



# Operating Instructions

## VLT<sup>®</sup> Factory Tool MCT 21





## Contents

|   |           |
|---|-----------|
| <b>1 Introduction</b>                                   | <b>3</b>  |
| 1.1 Purpose of the Manual                               | 3         |
| 1.2 Further Information                                 | 3         |
| 1.3 Product Overview                                    | 3         |
| 1.4 Document and Software Version                       | 3         |
| <b>2 Safety</b>   | <b>4</b>  |
| 2.1 Safety Symbols                                      | 4         |
| 2.2 Qualified Personnel                                 | 4         |
| 2.3 Safety Precautions                                  | 4         |
| <b>3 Installation and Set-up</b>                        | <b>6</b>  |
| 3.1 Installation  | 6         |
| 3.2 De-installation                                     | 6         |
| 3.3 Set-up  | 6         |
| <b>4 Workflow</b>                                       | <b>7</b>  |
| 4.1 Interaction of Engineering Tool and Technician Tool | 7         |
| 4.2 Workflow Engineering Tool                           | 8         |
| 4.3 Workflow Technician Tool                            | 9         |
| <b>5 Engineering Tool Functions</b>                     | <b>10</b> |
| 5.1 Project   | 10        |
| 5.1.1 Create a Project                                  | 10        |
| 5.1.2 New Project - Create from Database                | 10        |
| 5.1.3 New Project - Read from Drive                     | 12        |
| 5.1.4 Open Project                                      | 12        |
| 5.1.5 Search Project                                    | 13        |
| 5.1.6 Create Order                                      | 13        |
| 5.1.7 Copy Project                                      | 15        |
| 5.1.8 Upgrade a Project to New Firmware                 | 16        |
| 5.2 Motor Database                                      | 17        |
| 5.3 Motor Library                                       | 19        |
| 5.3.1 Common Motor Library                              | 19        |
| 5.3.2 Export Library                                    | 21        |
| 5.3.3 Copy the Common Motor Library                     | 21        |
| 5.4 SIVP (Specific Initial Values and Protection)       | 22        |
| 5.4.1 Define the SIVP                                   | 22        |
| 5.4.2 SIVP Examples                                     | 24        |
| 5.4.3 Copy SIVP Library                                 | 25        |

|  |           |
|--|-----------|
| 5.5 Tests  | 25        |
| 5.5.1 Create Test                                | 25        |
| 5.5.2 Edit Test                                  | 26        |
| 5.5.2.1 Commands                                 | 26        |
| 5.5.2.2 Editing Procedure                        | 27        |
| 5.5.3 Control Word according to FC Profile (CTW) | 28        |
| 5.5.4 Definition of Reference                    | 30        |
| 5.5.5 Select and Run Test, View Test Report      | 30        |
| 5.5.6 Remove Test                                | 30        |
| 5.5.7 Copy Test                                  | 31        |
| 5.6 Settings Menu                                | 32        |
| 5.6.1 General Settings                           | 32        |
| 5.6.2 Drive Communication                        | 32        |
| <b>6 Technician Tool Functions</b>               | <b>33</b> |
| 6.1 Project                                      | 33        |
| 6.1.1 Open a Project                             | 33        |
| 6.1.2 Project View                               | 33        |
| 6.1.3 Project Review and Adjustments             | 33        |
| 6.1.4 Create an Order                            | 34        |
| 6.1.5 Write to Frequency Converter               | 34        |
| 6.1.6 Compare                                    | 35        |
| 6.2 Motor Database                               | 35        |
| 6.3 SIVP   | 35        |
| 6.3.1 Select                                     | 35        |
| 6.3.2 Write to Frequency Converter               | 35        |
| 6.4 Tests  | 35        |
| 6.4.1 Test and Documentation                     | 35        |
| <b>Index</b>                                     | <b>37</b> |

# 1 Introduction

## 1.1 Purpose of the Manual

This manual provides basic knowledge required to use the VLT® MCT 21 Factory Tool with VLT® DriveMotor FCP 106 and FCM 106 frequency converters.

Familiarity with the following is assumed:

- MS®-Windows™ at user level.
- Set-up, process knowledge, and operation of frequency converters.
- Connection, set-up, and use of communication equipment.
- Familiarity with the PC or PLC master of the system.

Issues regarding hardware or software produced by other manufacturers are beyond the scope of this manual, and are not the responsibility of Danfoss.

The manual does not provide detailed information regarding:

- Specific applications
- Possible solutions
- Related parameter combinations in the set-up and use of a frequency converter.

VLT® is a registered trademark.

## 1.2 Further Information

Literature available:

- *VLT® DriveMotor FCP 106 and FCM 106 Operating Instructions*
- *VLT® DriveMotor FCP 106 and FCM 106 Programming Guide*
- *VLT® DriveMotor FCP 106 and FCM 106 Design Guide*

The full range of manuals, instructions, and software downloads is available at:

<http://www.danfoss.com/BusinessAreas/DrivesSolutions>

## 1.3 Product Overview

### 1.3.1 Intended Use

The MCT 21 Factory Tool enables the creation of factory settings and testing of the frequency converter in the factory. The software comprises 2 tools:

- Engineering Tool
- Technician Tool

For details of the interaction of these tools, refer to *chapter 4.1 Interaction of Engineering Tool and Technician Tool*.

### 1.3.2 System Requirements

Supported operating systems:

- Windows 7 (32 bit) Service Pack 1
- Windows 7 (64 bit) Service Pack 1
- Windows XP (32 bit) Service Pack 3

Additional system requirements:

- Minimum screen resolution: 1024 × 768
- Minimum physical memory: 256 MB
- Communication bus: Danfoss FC protocol on RS-485

Prerequisite installed software:

- VLT® Motion Control Tool MCT 10 software. MCT 21 Factory Tool uses the parameter database from MCT 10.

## 1.4 Document and Software Version

This manual is regularly reviewed and updated. All suggestions for improvement are welcome. *Table 1.1* shows the document version and the corresponding MCT 21 Factory Tool software version.

| Edition | Remarks      | MCT 21 Factory Tool software version |
|---------|--------------|--------------------------------------|
| MG10X1  | New document | 1.20 and later versions              |

Table 1.1 Document and Software Version

2

## 2 Safety

### 2.1 Safety Symbols

The following symbols are used in this document:



Indicates a potentially hazardous situation which could result in death or serious injury.



Indicates a potentially hazardous situation which could result in minor or moderate injury. It can also be used to alert against unsafe practices.



Indicates important information, including situations that can result in damage to equipment or property.

### 2.2 Qualified Personnel

Correct and reliable transport, storage, installation, operation, and maintenance are required for the trouble-free and safe operation of the frequency converter. Only qualified personnel are allowed to install or operate this equipment.

Qualified personnel are defined as trained staff, who are authorised to install, commission, and maintain equipment, systems, and circuits in accordance with pertinent laws and regulations. Additionally, the personnel must be familiar with the instructions and safety measures described in these operating instructions.

### 2.3 Safety Precautions



#### HIGH VOLTAGE

Frequency converters contain high voltage when connected to AC mains input power. Failure to perform installation, start up, and maintenance by qualified personnel could result in death or serious injury.

- Only qualified personnel are permitted to perform installation, start up, and maintenance.



#### UNINTENDED START

When the frequency converter is connected to AC mains, DC power supply, or load sharing, the motor can start at any time. Unintended start during programming, service, or repair work can result in death, serious injury, or property damage. The motor can start with an external switch, a fieldbus command, an input reference signal from the LCP or LOP, via remote operation using a software tool, or after a cleared fault condition.

To prevent unintended motor start:

- Disconnect the frequency converter from mains.
- Press [Off/Reset] on the LCP before programming parameters.
- Ensure the frequency converter, motor, and any driven equipment are fully wired and assembled when the frequency converter is connected to AC mains, DC power supply, or load sharing.



#### DISCHARGE TIME

The frequency converter contains DC-link capacitors, which can remain charged even when the frequency converter is not powered. Failure to wait the specified time after power has been removed before performing service or repair work could result in death or serious injury.

- Stop the motor.
- Disconnect AC mains and remote DC-link power supplies, including battery back-ups, UPS, and DC-link connections to other frequency converters.
- Disconnect or lock the PM motor.
- Wait for the capacitors to discharge fully before performing any service or repair work. The duration of waiting time is specified in *Table 2.1*.

| Voltage [V]   | Power range <sup>1)</sup> [kW] | Minimum waiting time (min) |
|---|--------------------------------|----------------------------|
| 3x400   | 0.55–7.5                       | 4                          |
| High voltage can be present even when the warning LED indicator lights are off. |                                |                            |

Table 2.1 Discharge Time

1) Power ratings relate to normal overload (NO).

**⚠ WARNING****EQUIPMENT HAZARD**

Contact with rotating shafts and electrical equipment can result in death or serious injury.

- Ensure that only trained and qualified personnel perform installation, start up, and maintenance.
- Ensure that electrical work conforms to national and local electrical codes.
- Follow the procedures in this manual.

**⚠ WARNING****UNINTENDED MOTOR ROTATION  
WINDMILLING**

Unintended rotation of permanent magnet motors can result in serious injury or equipment damage.

- Ensure that permanent magnet motors are blocked to prevent unintended rotation.

**⚠ WARNING****LEAKAGE CURRENT HAZARD**

Follow national and local codes regarding protective earthing of equipment with a leakage current exceeding 3.5 mA. Frequency converter technology implies high frequency switching at high power. This switching generates a leakage current in the ground connection. A fault current in the frequency converter at the output power terminals can contain a DC component which can charge the filter capacitors and cause a transient ground current. The ground leakage current depends on various system configurations including RFI filtering, screened motor cables, and frequency converter power. EN/IEC 61800-5-1 (Power Drive System Product Standard) requires special care because the leakage current exceeds 3.5 mA. See EN 60364-5-54 paragraph 543.7 for further information.

- Ensure correct grounding of the equipment by a certified electrical installer.
- Grounding must be reinforced in one of the following ways:
  - Ensure the ground wire has a cross-section of at least 10 mm<sup>2</sup>, or
  - Ensure 2 separate ground wires, both complying with the dimensioning rules, are used.

**NOTICE****HIGH ALTITUDES**

For installation at altitudes above 2000 m, contact Danfoss regarding PELV.

**⚠ WARNING****DC CURRENT RISK**

This product can cause a DC current in the protective conductor. Failure to follow the precautions can lead to personal injury or property damage.

Take the following precautions:

- Where a residual current device (RCD) is used for extra protection, use only an RCD of Type B (time delayed) on the supply side of this product.
- Protective earthing of the frequency converter and the use of RCDs must always follow national and local regulations.

**⚠ WARNING****GROUNDING HAZARD**

For operator safety, it is important to ground the frequency converter properly in accordance with national and local electrical codes, as well as the instructions in this manual. Ground currents are higher than 3.5 mA. Failure to ground the frequency converter properly could result in death or serious injury.

It is the responsibility of the user, or certified electrical installer, to ensure correct grounding of the equipment according to national and local electrical codes and standards.

- Follow all local and national electrical codes to ground electrical equipment properly.
- Establish proper protective grounding for equipment with current higher than 3.5 mA.
- A dedicated ground wire is required for input power, motor power, and control wiring.
- Use the clamps provided on the equipment for proper ground connections.
- Do not ground one frequency converter to another in a daisy chain fashion.
- Keep the ground wire connections as short as possible.
- Use high-strand wire to reduce electrical noise.
- Follow the motor manufacturer wiring requirements.

## 3 Installation and Set-up

### 3.1 Installation

Prerequisite: MCT 10 Set-up Software is installed.  
To install the MCT 21 Factory Tool,

1. Run the file *MCT 21 Factory Tool Setup x.x.exe*, where "x.x" refers to the software version. No key is required.
2. Select during installation:
  - 2a Technician Tool, and/or
  - 2b Engineering Tool
3. Open the programme.

### 3.2 De-installation

#### **NOTICE**

De-installation procedure for a Windows operating system:

1. Select *Start*.
2. Select *Settings*.
3. Select *Control Panel*.
4. Double-click *Programs and Features*.
5. Select MCT 21 Factory Tool software.
6. Select *Uninstall*.

### 3.3 Set-up

#### 3.3.1 General Settings

For detailed information regarding general settings, refer to *chapter 5.6.1 General Settings*.

- Open the MCT 21 Factory Tool software.
- The first time the program runs, the *New Project* dialog appears. For more information, see *chapter 5.1.2 New Project - Create from Database*.
- Go to [Settings → General Settings].
- In the *General Settings* dialog,;
  - Set the application and parameter languages.
  - Set the OEM password.

#### **NOTICE**

##### PASSWORD MATCH

Note that data can be password-protected in the frequency converter. Set the OEM password to match the frequency converter password. Otherwise no access is granted.

### 3.3.2 Serial Fieldbus Communication

To set up serial fieldbus communication with the frequency converter, refer to *chapter 5.6.2 Drive Communication*.



## 4 Workflow

### 4.1 Interaction of Engineering Tool and Technician Tool

The MCT 21 Factory Tool software comprises 2 tools which interact:

- Engineering Tool
- Technician Tool

Develop projects and tests in the Engineering Tool before implementation in the Technician Tool.

#### Engineering Tool - Development

The Engineering Tool is intended for use by engineers in developing projects and tests for planning factory implementation of frequency converter default settings.

The engineer uses the Engineering Tool to:

- Create projects.
- Set up default parameter settings for OEM production.
- Create, design, and verify tests.
- Manage passwords, motor database, general settings, and communication with the frequency converter.
- Process orders received.
- Access change and test logs.

For Engineering Tool workflow, refer to *chapter 4.2 Workflow Engineering Tool*.

For details of Engineering Tool functions, refer to *chapter 5 Engineering Tool Functions*.

#### Technician Tool - Implementation

The Technician Tool is intended for use by technicians working in the production line. The technician is familiar with how to assemble the frequency converter and motor.

The technician uses the Technician Tool to:

- Create custom set-ups for the frequency converter.
- Configure the frequency converter with new settings.
- Select and run tests.
- Manage communication with the frequency converter.

The technician uses projects and tests developed in the Engineering Tool.

For Technician Tool workflow, refer to *chapter 4.3 Workflow Technician Tool*.

For details of Technician Tool functions, refer to *chapter 6 Technician Tool Functions*.

## 4.2 Workflow Engineering Tool

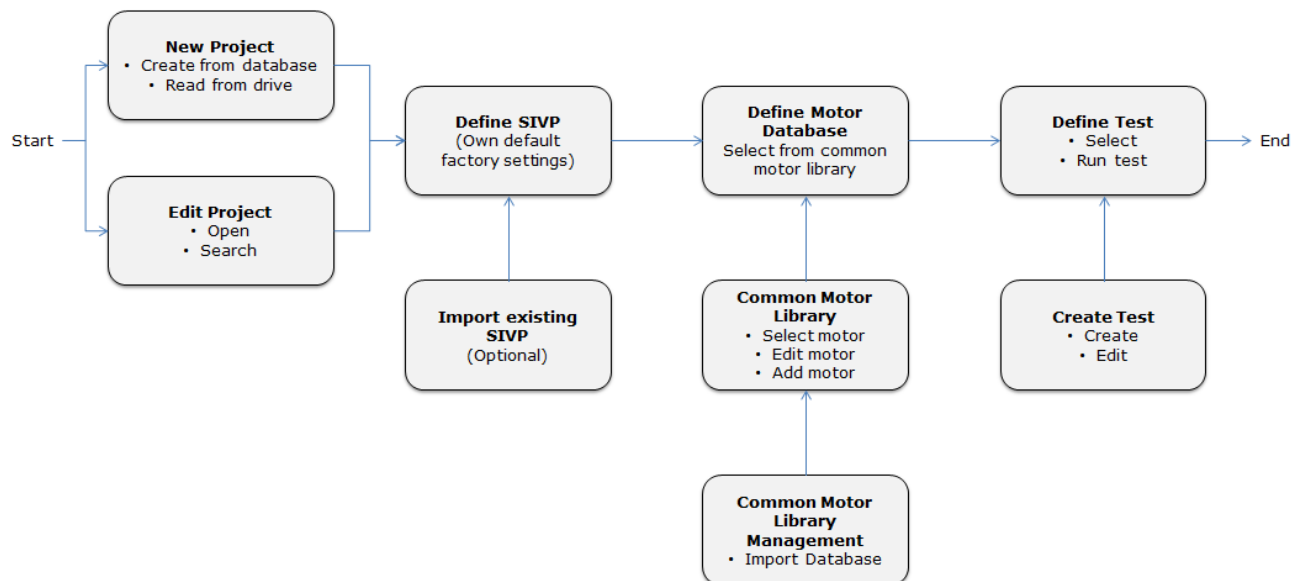


Illustration 4.1 Engineering Tool Workflow

For details of each step refer to the following:

- Chapter 5.1.1 Start
- Chapter 5.1.1 Create a Project
- Chapter 5.1.4 Open Project and chapter 5.1.5 Search Project
- Chapter 5.4.1 Define the SIVP
- Chapter 5.2.1 Define a Motor Database
- Chapter 5.3.1 Common Motor Library
- Chapter 5.3.2 Common Motor Library Management
- Chapter 5.5.5 Select and Run Test, View Test Report
- Chapter 5.5.1 Create Test and chapter 5.5.2 Edit Test

## 4.3 Workflow Technician Tool

### 4.3.1 Overview of Workflow

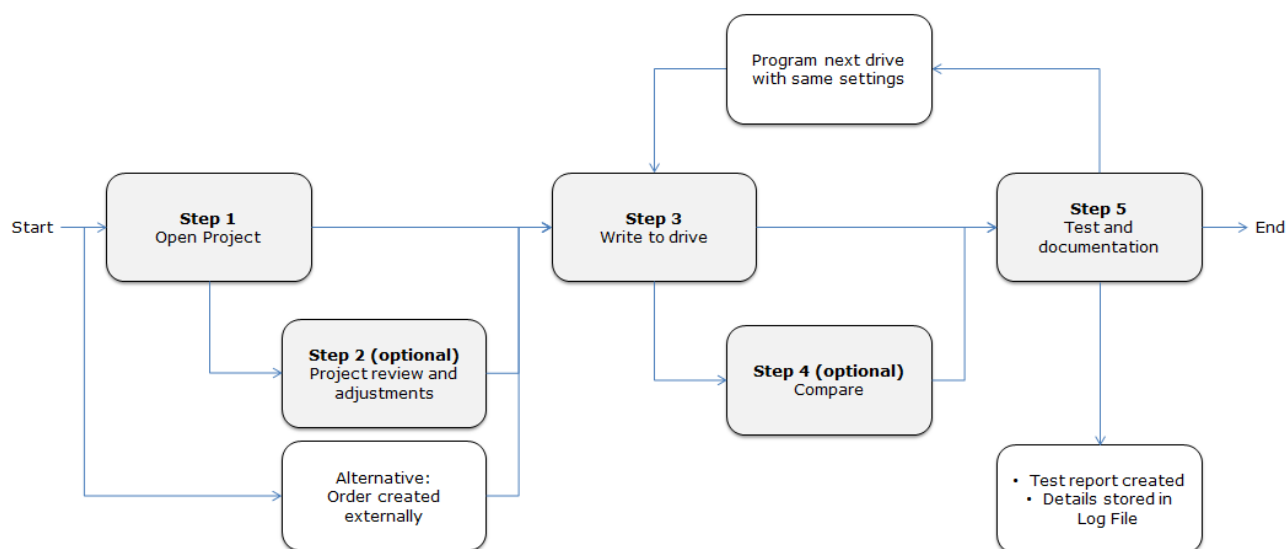


Illustration 4.2 Technician Tool Workflow

For details of each step refer to the following:

- Step 1: *chapter 6.1.2 Project View*
- Step 2 (optional): *chapter 6.1.3 Project Review and Adjustments*
- Alternative to Step 2: *chapter 5.1.6 Create Order*
- Step 3: *chapter 6.1.5 Write to Frequency Converter*
- Step 4 (optional): *chapter 6.1.6 Compare*
- Step 5: *chapter 6.4.1 Test and Documentation*
- Programme the next frequency converter with the same settings: see *chapter 5.3.1 Common Motor Library*
- A test report is created: see
  - *chapter 5.5.5 Select and Run Test, View Test Report*
  - *chapter 6.4.1 Test and Documentation*
- Details are stored in a log file: see *chapter 5.5.5 Select and Run Test, View Test Report*.

## 5 Engineering Tool Functions

### 5.1 Project

#### Initial start

At initial startup of the Engineering Tool, the *New Project* dialog opens, see *Illustration 5.1*. No projects have previously been created. For details of how to create a new project, go to *chapter 5.1.1 Create a Project*.

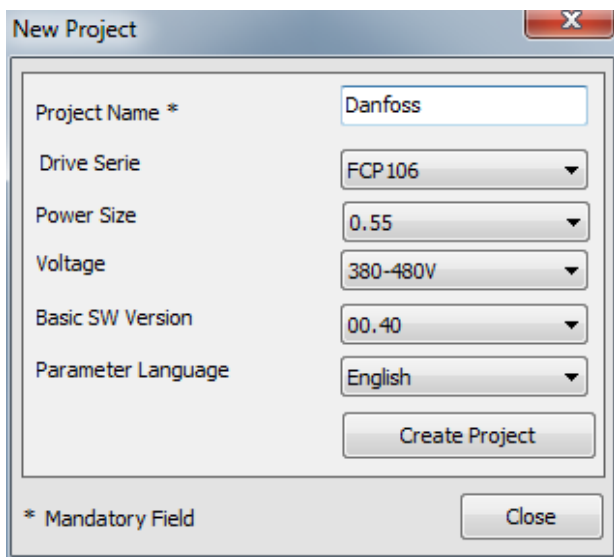


Illustration 5.1 New Project Dialog

#### Subsequent start

At subsequent startup of the Engineering Tool, the Search dialog opens, see *Illustration 5.2*. Use the dialog to search for existing projects. For more information go to *chapter 5.1.5 Search Project*.

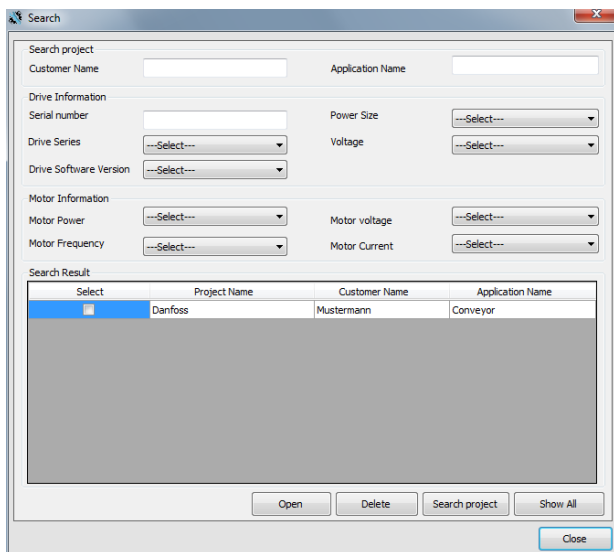


Illustration 5.2 Search Dialog

### 5.1.1 Create a Project

A project contains a set of motors and tests available for use by the technician. Use the Engineering Tool to create a project.

There are 2 starting points for creating a new project:

- Based on an MCT 10 database. Follow the steps in *chapter 5.1.2 New Project - Create from Database*.
- Based on a project stored in a frequency converter. Follow the steps in *chapter 5.1.3 New Project - Read from Drive*.

When all the steps are completed, the new project opens in project view. See *chapter 5.1.6 Project View*.

### 5.1.2 New Project - Create from Database

To create a new project based on the MCT 10 database:

1. Select *Projects* in the menu bar.
2. Via the dropdown menu, go to [Projects → New Project → Create from database], as shown in *Illustration 5.3*.

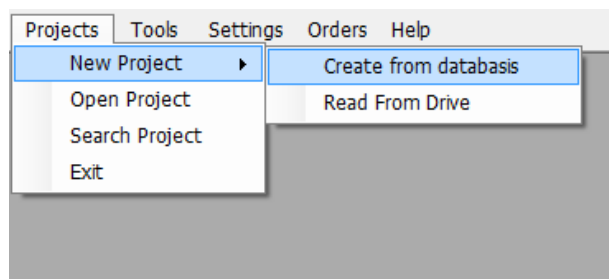


Illustration 5.3 Path for New Project Based on MCT 10 Database

3. The *New Project* dialog opens, see *Illustration 5.4*.

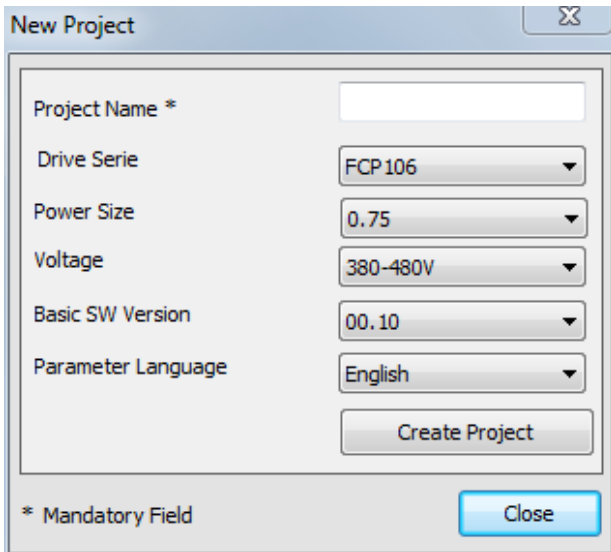


Illustration 5.4 New Project Dialog

4. Enter or select project details, see *Illustration 5.5*:

- 4a Project name
- 4b Frequency converter ("Drive series")
- 4c Power size
- 4d Voltage
- 4e Basic SW version
- 4f Parameter language

Click on [Create Project]

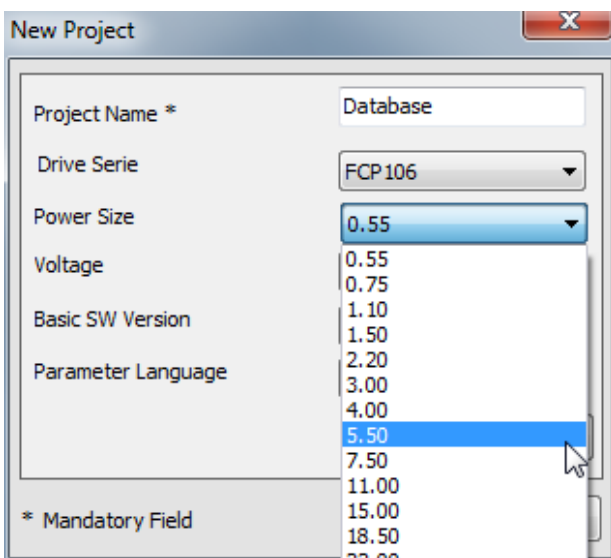


Illustration 5.5 New Project, Selection Drop Down Menu

5. The *Project Info* dialog opens. Enter further details of the project, as shown in the example, see *Illustration 5.6*.

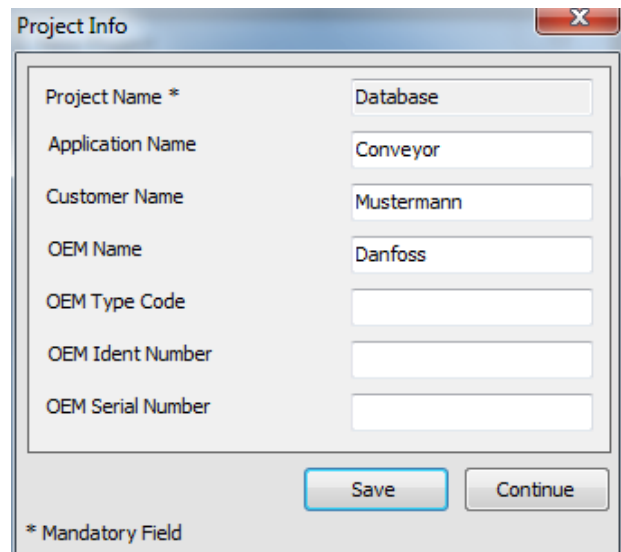


Illustration 5.6 Project Info Dialog

**NOTICE**

There are 2 dialogs containing information about the customer and the order: *Project Info* (see *Illustration 5.6*) and *Test Drive and Motor* (see *Illustration 5.37*). Ensure the data in both dialogs are consistent.

**NOTICE**

To adapt the *Project Info* content subsequently, ensure the original file is preserved, not overwritten. Use *Save As* when adapting content to a different project.

- 6. Click on [Save].
- 7. The new project opens.
- 8. A confirmation message appears, stating that the new project is now created, see *Illustration 5.7*.

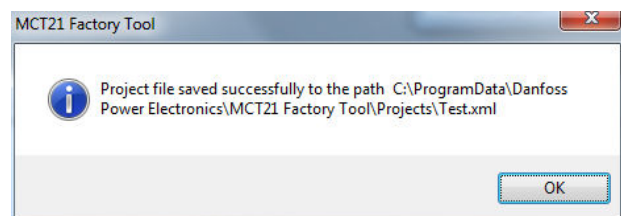


Illustration 5.7 Project Created

### 5.1.3 New Project - Read from Drive

#### Use of an existing project stored in a frequency converter

To import an existing project from a frequency converter to MCT 21 Factory Tool, use *Read From Drive*. The *Read From Drive* function enables project transfer from the frequency converter memory to the PC.

#### NOTICE

##### PASSWORD MATCH

Note that data may be password protected in the frequency converter. Set the MCT 21 Factory Tool password defined in [Settings → General Settings], to be identical with the frequency converter password. Otherwise no access is granted.

Otherwise no access is granted.

To create the project:

1. Select *Projects* in the menu bar.
2. Via the dropdown menu, go to [Projects → New Project → Read From Drive]. See the dropdown menu in *Illustration 5.3*.
3. The *Read From Drive* dialog opens, see *Illustration 5.8*.

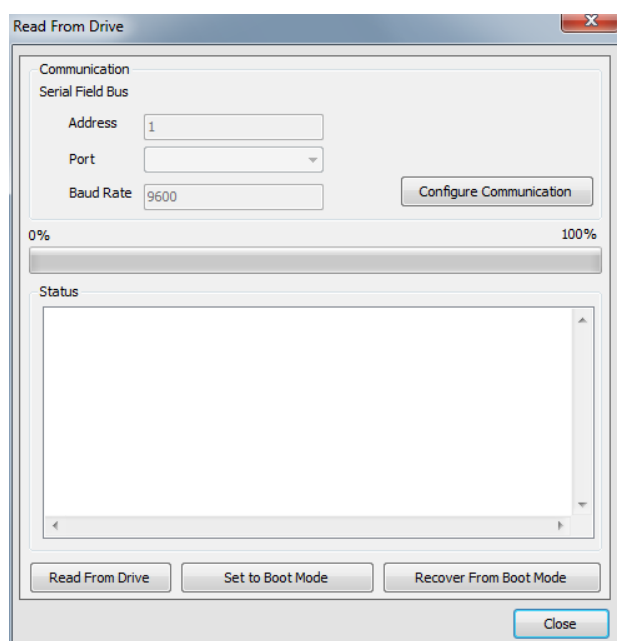


Illustration 5.8 Read From Drive

4. If communication with the frequency converter is not possible, click *Configure Communication*, to adjust the settings. To access the communication configuration later, go to [Settings → Drive Configuration].
5. Click [Read From Drive].

6. The data transfers from the frequency converter to MCT 21 Factory Tool, and the new project opens.

When selecting *Read from Drive*, a commutation must be established. Then project information can be extracted from the frequency converter. See the note on password match requirements.

### 5.1.4 Open Project

To open an existing project, go to [Projects → Open Project]. The browser opens. Select the project in the folder structure, and click [Open]. The *Project Info* dialog opens, see *Illustration 5.9*.

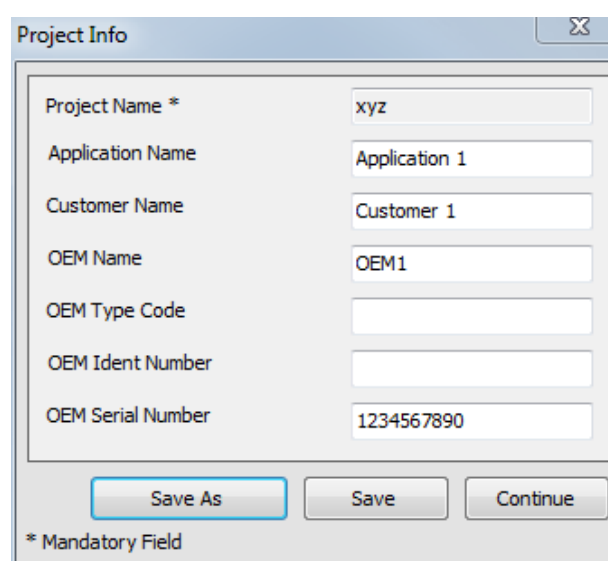


Illustration 5.9 Open Project, Project Info Dialog

The *Project Info* dialog differs from that for a new project. For an existing project, the *Project Info* dialog contains a [Save As] button. Use [Save As] to create a new project on the basis of a copy of an existing project. When changing the *Project Info* settings, use the [Save As] button to ensure the existing project is not overwritten. When entering new settings, clicking on [Save] will cause the previous settings to be overwritten, and the previously existing project will be deleted.

## 5.1.5 Search Project

Access the search dialog via [Menu → Search Project].

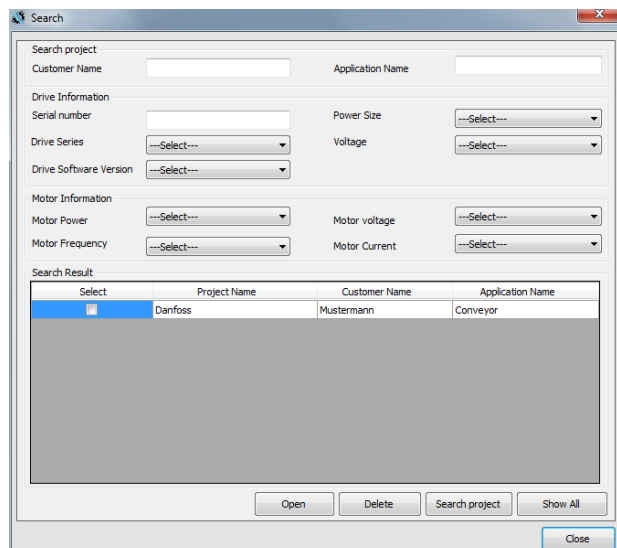


Illustration 5.10 Search Dialog

Use the *Search* dialog to find an existing project. The existing projects originate from the Engineering Tool, see [chapter 5.1.1 Create a Project](#).

### Search for all projects

To display a list of all existing projects:

1. Click on [Show All].
2. The search results are displayed in the field *Search Result*.

### Search with filter

To display a list containing only a selection of the existing projects:

1. Set the search criteria
  - 1a To search for a specific project, use the fields *Customer Name* and *Application Name*.
  - 1b To filter for specific properties of the frequency converter or motor, fill out the fields under *Drive Information* and *Motor Information*.
2. Click on [Search project].
3. The search results are displayed in the field *Search Result*.

The new project opens in the project view, see example in [Illustration 5.11](#).

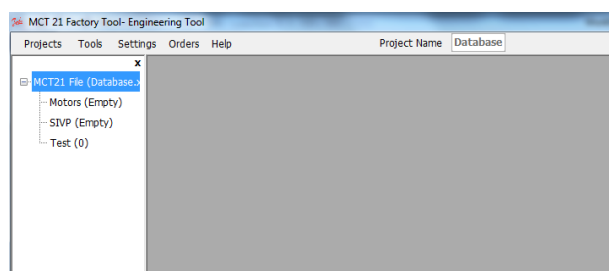


Illustration 5.11 Project View: Example of New Project

The project name appears in the horizontal menu bar. In the example the project name is *Database*, see [Illustration 5.11](#).

The left panel contains the project structure, for setting up and accessing data in the project. Unfold the structure to view the elements:

- Motors
- SIVP
- Test

Initially there is no data in the project, so the 3 elements have the suffixes *Empty* and *0*.

To enter and import data into the project, see:

- [Chapter 5.2.1 Motor Database](#)
- [Chapter 5.4 SIVP \(Specific Initial Values and Protection\)](#)
- [Chapter 5.5.1 Create Test](#)
- [Chapter 5.1.6 Create Order](#)

## 5.1.6 Create Order

A third way to create a project, is via an order file. The order file specifies project data, including SIVP parameters and motor database. To create the order, use an external order handling tool.

### Orders

MCT 21 Factory Tool monitors the order folders. The location of the order folder is specified under *General Settings*, see [chapter 5.6.1 General Settings](#). New orders are indicated in the menu bar, as shown in [Illustration 5.12](#).

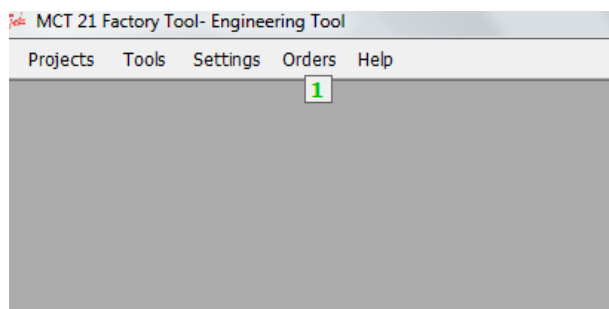


Illustration 5.12 New Order shown in Menu Bar

### Unprocessed Orders

When a user places an order file, it is listed in [Orders → Unprocessed Orders], see *Illustration 5.13*.

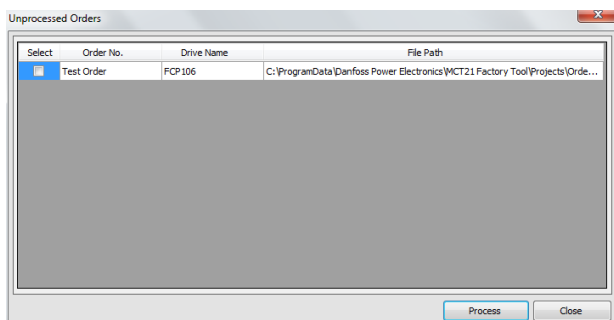


Illustration 5.13 Unprocessed Orders Dialog

### Processed Orders

Processed orders are listed in [Orders → Processed Orders], see *Illustration 5.15*.

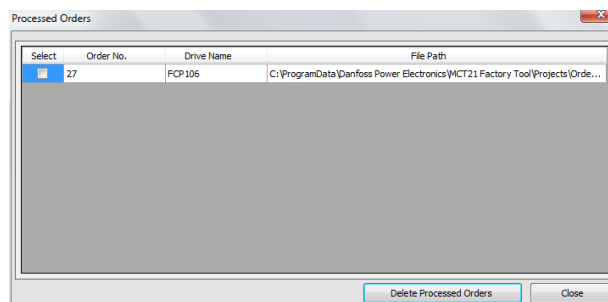


Illustration 5.15 Processed Orders Dialog

5

To select and open the order,

1. Mark the checkbox under *Select*
2. Click on [Process]
3. When processing the order, the order converts into a project, which can be saved to the frequency converter, see *Illustration 5.14*.

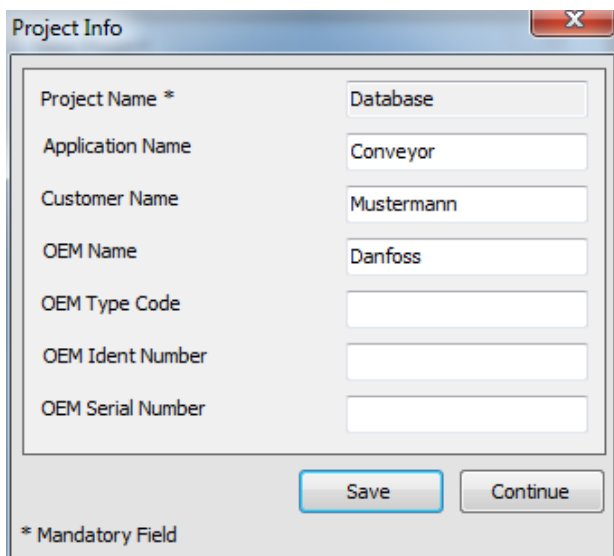


Illustration 5.14 Order Converts into Project: *Project Info* Dialog

### Order file

An order file of processed orders is maintained in the *Order* folder. The location of the order folder is specified under General Settings, see *chapter 5.6.1 General Settings*.

For the structure of the order file, see *Table 5.1*.

| Line | Content <sup>1)</sup>                               | Comment   |
|------|---|---|
| 1    | Order number  | Mandatory item  |
| 2    | OEM name  | Optional item, can be empty.  |
| 3    | OEM type code                                       | Optional item, can be empty.  |
| 4    | OEM identity  | Optional item, can be empty.  |
| 5    | OEM application name                                | Optional item, can be empty.  |
| 6    | Customer name                                       | Optional item, can be empty.  |
| 7    | Drive series  | Mandatory item: FCP106 or FCM 106   |
| 8    | Drive software                                      | If empty, reverts to default (most recent software version).  |
| 9    | Drive power   | Mandatory item. Example: 1.50   |
| 10   | Drive voltage                                       | Mandatory item. Example: 380-480  |
| 11   | Language  | If empty or invalid, reverts to default (English).  |
| 12   | Master file   | Optional item, can be empty.<br>The master file is an MCT 21 file containing for example MotorDB, Pump DB, and SIVP (or parts of it). |
| 13   | Number of parameters defined in the following lines | -   |



| Line | Content <sup>1)</sup>   | Comment   |
|------|---|---|
| x    | Parameter ID, Array index, Setup, Value, Read-Only, Visibility – it can be empty. | Optional item, can be empty. If Parameter ID is already in use by master file, it overwrites its value. |
| y    | Order file status   | 0 = processed<br>1 = unprocessed  |

**Table 5.1 Structure of an Order File**

1) Value separator is defined as - or ; or |.

Note that text starting with /\* and ending with \*/ will be ignored, and can be used for comments. See Table 5.2 for an order file example.

| Line | Content <sup>1)</sup>  |
|------|--|
| 1    | Test Order 1 /*ORDER NUMBER – it must exist*/  |
| 2    | OrderName /*OEM NAME – it can be empty also*/  |
| 3    | A412 /*OEM TYPE CODE – it can also be empty*/  |
| 4    | TEST /*OEM IDENT– it can also be empty*/   |
| 5    | MCT21 /*APPLICATION NAME – it can also be empty*/  |
| 6    | Danfoss /*CUSTOMER NAME– it can also be empty*/  |
| 7    | FCP106 /*DRIVE SERIES – it must exist*/  |
| 8    | 01.10 /*SW Version. If empty it will take the latest one*/   |
| 9    | 1.50 /*drive power – must exist*/  |
| 10   | 380-480 /*Voltage – must exist*/   |
| 11   |  |
| 12   | English /*parameter language if empty or wrong it must default to */   |
| 13   | /*MCT21 file from where we can extract MotorDB file, Pump DB location, and SIVP file – can be empty – called master file*/   |
| 14   | 3 /*Number of parameters – can be zero*/   |
| x    | 1;0;2;1;1;1 /*Parameter ID, Array index, Setup, Value, Read-Only, Visibility – it can be empty. In case of Parameter ID already in use by master file, it overwrites it's value.*/ |
| x    | 100;0;1;3;0;1 /*parameter is Configuration Mode, array index 0, setup 1, value 3 (Closed Loop), will be read and write, and not visible*/  |
| x    | 207;0;1;8.5;1;1 /*parameter is Parking Time, array index 0, setup 2, value 8.5, will become read-only and not visible*/  |
| y    | 1 /* Order is unprocessed */   |

**Table 5.2 Example of an Order File**

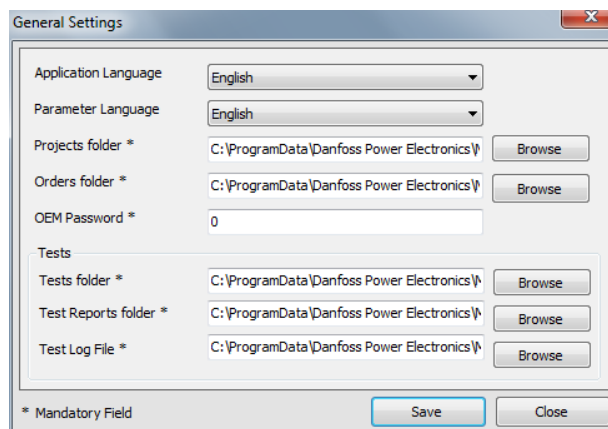
1) Value separator is defined as - or ; or |.

### 5.1.7 Copy Project

#### Copy all project data

To copy all project data from one PC to another:

1. Open Windows Explorer.
2. Open the project folder.
  - 2a To find the project folder go to [Menu → General Settings].
  - 2b The project folder is displayed in the field *Projects folder*, as shown in *Illustration 5.16*.
  - 2c The default project folder is *C:\ProgramData\Danfoss Power Electronics\MCT21 Factory Tool\Projects\*.
3. Copy the entire project folder content to a suitable storage media, for example a USB stick.
4. Open the test folder.
  - 4a To find the test folder, go to [Menu → General Settings].
  - 4b The test folder is displayed in the field *Tests folder*, as shown in *Illustration 5.16*.
  - 4c The default test folder is: *C:\ProgramData\Danfoss Power Electronics\MCT21 Factory Tool\Projects\*.
5. Copy the entire test folder content to a suitable storage media, for example a USB stick.
6. Move the media to the destination PC.
7. Copy the files from the source project and test folders to the corresponding folders on the destination PC.



**Illustration 5.16 General Settings Dialog, showing the Projects Folder**

### 5.1.8 Upgrade a Project to New Firmware

When new frequency converter firmware is released, a project may require upgrade to the new firmware.

There are 2 methods to upgrade a project to new firmware.

#### Upgrade method 1

1. Create a new project with the new firmware.
2. Import the motors.
3. Import the .siv files from the old project.
4. Select the required tests.
5. The new project is now ready for use.

For more information, see *chapter 5.1.1 Create a Project*.

#### Upgrade method 2

1. Open Windows Explorer.
2. Open the project folder.
  - 2a To find the project folder go to [Menu → General Settings].
  - 2b The project folder is displayed in the field "Projects folder", as shown in *Illustration 5.16*.
  - 2c The default project folder is C:  
`\ProgramData\Danfoss Power Electronics  
 \MCT21 Factory Tool\Projects\`.
3. Create a copy of the project file. The project file has the suffix *.xml*.
4. Open a new file in the text editor.
5. In the text editor, change the content of the tag `<BasicSoftwareVersion>1.10</BasicSoftwareVersion>` to the new firmware version, as shown in *Illustration 5.17*.
6. Save and close the text editor file.
7. The project is now upgraded to the new firmware version, and is ready for use.

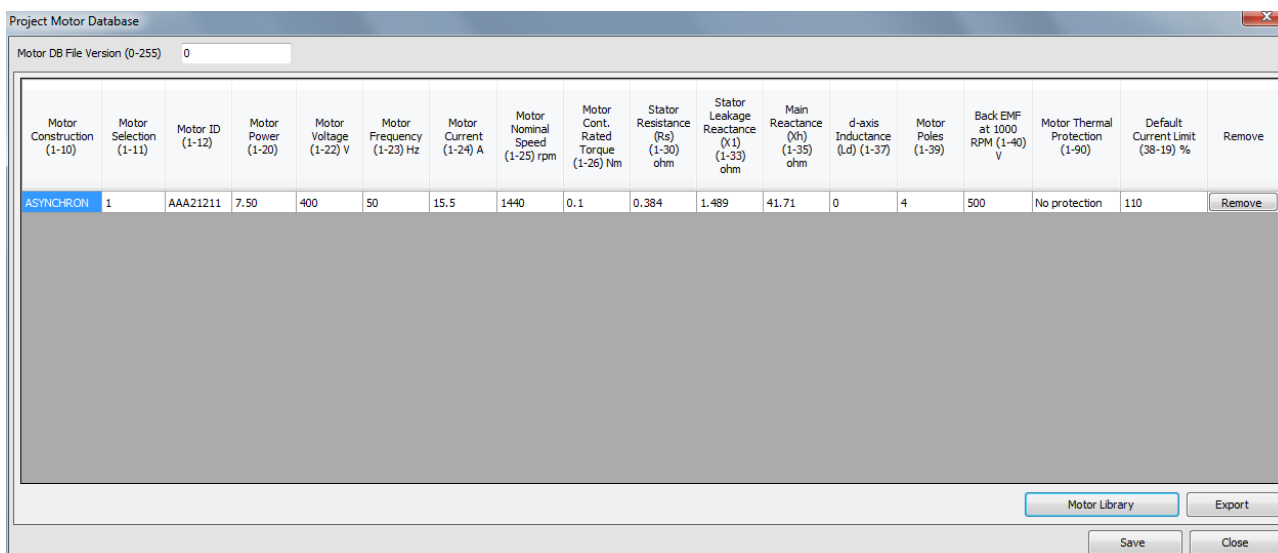
```
<?xml version="1.0" encoding="utf-8"?>
<MCT21>
  <ToolName>Engg</ToolName>
  <ParameterLanguage>English</ParameterLanguage>
  <DriveSeries>FC-101</DriveSeries>
  <BasicSoftwareVersion>01.10</BasicSoftwareVersion>
  <OEMSIVPReference>C:\ProgramData\Danfoss Power Electri
  <FcpMotorDB>C:\ProgramData\Danfoss Power Electronics\
  <TypeCode>
  <ProductCode>FC101</ProductCode>
```

Illustration 5.17 Basic Software Version Tag in the Text Editor

## 5.2 Motor Database

For each project, define a motor database, see *Illustration 5.18*.

To populate the motor database, import motors from the motor library, see *chapter 5.3 Motor Library*. For more information, refer to *chapter 5.2 Motor Database*.



5

Illustration 5.18 Project Motor Database

To view motors available to a project, open the *Motor Database*:

1. Go to the *Project View* via [Projects → Open Project] or [Projects → New Project].
2. Click the *Motors* element in the project structure.

The *Project Motor Database* dialog opens, see *Illustration 5.19*.

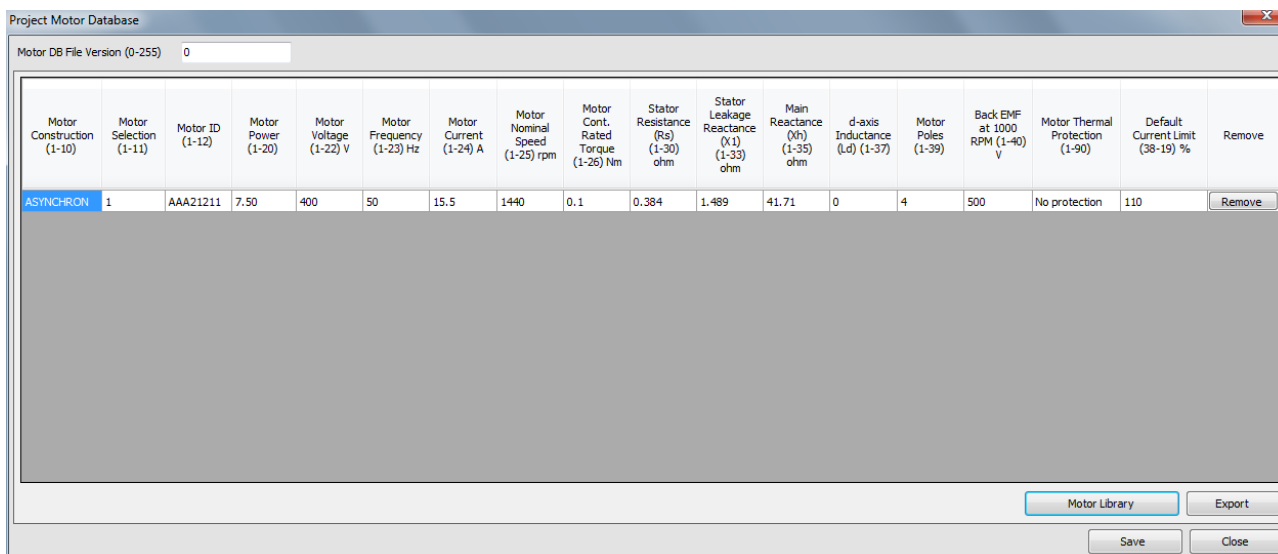


Illustration 5.19 Project Motor Database

The *Project Motor Database* dialog displays a list of motors available to the project, including details of motor characteristics.

### Add a motor to the database

To add a motor to the motor database:

1. Open the *Common Motor Library*. For instructions see *chapter 5.3.1 Common Motor Library*.
2. Open the *Project Motor Database* dialog, see *Illustration 5.19*.
3. Click [Motor Library]. The *Common Motor Library* dialog opens.
4. Select motors from the *Common Motor Library*. For more information, refer to *chapter 5.3.1 Common Motor Library*.
5. Place a checkmark to select which motors to add to the project.
6. Click [Copy motor(s) to project].
7. Click [Save].

5

| Motor Construction (1-10) | Motor Selection (1-11) | Motor ID (1-12) | Motor Power (1-20) | Motor Voltage (1-22) V | Motor Frequency (1-23) Hz | Motor Current (1-24) A | Motor Nominal Speed (1-25) rpm | Motor Cont. Rated Torque (1-26) Nm | Stator Resistance (Rs) (1-30) ohm | Stator Leakage Reactance (X1) (1-33) ohm | Main Reactance (Xh) (1-35) ohm | d-axis Inductance (Ld) (1-37) | Motor Poles (1-39) | Back EMF at 1000 RPM (1-40) V | Motor Thermal Protection (1-90) | Default Current Limit (38-19) % | Remove |
|---------------------------|------------------------|-----------------|--------------------|------------------------|---------------------------|------------------------|--------------------------------|------------------------------------|-----------------------------------|--|--------------------------------|-------------------------------|--------------------|-------------------------------|---------------------------------|---------------------------------|--------|
| ASYNCHRON                 | 1                      | AAA21211        | 7.50               | 400                    | 50                        | 15.5                   | 1440                           | 0.1                                | 0.384                             | 1.489                                    | 41.71                          | 0                             | 4                  | 500                           | No protection                   | 110                             | Remove |

Buttons: Motor Library, Export, Save, Close

Illustration 5.20 Project Motor Database

### Remove a motor from the database

To remove a motor from the *Project Motor Database*:

1. Click on [Remove] for the motor in the list.
2. Click on [Save].

### 5.3 Motor Library

#### 5.3.1 Common Motor Library

The *Common Motor Library* contains a list of all motors available for use in all projects, including motor characteristics for each. Use the *Common Motor Library* to find suitable motors for each project, and import them into the project.

| <input type="checkbox"/>            | Motor Construction (1-10) | Motor ID (1-12) | Motor Power (1-20) | Motor Voltage (1-22) V | Motor Frequency (1-23) Hz | Motor Current (1-24) A | Motor Nominal Speed (1-25) rpm | Motor Cont. Rated Torque (1-26) Nm | Stator Resistance (Rs) (1-30) ohm | Stator Leakage Reactance (X1) (1-33) ohm | Main Reactance (Xh) (1-35) ohm | d-axis Inductance (Ld) (1-37) | Motor Poles (1-39) | Back EMF at 1000 RPM (1-40) V | Motor Thermal Protection (1-90) | Default Current Limit (38-19) % |
|-------------------------------------|---------------------------|-----------------|--------------------|------------------------|---------------------------|------------------------|--------------------------------|------------------------------------|-----------------------------------|--|--------------------------------|-------------------------------|--------------------|-------------------------------|---------------------------------|---------------------------------|
| <input checked="" type="checkbox"/> | ASYNCHRON                 | 1               | 0.18               | 400                    | 50                        | 1.2                    | 1400                           | 0.1                                | 0.384                             | 1.489                                    | 348.33                         | 0                             | 4                  | 500                           | No protection                   | 110                             |
| <input type="checkbox"/>            | ASYNCHRON                 | 2               | 0.18               | 400                    | 50                        | 1.2                    | 1400                           | 0.1                                | 0.384                             | 1.489                                    | 348.33                         | 0                             | 4                  | 500                           | No protection                   | 110                             |
| <input type="checkbox"/>            | SPMSM                     | 23              | 0.18               | 400                    | 50                        | 1.2                    | 1400                           | 0.1                                | 0.384                             | 1.489                                    | 348.33                         | 0                             | 4                  | 500                           | No protection                   | 110                             |
| <input type="checkbox"/>            | ASYNCHRON                 | AAA21211        | 7.50               | 400                    | 50                        | 15.5                   | 1440                           | 0.1                                | 0.384                             | 1.489                                    | 41.71                          | 0                             | 4                  | 500                           | No protection                   | 110                             |

Buttons: Copy Motor(s) to project, Edit, Add New Motor, Delete Motor(s), Save, Close

5

Illustration 5.21 Motor Library, Example

#### Open the *Common Motor Library*

To open the *Common Motor Library*,

1. In the menu bar, go to [Tools → Common Motor Library.]
2. The *Management Common Motor Library* dialog opens, see *Illustration 5.21*.

**Create a new motor**

To add a motor to the *Common Motor Library*:

1. Select [Add New Motor].
2. The *Create New Motor* dialog opens, see *Illustration 5.22*.
3. The dialog contains preselected data, which are based on the MCT 10 database. Depending on the motor type, some fields are not accessible.
4. Select and/or enter the type and characteristics of the motor, then save.

**Create new Motor**
X

|                                     |           |   |               |
|-------------------------------------|-----------|---|---------------|
| Motor Construction (1-10) *         | ASYNCHRON | Stator Resistance (Rs) (1-30) ohm*        | 0.384         |
| Motor Selection (1-11) *            | 5         | Stator Leakage Reactance (X1) (1-33) ohm* | 1.489         |
| Motor ID (1-12) *                   |           | Main Reactance (Xh) (1-35) ohm*           | 41.71         |
| Motor Power (1-20) *                | 0.18      | d-axis Inductance (Ld) (1-37) *           | 0             |
| Motor Voltage (1-22) V*             | 400       | Motor Poles (1-39) *                      | 4             |
| Motor Frequency (1-23) Hz*          | 50        | Back EMF at 1000 RPM (1-40) V*            | 500           |
| Motor Current (1-24) A*             | 15.5      | Motor Thermal Protection (1-90) *         | No protection |
| Motor Nominal Speed (1-25) rpm*     | 1440      | Default Current Limit (38-19) %*          | 110           |
| Motor Cont. Rated Torque (1-26) Nm* | 0.1       |   |               |

\* Mandatory Field

Save
Cancel

Illustration 5.22 *Create New Motor* Dialog, Example

Alternative method to add a motor to the *Common Motor Library*:

1. Select [Library Import].
2. Select the library for import.
3. Click [Open].

#### **Edit the motor**

To change the motor data for a motor already listed in the *Common Motor Library*:

1. Check the check box for the motor.
2. Click [Edit].
3. Enter the changes, then click [Save].

#### **Delete a motor**

To delete a motor or group of motors from the *Common Motor Library*:

1. Check the check box for the motor, or for several motors.
2. Click [Delete Motor(s)].
3. Click [Save].

### 5.3.2 Export Library

Via Menu it is possible to export the *Common Motor Library*, which can then be imported to another PC.

To export a motor or group of motors to a project,

1. Check the check box for the motor(s).
2. Click [Library Export].
3. Enter file name.
4. Click [Save].
5. If any motor parameters are incompatible with the frequency converter, they are marked red. Correct them.

### 5.3.3 Copy the Common Motor Library

To copy the *Common Motor Library* from one PC to another:

1. Open the *Common Motor Library* via the menu [Tools → Common Motor Library].
2. The *Management Common Motor Library* dialog opens, see *Illustration 5.21*.
3. Click [Library Export] and export the database to suitable media (for example, a USB stick).
4. Move the media to the destination PC.
5. On the destination PC, open the *Common Motor Library* via the menu [Tools → Common Motor Library].
6. Click [Library Import] and import the database from the media.
7. Click [Save].
8. The *Common Motor Library* is now stored on the destination PC.

## 5.4 SIVP (Specific Initial Values and Protection)

### 5.4.1 Define the SIVP

Use the SIVP tool to define the factory default settings and attributes of parameters in each project:

- Read/write
- Read only
- Hidden

# 5

#### Open SIVP

To open SIVP:

1. Go to the *Project View* via [Projects → Open Project] or [Projects → New Project].
2. Unfold the project structure.
3. Click on the SIVP element in the project structure.
4. The SIVP dialog opens, see *Illustration 5.23*.

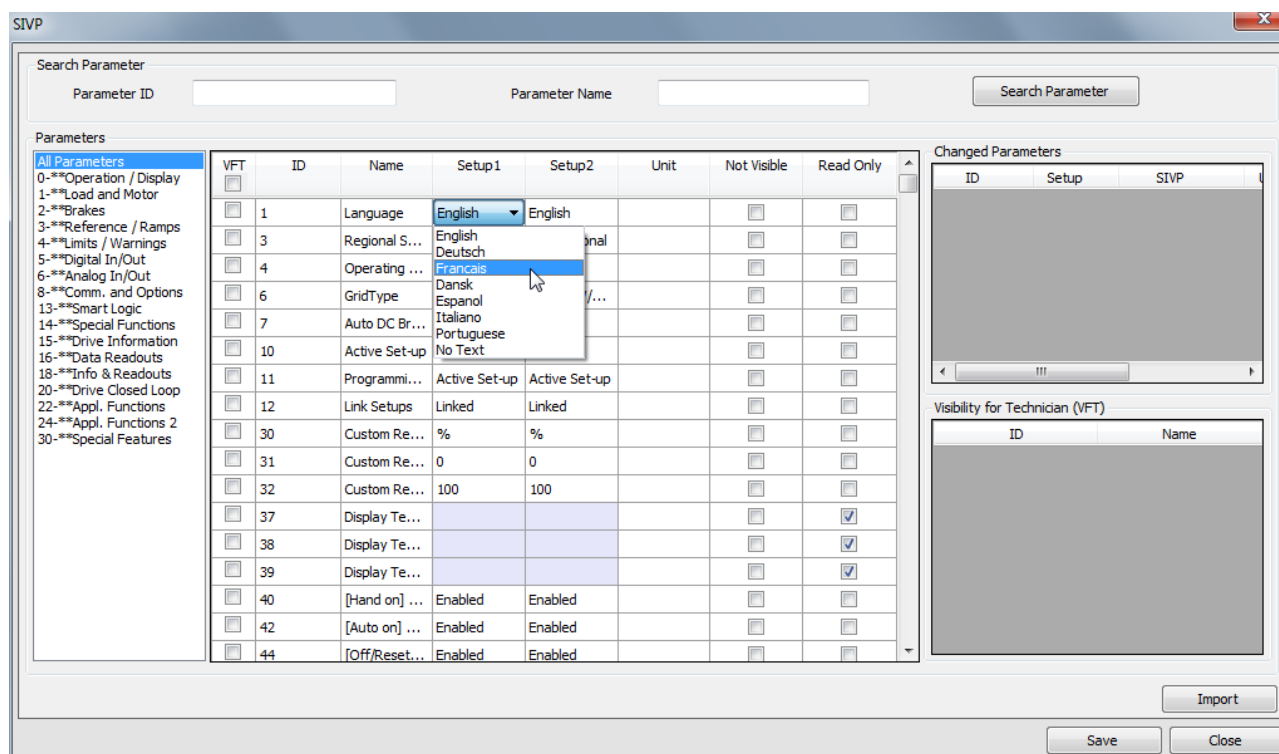


Illustration 5.23 SIVP Dialog, Example



**SIVP, left panel**

The SIVP dialog displays a list of all available parameters with their default settings.

1. Click on the parameter group name in the left panel.
2. The parameters within the group are displayed in the centre panel.

**SIVP, right panel**

The SIVP dialog displays a list of available parameters with default settings. The status fields in the right-hand panel show lists of:

- Changed parameters
- Parameters which are visible for technician (VFT), in the Technician Tool.

To import parameter settings from other projects, click [Import].

To save parameter settings, click [Save].

**SIVP, centre panel**

Set the desired status for use of each parameter in the frequency converter, as shown in *Table 5.3*.

| Field       | Set status   | Comment   |
|-------------|--|---|
| VFT         | Check this box for VFT (visible for technician) functionality.                     | When a parameter is marked as VFT, the parameter settings are visible and can be changed in the Technician Tool.      |
| Set-up 1    | Enter a value or select from the drop-down menu.                                   | The selected value becomes the factory setting in the frequency converter, activated after frequency converter reset. |
| Set-up 2    | Enter value or select from the drop-down menu.                                     | -   |
| Unit        | Enter the unit.  | Where applicable, the unit of the parameter is displayed.   |
| Not visible | Check this box to make the parameter invisible in the frequency converter.         | The selected parameter is no longer displayed in the LCP.   |
| Read only   | Check this box to remove write access to the parameter in the frequency converter. | In the LCP, the selected parameter is displayed, but the settings cannot be changed.                                  |

**Table 5.3 SIVP Centre Panel**

### 5.4.2 SIVP Examples

5

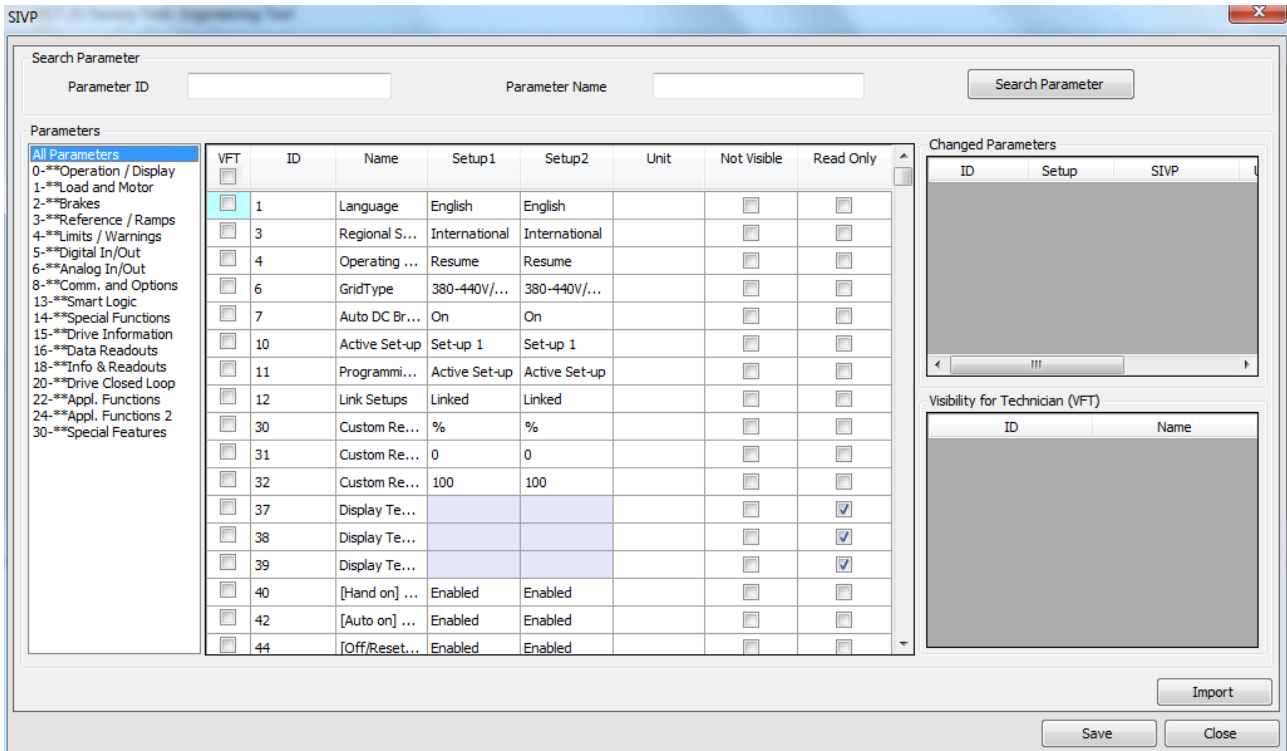


Illustration 5.24 SIVP All Parameters

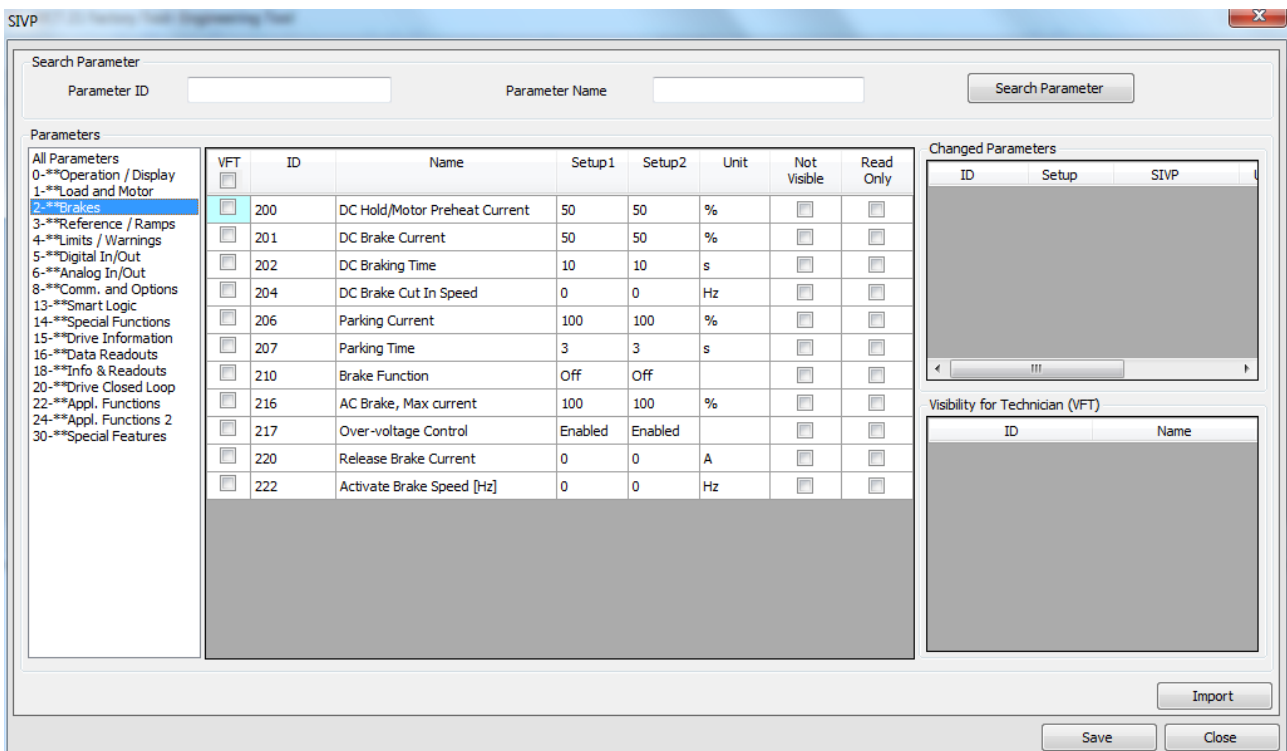


Illustration 5.25 Example: SIVP Parameter Group 2

### 5.4.3 Copy SIVP Library

To copy the SIVP Library from one PC to another:

1. Open Windows Explorer.
2. Open the project folder.
  - 2a To find the project folder go to [Menu → General Settings].
  - 2b The project folder is displayed in the field *Projects folder*, as shown in *Illustration 5.26*.
  - 2c The default project folder is C:\ProgramData\Danfoss Power Electronics\MCT21 Factory Tool\Projects\.
3. Select the required SIVP file (suffix .siv) and copy it to a suitable media (for example, a USB stick).
4. Move the media to the destination PC.

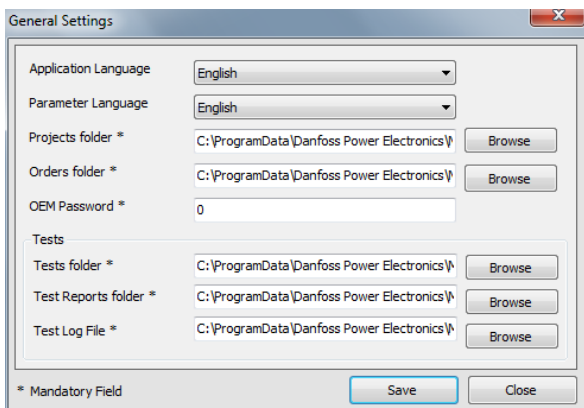


Illustration 5.26 General Settings Dialog, showing the Projects Folder

5. On the destination PC, open the SIVP dialog as shown in *chapter 5.4.1 Define the SIVP*.
6. In the SIVP dialog (*Illustration 5.27*), click on [Import], to import SIVP.
7. Click on [Save].
8. The SIVP Library is now stored on the destination PC.

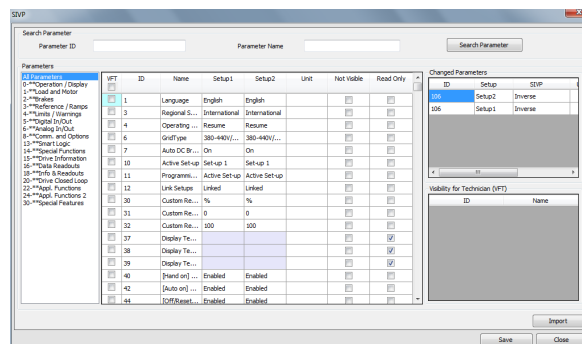


Illustration 5.27 SIVP Dialog

### 5.5 Tests

A test comprises a sequence of actions, testing the interaction of the frequency converter and the motor. The Engineering Tool offers the following test functionalities:

- Create test
- Edit test
- Run test<sup>1)</sup>
- View test results<sup>1)</sup>
- Remove test

1) The *Run test* and *View test results* functions are the same for the Engineering Tool and the Technician Tool.

#### 5.5.1 Create Test

To create a new test:

1. In the menu bar, go to [Tools → Common Test Database].
2. The *Test Database* dialog opens, see *Illustration 5.28*.

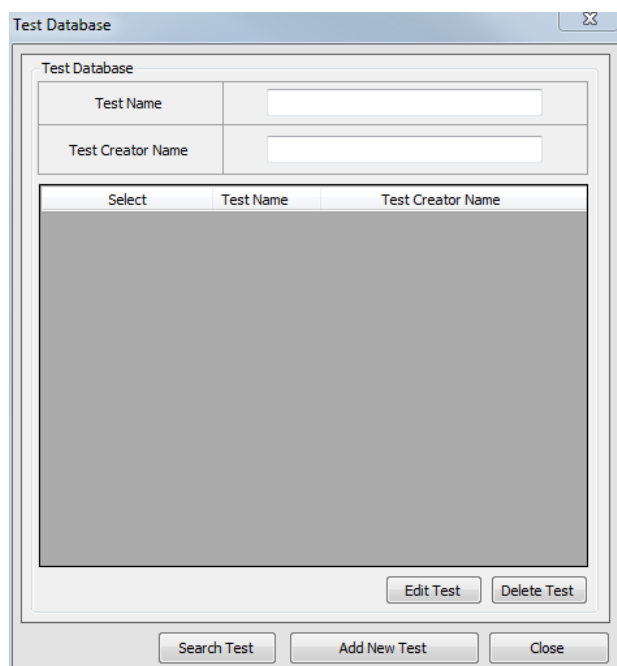


Illustration 5.28 Test Database Dialog

3. Click on [Add New Test].
4. The *New Test* dialog opens, see *Illustration 5.29*.

The new test contains several predefined initial steps by default, see *Illustration 5.29*. The predefined initial steps activate a function which monitors the communication between the PC and the frequency converter. If communication fails, these steps ensure that the frequency converter stops automatically. Therefore, consider possible negative impact on the test before changing or removing the predefined steps in the sequence.

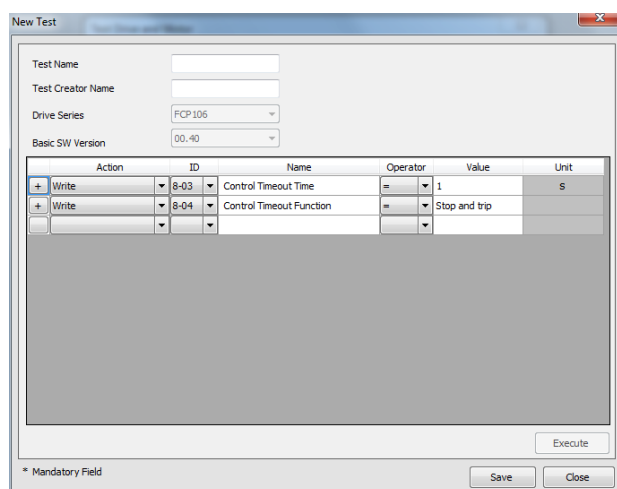


Illustration 5.29 Create Test, Predefined Steps

The following commands are available within each test step, to activate and monitor the frequency converter:

- Initialise drive
- Read
- Write
- Wait
- Write Control Word

For more information refer to *chapter 5.5.2 Edit Test*.

## 5.5.2 Edit Test

Before editing a test, it is necessary to understand:

- Range of commands available, see *chapter 5.5.2.1 Commands*.
- Predefined commands, see *chapter 5.5.1 Create Test*.
- How to edit, see *chapter 5.5.2.2 Editing Procedure*.

### 5.5.2.1 Commands

The following commands are available within each test step, to activate and monitor the frequency converter:

- Initialise drive
- Read
- Write
- Wait
- Write Control Word

View the available commands via the drop down menu, as shown in *Illustration 5.30*.

*Write* enables change of a parameter value, for example preset references or ramp times.

*Wait* tells the tool to wait for a specified time or condition before executing the next step. For example, using the wait command, the tool can wait until a motor has accelerated to a certain speed before performing the next command. Note: Enter the time in ms (1000 ms = 1 s).

*Read* tells the tool to fetch a value from a parameter. The test fails if a read function does not match the defined value. For example, in *Illustration 5.31*, the language selection must be *English*. If it is not *English*, the test will be marked as failed.

*Write Control Word* consists of a control word and a reference value. For details see *chapter 5.5.3 Control Word according to FC Profile (CTW)*.

**⚠ WARNING**

**UNINTENDED START**

Depending on the settings of the frequency converter, editing a command can start the motor. Unintended start during programming can result in death, serious injury, or property damage. To prevent unintended motor start:

- Disconnect the frequency converter from mains.
- Press [Off/Reset] on the LCP before editing a command.
- Ensure the frequency converter, motor, and any driven equipment are fully wired and assembled when the frequency converter is connected to AC mains, DC power supply, or load sharing.

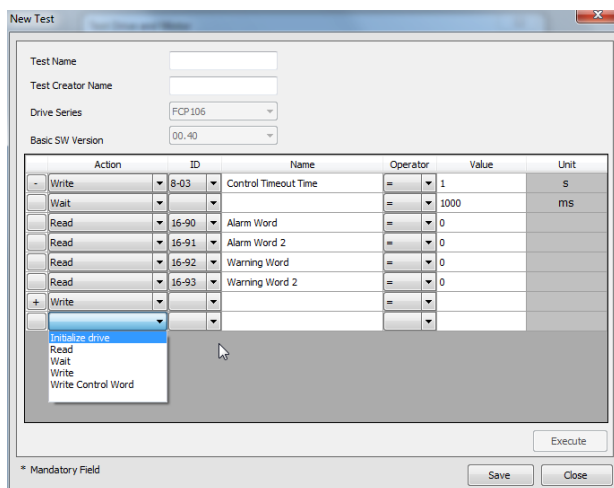


Illustration 5.30 Create Test, Commands Available

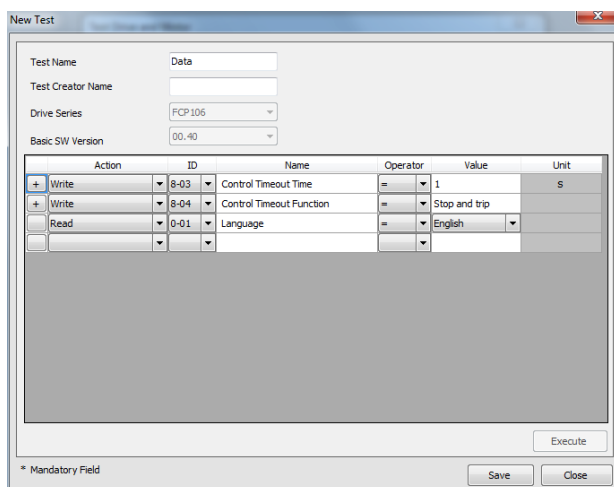


Illustration 5.31 Create Test, Write Command

5.5.2.2 Editing Procedure

To edit a test:

1. Use the checkmark to select the test from the list, see *Illustration 5.32*.
2. Click on [Edit].
3. The *Edit Test* dialog opens, see *Illustration 5.33*.

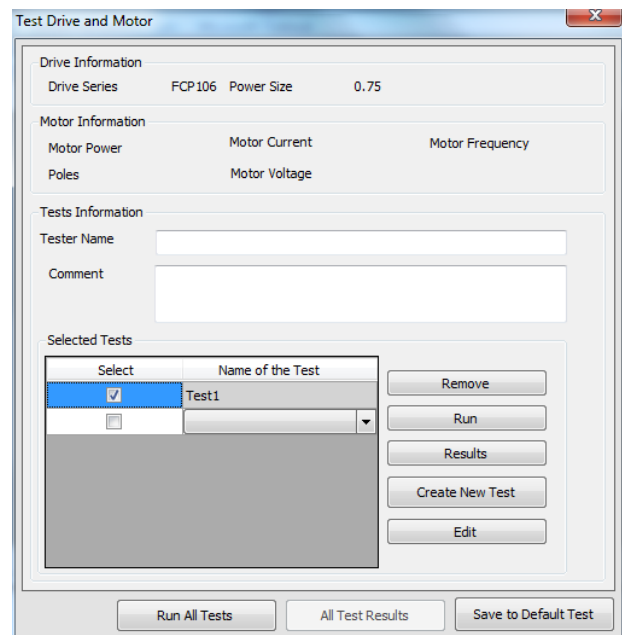


Illustration 5.32 Select Test for Editing

4. To view the sub-steps for each predefined process, click on [+], as shown in *Illustration 5.33*.
5. The sub-steps unfold as shown in *Illustration 5.34*.

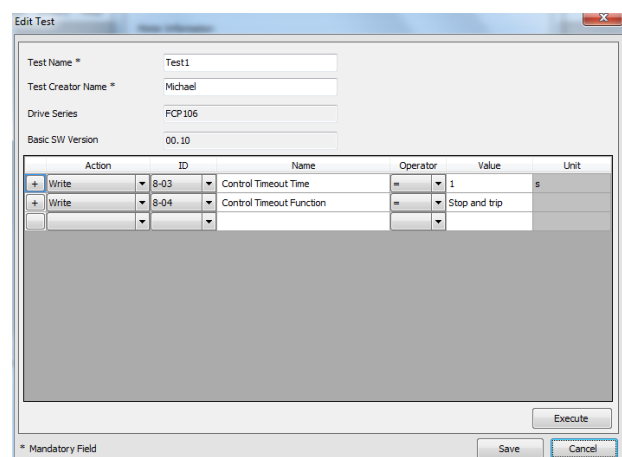


Illustration 5.33 Edit Test

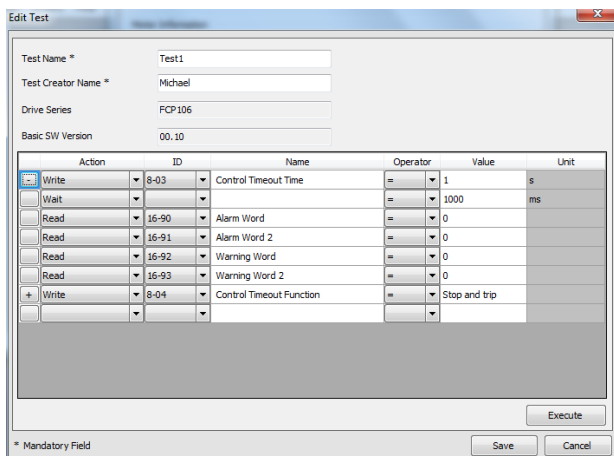


Illustration 5.34 Example: Process Step Expanded to show Sub-steps

6. Enter a new command by defining each of the fields *Action*, *ID* (parameter number), *Name* (parameter name).
7. Click [Save].
8. Continue to enter each new command. Click [Save] after each one.
9. When all new commands are completed, click [Execute]. The test is saved.
10. The dialog closes and returns to the *Test Drive and Motor* dialog (shown in *Illustration 5.32*).

### 5.5.3 Control Word according to FC Profile (CTW)

To select FC protocol in the control word, set *8-10 Control Word Profile* to *[0] Frequency converter profile*. The control word is used to send commands from a master (PLC or PC) to a follower (frequency converter).

| Bit | Bit value=0           | Bit value=1            |
|-----|-----------------------|------------------------|
| 00  | Reference value       | External selection lsb |
| 01  | Reference value       | External selection msb |
| 02  | DC brake              | Ramp                   |
| 03  | Coasting              | No coasting            |
| 04  | Quick stop            | Ramp                   |
| 05  | Hold output frequency | Use ramp               |
| 06  | Ramp stop             | Start                  |
| 07  | No function           | Reset                  |
| 08  | No function           | Jog                    |
| 09  | Ramp 1                | Ramp 2                 |
| 10  | Data invalid          | Data valid             |
| 11  | No function           | Relay 01 active        |
| 12  | No function           | Relay 04 active        |
| 13  | Parameter set-up      | Selection lsb          |
| 14  | Parameter set-up      | Selection msb          |
| 15  | No function           | Reverse                |

Table 5.4 Bit Values for FC Control Word

#### Explanation of the control bits

##### Bits 00/01 Reference value

Bits 00 and 01 are used to choose between the 4 reference values, which are pre-programmed in *3-10 Preset Reference* according to *Table 5.5*.

#### **NOTICE**

In *8-56 Preset Reference Select* a selection is made to define how bit 00/01 gates with the corresponding function on the digital inputs.

| Bit 01 | Bit 00 | Programmed ref. value | Parameter                 |
|--------|--------|-----------------------|---------------------------|
| 0      | 0      | 1                     | [0] 3-10 Preset Reference |
| 0      | 1      | 2                     | [1] 3-10 Preset Reference |
| 1      | 0      | 3                     | [2] 3-10 Preset Reference |
| 1      | 1      | 4                     | [3] 3-10 Preset Reference |

Table 5.5 Programmed Reference Values for Bits

##### Bit 02, DC brake

Bit 02=0 - leads to DC braking and stop. Braking current and duration are set in *2-01 DC Brake Current* and *2-02 DC Braking Time*.

Bit 02=1 - leads to ramping.

##### Bit 03, Coasting

Bit 03=0 - causes the frequency converter to immediately coast the motor to a standstill.

Bit 03=1 - enables the frequency converter to start the motor if the other starting conditions have been fulfilled.

**NOTICE**

In *8-50 Coasting Select* a selection is made to define how bit 03 gates with the corresponding function on a digital input.

**Bit 04, Quick stop**

Bit 04=0 - causes a quick stop, ramping the motor speed down to stop via *3-81 Quick Stop Ramp Time*.

Bit 04=1 - the frequency converter ramps the motor speed down to stop via *3-42 Ramp 1 Ramp Down Time* or *3-52 Ramp 2 Ramp Down Time*.

**Bit 05, Hold output frequency**

Bit 05=0 - causes the present output frequency (in Hz) to freeze. The frozen output frequency can only be changed with the digital inputs (*5-10 Terminal 18 Digital Input* to *5-15 Terminal 33 Digital Input*) programmed to *Speed up* and *Speed down*.

Bit 05=1 - use ramp.

**NOTICE**

If *Freeze output* is active, stop the frequency converter with:

- Bit 03 Coasting stop
- Bit 02 DC braking
- Digital input (*5-10 Terminal 18 Digital Input* to *5-15 Terminal 33 Digital Input*) programmed to *DC braking*, *Coasting stop*, or *Reset and coasting stop*.

**Bit 06, Ramp stop/start**

Bit 06=0 - causes a stop, in which the motor speed is ramped down to stop via the selected *Ramp down* parameter.

Bit 06=1 - permits the frequency converter to start the motor if the other starting conditions have been fulfilled.

**NOTICE**

In *8-53 Start Select* a selection is made to define how bit 06 Ramp stop/start gates with the corresponding function on a digital input.

**Bit 07, Reset**

Bit 07=0 - does not cause a reset.

Bit 07=1 - causes the reset of a trip. Reset is activated on the signals leading edge, that is, when changing from logic 0 to logic 1.

**Bit 08, Jog**

Bit 08=0 - no function.

Bit 08=1 - *3-19 Jog Speed [RPM]* determines the output frequency.

**Bit 09, Selection of ramp 1/2**

Bit 09=0 - ramp 1 is active (*3-40 Ramp 1 Type* to *3-47 Ramp 1 S-ramp Ratio at Decel. Start*).

Bit 09=1 - ramp 2 (*3-50 Ramp 2 Type* to *3-57 Ramp 2 S-ramp Ratio at Decel. Start*) is active.

**Bit 10, Data not valid/data valid**

Is used to tell the frequency converter whether it should use or ignore the control word.

Bit 10=0 - the control word is ignored.

Bit 10=1 - the control word is used. This function is relevant because the control word is always contained in the telegram, regardless of which type of telegram is used. Therefore, the control word can be turned off if it is not required when updating or reading parameters.

**Bit 11, Relay 01**

Bit 11=0 - relay 01 not activated.

Bit 11=1 - relay 01 activated, provided *Control word bit 11* has been chosen in *5-40 Function Relay*.

**Bit 12, Relay 04**

Bit 12=0 - relay 04 has not been activated.

Bit 12=1 - relay 04 has been activated, provided *Control word bit 12* has been chosen in *5-40 Function Relay*.

**Bit 13/14, Selection of set-up**

Bits 13 and 14 are used to choose from the 4 menu set-ups according to *Table 5.6*:

The function is only possible when *Multi-Set-ups* is selected in *0-10 Active Set-up*.

| Set-up | Bit 14 | Bit 13 |
|--------|--------|--------|
| 1      | 0      | 0      |
| 2      | 0      | 1      |
| 3      | 1      | 0      |
| 4      | 1      | 1      |

Table 5.6 Selection of Set-up

**NOTICE**

In *8-55 Set-up Select* a selection is made to define how bit 13/14 gates with the corresponding function on the digital inputs.

**Bit 15 Reverse**

Bit 15=0 - no reversing.

Bit 15=1 - reversing.

**NOTICE**

The control word cannot overrule settings in the frequency converter. For example, when the frequency converter is stopped via the LCP or a digital input (coast), it will not accelerate when sending a start command via bus.

**Examples**

| CTW  | Action                 |
|------|------------------------|
| 047C | Start motor            |
| 043C | Stop                   |
| 847C | Start reversing        |
| 046C | Quickstop              |
| 007C | No function (bit 10=0) |

Table 5.7 Examples

5.5.4 Definition of Reference

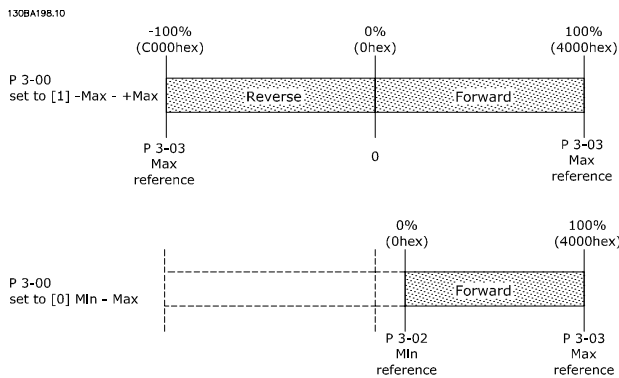


Illustration 5.35 Definition of Reference

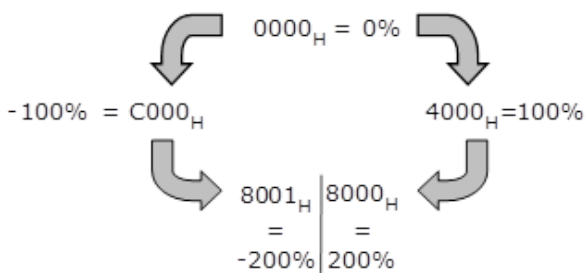


Illustration 5.36 Minimum and Maximum Reference

5.5.5 Select and Run Test, View Test Report

**Run a single test, or several tests**

To run a single test, or a group of tests:

1. Go to the project view. For more information, see *chapter 5.1.4 Open Project*.
2. In the left panel click on [Test] in the project structure.

3. The *Test Drive and Motor* dialog opens, see *Illustration 5.37*.
4. Use the checkmark to select the test(s) from the list.
5. Click [Run].
6. Click [Results] to view the test report.

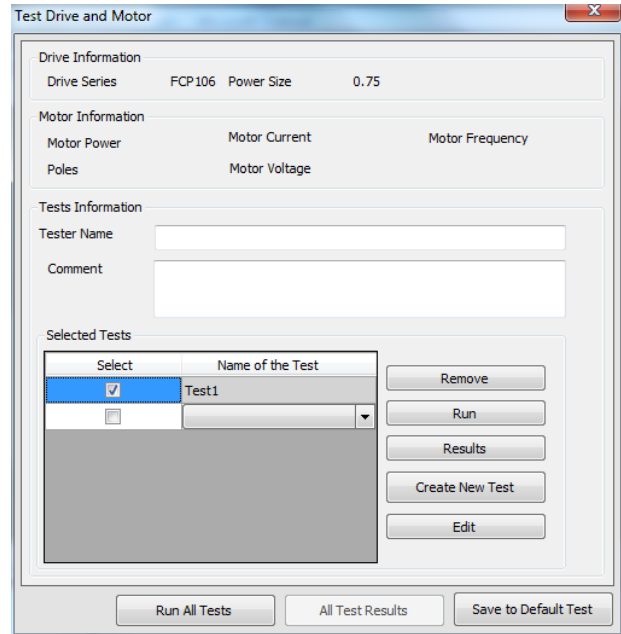


Illustration 5.37 Test Drive and Motor Dialog

**Run all tests**

To run all tests:

1. Follow steps 1, 2, and 3 above.
2. In the left panel click on [Test] in the project structure.
3. Click [Run All Tests].
4. Click [All Test Results] to view the test report.

5.5.6 Remove Test

To remove a test or tests from a project:

1. Go to the project view. For more information, see *chapter 5.1.4 Open Project*.
2. In the left panel click on [Test] in the project structure.
3. The *Test Drive and Motor* dialog opens, see *Illustration 5.37*.
4. Use the checkmark to select the test(s) from the list.
5. Click on [Remove].



6. The test or tests are now removed from the project. Confirm by checking the list of tests in the *Test Drive and Motor* dialog.

### 5.5.7 Copy Test

1. Open Windows Explorer.
2. Open the test folder.
  - 2a To find the test folder go to [Menu → General Settings].
  - 2b The test folder is displayed in the field *Tests folder*, as shown in *Illustration 5.38*.
  - 2c The default test folder is `C:\ProgramData\Danfoss Power Electronics\ MCT21 Factory Tool\Projects\`.

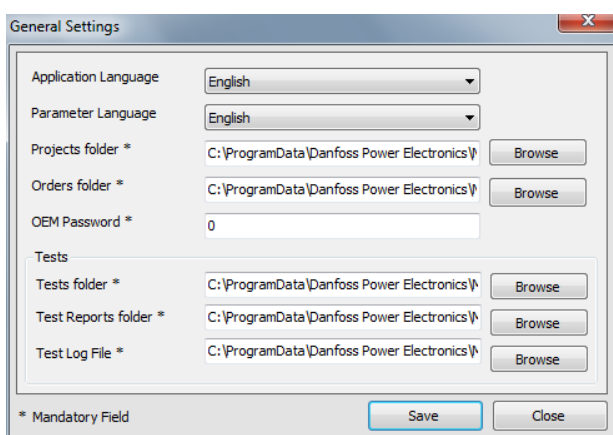


Illustration 5.38 General Settings Dialog, showing Tests Folder

3. Select the desired test file (suffix ".Test") and copy it to a suitable media (e.g. USB stick).
4. Move the media to the destination PC.
5. On the destination PC, copy the test to the test folder path specified in the General Settings dialog (see *Illustration 5.38*).
6. The test is now available for selection in the Engineering Tool and the Technician Tool on the destination PC.

## 5.6 Settings Menu

### 5.6.1 General Settings

To access *General Settings*:

1. Click *Settings* in the menu bar, see *Illustration 5.39*.
2. Select *General Settings* in the dropdown.
3. The dialog opens, see *Illustration 5.40*.

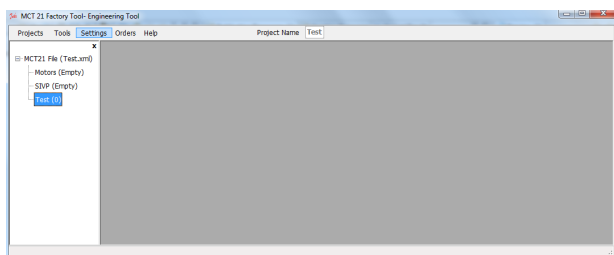


Illustration 5.39 General Settings

Use the *General Settings* dialog to set up preferences for:

- Language of the tool user interface (English or German).
- Language for displaying parameters (English, German, French, Danish, Spanish, or Italian).
- Folder location to store projects.
- OEM password definition.
- Tests:
  - Folder location to store test procedures.
  - Folder location to store test reports.
  - Folder location to store test log files.

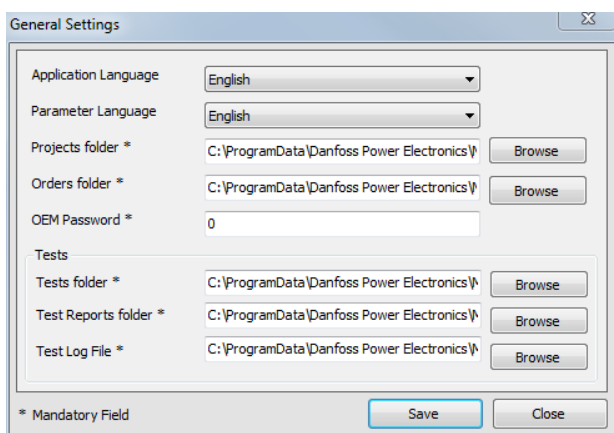


Illustration 5.40 General Settings Dialog

### 5.6.2 Drive Communication

To access serial fieldbus communication settings for the frequency converter:

1. Click *Settings* in the menu bar, see *Illustration 5.39*.
2. Select *Drive Communication* in the dropdown.
3. The *Serial Fieldbus Configuration* dialog opens, see *Illustration 5.41*.

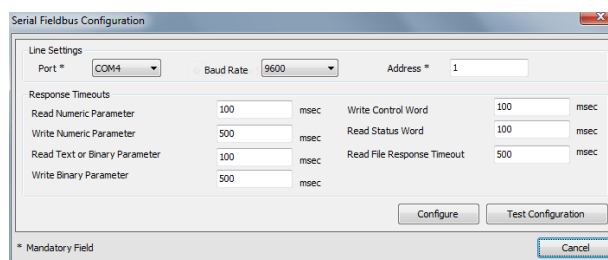


Illustration 5.41 Serial Fieldbus Configuration, Communication Settings

Procedure:

1. Enter the required settings. As a minimum, select *Port* and enter *Address*. The other settings are optional.
2. Click [Configure] to save the settings.
3. Click [Test Configuration] to check the settings function correctly.
4. Click [Cancel] to delete the settings.

## 6 Technician Tool Functions

### 6.1 Project

#### 6.1.1 Open a Project

At the start-up of the Technician Tool, the *Search* dialog opens, see *Illustration 5.10*. The dialog is also accessible via [Menu → Search Project].

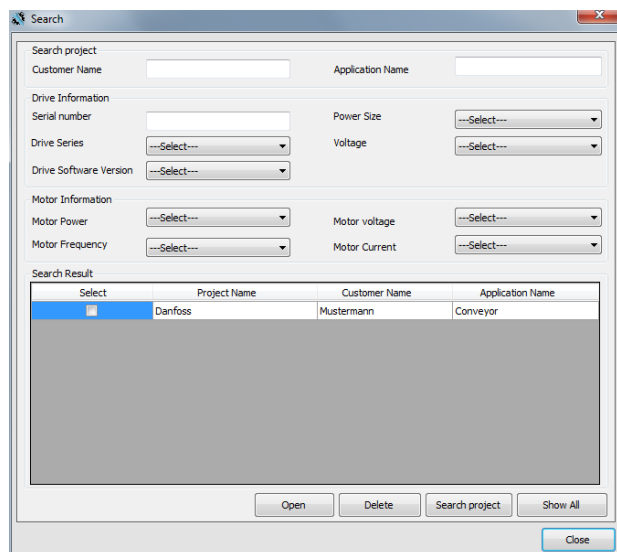


Illustration 6.1 Search Dialog

Use the Search dialog to find an existing project. The existing projects originate from the Engineering Tool, see *chapter 5.1.1 Create a Project*.

To search for a project, refer to the instructions in *chapter 5.1.5 Search Project*.

#### Open a project

To open a project in the *Search Result* dialog:

1. Double-click on the project, or
2. Use the check box to mark the required project, and click [Open]
3. The *Project View* dialog opens.

#### 6.1.2 Project View

##### Project View Dialog

The project opens in Project View, see *Illustration 6.2*. After opening the project, the following actions are available in the left-hand panel in the *Project View* dialog:

- Project Info
- Write to Drive
- Compare
- Test

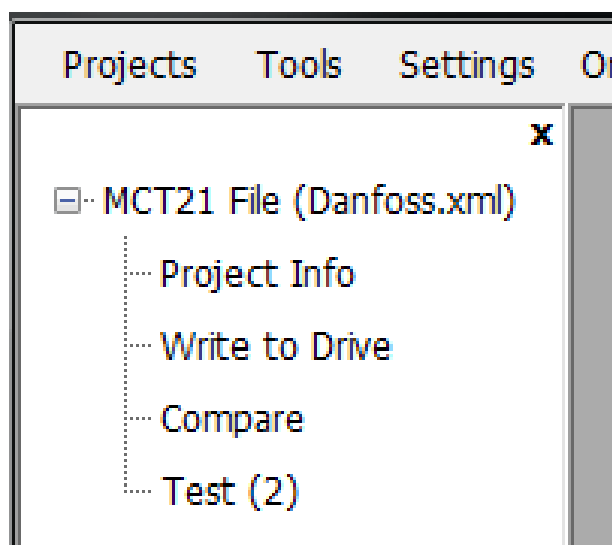


Illustration 6.2 Project View Dialog

##### Alternative - Order file

MCT 21 Factory Tool monitors the order folder specified in *General Settings*. When a user places an order file there, it is flagged in the menu bar, see *Illustration 6.3*. The order file specifies SIVP parameter, motor database and so on.

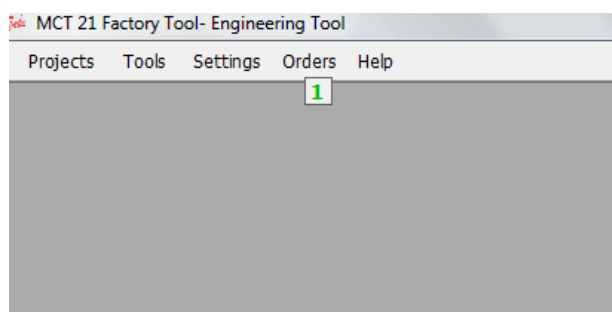


Illustration 6.3 Order Flag in the Menu Bar

After processing the order, the information transfers to a project. Handle this project in the same way as any other project, see *Illustration 6.2*.

#### 6.1.3 Project Review and Adjustments

##### Project Info

In the *Project View* dialog (*Illustration 6.2*) go to [MCT21 File → Project Info] to read project data:

- Project details
- Drive Information
- Motor Information

- SIVP parameters. Only SIVP parameters indicated in the Engineering Tool as VTF (Visible to Factory Tool) are visible in the Factory Tool dialog. The technician can only edit these parameters. Other parameters are not visible or editable by the technician.

**Edit the project**

If required, edit the project in the *Project Info* dialog as follows:

- Adapt the entries in the dialog fields.
- Click [Save] to overwrite a project with changes.
- Click [Save as] to create a new project with changes.

If no editing is required, click [Continue] to leave everything unchanged. The *Project View* opens.

**6.1.5 Write to Frequency Converter**

To write data to the frequency converter, in the project view go to [MCT21 File → Write to Drive] as shown in *Illustration 6.2*.

The dialog *Write SIVP and Selected Motors to Drive* opens, see *Illustration 6.4*. In the dialog,

- View and edit communication settings
- Select a pump table for the sensorless pump function
- View a summary of the project including motor data, adjusted parameters
- Transfer project data to the frequency converter

**6.1.4 Create an Order**

To create an order, refer to *chapter 5.1.6 Create Order*.

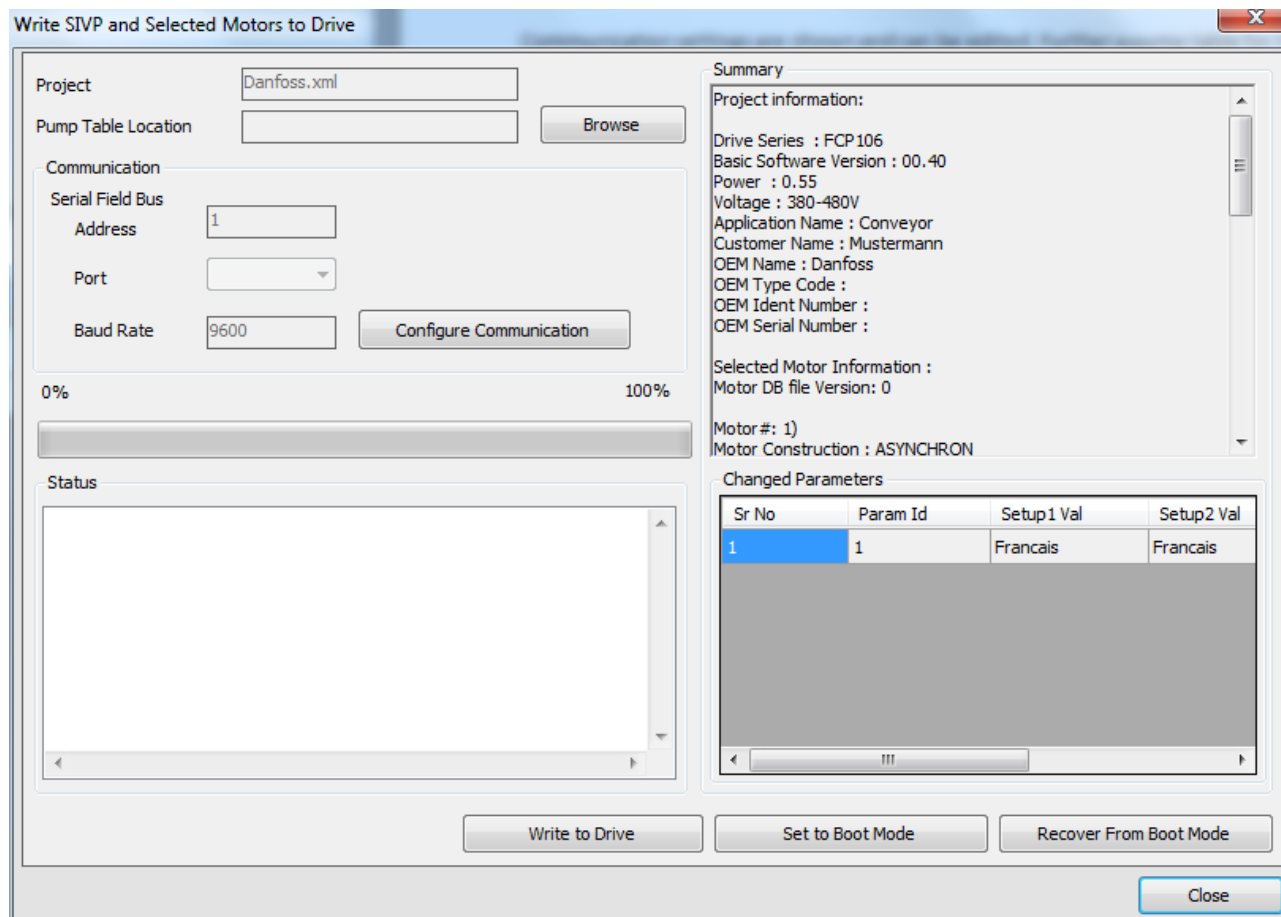


Illustration 6.4 Write SIVP and Selected Motors to Drive

To transfer the project data to the frequency converter, click [Write to Drive].

If an error arises during data transfer, click [Recover From Boot Mode]. Possible errors are power loss and communication failure.

### 6.1.6 Compare

Use the *Compare* function to check whether data are successfully transferred from the PC to the frequency converter.

In the project view, go to [MCT 21 File → Compare].

## 6.2 Motor Database

In the Technician Tool, use the motor database to select motors and to write to the frequency converter.

For more information, refer to *chapter 5.2 Motor Database*.

### 6.3 SIVP

#### 6.3.1 Select

In the Technician Tool, use the SIVP to select parameters and write to the frequency converter.

For more information, refer to *chapter 5.4 SIVP (Specific Initial Values and Protection)*.

### 6.3.2 Write to Frequency Converter

To write SIVP to the frequency converter, refer to the instructions in *chapter 6.1.5 Write to Frequency Converter*.

## 6.4 Tests

### 6.4.1 Test and Documentation

#### Test

To verify that a frequency converter is operating correctly, run a defined test. The result is documented.

To run a test or tests:

1. Open *Project View*.
2. Go to [MCT21 File → Test].
3. The *Test Drive and Motor* dialog opens, see *Illustration 6.5*.
4. Follow the steps in the following sections to run a test or tests.

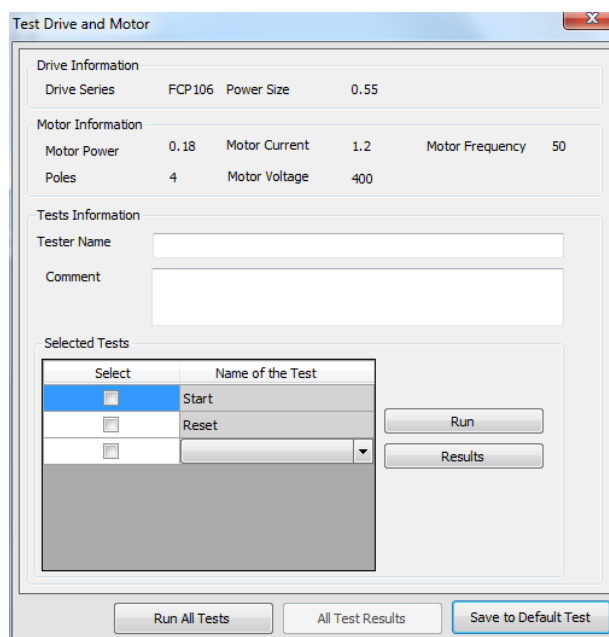


Illustration 6.5 Test Drive and Motor

#### Test Information field

In the section *Test Information*, use the fields *Tester Name* and *Comment* to document details about the test. For example, enter the code number in the *Comment* field.

#### Run Test

To start a dedicated test:

- Use the check boxes under the heading *Select*, to select the test or tests.
- Click [Run].
- The selected test(s) runs.

To run all available tests:

- Click [Run all Tests].
- The tests run.

#### Documentation - test result

The test result is saved in a pdf file.

Name the PDF file in the format *Type code + drive serial number + date*.

#### Documentation - test log

The output of the test is the test log, in csv file format.

The following test details are stored in the test log:

- Date
- Time
- Order number
- Customer name
- Name tester
- Drive type (15–46)
- Serial number (15–51)

- .Siv file name
- Comment
- Result (pass or not passed)
- Test report path (path with .PDF file name where report was created)

**Index**

**C**

Communication

- Serial fieldbus..... 6, 32
- Set-up..... 6

Create project..... 10

**D**

De-installation..... 6

Dialog

- General settings..... 6, 32
- New project..... 6, 10
- Project info..... 11, 34
- Read from drive..... 12
- Search..... 10
- Test drive and motor..... 11
- Write SIVP and selected motors to drive..... 34

Discharge time..... 4

Document version..... 3

**E**

Engineering tool..... 7, 8

**F**

FC profile

- Control bits..... 28
- Control word..... 28
- Example..... 30

**G**

General settings..... 32

**H**

High altitude..... 5

High voltage..... 4

**I**

Installation..... 6

Intended use..... 3

**L**

Leakage current..... 5

Links..... 3

**M**

MCT 10..... 10

Motor

- Add to database..... 18
- Common motor library..... 19
- Copy library..... 21
- Database..... 17, 35
- Library management..... 19
- Remove from database..... 18
- Write to drive..... 34

**O**

Order..... 13

Order file

- Example..... 15
- Flag..... 33
- Order folder..... 33
- Structure..... 15

**P**

Password

- Frequency converter..... 6
- OEM..... 6

PELV..... 5

Project

- Copy all data..... 15
- Edit..... 34
- Existing..... 12
- Folder..... 15
- Info..... 33
- New..... 10
- New, create from database..... 10
- New, read from drive..... 12
- Open..... 12, 33
- Search..... 13, 33
- Search with filter..... 13
- Upgrade to new firmware..... 16
- View..... 13
- Write to drive..... 34

Project structure..... 13

Project view..... 13

Purpose of the manual..... 3

**Q**

Qualified personnel..... 4

**R**

Reference..... 30

Removal..... 6

Residual Current Device..... 5

**S**

Set-up..... 6

|   |          |
|---|----------|
| SIVP  |          |
| Definition.....                             | 22       |
| Example.....                                | 24       |
| In Technician Tool.....                     | 35       |
| Library.....                                | 25       |
| Software version.....                       | 3        |
| Specific initial values and protection..... | 22       |
| System requirements.....                    | 3        |
| T   |          |
| Technician tool.....                        | 7, 9, 33 |
| Test  |          |
| Copy.....                                   | 31       |
| Create.....                                 | 25       |
| Documentation.....                          | 35       |
| Edit.....                                   | 26       |
| Log.....                                    | 35       |
| Remove.....                                 | 31       |
| Report.....                                 | 30, 35   |
| Run.....                                    | 30, 35   |
| Select.....                                 | 30       |
| U   |          |
| Unintended motor rotation.....              | 5        |
| Unintended start.....                       | 4, 27    |
| W   |          |
| Windmilling.....                            | 5        |
| Workflow.....                               | 7, 8, 9  |







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