

# Danfoss DriveManager Plug-in for TwinCAT

VLT<sup>®</sup> AutomationDrive FC 301/FC 302, VLT<sup>®</sup> Decentral Drive FCD 302



<u>Danfoss</u>

Contents

## Contents

1	Inti	roduction	3
	1.1	Purpose of the User Guide	3
	1.2	Qualified Personnel	3
	1.3	Additional Resources	3
	1.4	Document and TwinCAT <sup>®</sup> Version	3
	1.5	Product Overview	3
		1.5.1 Purpose of the Plug-in	3
		1.5.2 Preconditions	4
		1.5.3 Supported Drive Series	4
		1.5.3.1 Supported Data Types	4
		1.5.4 Limitations	4
2	Ins	stallation and Deinstallation	5
	2.1	Installing the Danfoss DriveManager Plug-in for TwinCAT®	5
	2.2	Deinstallation, Danfoss DriveManager Plug-in for TwinCAT® and VLT® Motion Control Tool MCT 10	6
3	Use	er Interface	7
	3.1	Description of the Danfoss DriveManager for TwinCAT® User Interface	7
4	Usi	ing the Danfoss DriveManager Plug-in for TwinCAT®	9
	4.1	Scanning Devices	9
	4.2	Modifying the Startup List with Danfoss DriveManager Plug-in for TwinCAT®	13
		4.2.1 Grid Colors	15
		4.2.2 Removing a Parameter from the Startup List	15
		4.2.3 Adding a Default Value to the Startup List	16
		4.2.4 Activating the Configuration	16
	4.3	Working with an Online Drive	17
	4.4	Modifying the Online Drive Parameters with Danfoss DriveManager Plug-in for TwinCAT®	17
		4.4.1 Restricted Modification	18
	4.5	Use Cases for Manual Drive Identification	20
		4.5.1 Drive Identified but not Created in Danfoss DriveManager Plug-in	20
		4.5.1.1 Identifying the Device	21
		4.5.2 The Drive is Created, but Has Been Changed Externally	21



## **1** Introduction

## 1.1 Purpose of the User Guide

This User Guide provides:

- Step-by-step instructions on how to install the Danfoss DriveManager Plug-in for TwinCAT®.
- Description of the Danfoss DriveManager user interface.
- Use case examples of working with the Danfoss DriveManager.

The user guide is intended for use by qualified personnel.

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TwinCAT<sup>®</sup> is a registered trademark of Beckhoff Automation GmbH. Other designations used in this publication may be trademarks whose use by 3<sup>rd</sup> parties for their own purposes could violate the rights of the owners.

## 1.2 Qualified Personnel

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

Qualified personnel are defined as trained staff, who are authorized to install, commission, and maintain equipment, systems, and circuits in accordance with pertinent laws and regulations. Also, the qualified personnel must be familiar with the instructions and safety measures described in this manual.

## 1.3 Additional Resources

Resources available for the TwinCAT<sup>®</sup> software and for the drives in which the software can be installed:

- The Operating Guide of the relevant drive provides the necessary information for getting the drive up and running.
- The Design Guide of the relevant drive provides detailed information about capabilities and functionality to design motor control systems.
- The Programming Guide of the relevant drive provides greater detail on working with parameters.
- The Function Blocks with TwinCAT<sup>®</sup> User Guide provides instructions on how to integrate a Danfoss drive into a Beckhoff Twin-CAT<sup>®</sup> 3 system.

## 1.4 Document and TwinCAT<sup>®</sup> Version

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

The original language of this manual is English.

ΝΟΤΙΟΕ

This manual contains images from previous versions. The purpose of these images is merely showing and understanding how to use the software.

#### Table 1: Document and TwinCAT® Version

Revision	Remarks	TwinCAT <sup>®</sup> version	Danfoss DriveManager version
BC319549253561, version 0301	Update to Danfoss DriveManager software version.	3.1	1.47

## 1.5 Product Overview

### 1.5.1 Purpose of the Plug-in

The Danfoss Drive Manager Plug-in for TwinCAT simplifies the complete commissioning of Danfoss drives without using VLT® Motion Control Tool MCT 10.

**User Guide** 



## 1.5.2 Preconditions

- Operating system: Windows 7 or later.
- TwinCAT 3.1 must be installed in the default folder C:\TwinCAT.

NOTICE

It is not necessary to install Danfoss ESI files separately as they are installed with the plug-in.

## 1.5.3 Supported Drive Series

The Danfoss DriveManager Plug-in for TwinCAT® supports the following drive series:

- VLT<sup>®</sup> AutomationDrive FC 301
- VLT<sup>®</sup> AutomationDrive FC 302
- VLT<sup>®</sup> Decentral Drive FCD 302

## 1.5.3.1 Supported Data Types

The Danfoss DriveManager plug-in for TwinCAT® supports the following data types:

- INTEGER8
- INTEGER16
- INTEGER32
- UNSIGNED8
- UNSIGNED16
- UNSIGNED32
- VISIBLE\_STRING
- 4 byte BYTE\_STRING
- NORMAL\_VALUE\_N2
- BIT\_SEQUENCE
- TIME\_DIFFERENCE\_WITH\_DATE\_INDICATION
- TIME\_DIFFERENCE\_WITHOUT\_DATE\_INDICATION

## 1.5.4 Limitations

The limitations listed apply to Danfoss DriveManager Plug-in for TwinCAT<sup>®</sup> version 1.47. The plug-in does not support the following:

- Certain drive-specific data types:
  - TIMEOFDAY
  - TIMEOFDAY\_WITHOUT\_DATE
- Parameters in parameter group 19-\*\* User-defined Parameters.
- Running automatic motor adaptation (AMA).
- Parameters in parameter group 12-2\* Process Data.
- Configuring more than 1 out of 4 drive setups at a time via the plug-in.

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## 2 Installation and Deinstallation

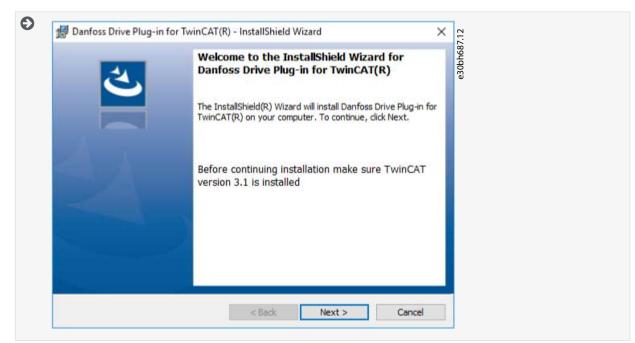
## 2.1 Installing the Danfoss DriveManager Plug-in for TwinCAT®

Follow the on-screen instructions for installing the plug-in.

#### Procedure

**User Guide** 

1. Double-click the Danfoss DriveManager Plugin for TwinCAT file to start the Installshield Wizard.



2. Click Next.

B Danfoss Drive Plug-in for TwinCAT(R) -	Instalionield wizard	e30bh688.12
Ready to Install the Program		oh6
The wizard is ready to begin installation.		e301
Click Install to begin the installation.		
If you want to review or change any of yo exit the wizard.	our installation settings, click Back. C	ick Cancel to
InstallShield		
	< Back 🛛 🖓 Install	Cancel

3. Click Install.

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👷 Danfoss Drive Plug-in f	or TwinCAT(R) - InstallShield Wizard	× 89.12
2	InstallShield Wizard Completed	e30bh689.12
	The InstallShield Wizard has successfully installed Danf Drive Plug-in for TwinCAT(R). Click Finish to exit the wi	
the second s		
	< Back Finish Ca	ancel

4. Click Finish.

2.2 Deinstallation, Danfoss DriveManager Plug-in for TwinCAT<sup>®</sup> and VLT<sup>®</sup> Motion Control Tool MCT 10

If both the Danfoss DriveManager Plug-in for TwinCAT<sup>®</sup> and the VLT<sup>®</sup> Motion Control Tool MCT 10 are installed, they share a database.

Uninstalling either program affects the operation of the other.

After uninstalling 1 of the programs, reinstall the other to continue normal operation.

## **3 User Interface**

## 3.1 Description of the Danfoss DriveManager for TwinCAT® User Interface

	1D	Name	Startup value	Default value	Unit	Value
Online Drive Parameters	110	Motor Construction	[0] Asynchron	[0] Asynchron		
- Startup List Parameters	111	Motor Model	[1] Std. Asynchron	[1] Std. Asynchron		140
- 0-** Operation / Display	D 114	Damping Gain	140	140	7.	Min Max
- 1-** Load and Motor	115	Low Speed Filter Time Const.	1.00	1.00	s	0 250
<ul> <li>1-0° General Settings</li> <li>1-1° Special Settings</li> </ul>	116	High Speed Filter Time Const.	1.00	1.00	s	
- 1-2* Motor Data	117	Voltage filter time const.	0.500	0.500	8	
<ul> <li>1-3" Adv. Motor Data</li> <li>1-5" Load Indep. Setting</li> </ul>	118	Min. Current at No Load	0	0	%	This parameter influences the dynamic performance of the PM machine. Low damping
- 1-5' Load Depen. Setting - 1-7' Start Adjustments - 1-8' Stop Adjustments - 1-9' Motor Temperature - 2-*' Brakenes / Ramps - 3-*' Reference / Ramps - 3-*' Ramps -						gain results in low dynamic and high value results in high dynamic. The dynamic performance is related to the machine data and load type. If the damping gain is too high or low the control will become unstable.

#### The interface is split into 3 views:

- The left view contains parameter groups and subgroups.
- The middle view contains the following parameter information:
  - ID (parameter number)
  - Name
  - Value
  - Default value
  - Unit
  - Data type
  - Index start-up list index
- The right view contains parameter values, its minimum and maximum values, and the description.

Parameter values are modified via the *Edit Parameter* dialog, which can be called through a mouse double-click, or by pressing either the spacebar or the Enter key.



User Interface

FC Edit Parameter	×
114: Damping Gain	
Min	Max
0	250
Parameter value	
140	
ОК	Cancel

Illustration 1: Edit Parameter Dialog

## 4 Using the Danfoss DriveManager Plug-in for TwinCAT®

## 4.1 Scanning Devices

This procedure is a use case for scanning devices.

Ensure that the hardware setup is correct.

#### Procedure

- 1. Open TwinCAT<sup>®</sup>.
- 2. Create a new TwinCAT project.

New Project				?	$\times$
▶ Recent	.NET Framework 4.5	· Sort by: Default	- II 🗉	Search Installed Templates (Ctrl+E)	p-
Installed  Templates  TwinCAT PLC  TwinCAT PLC  Samples  Online	TwinCAT XAE	Project (XML format)	TwinCAT Projects	Type: TwinCAT Projects TwinCAT XAE System Manager Configuration	
ne: TwinCAT Proje		Click here to go online and find	templates.		
	k\documents\visual studio	2013\Projects	×	Browse	
Solution name: TwinCAT Proje	ct146			Create directory for solution	

- 3. On the TwinCAT Project tab in the middle view, click Choose Target.
- 4. Select the target system and click OK.

The second second

Microsoft	Visual Studio Active solution platform 'TwinCAT RT (x64)' differs from new target platform 'TwinCAT CE7 (ARMV7)'!	e30bh963.11
	Change solution platform?	
	Yes No	

- 5. Click Yes to change the solution platform.
- **6.** Select the tab *TwinCAT*.
- 7. Select Reset TwinCAT (Config Mode).

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Using the Danfoss DriveManager

Plug-in for TwinCAT®

Error List Output		Selected Item  EtherCAT Devices Target Browser About TwinCAT Description File	tear Search Error List Project		
	Er	ror List Output			

Cancel

Restart TwinCAT System in Config Mode

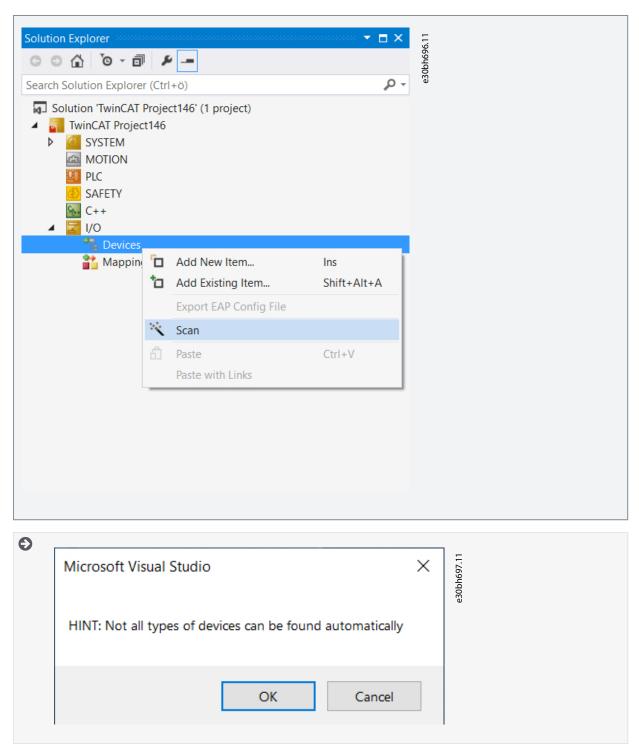
OK

8. Click OK.

9. In the Solution Explorer window, right-click Devices and select Scan.

Using the Danfoss DriveManager Plug-in for TwinCAT®

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10. Click OK.

## Using the Danfoss DriveManager Plug-in for TwinCAT®

OK Cancel Select All	e30bh698.11
Colored All	
Unselect All	
	Unselect All

#### 11. Click OK.

Ð	Microsoft Visual Studio	×	e30bh699.11
	? Scan for boxes		
	Yes	No	

#### 12. Click Yes.

If the network was set up correctly, all drives are found and identified, and the Danfoss DriveManager Plug-in for TwinCAT<sup>®</sup> is ready to be used.

	EtherCAT Process Data Slots Startup CoE - Online C 2.1.1kW (P1K1) 200-240 VAC (T2)	nine Drive Harlager (V1.40)		
Solution 'TwinCAT Project's' (1 project)	nline Drive Parameters		Drive Information	
SYSTEM	- 0-** Operation / Display     - 1-** Load and Motor	Drive Series	FC-302	
MOTION		Power Size	1.1kW (P1K1)	
PLC SAFETY	3-** Reference / Ramps     -4-** Limits / Warnings	Voltage	PH 3 200-240 VAC (T2)	
₩ C++ ↓ ₩ 1/0	⊞-5-** Digital In/Out ⊞-6-** Analog In/Out	Software version	56.01	
<sup>60</sup> <sup>1</sup>	- 7-** Controllers     - 8-** Comm. and Options	Option A	MCA124 EtherCAT	
<ul> <li>Device 1 (Beckhoff CCAT)</li> <li>Device 2 (EtherCAT)</li> </ul>		Option B No option		
Image Image-Info		Option C0/E0	No option	
<ul> <li>Indefinition</li> <li>SyncUnits</li> </ul>	⊕ 16-** Data Readouts	Option C1/E1	No option	
Þ 🛄 Inputs	17-** Position Feedback     18-** Data Readouts 2		FC-302P1K1T2 V0455-00.pud	
▶         ● Outputs           ▶         ■ Term 1(61X120)           ▶         ■ Term 2(61200)           ▶         ■ Term 2(6120)	10° 10° 10° 10° 10° 10° 10° 10° 10° 10°		at Drive Try to identify the Drive	

## ΝΟΤΙΟΕ

If the drive software version is not supported (for example, if it is a new software version), the project drive can be created manually.

Solution Explorer 🔹 🖣 🗙	× TwinCAT Project3 ↔ ×			
0 0 🕼 🛱 - 10 - 5 🖉 🏓 🗕	General EtherCAT Process Data Slots Stz	artup CoE - Online Online Drive Manager (V1.40)		
Search Solution Explorer (Ctrl+;)	-			
Solution TwincAT Project3 (1 project)         ■ TwincAT Project3         ■ Twincat Project3		Create a drive to start work	king with the Drive Manager Try to identify the Drive	

If the software version is not supported, contact Danfoss help desk to find the most compatible software version from the list of supported firmware, or to receive software support.

ew Drive			-		$\times$
me					
rive Name: Box 8 (FC-302 VLT® Automation Drive)	Software Version:	08.34		$\sim$	
······	Voltage:	08.34		~	
	voitage.	08.33 08.23			
		08.12			
		08.11			
lect Drive Type		08.10 08.04			
Series: FC-302	Power Size:	08.03			
		07.67			
PUD file: FC-302PK25T2		07.65 07.64		_	
		07.62			
		07.52			
		07.44			
tions		07.42			
Option A: MCA124 EtherCAT		07.31 07.27			
Option B: No Option		07.26			
i to opion		07.25			
Option C0/E0: No Option ~		07.11 07.02			
Option C1/E1: No Option V		06.84			
No Option V		06.82			
		06.81 06.72			
		06.66			
		06.65			
Reset Fields OK		06.65 06.64 06.58			

## 4.2 Modifying the Startup List with Danfoss DriveManager Plug-in for TwinCAT®

The startup list may already contain values that were configured by the system manager based on the ESI specifications. More application-specific entries can be created.

To edit the start-up list parameters, use either the Startup tab or the Drive Manager tab.

ral         EtherCAT         Process Data         Slots           anstion         Protocol         Index <ps>         CoE         0x1A16C0           <ps>         CoE         0x1616C0</ps></ps>	Startup CoE-Online Online Drive Manager (V1.40) Data Comment	© © ☆ o + 2 ๗ ♪ - Search Solution Explorer (Ctrl+ö) ♪ -
<ps> CoE 0x1A16 C 0</ps>	Deta Comment	
<ps> CoE 0x1A16 C 0</ps>	Data Comment	
		G. Solution 'TwinCAT Project1' (1 project)
	02 00 10 00 43 26 10 00 4 download pdo 0x1A16 entr	<ul> <li>TwinCAT Project1</li> </ul>
	02 00 10 00 90 26 10 00 9 download pdo 0x1616 entr	SYSTEM
<ps> CoE 0x1C12C0</ps>	01 00 16 16 download pdo 0x1C12 index	MOTION
<ps> CoE 0x1C13C0</ps>	01 00 16 1A download pdo 0x1C13 index	PLC
<ps> CoE 0xF030 C 0 PS CoE 0x232A:00</ps>	01 00 01 00 00 00 download slot cfg 0x00 (0) download Control Word Pr	J Untitled1
PS CoE 0,232400	(600 (9) download Cartrol Wood Pr	<ul> <li>► ■ United Project</li> <li>Q United Instance</li> <li>SAFETY</li> <li>C++</li> <li>C++</li> <li>C++</li> <li>Device 2 (bits-CAT)</li> <li>■ Device 2</li></ul>

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## User Guide

The Danfoss DriveManager Plug-in makes easy to work with parameters. The parameters are easily found, selections can be made from dropdown lists, and values can be entered directly.

#### Example

Example of selecting an option in a parameter via the Danfoss DriveManager:

neral Ethe	erCAT Proce	ess Data Slots	Startup CoE - Online Onlin	Drive Manager (V1.40)
Transition	Protocol	Index	Data	Comment
C <ps></ps>	CoE	0x1A16C0	02 00 10 00 43 26 10 00 4	download pdo 0x1A16 entries
C <ps></ps>	CoE	0x1616 C 0	02 00 10 00 90 26 10 00 9	download pdo 0x1616 entries
C <ps></ps>	CoE	0x1C12C0	01 00 16 16	download pdo 0x1C12 index
C <ps></ps>	CoE	0x1C13C0	01 00 16 1A	download pdo 0x1C13 index
C <ps></ps>	CoE	0xF030 C 0	01 00 01 00 00 00	download slot cfg
C PS	CoE	0x219A:00	0x02 (2)	Motor Speed Direction (P410)
PS	CoE	0x232A:00	0x00 (0)	download Control Word Profile (p8-10)

### Illustration 2: Parameter Selected in Startup List

E - Online Online Drive Manager (V1.40)

ID	Name	Startup value	Default value	Unit	Value
> 410	Motor Speed Direction	[2] Both directions	[0] Clockwise		P. 27 (1997) 20 (1997)
411	Motor Speed Low Limit [RPM]	0	0	RPM	[2] Both directions
412	Motor Speed Low Limit [Hz]	0.0	0.0	Hz	
413	Motor Speed High Limit [RPM]	3,600	3,600	RPM	
414	Motor Speed High Limit [Hz]	120.0	120.0	Hz	Not editable while motor is running
416	Torque Limit Motor Mode	160.0	160.0	%	
417	Torque Limit Generator Mode	100.0	100.0	%	Select the motor speed direction(s) required. Use this parameter to prevent unwanted
418	Current Limit	160.0	160.0	%	reversing. When par. 1-00 Configuration Mode is
419	Max Output Frequency	132.0	132.0	Hz	set to Process [3], par. 4-10 is set to Clockwise [0] as default.

e30bh706.11

Illustration 3: Option Selected for Parameter in Danfoss DriveManager

## Example

Example of setting a value for a parameter via the Danfoss DriveManager:

Protocol	Index	Data	Comment
CoE	0x1A16 C 0	02 00 10 00 43 26 10 00 45 26	download pdo 0x1A16 entries
CoE	0x1616 C 0	02 00 10 00 90 26 10 00 92 26	download pdo 0x1616 entries
CoE	0x1C12 C 0	01 00 16 16	download pdo 0x1C12 index
CoE	0x1C13 C 0	01 00 16 1A	download pdo 0x1C13 index
CoE	0xF030 C 0	01 00 01 00 00 00	download slot cfg
CoE	0x219A:00	0x02 (2)	Motor Speed Direction (P410)
CoE	0x21EF:00	0x01F4 (500)	Positive Torque limit (P495)
CoE	0x232A:00	0x00 (0)	Control Word Profile (P810)
	CoE CoE CoE CoE CoE CoE	CoE         0x1616 C 0           CoE         0x1C12 C 0           CoE         0x1C13 C 0           CoE         0xF030 C 0           CoE         0x219A:00           CoE         0x21EF:00	CoE         0x1616 C 0         02 00 10 00 90 26 10 00 92 26           CoE         0x1C12 C 0         01 00 16 16           CoE         0x1C13 C 0         01 00 16 1A           CoE         0xF030 C 0         01 00 10 00 00           CoE         0x219A:00         0x02 (2)           CoE         0x21EF:00         0x01F4 (500)

### Illustration 4: Parameter Selected in Startup List

ID	Name	Startup value	Default value	Unit	Data type	Index	Value
490	Directional Limit Mode	[0] Disabled	[0] Disabled		UNSIGNED8	0x21EA:00	50.0
491	Positive Speed Limit [RPM]	3,600	3,600	RPM	UNSIGNED16	0x21EB:00	Min Max
492	Positive Speed Limit [Hz]	120.0	120.0	Hz	UNSIGNED16	0x21EC:00	0.0 100.0
493	Negative Speed Limit [RPM]	3,600	3,600	RPM	UNSIGNED16	0x21ED:00	
494	Negative Speed Limit [Hz]	120.0	120.0	Hz	UNSIGNED16	0x21EE:00	
495	Positive Torque limit	50.0	100.0	1	UNSIGNED16	0x21EF:00	Enter the limit for the motor torque when the
496	Negative Torque limit	100.0	100.0	%	UNSIGNED16	0x21F0:00	torque direction is clockwise.

Illustration 5: Parameter Value Added in DriveManager

## 4.2.1 Grid Colors

In the *DriveManager* view, the values of the parameters are color-coded depending on whether they are default or non-default values, or if they have been added to the startup list with or without a default value.

-302 1.1kW (P1K1) 200-240 VAC (T2) -Online Drive Parameters	ID	Name	Startup value	Default value	Unit	Data type	Index
All Parameters	100	Configuration Mode	[3] Process	[0] Speed open		UNSIGNED8	0x2064:00
- Startup List Parameters	101	Motor Control Principle	[1] VVC+	[1] VVC+		UNSIGNED8	0x2065:00
O-** Operation / Display	102	Flux Motor Feedback Source	[1] 24V encoder	[1] 24V encoder		UNSIGNED8	0x2066:00
1-** Load and Motor	103	Torque Characteristics	[0] Constant torque	[0] Constant tor		UNSIGNED8	0x2067:00
3.** Reference / Ramps	104	Overload Mode	[0] High torque	[0] High torque		UNSIGNED8	0x2068:00
- 4-** Limits / Warnings	105	Local Mode Configuration	[2] As mode par 1-00	[2] As mode par		UNSIGNED8	0x2069:00
⊕ 5** Digital In/Out     ⊕ 6** Analog In/Out	106	Clockwise Direction	[0] Normal	[0] Normal		UNSIGNED8	0x206A:00
E-7-** Controllers	107	Motor Angle Offset Adjust	[0] Manual	[0] Manual		UNSIGNED8	0x206B:00
B- 8-** Comm. and Options	110	Motor Construction	[0] Asynchron	[0] Asynchron		UNSIGNED8	0x206E:00
12-** Ethernet     13-** Smart Logic	111	Motor Model	[1] Std. Asynchron	[1] Std. Asynch		UNSIGNED8	0x206F:00
- 14-** Special Functions	114	Damping Gain	120	140	%	INTEGER16	0x2072:00
<ul> <li>15-** Drive Information</li> <li>16-** Data Readouts</li> </ul>	115	Low Speed Filter Time Const.	1.00	1.00	5	UNSIGNED16	0x2073:00
17-** Position Feedback	116	High Speed Filter Time Const.	1.00	1.00	5	UNSIGNED16	0x2074:00
18-** Data Readouts 2	117	Voltage filter time const.	0.500	0.500	s	UNSIGNED16	0x2075:00
22-** Appl. Functions     23-** Time-based Functions	118	Min. Current at No Load	0	0	%	UNSIGNED16	0x2076:00
	120	Motor Power [kW]	1.10	1.10	kW	UNSIGNED32	0x2078:00
⊕ 40-** Special Settings	121	Motor Power [HP]	1.48	1.48	hp	UNSIGNED32	0x2079:00
	122	Motor Voltage	230	230	V	UNSIGNED16	0x207A:00
	123	Motor Frequency	50	50	Hz	UNSIGNED16	0x207B:00
	124	Motor Current	4 07	4.97		LINGIGNED 22	0-2070-00

#### Illustration 6: Example of Color-coded Values in the DriveManager View

#### Table 2: Grid Color Legend

Color	Description
White	The parameter has the default value and is not in the startup list.
Golden	If the parameter value is different from the default value, this parameter value, and all other parameters de- pending on that one, are added to the startup list and marked with a golden color.
Orange	By right-clicking, the parameter is added to the startup list whether it has a default value or not.
Gainsboro (dark gray)	The parameter is read-only.
Red	Occurs if an error takes place and a parameter value cannot be read from the drive.
Yellow	Occurs if a parameter value cannot be applied because the parameter depends on the values of other parame- ters.

## 4.2.2 Removing a Parameter from the Startup List

When removing a parameter, the context menu depends on whether the parameter value is default or not. If the parameter value is not default, the parameter is reset to default before it is removed from the startup list.

#### Procedure

- 1. Right-click the parameter to be removed from the startup list.
- 2. Click the context menu.

106	Clockwise Direction	0:Normal	0:Normal	.11
107	Motor Angle Offset Adjust	0:Manual	0:Manual	e 30hh 709
110	Motor Construction	Remove param	neter 107 from startup list	30hl
Illustrati	ion 7: Example of Paramete	r with Default Value	0:Normal	= =
107		3:Off	0:Manual	0
110			ual' and remove from startup list	e30bh71
llustrati	ion 8: Example of Paramete	r with Non-default	Value	e3

## 4.2.3 Adding a Default Value to the Startup List

To initialize drives, the parameters must have default values.

#### Procedure

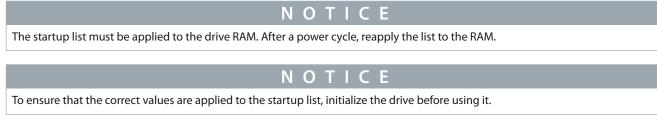
1. Right-click the parameter to be added to the startup list.

106	Clockwise Direction	0:Normal	0:Normal
107	Motor Angle Offset Adjust	0:Manual	0:Manual
110	Motor Construction	Add parameter 107 to	startup list

2. Select the parameter appearing in the context menu.

## 4.2.4 Activating the Configuration

To apply the startup list to the PLC, activate the configuration as described in this procedure.



#### Procedure

- 1. Select the *TwinCAT* tab.
- 2. Select Activate Configuration.

O       •       •       •       •       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●       ●	How The Activate Configuration       Image: State Configuration <tr< th=""><th>e30bh712.12.1</th></tr<>	e30bh712.12.1
Search Solution Explorer (Ctrl+5) Solution 'TwinCAT Project149' (1 project) TwinCAT Project149 SYSTEM MOTION III PLC	P - Toggle Free Run State	
Microsoft Visi	ual Studio	e30bh713.11
Act	ivate Configuration d Configurations will be overwritter	n!)
(0)		

Ð	Microsoft Visual Studio	×	e30bh714.11
	? Restart TwinCAT System in Run Mode		
	OK Cancel		

4. Click OK.

## 4.3 Working with an Online Drive

This procedure is a use case for working with online drives.

Ensure that the proper hardware setup is in place.

#### Procedure

- 1. Scan for devices (see <u>4.1 Scanning Devices</u>).
- 2. Select the scanned device and go to the *DriveManager* tab.
- 3. Select a parameter group under Online Drive Parameters.

02 1.1kW (P1K1) 200-240 VAC (T2) Online Drive Parameters	ID	Name	Online value	Default value	Unit	Data ty A	Value	<del>.</del> .
- All Parameters	100	Configuration Mode	[0] Speed open loop	[0] Speed open loop		UNSIGI	101 High torque	55
Operation / Display	101		[1] VVC+	[1] VVC+		UNSIGI		8
1-** Load and Motor     1-** Brakes	102	Flux Motor Feedback Source		[1] 24V encoder		UNSIGI		ų
B-3-** Reference / Ramps	103	Torque Characteristics	[0] Constant torque	[0] Constant torque		UNSIGI		30bh82
B-4-** Limits / Warnings	▶ 104	Overload Mode	(0) High torque	[0] High torque		UNSIG	Not editable while motor is running	Ĝ
5-** Digital In/Out     6-** Analog In/Out	105	Local Mode Configuration	[2] As mode par 1-00	[2] As mode par 1-00		UNSIGI		Ψ
7-** Controllers	106	Clockwise Direction	[0] Normal	[0] Normal		UNSIGI	High torque [0] allows up to 160% over torque. Normal torque [1] is for oversized motors and	
- 8-** Comm. and Options	107	Motor Angle Offset Adjust	[0] Manual	(0) Manual		UNSIGI	allows up to 110% over torque.	
	110	Motor Construction	[0] Asynchron	[0] Asynchron		UNSIGI		
13- Smart Logic     14-** Special Functions	111	Motor Model	[1] Std. Asynchron	[1] Std. Asynchron		UNSIGI		
⊕- 15-** Drive Information	114	Damping Gain	140	140	%	INTEGE		
16-** Data Readouts     17-** Postion Feedback	115	Low Speed Filter Time Const.	1,00	1,00	5	UNSIGI		
H-18-** Data Readouts 2	116	High Speed Filter Time Const.	1.00	1.00	8	UNSIGI		
- 22-** Appl. Functions	117	Voltage filter time const.	0,500	0,500	5	UNSIGI		
-23-** Time-based Functions     -30-** Special Features	118	Min. Current at No Load	0	0	2,	UNSIGI		
40-** Special Features	120	Motor Power [kW]	1.10	1.10	kW	UNSIGI		
rtup List Parameters	121	Motor Power [HP]	1,48	1.48	hp	UNSIGI		
All Parameters	122	Motor Voltage	230	230	V	UNSIGI		
	123	Motor Frequency	50	50	Hz	UNSIGI		
	124	Motor Current	4.87	4.87	A	UNSIGI		
	125		1 420	1 420	RPM	UNSIGI *	r	
	4	THICKI HUITHAI SUEED	11420	11420	152.09	- Unioidi		

## 4.4 Modifying the Online Drive Parameters with Danfoss DriveManager Plug-in for TwinCAT®

Parameters under Online Drive Parameters allow interaction with an online drive in a more convenient way so that the parameters in the parameter grid show the actual values read from the drive. Parameter values of an online drive can be edited in the same way as the parameters under Startup List Parameters.

C-302 1.1kW (P1K1) 200-240 VAC (T2)	ID	Name	Online value		Default value	Unit	Data ty A	Value
Online Drive Parameters     Al Parameters	100	Configuration Mode	[0] Speed oper	n loop	[0] Speed open loop		UNSIGI	
- All Parameters     - 0-** Operation / Display	101	Motor Control Principle	[1] VVC+		[1] VVC+		UNSIGI	[0] High torque
I-** Load and Motor	102	Flux Motor Feedback Source	[1] 24V encode	er	[1] 24V encoder		UNSIGI	
⊕ 2.** Brakes	103	Torque Characteristics	101 Constant to	(Club	(0) Constant tomus		UNSIG	
3-** Reference / Ramps	▶ 104	Overload Mode	[0] High torqu	FC Edit Parameter	×		UNSIG	Not editable while motor is running
⊕ 5-** Digtal In/Out	105	Local Mode Configuration	[2] As mode p				UNSIGI	Not exclude while motor is furring
⊕ 6-** Analog In/Out	106	Clockwise Direction	[0] Normal	104: Overload Mode			UNSIGI	High torque [0] allows up to 160% over torque.
- 7-** Controllers  - 8-** Comm. and Options				101 High torque				Normal torque [1] is for oversized motors and allows up to 110% over torgue.
<ul> <li>8- Comm. and Options</li> <li>12-** Ethemet</li> </ul>	107	Motor Angle Offset Adjust	[0] Manual	[1] Normal torque			UNSIGI	allows up to 110% over torque.
13-** Smart Logic	110	Motor Construction	[0] Asynchron				UNSIGI	
⊕-14-** Special Functions	111	Motor Model	[1] Std. Aayno				UNSIG	
15-** Drive Information	114	Damping Gain	140			2	INTEGE	
<ul> <li>16-** Data Readouts</li> <li>17-** Position Feedback</li> </ul>	115	Low Speed Filter Time Const.	1,00			s	UNSIGI	
⊕ 18-** Data Readouts 2	116	High Speed Filter Time Const.	1,00			5	UNSIG	
	117	Voltage filter time const.	0,500			8	UNSIGI	
23-** Time-based Functions	118	Min. Current at No Load	0			%	UNSIGI	
⊕ 40.** Special Features	120	Motor Power IkW1	1.10			kW	UNSIGI	
Startup List Parameters	121	Motor Power [HP]	1.48			hp	UNSIGI	
All Parameters	122	Motor Voltage	230	OK	Cancel	V	UNSIG	
	123	Motor Frequency	50		50	Hz	UNSIGI	
	124	Motor Current	4,87		4,87	A	UNSIG	
	125	Motor Nominal Speed	1 420		1 420	RPM	UNSIGI *	

Illustration 10: Example of a Parameter Modification From the Online Drive

## 4.4.1 Restricted Modification

Restrictions on the modification of online drive parameters often occur in the following situations:

• The parameter is read-only.

D	Name	Online value	Default value	Unit	Data type	Value Value
001	Language	[0] English	[0] English		UNSIGNED8	
002	Motor Speed Unit	[0] RPM	[0] RPM		UNSIGNED8	{0}
003	Regional Settings	[0] International	[0] International		UNSIGNED8	Min Max
004	Operating State at Power-u	[1] Forced stop, ref=old	[1] Forced stop, ref=old		UNSIGNED8	{ 0.1,2,3,4,5,6,7 }
010	Active Set-up	[1] Set-up 1	[1] Set-up 1		UNSIGNED8	Parameter is read-only
011	Edit Set-up	[9] Active Set-up	[9] Active Set-up		UNSIGNED8	
012	This Set-up Linked to	[0] Not linked	[0] Not linked		UNSIGNED8	View the set-ups linked by means of par. 0-12 This Set-up Linked to. Linked set-ups are
013.0	Readout: Linked Set-ups	{0}	(0)		UNSIGNED16	displayed as two digits separated by a comma.
013.1	Readout: Linked Set-ups	{1}	{1}		UNSIGNED16	
013.2	Readout: Linked Set-ups	{2}	{2}		UNSIGNED16	
013.3	Readout: Linked Set-ups	{3}	{3}		UNSIGNED16	
013.4	Readout: Linked Set-ups	{4}	{4}		UNSIGNED16	
014	Readout: Edit Set-ups / Ch	AAAAAAAhex	AAAAAAAhex		INTEGER32	
015	Readout: actual setup	1	1		UNSIGNED8	
020	Display Line 1.1 Small	[1617] Speed [RPM]	[1617] Speed [RPM]		UNSIGNED16	
021	Display Line 1.2 Small	[1614] Motor current	[1614] Motor current		UNSIGNED16	
022	Display Line 1.3 Small	[37] Display Text 1	[1610] Power [kW]		UNSIGNED16	
023	Display Line 2 Large	[1613] Frequency	[1613] Frequency		UNSIGNED16	
024	Display Line 3 Large	[1602] Reference %	[1602] Reference %		UNSIGNED16	
025.0	My Personal Menu	1	1		UNSIGNED16	
025 1	My Personal Menu	20	20		UNSIGNED16	*

#### Illustration 11: Examples of Read-only Parameters with Corresponding Label Shown in the Right View

- The parameter is not editable while the motor is running. An example of such a parameter is shown in <u>Illustration 9</u>. The corresponding label is shown in the right view.
- The parameter value is not read. Parameter polling is not instant and performed starting from the top row so that if a parameter is yet to be read, its value is shown as "???????.".

D	Name	Online value	Default value	Unit	Data type
410	Motor Speed Direction	[2] Both directions	[0] Clockwise		UNSIGNED8
411	Motor Speed Low Limit [RPM]	0	0	RPM	UNSIGNED16
412	Motor Speed Low Limit [Hz]	0.0	0.0	Hz	UNSIGNED16
413	Motor Speed High Limit [RP	3 600	3 600	RPM	UNSIGNED16
414	Motor Speed High Limit [Hz]	120,0	120,0	Hz	UNSIGNED16
416	Torque Limit Motor Mode	77777777	160.0	%	UNSIGNED16
417	Torque Limit Generator Mode	77777777	100,0	*	UNSIGNED16
418	Current Limit	77777777	160.0	%	UNSIGNED32
419	Max Output Frequency	<del>777777</del> 777	132,0	Hz	UNSIGNED16
420	Torque Limit Factor Source	????????	[0] No function		UNSIGNED8
421	Speed Limit Factor Source	222222	[0] No function		UNSIGNED8
423	Brake Check Limit Factor S	77777777	[0] DC-link voltage		UNSIGNED8
424	Brake Check Limit Factor	<del>???????</del> ?	98	%	UNSIGNED8
425	Power Limit Motor Factor So	<u> </u>	[0] No function		UNSIGNED8
426	Power Limit Gener. Factor S	????????	[0] No function		UNSIGNED8
430	Motor Feedback Loss Funct	????????	[2] Trip		UNSIGNED8
431	Motor Feedback Speed Error	<u> </u>	300	RPM	UNSIGNED16
432	Motor Feedback Loss Time	????????	0,05	s	UNSIGNED16
434	Tracking Error Function	<u> </u>	[0] Disable		UNSIGNED8
435	Tracking Error	<u>,,,,,,,,,,,</u>	10	RPM	UNSIGNED16
436	Tracking Error Timeout	77777777	1.00	s	UNSIGNED16

#### Illustration 12: Example of Read and Unread Parameters in the Grid

• The parameter value cannot be read. Typically, such an issue occurs if there are network problems. A corresponding message is shown in the parameter grid indicating the exact cause for the issue.

)	Name	Online value	Default value	Unit	Data type	. 1
126	Motor Cont. Rated Torque	Ads-Error 0x712 : Server is in in	5.0	Nm	UNSIGNED32	
129	Automatic Motor Adaptation	Ads-Error 0x712 : Server is in in	[0] Off		UNSIGNED8	
130	Stator Resistance (Rs)	Ads-Error 0x712 : Server is in in	0.0384	Ohm	UNSIGNED32	
131	Rotor Resistance (Rr)	Ads-Error 0x712 : Server is in in	0,0327	Ohm	UNSIGNED32	
133	Stator Leakage Reactance	Ads-Error 0x712 : Server is in in	0,2182	Ohm	UNSIGNED32	
134	Rotor Leakage Reactance (	Ads-Error 0x712 : Server is in in	0,2618	Ohm	UNSIGNED32	
135	Main Reactance (Xh)	Ads-Error 0x712 : Server is in in	6,7628	Ohm	UNSIGNED32	
136	Iron Loss Resistance (Rfe)	Ads-Error 0x712 : Server is in in	139,894	Ohm	UNSIGNED32	
137	d-axis Inductance (Ld)	Ads-Error 0x712 : Server is in in	0.0	mH	INTEGER32	
138	q-axis Inductance (Lq)	Ads-Error 0x712 : Server is in in	0,000	mH	INTEGER32	
139	Motor Poles	Ads-Error 0x712 Server is in in	4		UNSIGNED8	
140	Back EMF at 1000 RPM	Ads-Error 0x712 : Server is in in	230	V	UNSIGNED16	
141	Motor Angle Offset	Ads-Error 0x712 : Server is in	invalid state. (Ads-Err	ror 0x712 : Serve	er is in invalid state.)	
144	d-axis Inductance Sat. (LdS	Ads-Error 0x712 : Server is in in	0,000	mH	INTEGER32	
145	q-axis Inductance Sat. (LqS	Ads-Error 0x712 : Server is in in	0.000	mH	INTEGER32	
146	Position Detection Gain	Ads-Error 0x712 : Server is in in	120	%	UNSIGNED16	
147	Torque Calibration	Ads-Error 0x712 : Server is in in	[0] Off		UNSIGNED8	
148	Inductance Sat. Point	Ads-Error 0x712 : Server is in in	35	%	INTEGER16	
149	q-axis Inductance Sat. Point	Ads-Error 0x712 : Server is in in	100	%	UNSIGNED16	
150	Motor Magnetisation at Zero	Ads-Error 0x712 : Server is in in	100	%	UNSIGNED16	
151	Min Speed Normal Magnetis	Ads-Error 0x712 : Server is in in	15	RPM	UNSIGNED16	

#### Illustration 13: Example of a Situation Where a Parameter Cannot be Read

• The parameter has a dependency. It could be that a parameter depends on the values of other parameters that have not been read yet. In this case, the cell will be highlighted in yellow, and the mouse hover will trigger a tooltip message.

)	Name	Online value	Default value	Unit	Data type	- D Valu	
300	Reference Range	[1] -Max - +Max	[1] -Max - +Max		UNSIGNED8		
301	Reference/Feedback Unit	[4] Nm	[2] RPM		UNSIGNED8	7,3	3/
302	Minimum Reference	0.0 Parameter cannot be s	tored. To solve the problem tr	y to read r	more parameters in the	grid, e.g. pi	arameters group 1-**. 🗴
303	Maximum Reference	7,397	1 500,000	RPM	INTEGER32	0,0	00 999 999,999
304	Reference Function	[0] Sum	[0] Sum		UNSIGNED8		
310.0	Preset Reference	0,00	0.00	%	INTEGER16		
310.1	Preset Reference	0.00	0.00	%	INTEGER16	The	Maximum Ref. is the highest value ainable by summing all references. The
310.2	Preset Reference	0.00	0,00	%	INTEGER16	Max	imum Ref. unit matches the choice of figuration in par. 1-00 Configuration Mode
310.3	Preset Reference	0.00	0,00	%	INTEGER16	and	the unit in par. 3-01 Reference/Feedback
310.4	Preset Reference	0.00	0.00	%	INTEGER16	Unit	
310.5	Preset Reference	0.00	0.00	%	INTEGER16		
310.6	Preset Reference	0,00	0,00	%	INTEGER16		
310.7	Preset Reference	0.00	0,00	%	INTEGER16		
311	Jog Speed [Hz]	5,0	5.0	Hz	UNSIGNED16		
312	Catch up/slow Down Value	0,00	0.00	%	INTEGER16		
313	Reference Site	[0] Linked to Hand / Auto	[0] Linked to Hand / Auto		UNSIGNED8		
314	Preset Relative Reference	0.00	0,00	%	INTEGER32		
315	Reference Resource 1	[1] Analog Input 53	[1] Analog Input 53		UNSIGNED8		
316	Reference Resource 2	[20] Digital pot.meter	[20] Digital pot.meter		UNSIGNED8		
317	Reference Resource 3	[11] Local bus reference	[11] Local bus reference		UNSIGNED8		
318	Relative Scaling Reference	. 101 No function	[0] No function		UNSIGNED8	<b>T</b>	

#### Illustration 14: Example of a Situation Where a Parameter Cannot be Stored due to Being Dependent on Other Parameters

To handle restricted parameters, manually read the parameters of the drive.

## 4.5 Use Cases for Manual Drive Identification

## 4.5.1 Drive Identified but not Created in Danfoss DriveManager Plug-in

The problem in this use case is that, even though the devices are identified and created at the scanning, they may be unvisited after saving and closing the project. This can occur if, for example, many devices are connected. In these cases, the previously unvisited devices in the solution explorer do not have the project drives created automatically the next time the project is opened.

TwinCAT Project25 @	CAT Project25 🐐 🗙								Solution Explorer • # × C	
General EtherCAT P	General EtherCAT Process Data Slots Startup CoE-Online Online Online Online Online Online Online Online Online									00000-500
		Create a	drive to	start wo	orking	with th	ne Drive Mana	ger		Search Solution Explorer (Ctrl-0)         P -           III Solution TwinGAT Project23 () project)         III Ctrl-Ctrl-Ctrl-Ctrl-Ctrl-Ctrl-Ctrl-Ctrl-
			New FC-302				ry to identify the Drive			▶         ▶ Device 1 (Beckhoff CCAT)           ■         ■ Device 2 (Beckhoff CCAT)           ■         ■ Image Info           ■         ■ Image Info           >         > Outputs           >         ■ Outputs           >         ■ Image Info           >         ■ Outputs           >         ■ Image Info           >         ■ Image Info           >         ■ Image Info           >         ■ Outputs           >         ■ Image Info           >         ■ Image Info
Name	Online	Туре	Size	>Addr	In/Out	User ID	Linked to		4	
🕫 1603. Status Word	3975	UINT	2.0	39.0	Input	0				Box 8 (FC-302 VLT   Automation Drive)
🕫 1605. Main Actu	-114	INT	2.0	41.0	Input	0				Mappings
🕶 WcState	0	BIT	0.1	1522.1	Input	0				

#### Illustration 15: Resulting View of a Device Being Previously Identified, but not Created in the Danfoss DriveManager Plug-in

### Solution

Try to identify the drive by clicking the *Try to identify the Drive* button. On a successful drive identification, the drive is created automatically as shown in <u>Illustration 16</u>. If the identification fails, a corresponding error message is shown with hints to troubleshooting.

winCAT Project25 🕫	×						*	Solution Explorer 🔹 🖣 🗙
General EtherCAT Pr	rocess Data Slots S	Rantup CoE-C	Inline Onlin	e Drive Mar	ager (V1.4	5		004 🛗 - 10-5 🖉 🏓
E FC-302 18kW (P18 Online Drive Pa	K) 200-240 VAC (T2) rameters					Drive Information		Search Solution Explorer (Ctrl+ 6) P -
All Parameter     Startup List Para		The second se	Dr	ve Series	FC-302			TwinCAT Project25
All Parameter	ers		P	ower Size	18kW (F	18K)		SYSTEM     MOTION
			PH 3 20	0-240 VAC (T2)		PLC SAFETY		
			Softwa	re version	08.34			6 C++
		1		Option A	MCA12	EtherCAT		✓ I/O ✓ ♥ Devices
				Option B	No Opti	n		<ul> <li>Device 1 (Beckhoff CCAT)</li> <li>Device 2 (EtherCAT)</li> </ul>
Option C0/E0				ion C0/E0	No Opti	n		🚼 Image
Option C1/E1			ion C1/E1	No Opti	on		<ul> <li>Image-Info</li> <li>SyncUnits</li> </ul>	
				PUD File	FC-302	P18KT2=====V0455-00.pud		<ul> <li>Inputs</li> <li>Outputs</li> </ul>
				E	dit Drive	Try to identify the Drive		<ul> <li>▶ ■ InfoData</li> <li>▲ [] Term 1 (EX100)</li> <li>▶ ■ Term 2 (Ex1008)</li> <li>▶ ■ Term 3 (Ex1352)</li> <li>▶ ■ Term 4 (Ex1208)</li> <li>▶ ■ Term 5 (Ex1424)</li> </ul>
lame	Online	Type	Size	>Addr	In/Out	User ID Linked to	*	<ul> <li>Term 6 (EK1122)</li> <li>InfoData</li> </ul>
1603. Status Word	3975	UINT	2.0	39.0		0		Box 7 (FC-302 VLT® Automation Drive)     Sox 8 (FC-302 VLT® Automation Drive)
1605. Main Actu	-118	INT	2.0	41.0		0		Mappings
WcState	0	BIT	0.1	1522.1	Input	0	-	

Illustration 16: Device Created Successfully via the Manual Drive Identification Feature

### 4.5.1.1 Identifying the Device

#### Procedure

- 1. Scan for devices.
- 2. Select the scanned device and go to the DriveManager tab.
- 3. Click the *Try to identify the Drive* button.

#### 4.5.2 The Drive is Created, but Has Been Changed Externally

The problem in this use case is that, while the project is open with previously scanned devices, some of the devices may have been changed externally. For example, a software version has been updated by VLT<sup>®</sup> Motion Control Tool MCT 10, which causes the drive information in the plug-in to stay outdated.

#### Solution

Try to identify the drive by clicking the *Try to identify the Drive* button on the drive information panel. The identification result is shown at the bottom of the panel. There are 4 possible outcomes:

- The configuration is identical. The project is up-to-date and no changes to the projects are done.
- The configuration is different.
  - The project update is possible. In such case, the *Danfoss DriveManager* updates the project to the up-to-date state. To see an example where the updated information text appears in green, refer to <u>Illustration 17</u>.
  - The project update is not possible. No changes to the project are done and an error message is shown.
- Identification has failed. No changes to the projects are done and an error message is shown.

- FC-302 18kW (P18K) 200-240 VAC (T2)		Drive Information
All Parameters     Startup List Parameters	Drive Series	FC-302
	Power Size	18kW (P18K)
	Voltage	PH 3 200-240 VAC (T2)
	Software version	08.34
	Option A	MCA124 EtherCAT
	Option B	No Option
	Option C0/E0	No Option
	Option C1/E1	No Option
	PUD File	FC-302P18KT2
	Ed	tit Drive Try to identify the Drive
	A new drive has been identified, the	project was updated

Illustration 17: Drive Information has been Successfully Identified and Updated

<u>Danfoss</u>

## Index

## Index

A	Р
Activate configuration16	Preconditions
Active solution platform9	
Additional resources	Q
Apply startup list to PLC16	Qualified personnel3
C	
Color code15	S
	Scanning9
E	Startup list13
ESI files	Т
	Target system9
L	
Limitations of the Danfoss DriveManager4	U
Ν	User interface7
N	
New project9	
0	
Online drive	



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