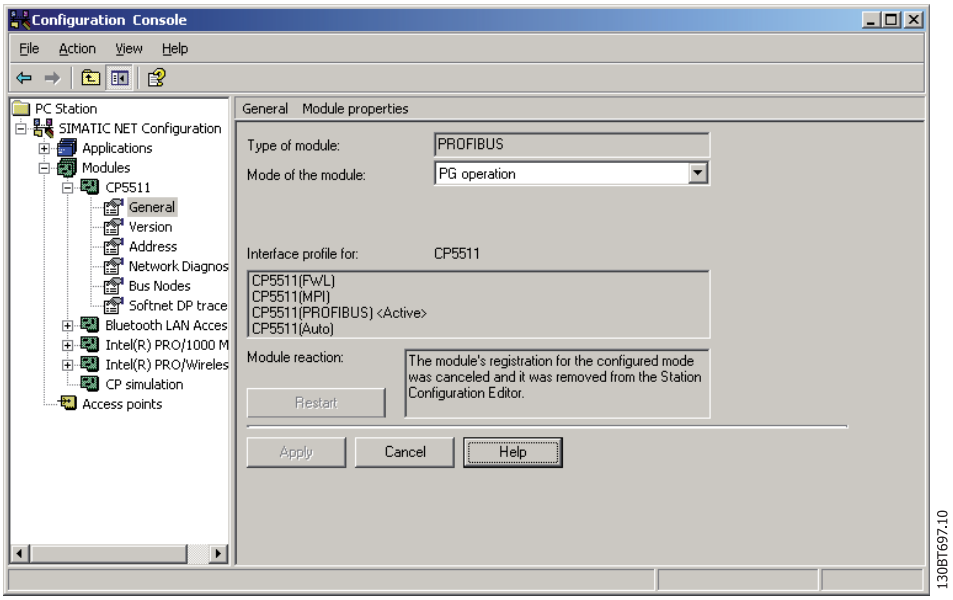


Click on Next again and click on finished.

By Configuration Console and by *Access points* set the CP_L2_1 and CP_L2_2 Interface parameter assignment to *CP5511(PROFIBUS)*.

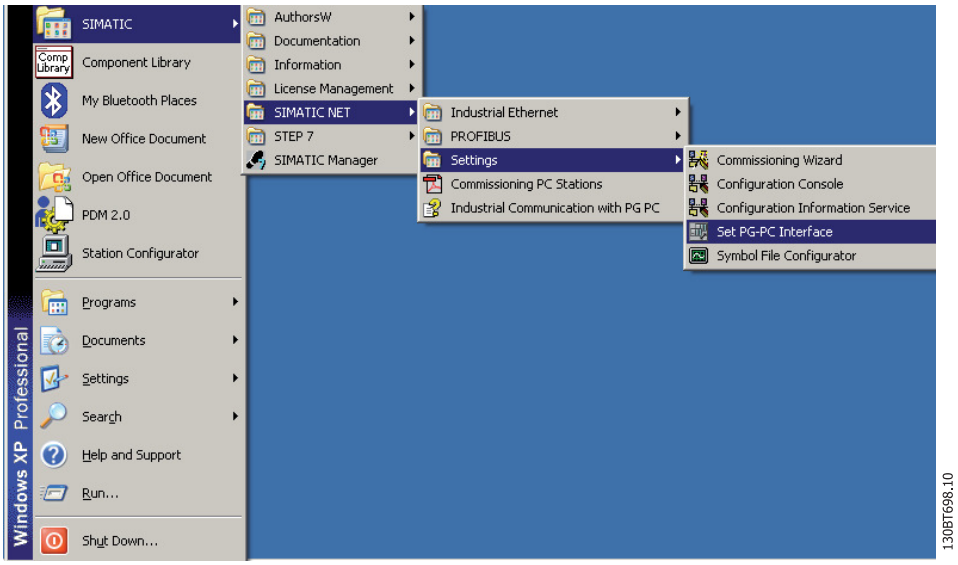


Set the Mode of the module from *Configure mode* to *PG Operation* and press apply and OK.
Close the program.

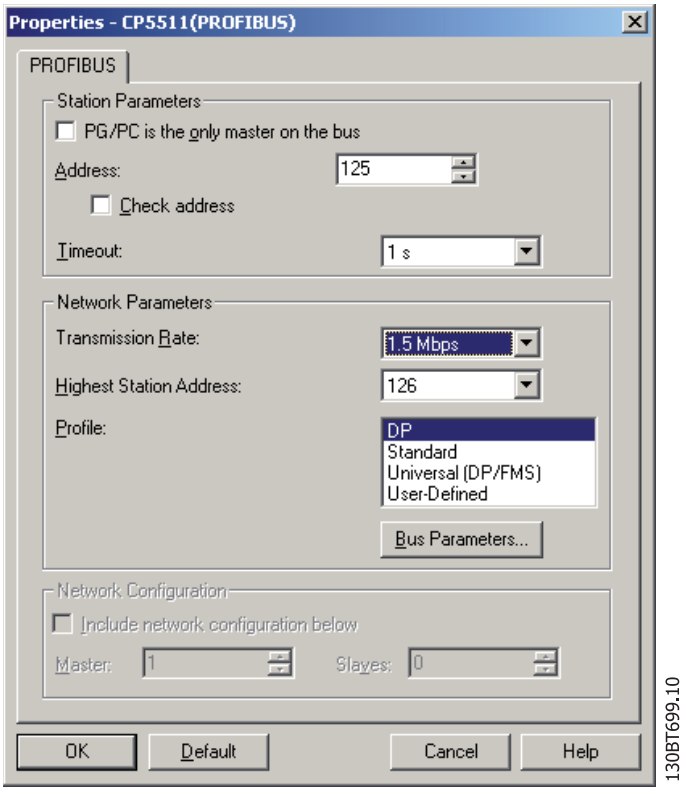


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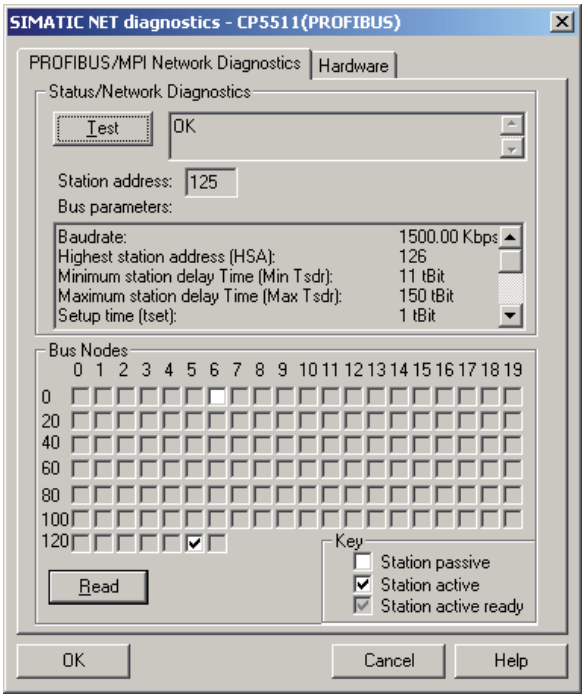
Open the *Set PG-PC Interface*:



Set *Interface Parameter Assignment Used* to CP5511(Profibus) and click on Properties:



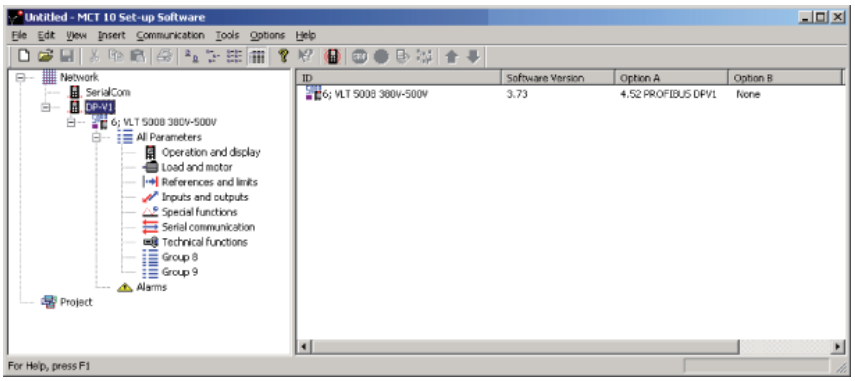
The tag *PG/PC is the only master on the bus* should only be set active if no PLC is active on the bus. Set the Transmission Rate (Baud Rate) to the same baud rate as the PLC and click on OK. Click on *Diagnostic* and on *Test* and *Read* and the CP5511 card will read all nodes on the Profibus network. In this example it finds a Slave on address 6.

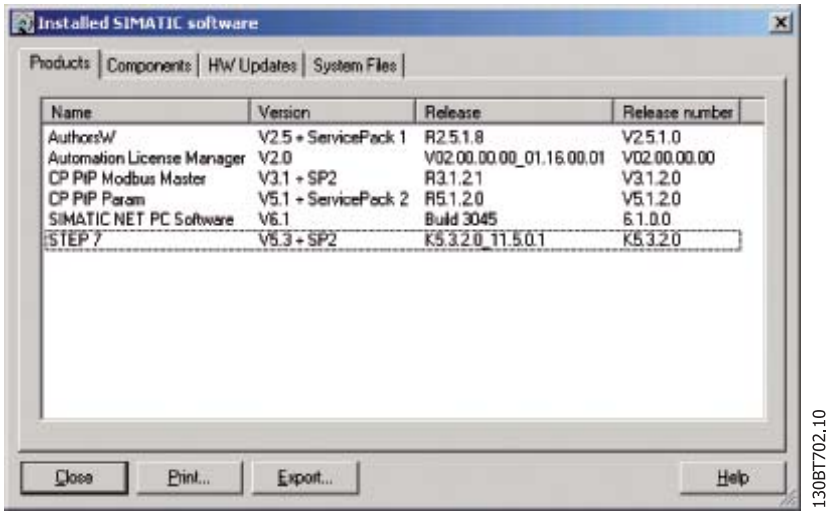


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Open MCT 10 Set-up Software and a DP-V1 connection should be detected by *Network*.

In this example a VLT 5000 is found at address 6.





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17 FC 102 and FC 202 Series Functions

17.1 New Features

In MCT 10 Set-up Software there is added special support for some new features in the FC 10x series of frequency converters.The following section describes how to access and set these new features.

NB!
Consult the FC 102 and FC 102 Design Guide for detailed functionality of the frequency converters.

17.1.1 Clock Features

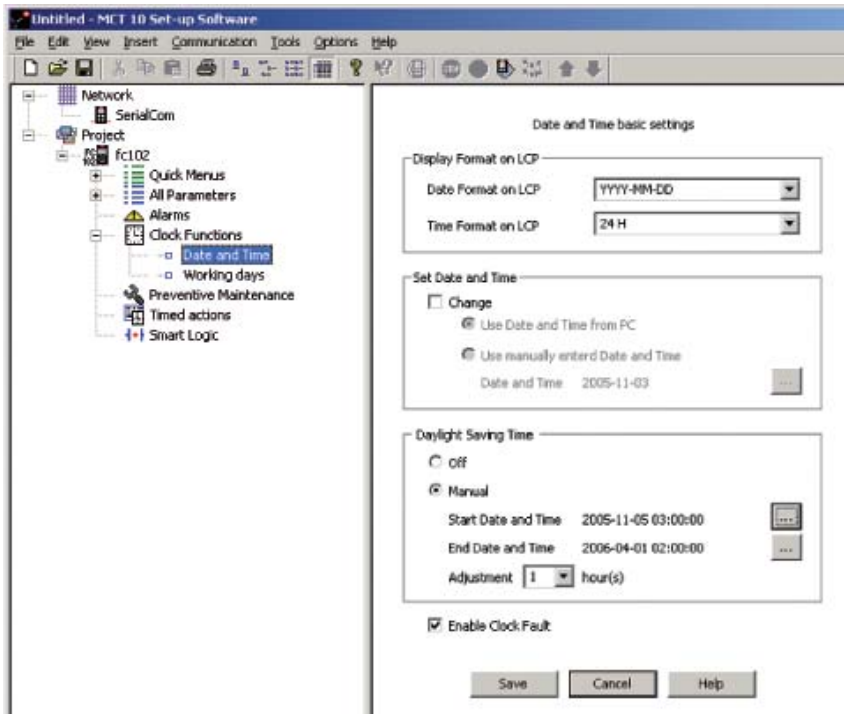
MCT 10 Set-up Software supports the clock features in FC 102, by means of intuitive dialogs, enabling the user to set-up the clock features

The Clock Features are grouped in two sub-levels:

1. Date and Time
2. Working days

17.1.2 Date and Time

In the Date and Time dialog, the user can see three groups of settings:

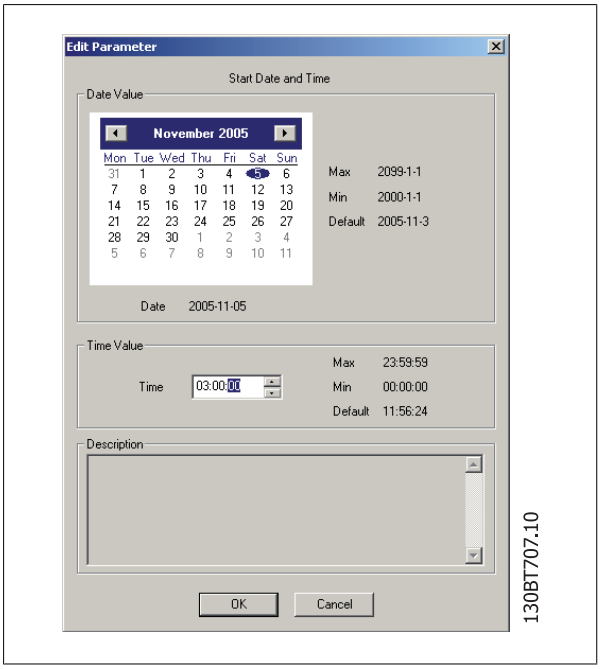


Display format on LCP:
In this group the user can select how to get date and time presented on the local control panel on the FC 102. In MCT 10 Set-up Software parameters Date and Time format depends on PC Regional Options (Date and Time format).

Set Date and Time:

In this group the user can actively select to change the date and time in the FC 102 from the PC. Normally it should be set to use the local PC's date and time, connected. When the connected PC's time is in another time zone, then it can be beneficial to set the date and time manually. Date and time will be changed in MCT 10 Set-up Software project file or in drive only when "Change" check box is checked.

Setting the date and time manually, this dialog appears.



Daylight Saving Time:

In this group the user can 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, then the drive shows a specific warning. (Also MCT 10 Set-up Software shows warning in Warnings folder). If the user does not want to set up clock or can not set up clock then he probably also does not want to see this warning all the time. For that case is the parameter Clock Fault. If Clock fault is enabled, the user can see this specific warning and if clock fault is disabled then user can not see the warning.

Enable Clock Fault is checked - drive is showing warning.
Enable Clock Fault is unchecked - drive is not showing warning.

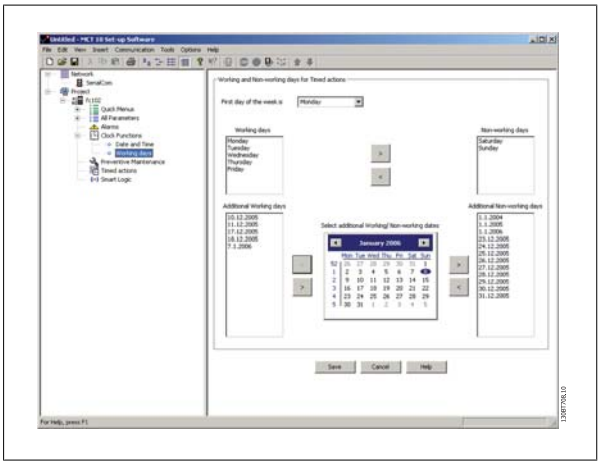
17.1.3 Working Days

In the Working days dialog, the user can easily define the working days for time based actions.

Start of the week can be Monday or Sunday. The visual Calendar will change.

Only 5 additional working days (dates) are allowed.

Only 15 additional non-working days (dates) are allowed.

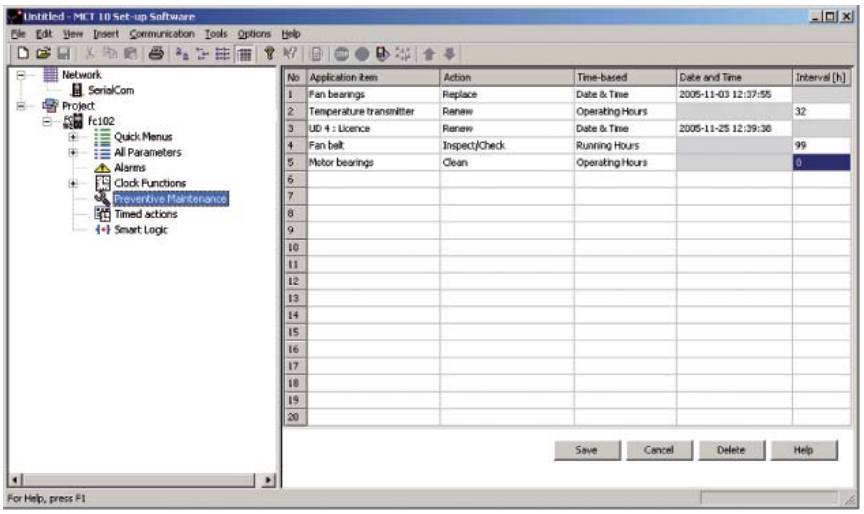


Please notice Additional working dates and non-working dates have year and must be updated every year.

17.2 Preventive Maintenance

The intension of the "preventive maintenance" feature is to provide the user's with the capability to plan periodic maintenance of both the drive and other technical equipment within the same plant. Preventive maintenance should be seen as time based scheduling of periodic checks that manually should be done.

In the right view grid, it is possible by means of double clicking in the cells to activate dialogs to enter application item, action and how the interval must be defined.



The clock parameters (parameters in the Clock Functions folder) must be correctly programmed for Preventive Maintenance to function correctly.

If Preventive Maintenance item Date and Time is passed then the line is marked as red.

Before writing new Preventive items to FC 102 do not forgot to reset Maintenance Word (par 23-15).

17.3 Times Actions

MCT 10 Set-up Software can by means of an intuitive user interface, easily setup the possible "time based actions" supported in the FC 102.

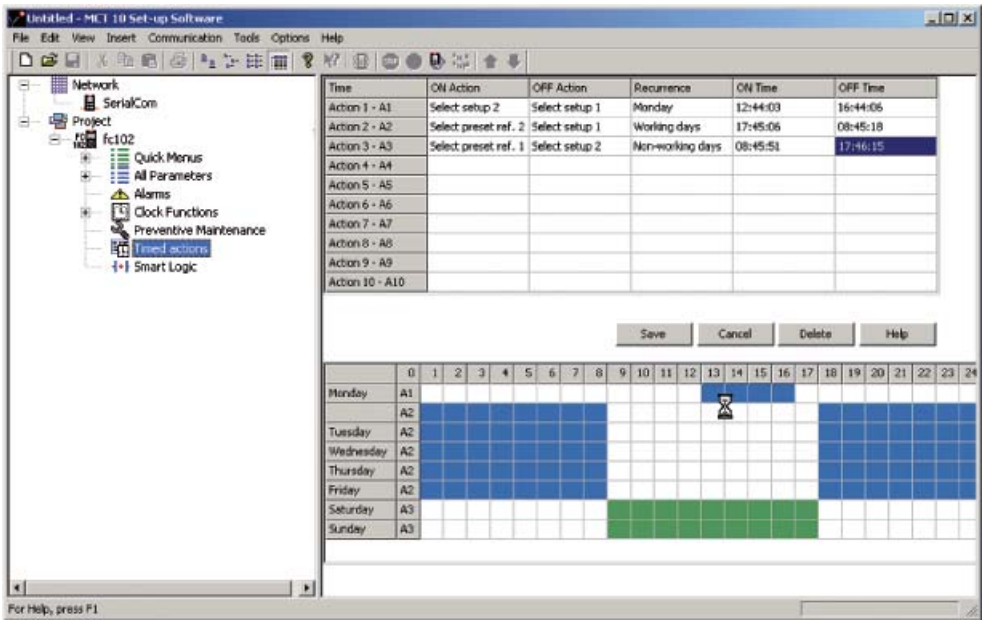
The purpose of "Time-based Actions" is to automate the drive by giving the user the possibility to define real-time controlled events. The basic idea is to have a possibility to define time of day and which day(s) of the week, when the drive automatically must perform a selected action.

In this way the user doesn't have to execute the actions defined manually, instead the drive automatically does the job on the days needed.

The programmed actions will be repeated on a weekly basis. Additional working days and additional non-working days can be programmed.

The clock parameters (parameters in the Clock Functions folder) must be correctly programmed for Timed Actions to function correctly.

Actions, which can be programmed, are the same as known from the SLC (Smart Logic Controller).



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It is easy to by means of double clicking in the cells to activate dialogs to enter the required data.

17.4 Cascade Controller

The cascade controller is usable in pump applications where multiple motors are used to 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.

There are 3 versions of cascade controllers available in the frequency converter:

- Basic Cascade Controller is delivered as a part of the native software in the FC 102 and FC 202. It can control speed of one device connected to the drive output and on/off control devices by means of using the two relays on the Power Card.
- Extended Cascade Controller allows more devices to be applied to the control circuitry and offers additional cascade principles. It is available only in the FC 202 utilizing the MCO 101 option card.
- Advanced Cascade Controller offers the cascade principles similar to Extended Cascade, but allows additional devices to be applied to the control circuitry. It is available only in the FC 202 by utilizing the MCO 102 option card.

The add-on option cards MCO 101 and MCO 102 can be used to extent the number of pumps to be controlled by the Basic cascade controller parameter group 25-**. More likely, MCO 101/MCO 102 is using the extended/advanced cascade controller available in parameter group 27-**.

Function	Cascade Controller		
	Basic	Extended	Advanced
Available relays, Power Card	2	2	2
Number of relays on option card	-	3	8+3[1]
Number of relays controlled by cascade controller	2	5	8
Basic functionality (all features, except the cells below left empty)	yes	yes	yes
Master-slave		yes	yes
Alternating lead pump with one relay per pump	yes(2)	yes(5)[2]	
Alternating lead pump with two relays per pump		yes(2)	yes(6)[3]
Alternating lead pump at staging or an internal[4]/external signal	yes	yes	yes
Control of unequal sized pumps		yes	yes
Operation hours counter for relays	yes	yes	yes
Operation hours counter for pumps	yes	yes	yes
[1]By using the MCB 105 relay card.			
[2]By using Basic Cascade parameter group 25-**, just extend the number of relays.			
[3]Using 1 relays on control card + 8 on MCO 102 + 2 on MCB 105.			
[4]Ex. Time of day etc.			

The cascade controller can be configured in MCT 10 from the plugin named Cascade Controller, supporting Basic and Extended mode. Basic mode supports the Basic cascade controller, were Extended mode supports the Extended/Advanced cascade option MCO 101/MCO 102.

The MCT 10 Cascade Controller custom view is divided into four tabs equivalent in both cascade modes:

- Preconditions
- Setup
- System Optimizing
- Service

Changes can be applied to one Setup with the Save bottom to the offline project or directly to the online frequency converter. The Cancel button restores all the unsaved settings.

17.4.1 Basic Cascade Controller

Allows the frequency converter to control up to 3 equal size pumps, by varying the speed of the initial motor, in response to system feedback signals, while staging additional fixed speed motors on and off. Staging motors on or off is done cyclically in accordance with the relay on time. This function assures equal use over time and eliminates concern about starting a seldom-used motor.
Two basic cascade modes are available.

Function	Basic Cascade Mode	
	Motor alternation[1]	Basic Cascade
Number of relays controlled by cascade controller	2	2
Alternating lead pump with one relay per pump	-	yes(2)
Fixed lead pump	-	yes(2)
Alternating lead pump with two relays per pump	yes	yes
Alternating lead pump at staging or an internal/external signal	yes	yes
[1]Motor Alternation is only available in the FC 202.		

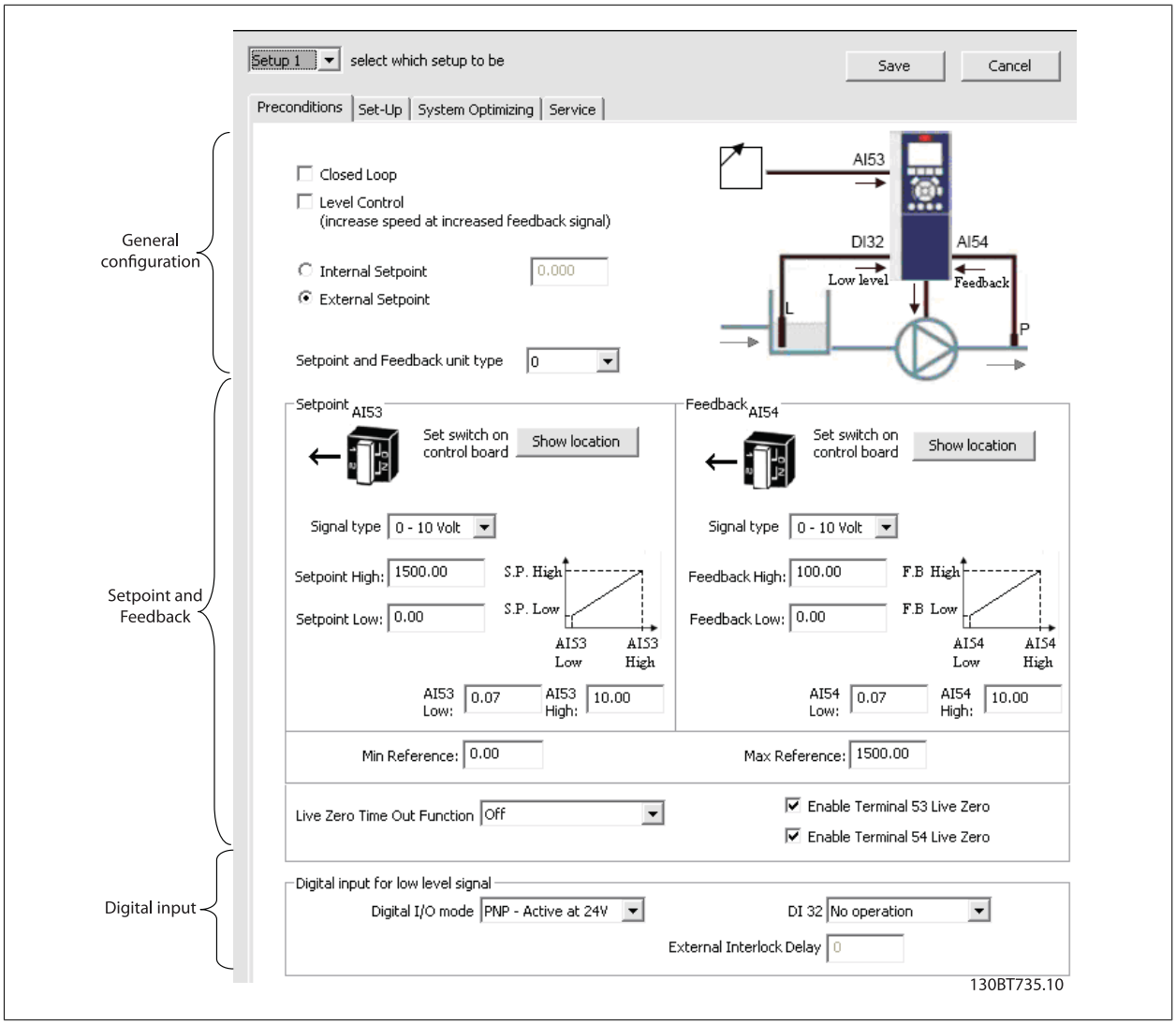


NB!
Basic Cascade Controller is configurable only from the parameter group 25-**.

17.4.2 Preconditions

The preconditions tab contains the general setup required for the cascade controller to operate in an application. It can also be used in general to setup the closed loop for other applications without the need for the cascade control. In the view the user can configure:

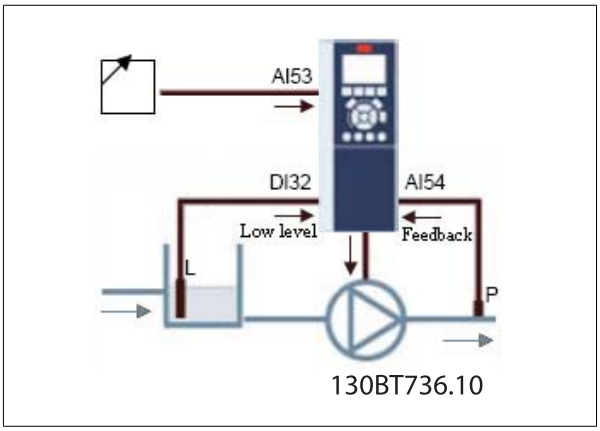
- General Configuration
- Setpoint and Feedback
- Digital Input



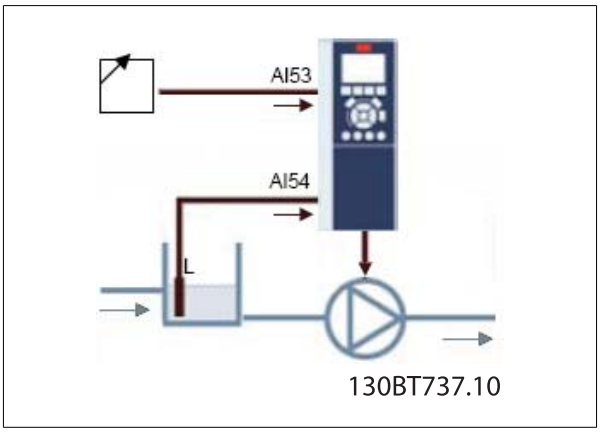
17.4.3 General Configuration

Closed Loop is the configuration mode of the drive. Disabling the checkbox, par. 1-00 is set to *Open Loop*. Enabling the checkbox, the parameter will be set to *Closed Loop*.

Level Control configure the inverse mode of the PID controller. Causes the frequency converter 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 DI32 is enabled.



Enabling the checkbox, the PID is configured to Inverse control and digital I/O mode and DI32 is disabled. The frequency converter graphic is updated to reflect the general configuration.



The Setpoint is used in closed loop as the reference to compare the feedback values. It can be offset with the digital, analogue or bus references. Enabling the Internal Setpoint, the user will be able to enter a numerical value for the reference source. If the External Setpoint is selected, the reference source is set to AI53. The internal setpoint settings remains in the field allowing the user to switch between a preset- or 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
- Ib/in2
- in WG
- ft WG

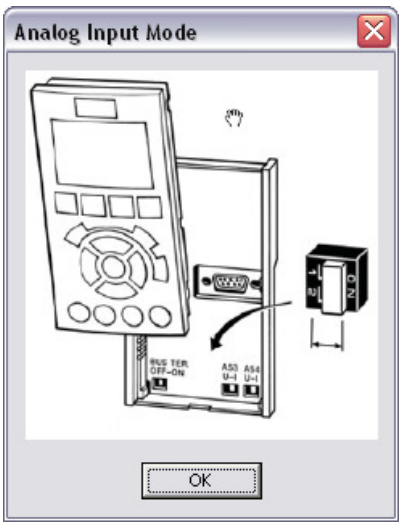
17

General configuration affected parameters

Parameter ID	Parameter Name
1-00	Configuration Modepar.
20-81	PID Mode
3-15	Reference 1 Sourcepar. 3-15 *Reference Resource 1*
20-12	Reference/Feedback Unit

17.4.4 Setpoint and Feedback

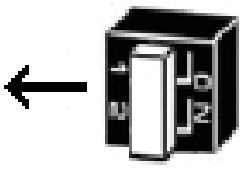
Configures the analogue input used as setpoint and feedback. The general configuration assumes the AI53 (Analogue Input 53) is used for the Setpoint and the AI54 (Analogue Input 54) used as feedback. Be aware, the settings of the signal type, can only be configured from current- to voltage input by using the switches on the control board of the frequency converter. Clicking on the bottons "Show Location", illustrates the specific location on the frequency converter.



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It is required to configure the Signal type in accordance with the hardware switches.

0-10 Volt


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0-20 mA
4-20 mA


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Setpoint- and Feedback High are used to configure the analogue input scaling value corresponding to the maximum reference feedback value. Setpoint- and Feedback Low are used to configure the analogue input scaling value corresponding to the minimum reference feedback value. The Minimum and Maximum references is the lowest and highest values obtainable by summing all references.

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In addition an appropriate reaction on a missing or defective transmitter, Live Zero can be defined among the functions:

- Off
- Freeze Output
- Stop
- Jogging
- Max. speed
- Stop and trip
- Select setup 1
- Select setup 2
- Select setup 3
- Select setup 4

The function will be activated if the signal on terminal AI53 or AI54 is below 50% of the value defined in AI53 Low or AI54 Low. Default Live Zero timeout time is 10 seconds and can be reconfigured in par. 6-00.

Enable Terminal 53 Live Zero and Terminal 54 Live Zero makes it possible to disable the Live Zero monitoring, relevant if the analogue outputs are used as part of a decentral I/O system. Default both checkboxes are enabled.

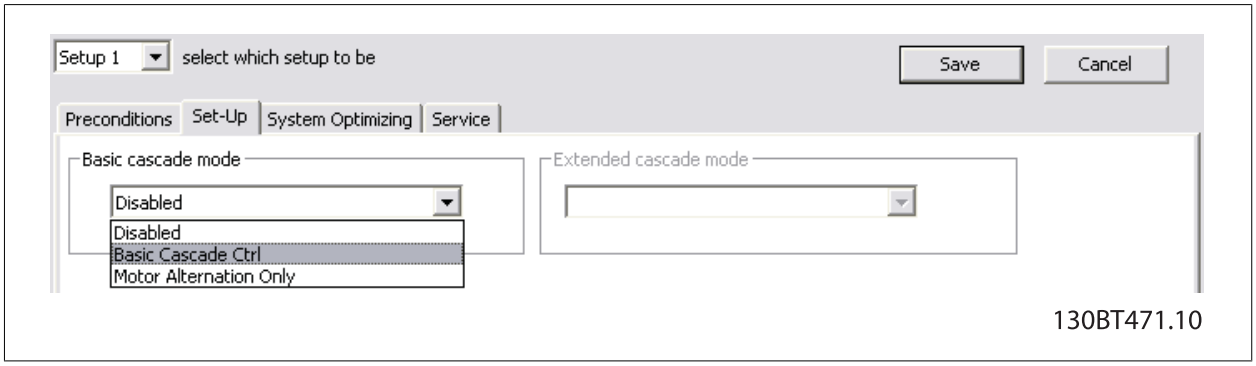
Setpoint and feedback affected parameters.

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

17.4.5 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 by the user. The type of pulse to trigger, can be configured from the Digital I/O Mode dropdown.

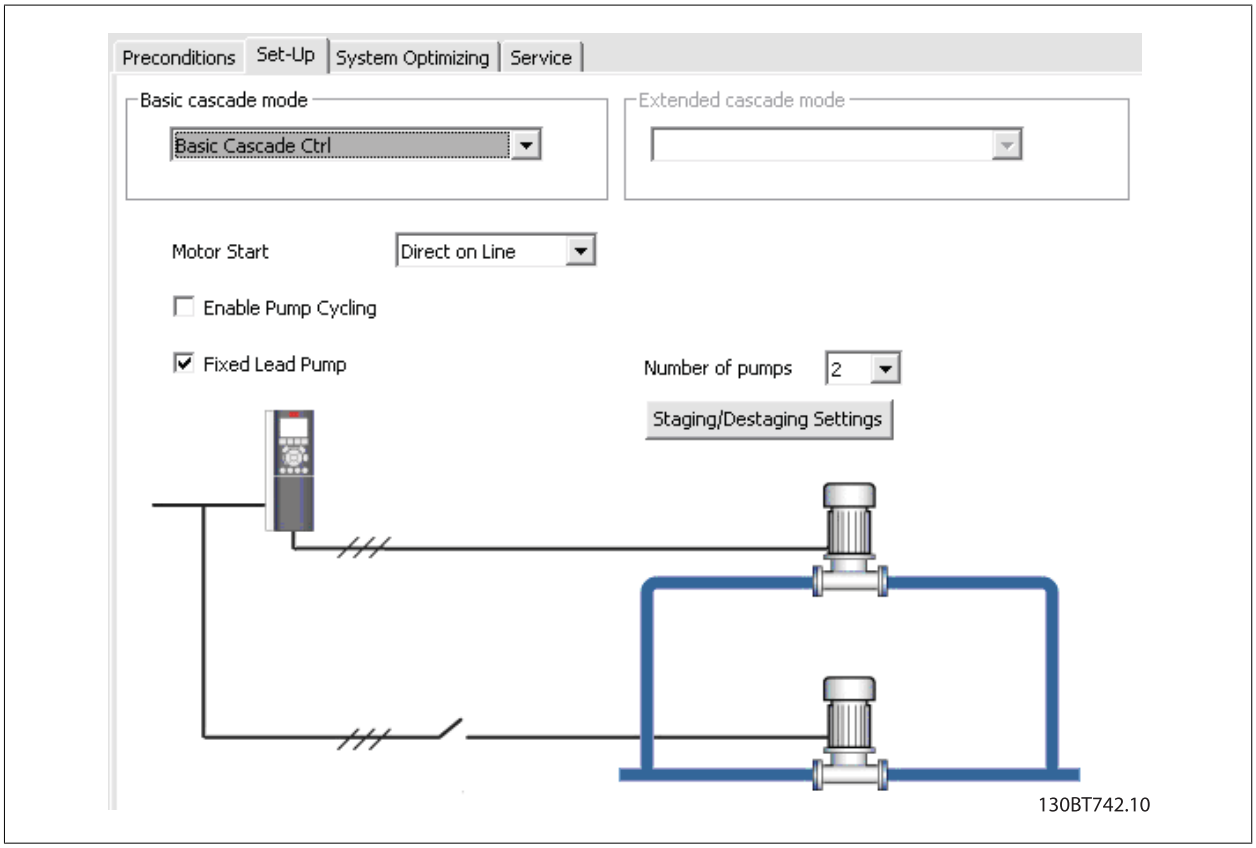
The Setup tab contains the configuration interface for the cascade controller parameter group 25-**. The cascade principle can be configured to *Basic Cascade Ctrl* or *Motor Alternation Only*. Last item is only configurable in the FC 202.



Basic Cascade Ctrl

In the view, the user can configure:

- Motor start
- Pump configuration
- Stating/Destating settings



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From the Motor Start dropdown, the principle can be configured between:

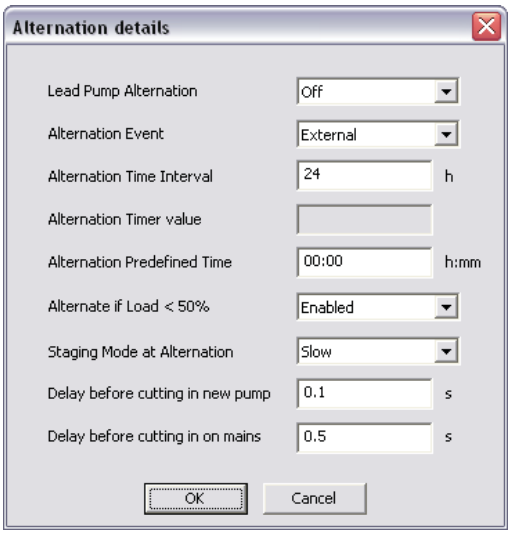
- **Direct on Line** – each lag pump is cut in direct online via a contactor.
- **Softstarter** – can be used to replace traditional contactors for any fixed speed pump configuration and it must be used for all fixed speed pumps. When using softstarters, a delay is added from staging signal occurs until staging takes place. It is required, due to the ramp time of the fixed speed pump, because of the softstarter.

When the Enable Pump Cycling checkbox is disabled, lag and lead pumps will be cut in, to have equal running hours for each pump. Enabling the checkbox, lag pumps will be cut in according to First in, Last out principle.

The number of pumps configurable from the drop down are:

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

When fixed lead pump is used, the lead pumps are connected directly to the relays on the frequency converter control card. This is illustrated in the pump graphic. To obtain equal hours of operation within the fixed speed pumps, the lead pump can be alternated. Timers on the relay outputs monitors the running hours of each pump. When a pump is not operating over a long time period, corrosion concerns may reveal. When it is configured for alternating lead pump, a botton is available to setup the *Alternation details*.



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Lead Pump Alternation changes the lead pump so all pumps run equal time. From a drop down the lead pump can be configured to alternate:

- **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.

Configuring the Lead Pump Alternation *At command* or *At stating or command* the Alternation Event can be configured to:

- **External** – Alternation takes place when a signal is applied to one of the digital inputs in the terminal strip.
- **Alternation Time Interval** – Alternation takes place every time *Alternation Time Interval* expires.
- **Sleep Mode** – Alternation takes place each time the lead pump goes into sleep mode. 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.

Alternation Time Interval is the time period between automatic alternation of the lead pump. It can be configured from 1 to 999.9 hours. When it expires the lead pump alternates.

Alternation Timer Value contains the actual value of the alternation timer.

Alternation Predefined Time is for setting the time of day to perform an alternation. The time format is depending of the setting configured in the frequency converter.

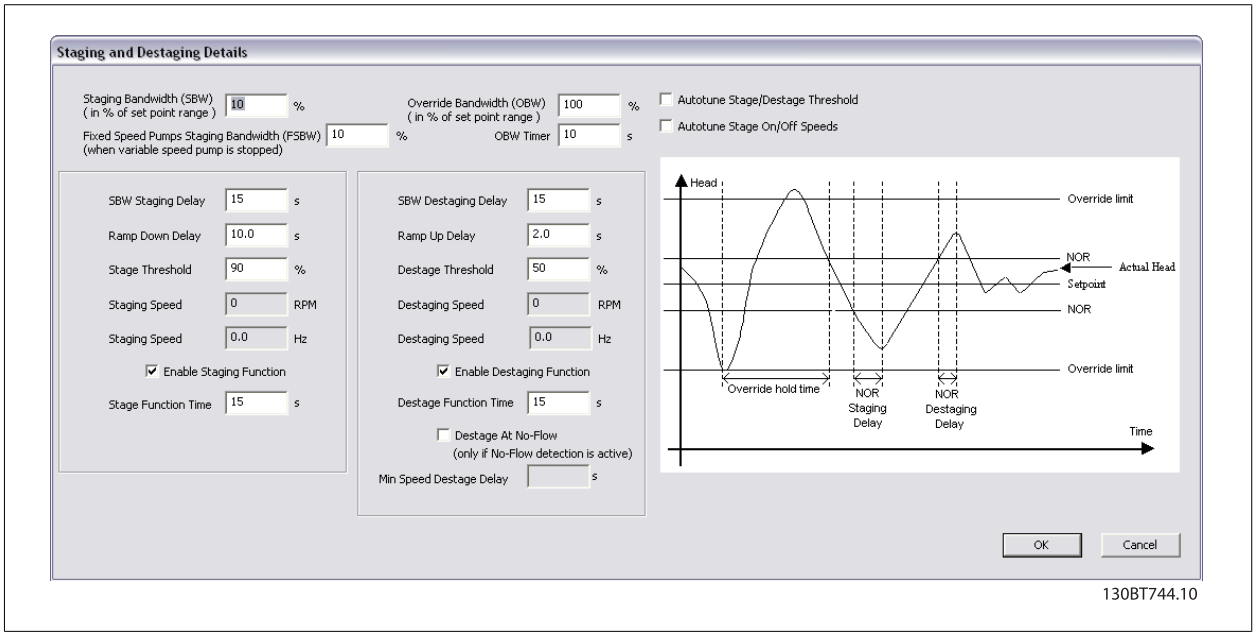
If Alternate if load < 50% is enabled in the drop down, the pump alternation will be carried out only if the capacity is equal or below 50%.

Staging Mode at Alternation configures the staging mode at alternation and determines the time of the variable speed pump deceleration. It can be configured between Quick or Slow.

Delay before cutting in next pump is for setting the time between stopping the old lead pump and starting another one as the lead pump. It can be configured between 0.1 to 5.0 seconds.

Delay before cutting in on mains, is the 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. The resolution can be configured between 0.1 to 5.0 seconds.

With the botton *Staging/Destaging settings* the user can configure when to add and remove a stage from a running application. One stage is a representation of a 100% pump, as this is what is supported in the *Basic Cascade Controller*.



Staging Bandwidth (SBW) defines the band around the head set point and it is configured as a percentage of the maximum reference. 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. It can be configured from 1 to 100%.

Override Bandwidth (OBW) is to preserve 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. Override bandwidth has a delay until the lead pump has reached *Motor Nominal Speed* or *Motor Speed High Limit* after a start command, to avoid unintended staging, until the head has settled after start. The value can be configured between SBW to 100%.

Fixed Speed Pumps Staging Bandwidth (FSBW) is used to make sure the cascade controller continues, if the frequency converter issues an alarm. To keep 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. FSBW is configurable in the range between SBW to OBW.

OBW timer is for avoiding frequent staging/destaging. The OBW timer prevents staging a pump until the application pressure is stabilized. It can be configured from 0 to 300 seconds.

SBW Staging Delay is the delay between when the feedback signal is below the staging bandwidth and when a lag pump is added. SBW Destaging Delay is the time between when the feedback signal is above the staging bandwidth and when a lag pump is removed. Both delays are configurable from 0 to 3000 seconds.

Ramp Down- and Up Delay is for use with Sofstarters. 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 Destage Threshold is 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*.

In order 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 Spee High Limit*. Destaging Speed can be entered in RPM or Hz.

Enable Staging Function is to avoid frequent staging of fixed speed pumps. Enabling the check box starts the stage function timer. Enable Destage Function ensures 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.

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 one 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 Low Limit" with one 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 check box is enabled, a stage will be removed when there is *No Flow* situation.

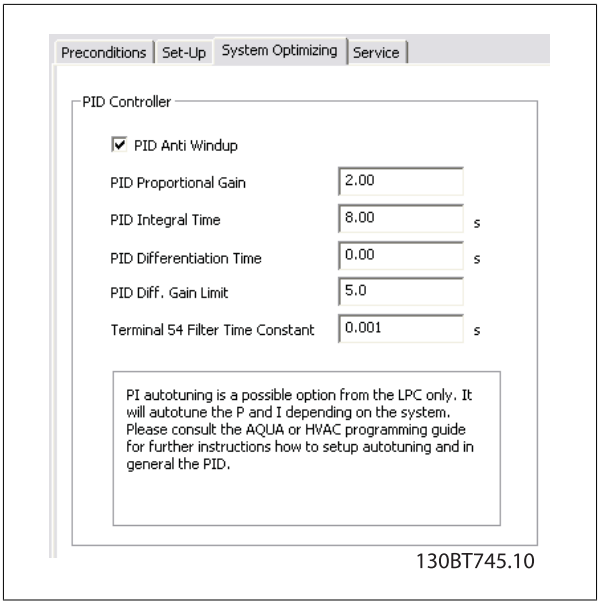
17.4.6 Motor Alternation Only

In Motor Alternation Only one drive and two 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 will take place at an external command signal or a pre-programmed event.

17.4.7 System Optimizing

The System Optimizing tab provides a simple way to start and stop the Cascade Controller run. The user can configure:

- PID Controller
- Feedback low pass filter



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 set-point reference, if its not possible to adjust the output frequency of the drive, to correct the error. This can occur when the drive has reached the min- 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 set-point reference even through the drive cannot adjust its output frequency to correct this error.

PID Proportional Gain adjusts the output of the drives PID controller based on the error between the feedback and the set-point reference. 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 to 10.00.

PID Integral Time is the duration of integration the error between the feedback and the set-point reference, to ensure the error approaches zero. Quick speed adjustments is obtained using a short duration. A too short value. the drive output frequency may become unstable. The time is configurable from 0.01 to 10000.00 seconds.

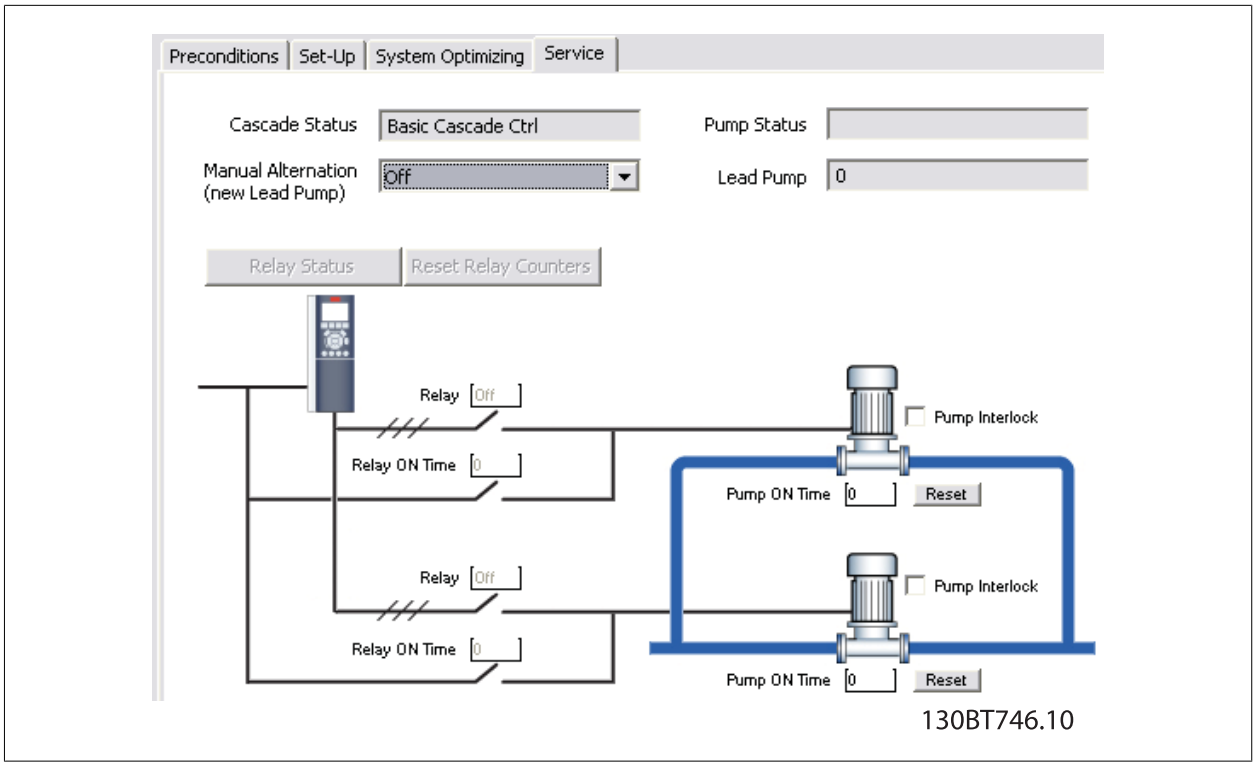
PID Differentiation Time is the duration the differentiator monitors the rate of change of the feedback. If its quickly changing, it will adjust the output of the PID Controller to reduce the rate of change of the feedback. Quick PID controller responses is obtained using a large duration. However, if too large value, the frequency converter output frequency may become unstable. Differential time is useful in situations where very fast responses and precise speed control is required. The time is configurable from 0.00 to 10.00 seconds.

Terminal 54 Filter Time Constant is 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 frequency converter is stopped. The time constant can be configured from 0.001 to 10.000 seconds.

17.4.8 Service

The service tab provides a simple way to make Cascade Controller service. From the view the user can monitor the:

- Cascade Status
- Pump Status
- Lead Pump
- Relay Status
- Relay on Time
- Pump Interlock



Cascade Status is the readout of the Cascade Controller. The status can be:

- **Disabled** – Cascade controller is disabled.
- **Emergency** – All pumps have been stopped by means of a Coast/Coast inverse or an External Interlock command applied to the frequency converter.
- **Off** – All pumps have been stopped by means of a stop command applied to the frequency converter.
- **In Open Loop** – Configuration Mode has been set for Open Loop. All fixed speed pumps are stopped and the variable speed pump will continue 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 will run at jog speed.
- **Running** – A start command is applied to the frequency converter and the cascade controller is controlling the pumps.
- **Running FSBW** – the frequency is tripped off and the Cascade Controller is controlling 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 Off and an alternation sequence is taking place.
- **Lead Not Set** – No pump available to be assigned as variable speed pump.

Pump Status is the readout of the status for each pump selected with a string which consists of the pump number and the current status of the pump. The status can be:

- **X** – disabled. The pump is interlocked either via Pump interlock or signal on a digital input programmed for Pump Interlock in Digital inputs.
- **Off** – Stopped by the Cascade controller but not interlocked.
- **D** – Running on Frequency Converter. Variable speed pump, regardless if connected directly or controlled via relay in the frequency converter.
- **R** – Running on manis. Fixed speed pump running.

A readout with two pumps could be "1:D 2:O".

- **1:D** – Pump 1 Running on frequency converter.
- **2:O** – Pump 2 Off.

Manual Alternation is for selecting the new lead pump. The items available from the drop down is Off to the number of pumps.

Lead pump is showing the actual lead pump in the application. When an alternation takes place, the field is updated to reflect the current lead pump.

Relay Status is showing the status of each relay. It can be updated from the Realy Status bottom. The status can be:

- **On** – the relay is activated.
- **Off** – the relay is deactivated.

The Values can only be updated if the frequency converter is connected online.

Relay ON Time is monitoring the total operating hours of the connected relay. The resolution is in operating hours.

Pump Interlock is for disabling a certain pump and is configurable from a checkboxn located at each pump.

Pump ON Time is monitoring the total operating hours of the connected pump. The resolution is in operating hours. The Reset bottom(s) clears the operating hours of a specific pump.

The bottom Reset Relay Counter resets all Relay On Times. It is only available if the frequency converters is connected online.

17.4.9 Extended Cascade Controller

Using one of the add-on option cards allows the frequency converter to control larger pump systems and extending the cascade mode, not only by varying the speed of the initial motor while staging additional fixed speed motors on and off.

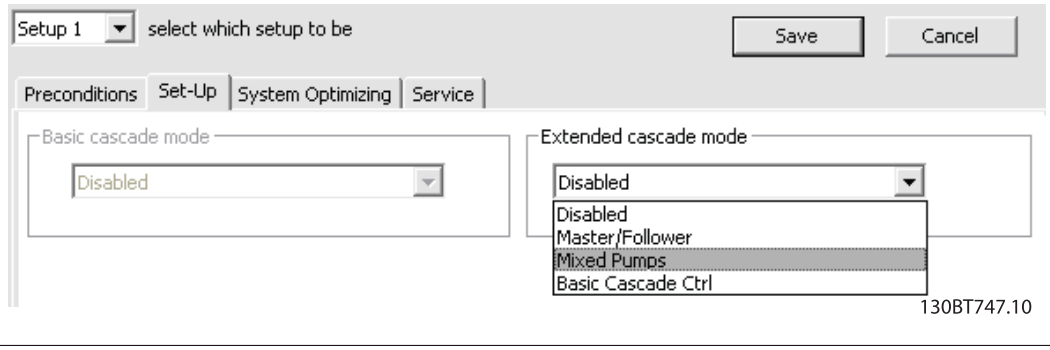
NB!
Extended Cascade Controller is configurable only from the parameter group 27-**.

17.4.10 Precontitions

The preconditions tab is similar the *Basic Cascade Mode*.

17.4.11 Set-up

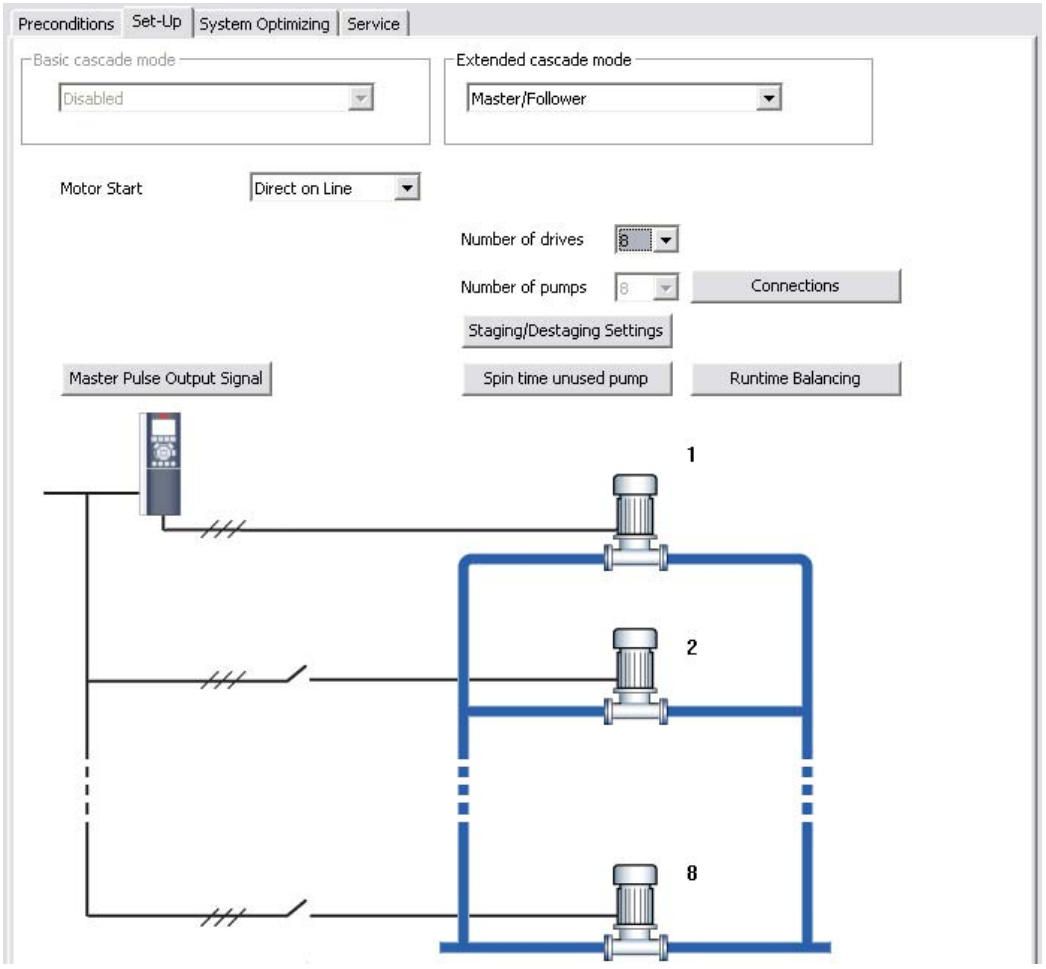
Is the user interface setting up the add-on cascade controller option The cascade mode drop down is extended with *Master/Follower* and *Mixed Pumps*.



17.4.12 Master/Follower

In the view, the user can configure:

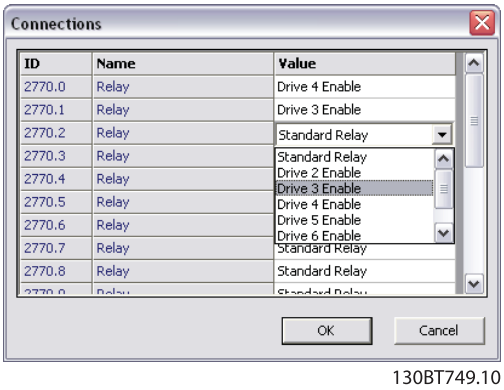
- Motor Start
- Pump Configuration
- Connections
- Staging/Destaging
- Master Pulse Output Signal
- Spin time unused pump
- Runtime Balancing



The Motor Start dropdown is similar the configuration available in *Basic Cascade*.

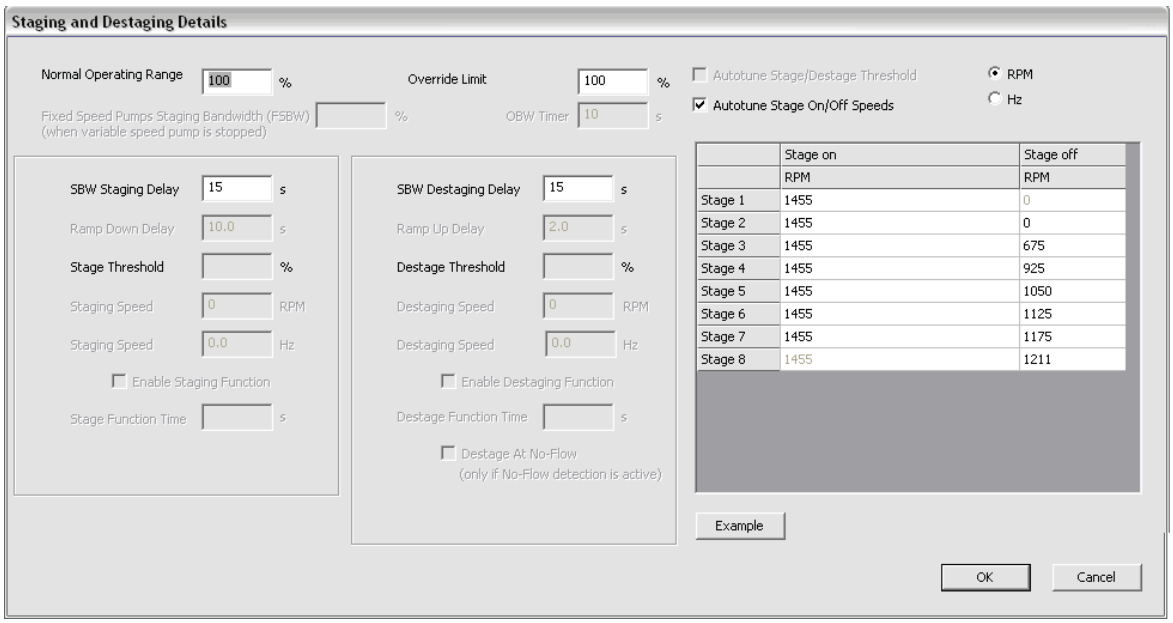
Each pump is controlled by a frequency converter and the number of drives corresponds the number of pumps. Staging and destaging are done based on the speed of the frequency converter. The constant pressure is controlled by the master drive operating in closed loop. Up to 6 pumps can be controlled with MCO 101 and up to 8 with the MCO 102 add-on option.

From the botton, *Connections*, the user can configure the relay function for each relay in the application.



Depending on the add-on option installed, only the available relays will be visible. To setup the function of each relay, double click on the Value field and select the item among the dropdown list. If add-on option MCO 102 is installed the relay option MCB 105 may also be used as an expansion.

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



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Normal Operating Range is the allowed offset from the set-point before a pump may be added or removed. The system must be out of the limit for the time specified in *Staging Delay*.

Override Limit is the allowed offset from the set-point before a pump immediately will added or removed.

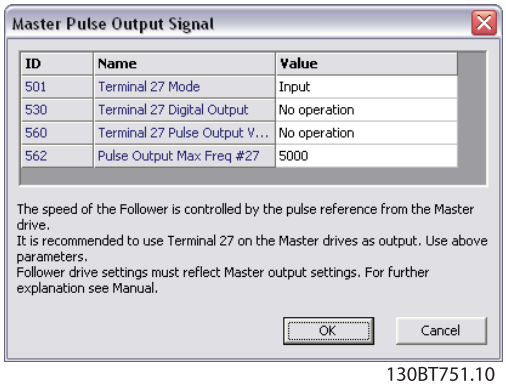
Autotune Stage/Destage Threshold optimizes the threshold values during operation. The settings are updated in order to prevent pressure over and undershoots when staging and destaging.

When *Autotune Stage On/Off Speeds* is enabled in the checkbox the stage on and off speeds will continually be auto tuned during operation. Sittings will be optimized in order to ensure high performance and low energy consumption.

All supported stages On and Off settings can be configured in RPM or Hz. The botton *Example* opens a dialog with a configuration example of three pumps.

The *Ramp Down-* and *Ramp Up Delay* is only configurable when the *Motor Start* is configured to *Softstarter*.

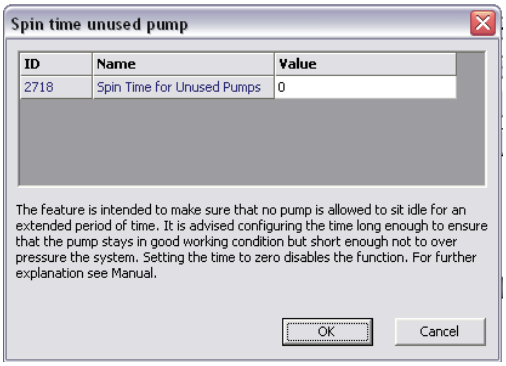
The botton *Master Pulse Output Signal* opens dialog to configure Terminal 27 on the Master drive.



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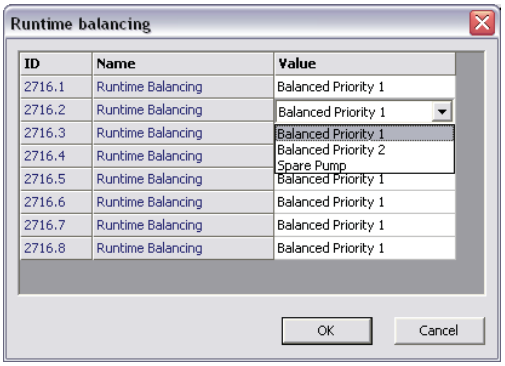
17

In some applications not all pumps are used on a regularly basis. With the bottom *Spin time unused pump*, the user can open a dialog to configure the time a pump is allowed to idle.



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Opening the *Runtime balancing* dialog from the botton, the user can configure to balance of running hours between the available pumps. Each pump can be configured among three balancing priorities.



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17.4.13 Mixed Pumps

In the view, the user can configure:

- Motor Start
- Pump configuration
- Pump Size
- Connections
- Alternation Details
- Staging/Destaging settings
- Spin time unused pump
- Runtime Balancing

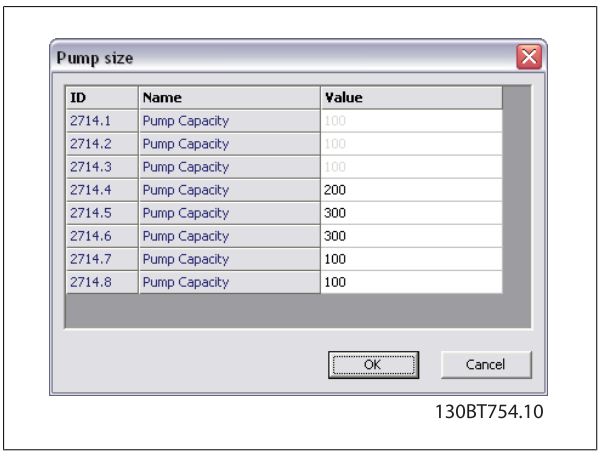
The Motor Start dropdown list is similar Basic Cascade with the additional item to configure Star/Delta.

Mixed Pumps cascade mode can be configured to:

- **Mixed pump** – a mix of variable speed pumps connected to frequency converters as well as additional fixed speed pumps.
- **Unequal size pump** – limited mix of fixed speed pumps in different sizes.
- **Mixed pump with alternation** – alternates the frequency converter between two pumps along with controlling additional fixed speed pumps.

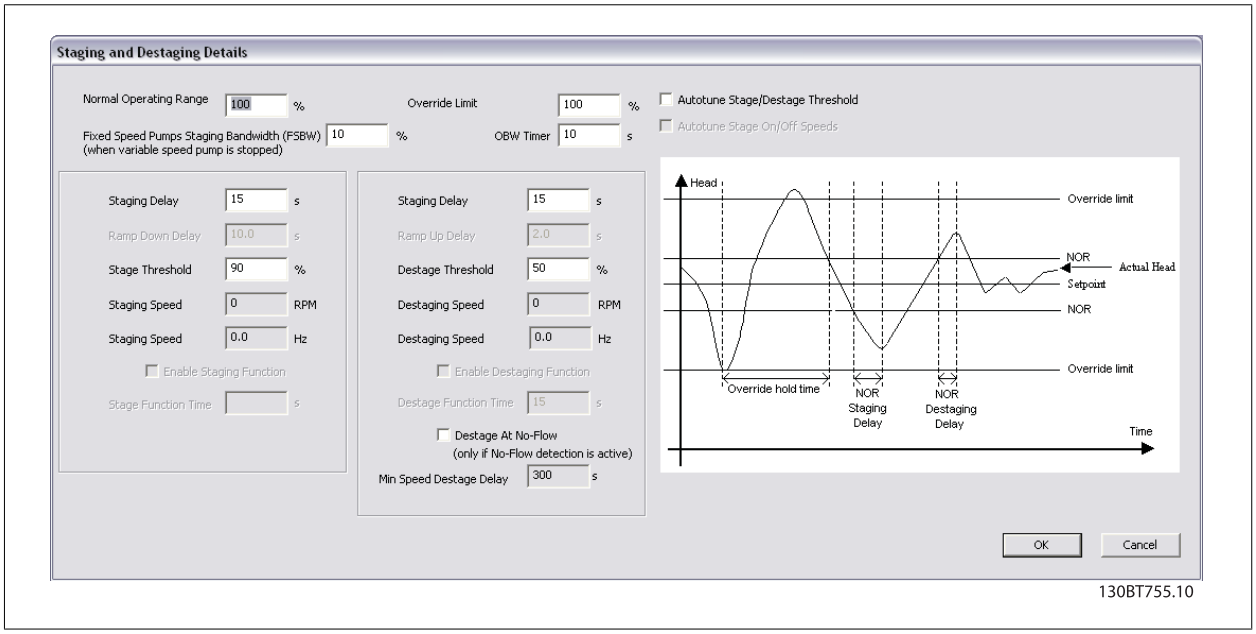
Up to 6 pumps can be controlled with MCO 101 and up to 8 with the MCO 102 add-on option.

Pump size botton opens the *Pump size* dialog to configure the fixed pump capacity in the application. All variable speed pumps is read only and 100% in capacity.



Connection dialog opened from the *Connection* botton is similar in the *Master/Follower* configuration. *Mixed Pumps Alternation Details* configuration is similar the *Basic Cascade*.

The dialog *Staging/Destaging settings* is similar the *Basic Cascade* with the additional option to configure *Min speed Destage Delay*. The value configured is the time in seconds that the lead pump must be running at minimum speed while the system feedback is still inside the normal operating band before the pump will be turned off to save energy.



The *Ramp Down- and Ramp Up Delay* is only configurable when the *Motor Start* is configured to *Softstarter* or *Star/Delta*.

Spin time unused pump and *Runtime Balancing* configuration is similar the *Master/Follower configuration*.

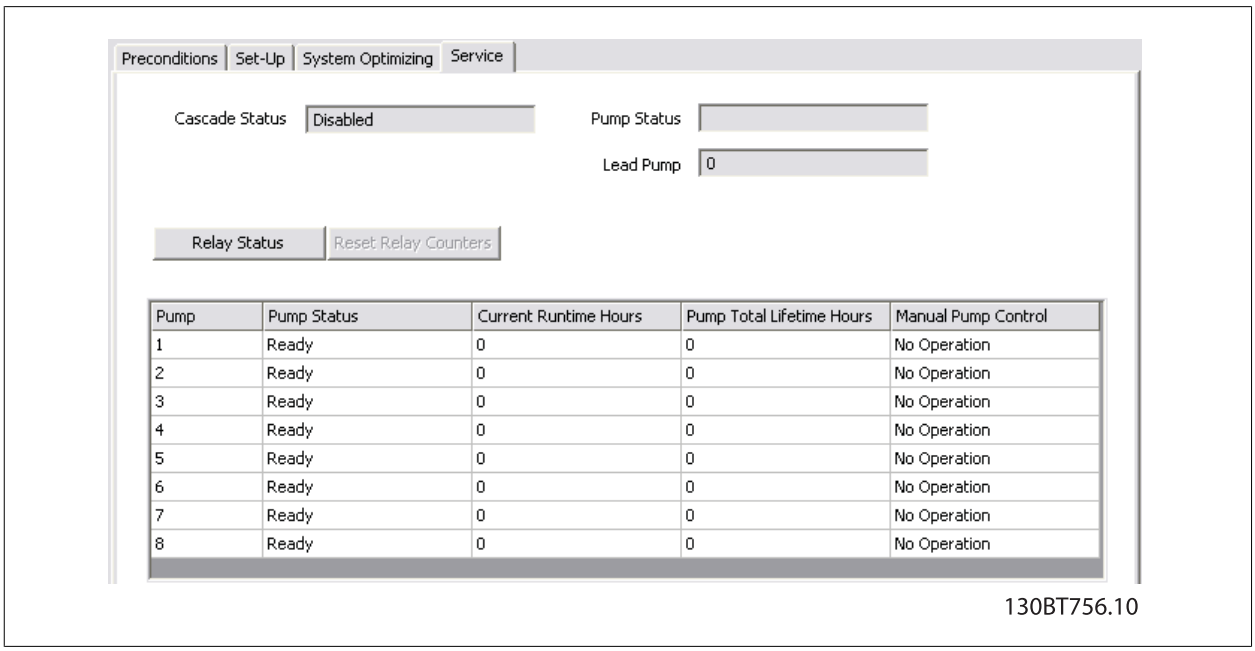
17.4.14 System Optimizing

The *System Optimizing* tab configuration is similar the *Basic Cascade* and *Master/Follower*.

17.4.15 Service

The *Service* tab provides similar the *Basic Cascade*, a simple way to make *Extended Cascade Controller* service.
From the view the user can monitor:

- **Cascade Status** – similar the Basic Cascade.
- **Pump Status** – similar the Basic Cascade.
- **Lead Pump** – similar the Basic Cascade.
- Table listing for each pump the *Pump Status*, *Current Runtime Hours*, *Pump Total Lifetime Hours* and *Manual Pump Control*.



Pump	Pump Status	Current Runtime Hours	Pump Total Lifetime Hours	Manual Pump Control
1	Ready	0	0	No Operation
2	Ready	0	0	No Operation
3	Ready	0	0	No Operation
4	Ready	0	0	No Operation
5	Ready	0	0	No Operation
6	Ready	0	0	No Operation
7	Ready	0	0	No Operation
8	Ready	0	0	No Operation

Pump Status readout the status of each pump in the application.

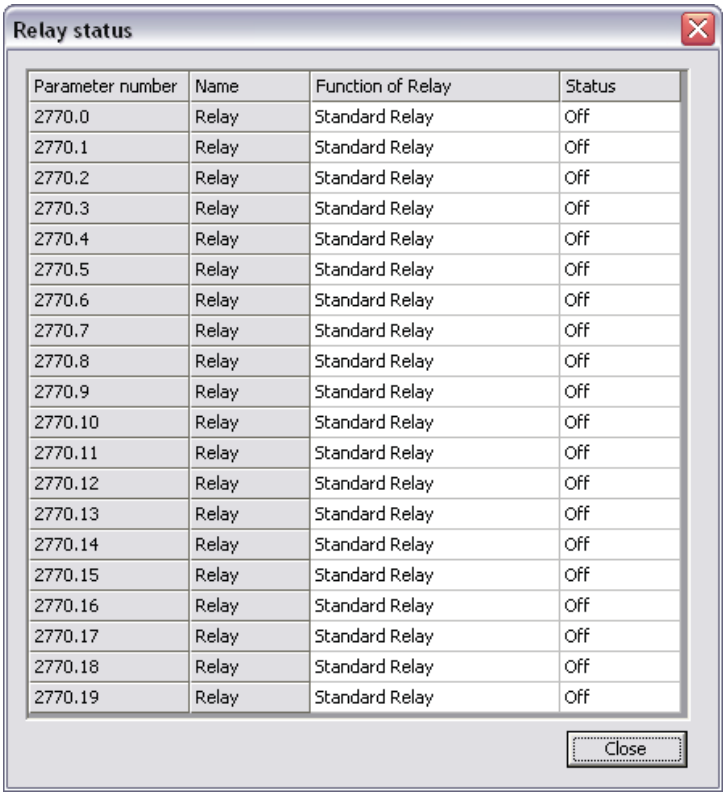
Current Runtime Hours readout the total number of hours each pump has been running since last reset. The time is used to balance the running hours between pumps.

Pump Total Lifetime Hours is the total operating hours for each connected pump.

Manual Pump Control is the readout of the command parameter that allows manual control of individual pump states.
The possible control states are:

- **No operation** – Does Nothing.
- **Online** – Makes the pump available of the cascade controller.
- **Alternate On** – forces the selected pump to be the lead pump.
- **Offline-Off** – Turns the pump off and makes the pump unavailable for cascading.
- **Offline-On** – Turns the pump on and makes the pump unavailable for cascading.
- **Offline-Spin** – Initiates a pump spin.

The *Relay Status* botton opens the *Relay Status* dialog to readout the function and status of each relay.



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

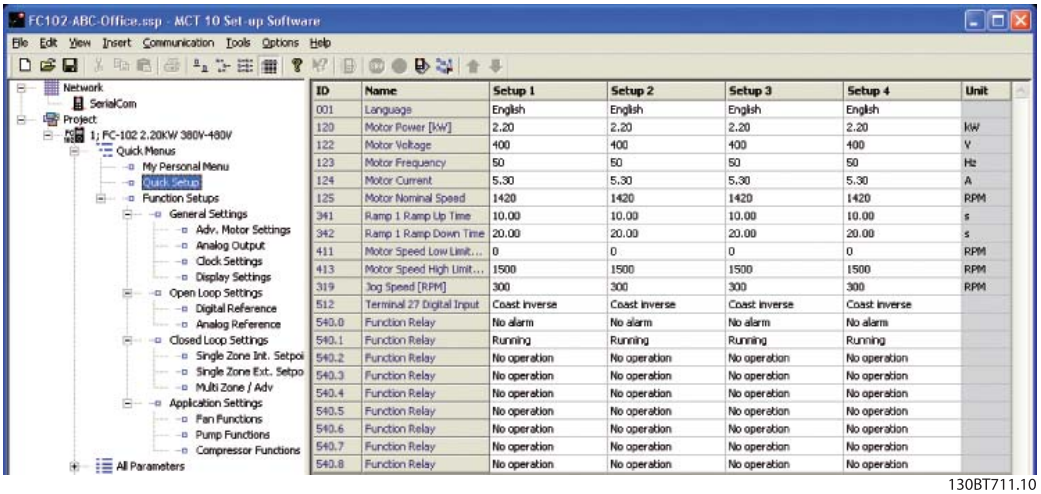
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Function of Relay defines the function of each option relays were the Status is the state of each relay.

17.5.1 Quick Menus

The quick menus can be viewed in MCT 10 Set-up Software.

The quick menus allow easy access to the relevant parameters for specific application set-up. The user should just follow the steps through the tree-view in MCT 10 Set-up Software as on the LCP on the drive.



ID	Name	Setup 1	Setup 2	Setup 3	Setup 4	Unit
001	Language	English	English	English	English	
120	Motor Power [kW]	2.20	2.20	2.20	2.20	kW
122	Motor Voltage	400	400	400	400	V
123	Motor Frequency	50	50	50	50	Hz
124	Motor Current	5.30	5.30	5.30	5.30	A
125	Motor Nominal Speed	1420	1420	1420	1420	RPM
341	Ramp 1 Ramp Up Time	10.00	10.00	10.00	10.00	s
342	Ramp 1 Ramp Down Time	20.00	20.00	20.00	20.00	s
411	Motor Speed Low Limit...	0	0	0	0	RPM
413	Motor Speed High Limit...	1500	1500	1500	1500	RPM
319	Jog Speed [RPM]	300	300	300	300	RPM
512	Terminal 27 Digital Input	Coast inverse	Coast inverse	Coast inverse	Coast inverse	
540.0	Function Relay	No alarm	No alarm	No alarm	No alarm	
540.1	Function Relay	Running	Running	Running	Running	
540.2	Function Relay	No operation	No operation	No operation	No operation	
540.3	Function Relay	No operation	No operation	No operation	No operation	
540.4	Function Relay	No operation	No operation	No operation	No operation	
540.5	Function Relay	No operation	No operation	No operation	No operation	
540.6	Function Relay	No operation	No operation	No operation	No operation	
540.7	Function Relay	No operation	No operation	No operation	No operation	
540.8	Function Relay	No operation	No operation	No operation	No operation	

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17

18 Conversion Wizard

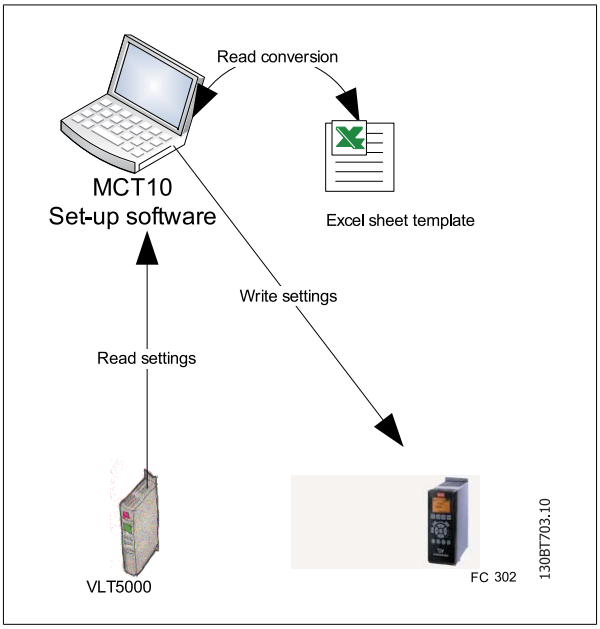
If the parameter database of a source drive is different or contains differences compared to destination drive, it cannot be written without errors signalled during write to drive. Writing parameters, it is required the database versions, power size, voltage range and option configuration to match between the source- and destination drive. Any differences can be converted using one of the two conversion wizards available in MCT 10 Set-up Software:

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

18.2 VLT to FC Series Converter Function

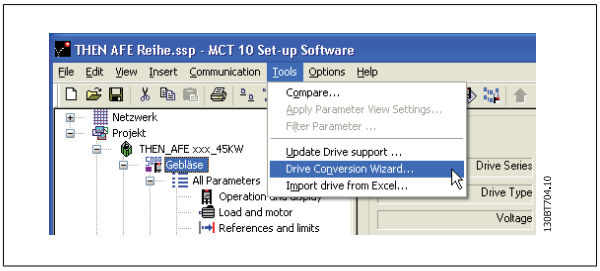
In MCT 10 Set-up Software it is possible to have a VLT5000 drive in the project folder converted to a FC302 Automation Drive. This is easy done by means of a build in function in MCT 10 Set-up Software.

Easy converting in MCT 10 Set-up Software:
The conversion matrix (Excel sheet) can be edited by the Advanced user, when necessary.



Easy conversion of multiple drives:

- Select the Tools menu and activate the "Drive Conversion Wizard" item
- In the following dialogs select the drives for conversion.
- When converted a new FC302 drives will be created in the project folder.

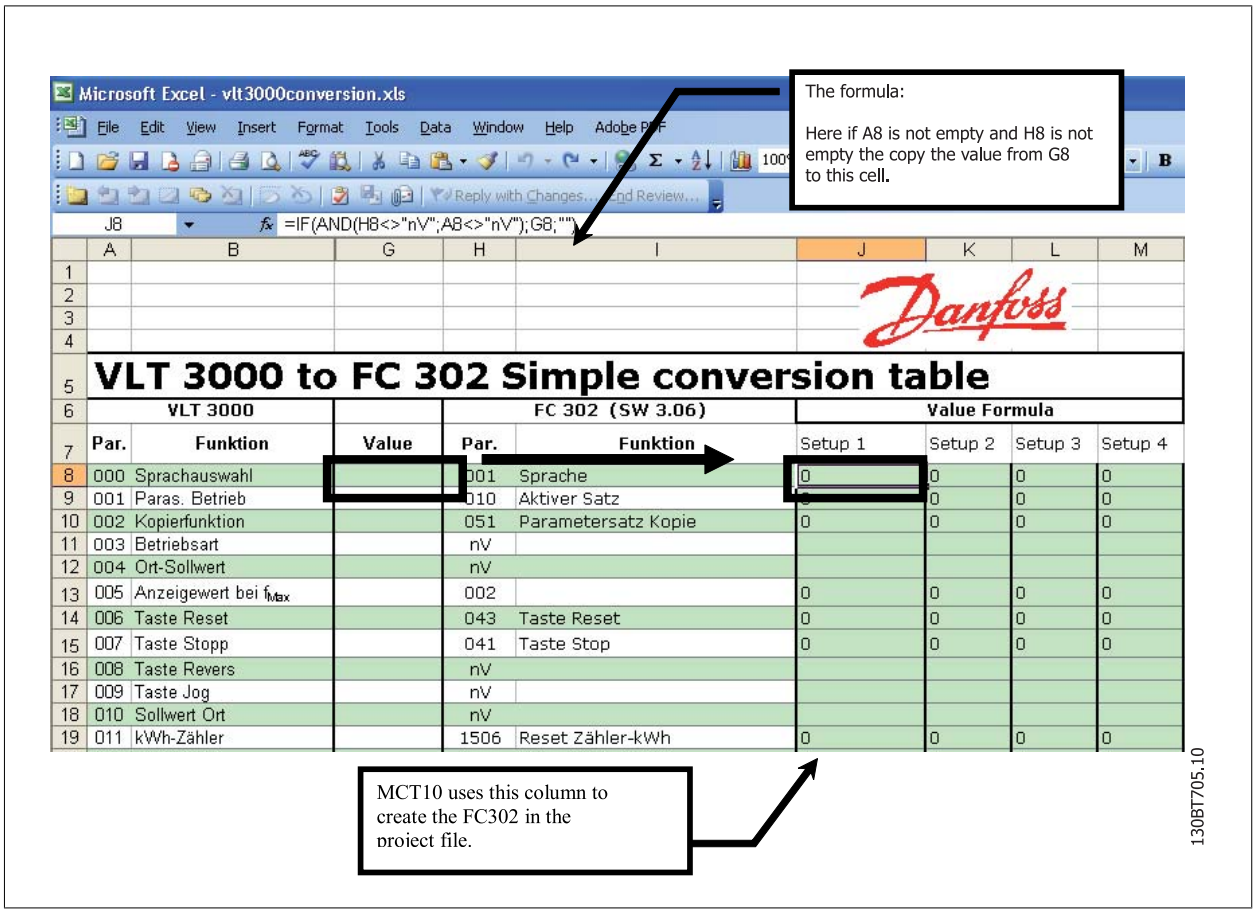


18.2.1 Import Drive from Excel

This function can create an FC30x drive out from an Excel sheet. The objective with this function is that the user himself can import VLT3000 settings, from settings copied into an excel sheet and have these settings copied into the selected parameter numbers into a new FC302.

An example file is attached in MCT 10 Set-up Software (vlt3000conversion.xls), this example file can be edited by the user and be used for converting from vlt3000 to FC302. This requires however that the user must have detailed knowledge of Microsoft Excel formula editing.

The user must enter VLT3000 settings into column G8 !



18.3 FC to FC Series Conversion

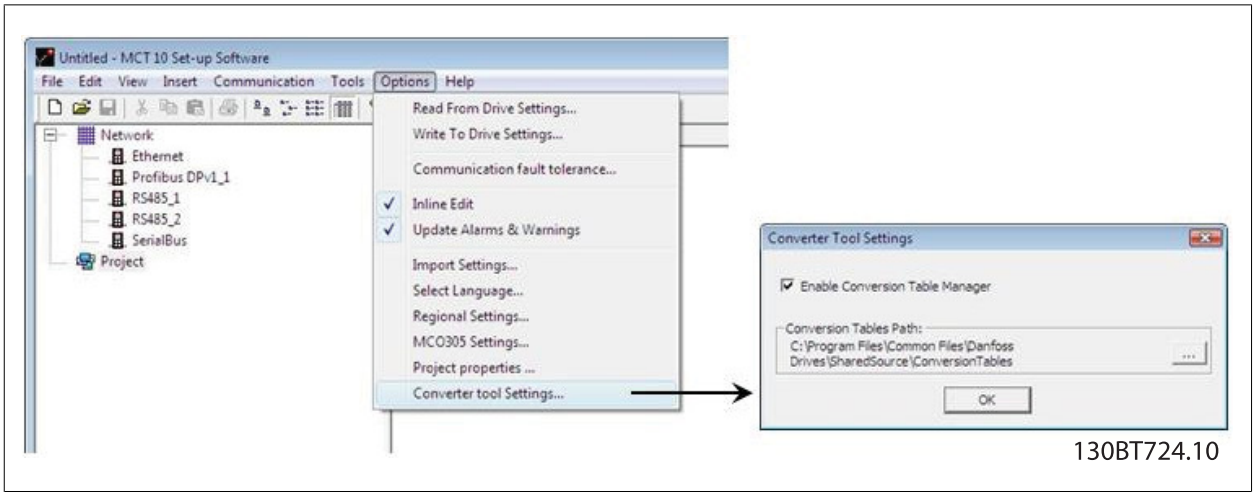
The drive converter tool is capable to migrate between different software versions, power size, voltage range and option configuration of the same drive series. It covers the FC 102, FC 202, FC 3xx, LD 302 and all OEM versions based on the FC xxx series. Any difference can easily be matched by using the Conversion Table Manager, creating a table to convert between source and destination drive.
When a conversion table is made, the user can apply transparently from:

- Online to Online Drive
- Online to Offline Drive
- Offline to Online Drive
- Offline to Offline Drive

Users with different knowledge and competence, it is possible to configure among two profiles providing different user rights.

- Administrator – is the one qualifying and managing the conversion table(s) through access to the Conversion Table Manager. From the Conversion Table Manager new conversion table(s) can be created and deployed to other MCT 10 Set-up Software installations.
- User – is the one not concerned about any drive compatibility issues. With proper conversion tables in the database, all projects can be written to the destination, by using the conversion tables transparently. The user is restricted from accessing the Conversion Table Manager. Deployed conversion tables can be imported to the database.

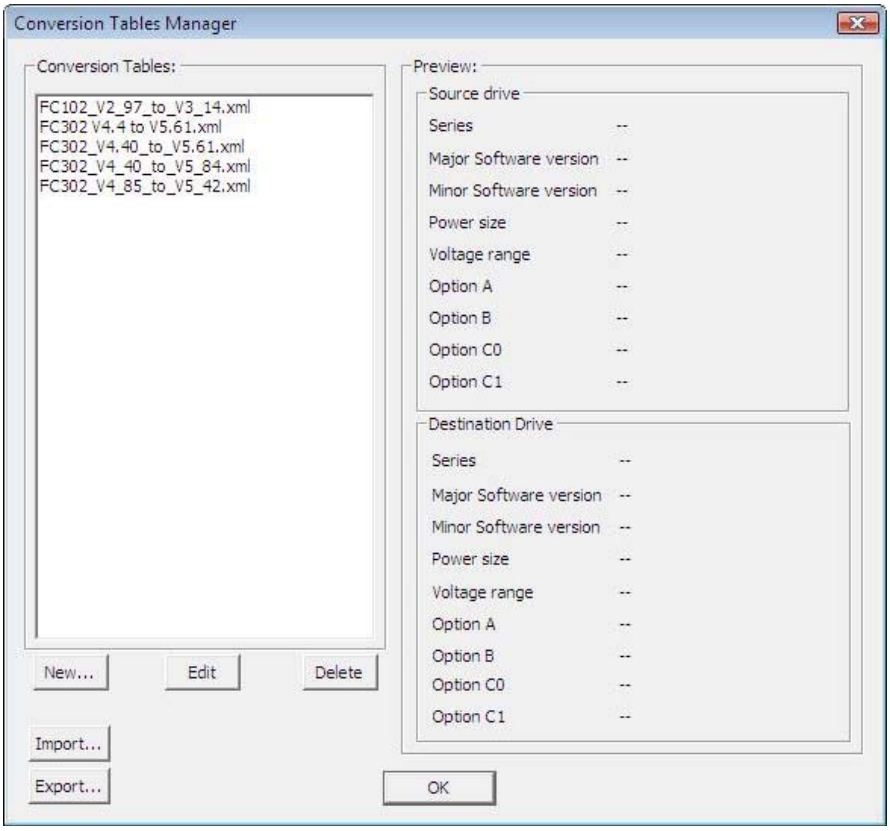
Default MCT 10 Set-up Software is installed with user rights. Enabling the Conversion Table Manger is done from the checkbox in the Converter Tools Settings dialog.



Default 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.

18.3.1 Conversion Table Manager

The Conversion Table Manager can be accessed through the MCT 10 Set-up Software tools menu. From the same location, new conversion tables can be imported into the database.



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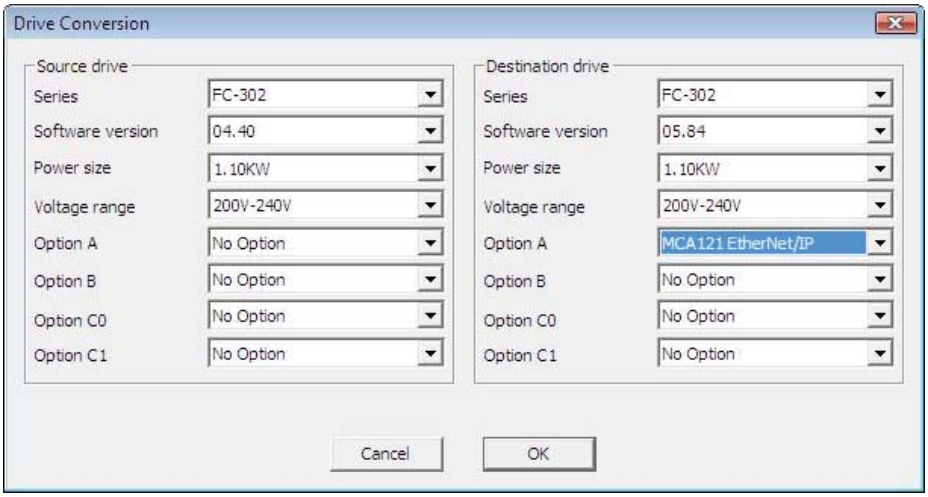
The dialog is divided in a Conversion Table containing the list of conversion tables in the database and a Preview pane. New conversion tables can be created, existing ones edited or deleted.

Distributing to other MCT 10 Set-up Software installations, the user can select a number of tables in the database to be exported to a *.cvt file. The Preview pane list the conversion table source and destination drive info and can be converted among the following combinations:

- Drive series based on the FC 102/FC 202/FC 3xx platform
- Software version. Is divided in the database into a major and minor software version
- Power size
- Voltage range
- Option A
- Option B
- Option C0
- Option C1

New conversion table(s) can be created from the Conversion Table Manager or by right clicking on the source drive and choose Convert Drive. Both options opens the Drive Conversion dialog, but with the last one only the destination drive info configurable.

Converting a drive by right clicking and choose Convert Drive do not include the par. group 19-**. The settings are written when the user writes from source to destination transparently.

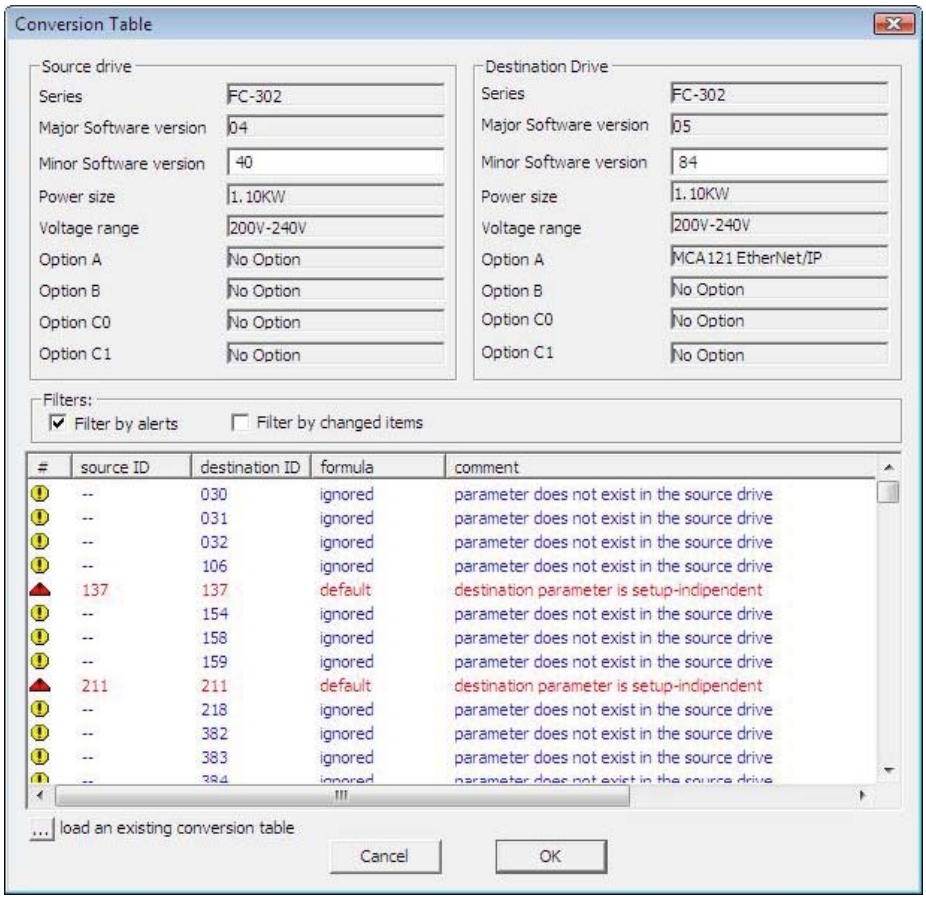


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Source and Destination drive info defined, opens the conversion table editor listing the parameter database differences.

In the conversion table editor, the user can create the conversion table from scratch or loading an existing one. Loading an existing conversion table must match according to the drive series, software version, power size, voltage range and option configuration. Any difference MCT 10 Set-up Software will not find any usable conversion table. When a conversion table is found, the user have the ability to reedit the table or to convert the source drive and store the converted drive in an offline folder.

Default the parameter database is listed and sorted according to the parameter ID. To simplify conversion process, the parameter database can be filtered to list only alerts or the changes applied by the user. Alerts coloured by read corresponds to the differences between the source and destination, requiring a formula, to be able to apply settings to destination drive. Alerts coloured in blue, the formula is per default ignored and can be applied to the destination drive. If a formula is applied to all alerts, the source parameter database can be converted to the destination parameter database without any further configurations required.

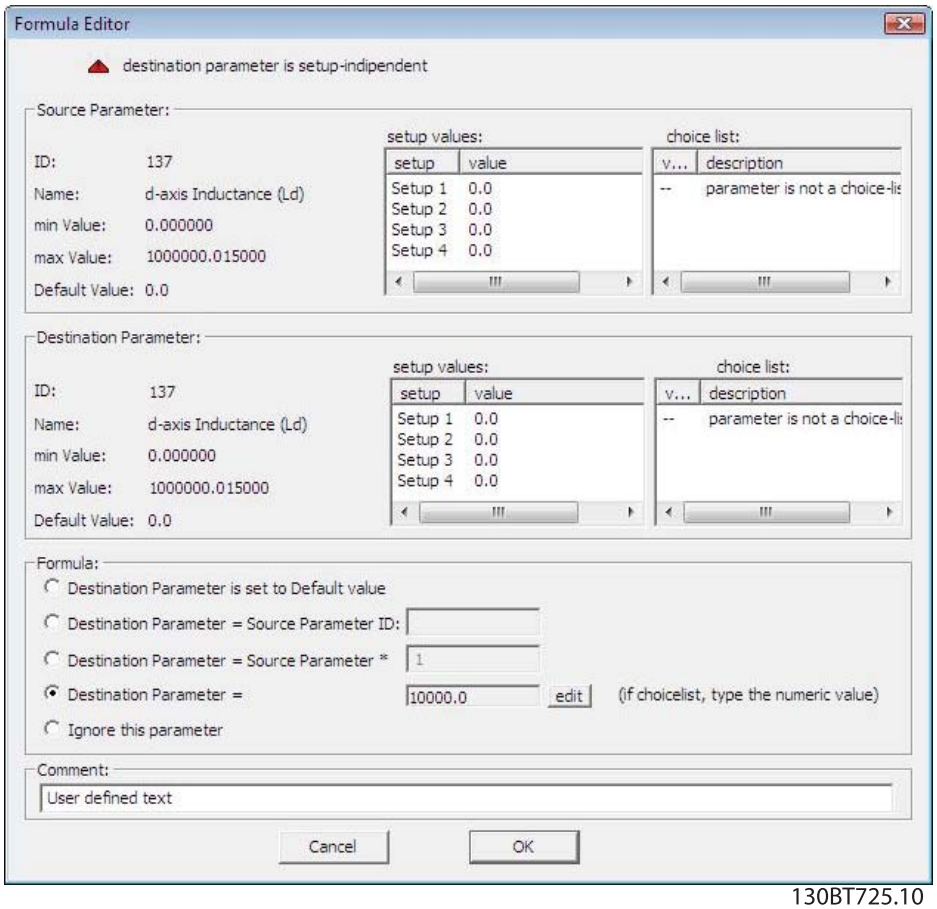


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Double clicking on an alert opens the Formula Editor dialog to specify the destination parameter mapping. The following configurations are possible:

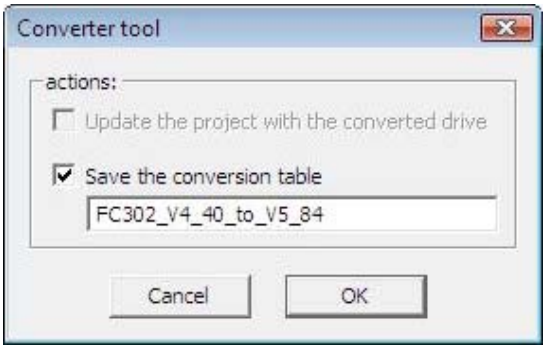
- Destination parameter is set to default value corresponding to the drive factory configuration. Is the default setting for alerts coloured in read.
- Destination parameter = source parameter ID.
- Destination parameter = source parameter multiplied by a user defined numeric value.
- Destination parameter = destination choice list or numerical value.
- Ignore this parameter. Is the default setting for alerts coloured in blue.

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



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



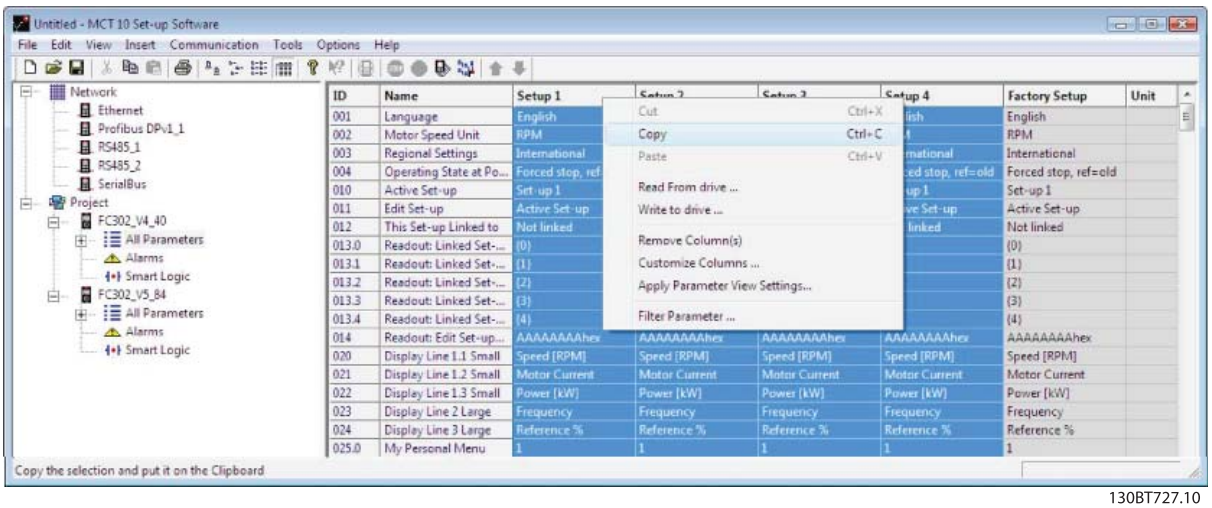
130BT726.10

If differences is detected when writing from a source to destination drive, MCT 10 Set-up Software uses the drive series, major software version, power size, voltage range and option configuration as search criteria's. With the proper conversion table in the database, any drive can be written transparently to a destination even if the minor software version do not match. If several conversion tables are found matching the criterias, MCT 10 Set-up Software will use the minor software version to find the closest match. Only one drive can be written to destination transparently.

If par. group 19-** is available the settings will be written to the destination drive.

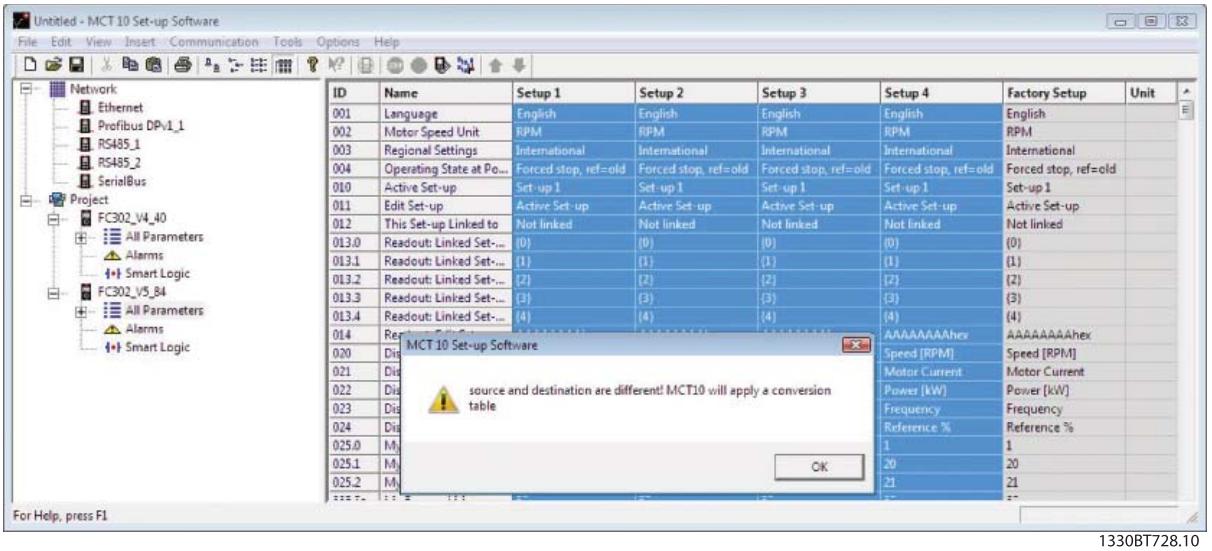
18.3.2 Convert Offline to Offline

Writing between two offline drives is done marking the appropriate number of set-ups from All Parameters, right click and choose copy.



130BT727.10

Pasting the parameters to destination drive, MCT 10 Set-up Software will recognize the difference and automatically applies a conversion table, if a matching one is available in the database.



1330BT728.10

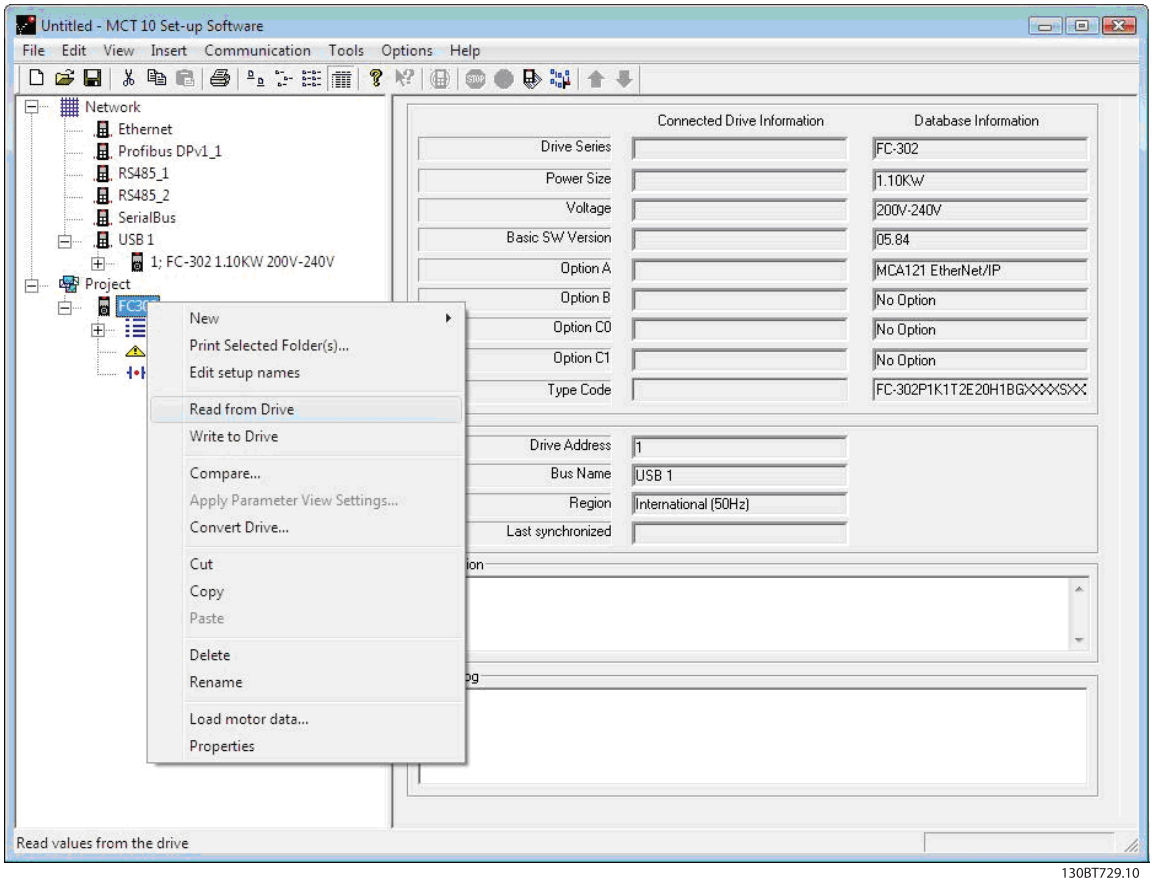
18.3.3 Convert Online to Online

Writing between two online drives is done by copy and paste the appropriate number of set-ups similar the way writing between two offline drives.

18

18.3.4 Convert Online to Offline

Writing from online to an offline drive is done by right clicking on the offline drive and chose to read from drive. MCT 10 Set-up Software will recognize the difference and automatically applies a conversion table if a matching one is available in the database.



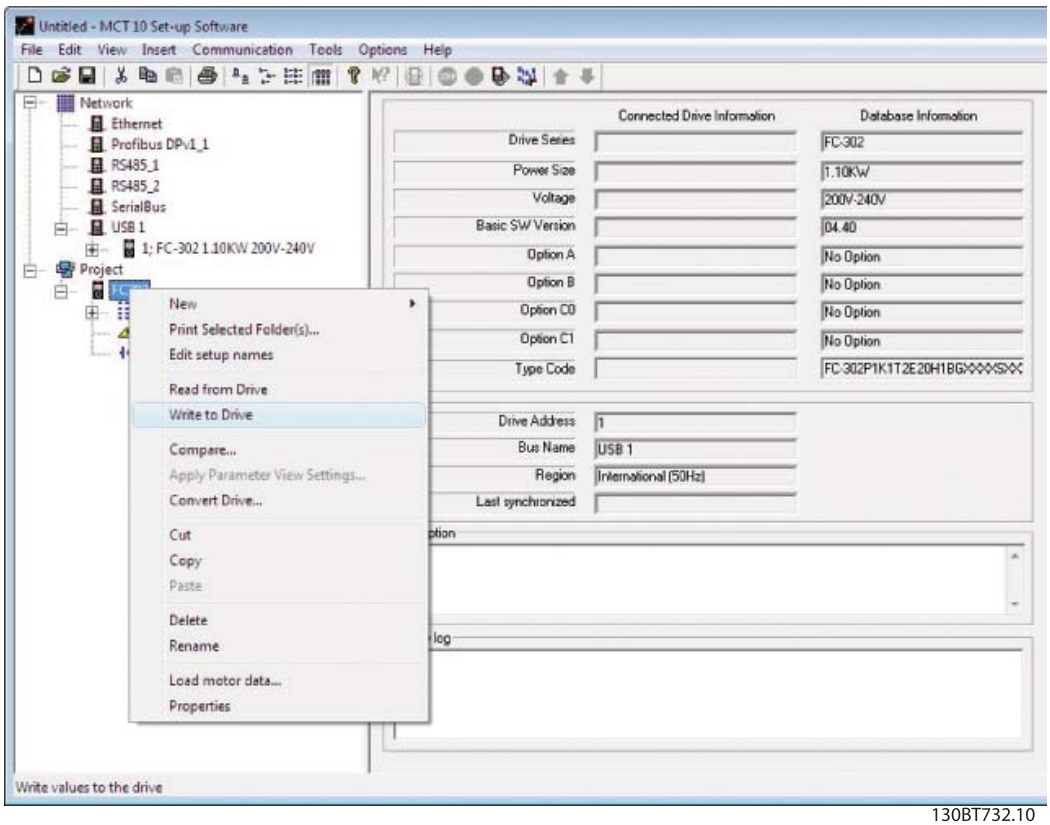
130BT729.10

NB!

Make sure the offline drive connection properties corresponds with the online drive.

18.3.5 Convert Offline to Online

Writing from offline to an online drive is done by right clicking on the offline drive and chose write to drive. MCT 10 Set-up Software will recognize the difference and automatically applies a conversion table if a matching one is available in the database.



130BT732.10

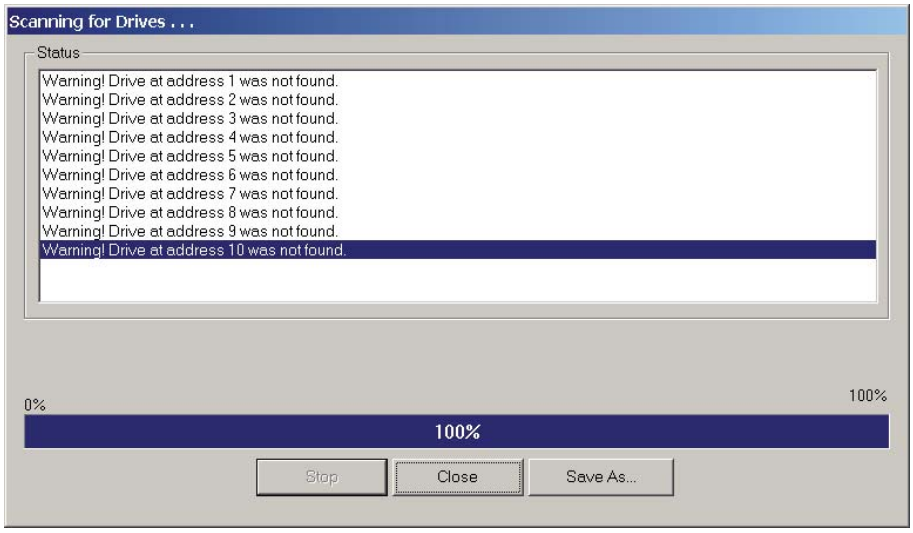
NB!
Make sure the offline drive connection properties corresponds with the online drive.

19 Troubleshooting

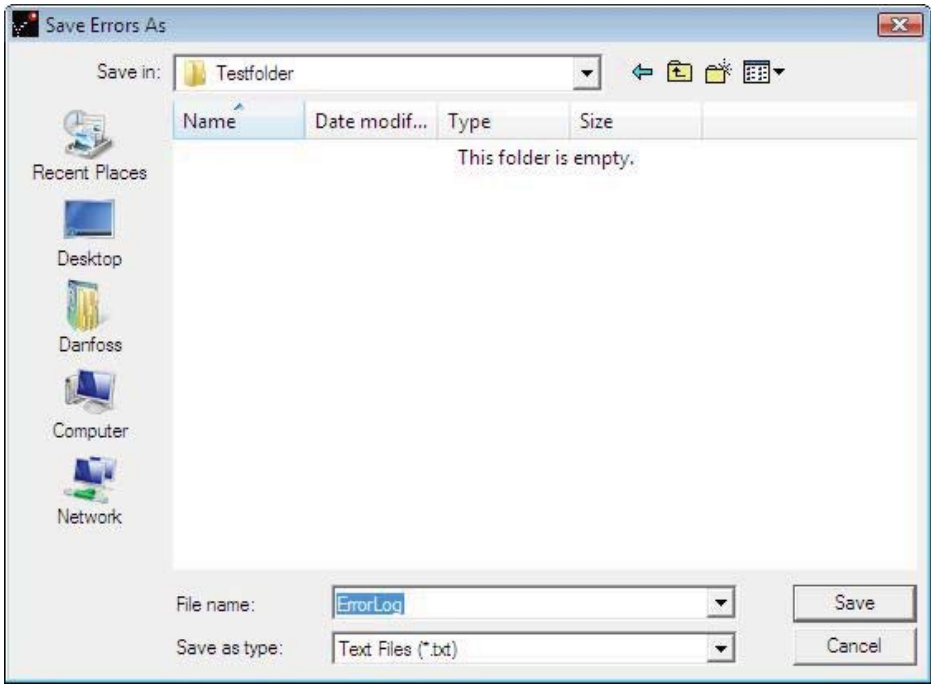
19.1 Save Error Dialog

When an error dialog appears on the screen MCT 10 Set-up Software has a facility for saving 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 the option Save As and you will be able to record the error message as a text file with free choice of file name and location.

For example, when scanning the network for frequency converters, an error dialog will appear showing the frequency converters not detected:



Select Save As.. to store the error log and the following dialog will appear:



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19.2 Common Problems and Solutions

19.2.1 Changes Are Not Saved to PC

Checks that changes made in the Network folder have been copied over to the Project folder, and then saved to a directory on the users hard disk. Changes made in the Network folder are implemented in the field device only, and are not automatically saved to a PC.

19.2.2 Error Message Whilst Installing MCT 10 Set-up Software

Message such as "MCT 10 SET UP SOFTWARE ERROR OPENING FC DRIVER" This error may occur if there is a second 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 etc. Investigate whether other programs use the same COM port. If this is the case make sure that the other PC tool does not lock or reserve the COM port.

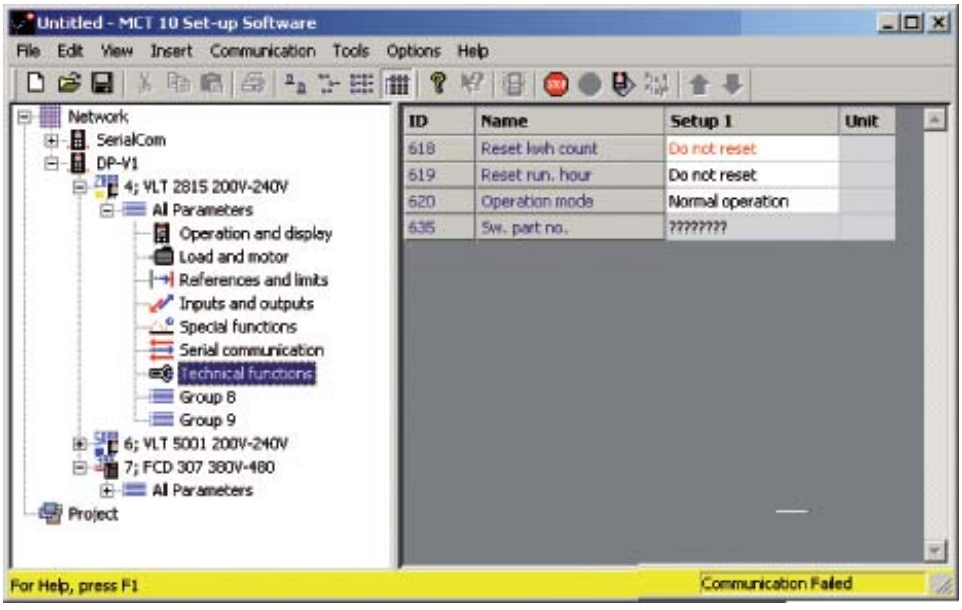
Error message whilst storing parameter settings and reading / writing via Profibus DP-V1 using the function Database readout from the Drive.

19.2.3 Error Message Communication Failed

The communications error comes and goes sporadically:
This type of communications error typically occurs when cables are inadequately screened, in which case EMC noise can affect the communications. Check that the cables are installed according to the guidelines in the Operating Instructions for the frequency converter.

The communications error is permanent:
This type of communications error is typically due to an error in network configuration. Check that the network configuration is in accordance with the frequency converter Operating Instructions guidelines.

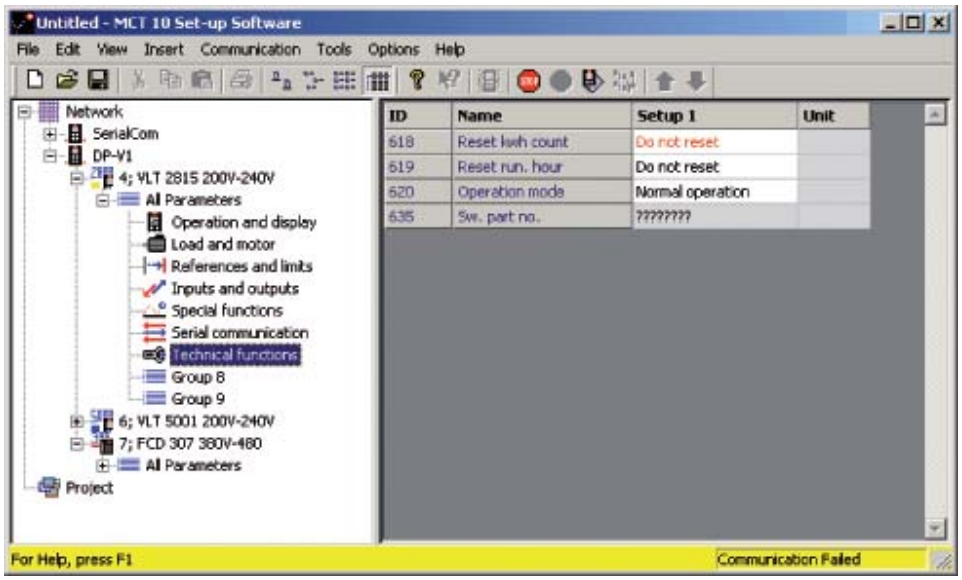
The Communication Failed error message appears in the status bar as shown:



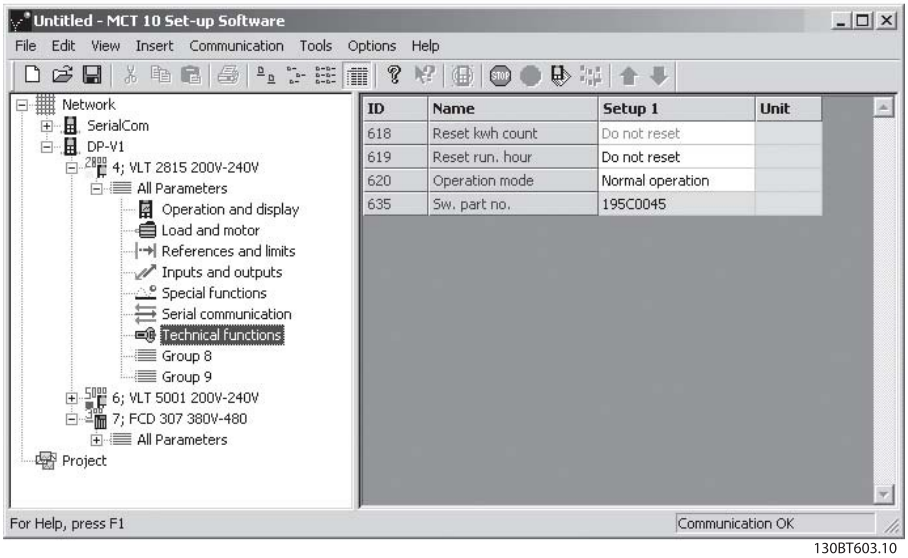
19.2.4 Communication Errors

If an erroneous/illegal action has been attempted, an error highlight will appear in the status bar at the bottom of the MCT 10 Set-up Software window.

When a communications error arises, the status bar at the bottom of the MCT 10 Set-up Software window will be highlighted and display a *Communications Failed* error message, as shown in the following example:



When no communications error has occurred the same window will appear as:



Communications errors typically occur due to inadequate screening of cables, i.e. cable is not installed in accordance with installation instructions.