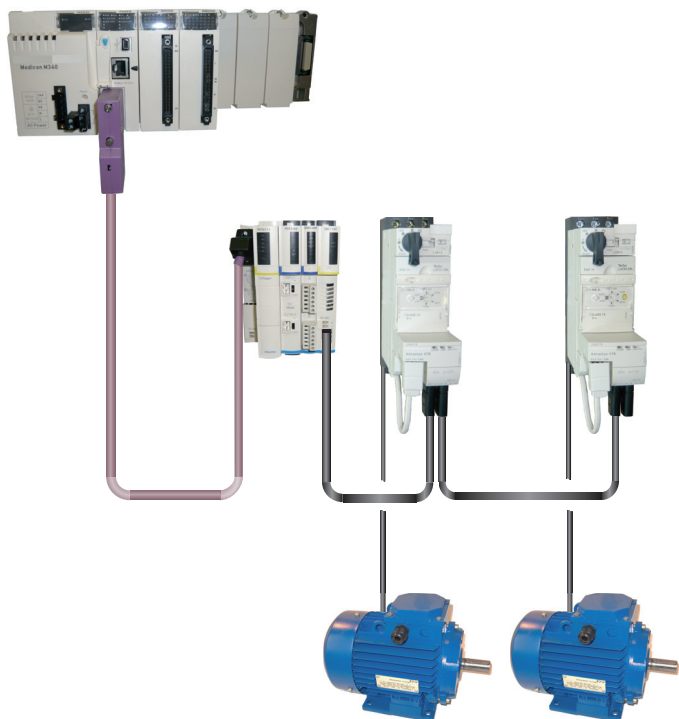


# TeSys U Advantys STB

## Quick Start Guide

12/2009



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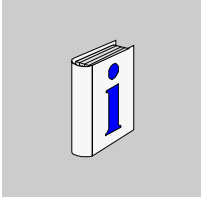
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## About the Book

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### At a Glance

#### Document Scope

The Quick Start Guide uses an application example to describe the different steps to quickly install, configure, and control TeSys U motor starters. With this Quick Start Guide, you can easily set up an Advantys STB communication network, provided that you have a basic knowledge in PLCs and application software (Advantys, Unity Pro). You do not need any other document to perform this task.

For more details about other capabilities of TeSys U motor starters, consult the related documents listed below.

#### Validity Note

The information described in this Quick Start Guide is valid for the hardware and software used in the application example provided. The same procedures can be used with different versions of the hardware and software given provided that compatible versions are used.

#### Related Documents

Title of Documentation	Reference Number
TeSys U LULC15 Advantys STB Communication Module - User's Manual	1744083
TeSys U Communication Variables - User's Manual	1744082
LUB/LUS TeSys U Starters - Instruction Sheet	1629984
TeSys DFB Offer V2 for Unity Pro - User Manual	1672609
Advantys STB Standard CANopen Network Interface Module - Applications Guide	31003684

You can download these technical publications and other technical information from our website at [www.schneider-electric.com](http://www.schneider-electric.com).

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# Introduction

# 1

## What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Presentation of the Application	5
The Schneider Electric Solution with Tesys U Motor Starter	6

## Presentation of the Application

### Introduction

The application example helps you to define Direct On Line (D.O.L.) motor starters step by step, in order to:

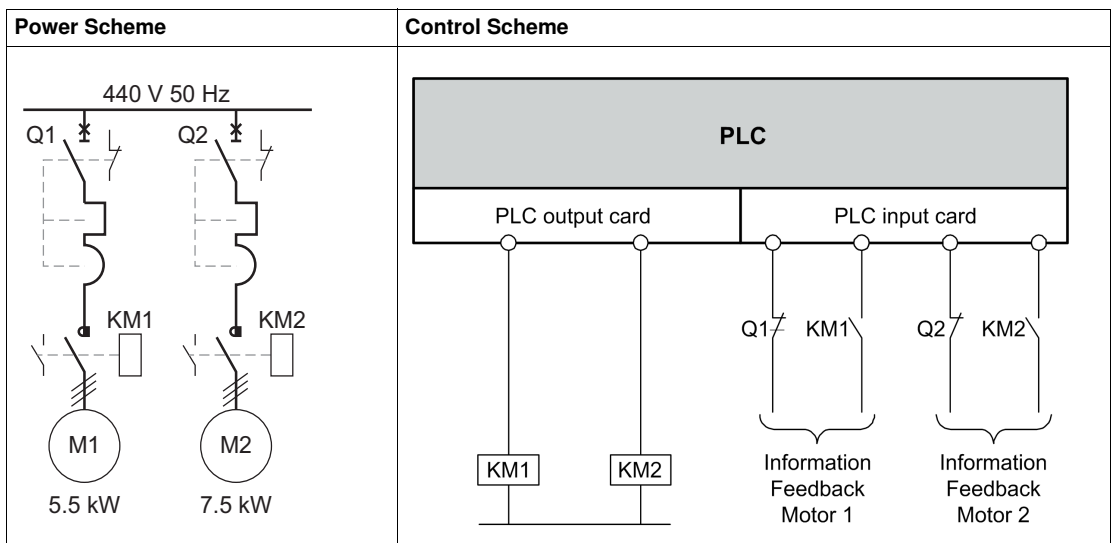
- provide thermal magnetic protection,
- control the motor, and
- obtain contactor feedback and circuit breaker trip feedback.

### Description of the Application

- Motor 1 (M1):  
3-phase motor, class 10, 5.5 kW (7.5 hp) at 440 V, 50 Hz, rated current  $I_n = 10.5$  A, D.O.L.
- Motor 2 (M2):  
3-phase motor, class 20, 7.5 kW (10 hp) at 440 V, 50 Hz, rated current  $I_n = 14.7$  A, D.O.L. with remote monitoring of motor load.

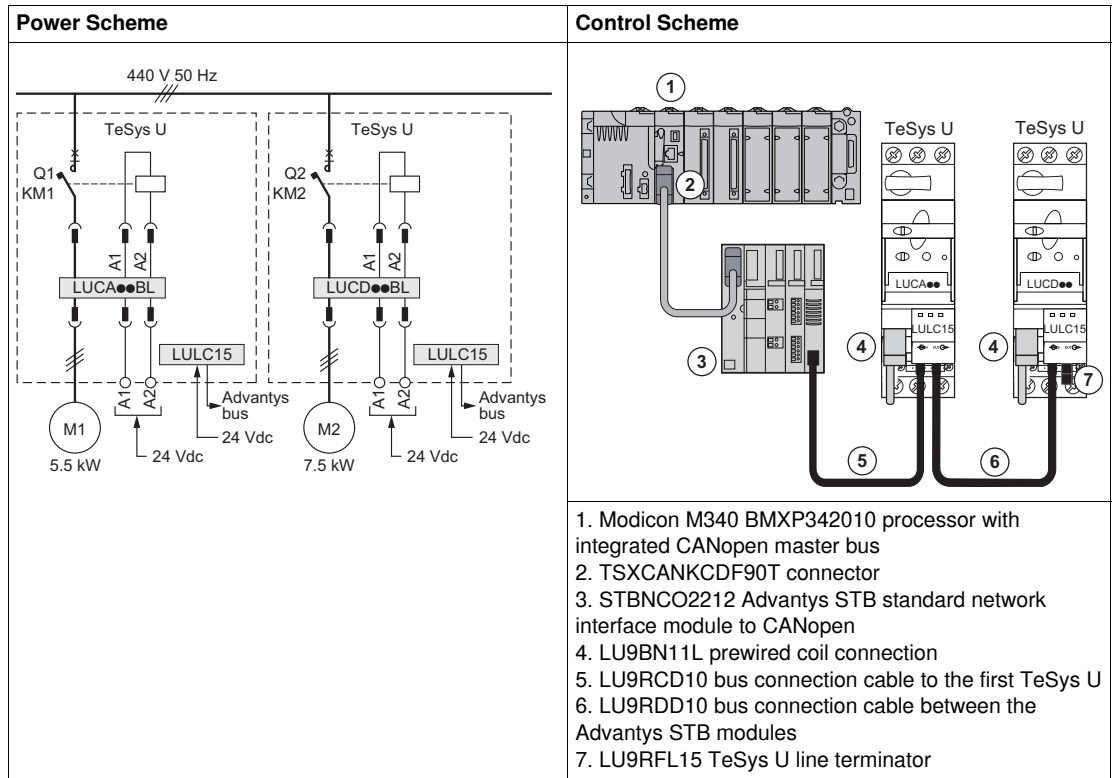
### Traditional Solution

The scheme below shows wiring in the traditional solution: all control and feedback information is wired through a PLC.



## The Schneider Electric Solution with Tesys U Motor Starter

### Power and Control Schemes in the Schneider Electric Solution



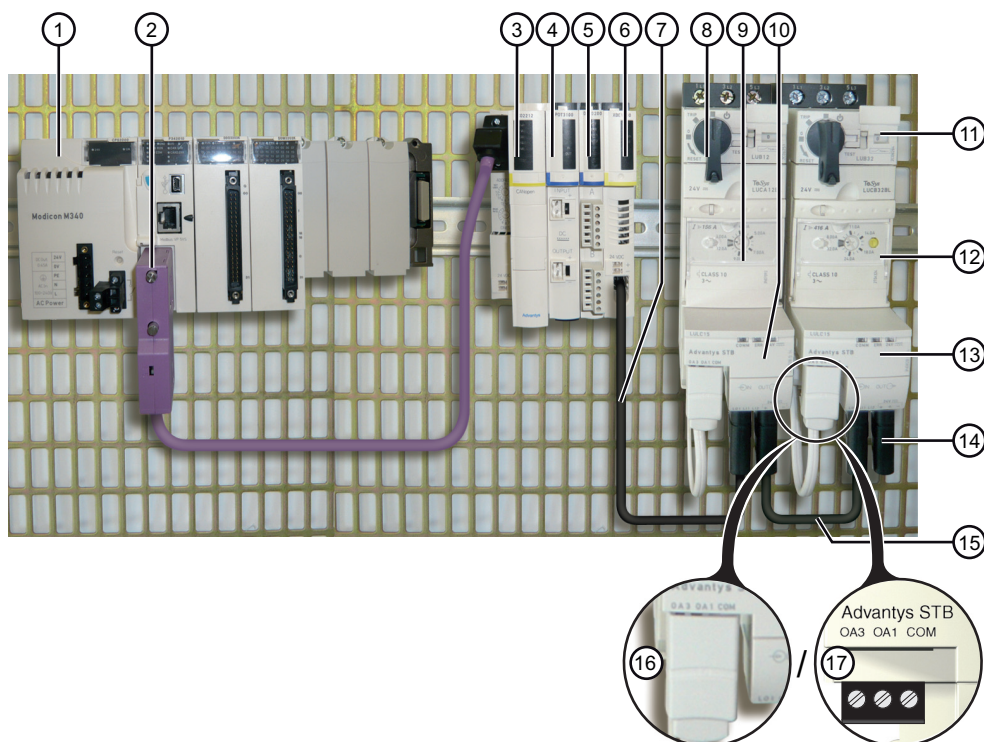
### Control Units Used in the Schneider Electric Solution

The Schneider Electric solution presented in this Quick Start Guide uses TeSys U to meet different client needs.

- LUCA12BL is a standard control unit used with motor 1 for basic needs:
  - control a motor remotely (start/stop)
  - provide status information (ready, running, fault condition)
- LUCD18BL is an advanced control unit used with motor 2 for advanced needs, in addition to the standard ones:
  - warning
  - automatic and remote reset via the bus
  - indication of the motor load
  - differentiation of faults

## Architecture of the TeSys U System

The following architecture presents the main components of the TeSys U system mounted on a plate:



Legend	Commercial Reference	Description
1	Modicon M340	Programmable Logic Controller (PLC)
STB island comprising the following components:		
2	TSXCANKCDF90T	CANopen right angle SUB-D9 connector in ON position
3	STBNCO2212	Network Interface Module (NIM) with CANopen bus
4	STBPDT3100	Power distribution module STB for 24 V
5	STBDDO3200	Digital output module
6	STBXBE1100	End of segment (EOS) extension module
7	LU9RCD10	Bus connection cable, elbowed/straight, with one island bus extension cable connector at each end, providing bus signals and internal power supply, enabling connection of the first TeSys U communication module (maximum 1 m (39.4 in.) to be cut according to the network size)
8	LUB12	TeSys U power base
9	LUCA12BL	Standard control unit
10, 13	LULC15	Advantys STB communication module
11	LUB32	TeSys U power base
12	LUCD18BL	Advanced control unit
14	LU9RFL15	TeSys U line end adapter
15	LU9RDD10	Bus connection cable, straight/straight, with one island bus extension cable connector at each end, providing bus signals and internal power supply, enabling connections between LULC15 communication modules (maximum 1 m (39.4 in.) to be cut according to the network size)
16	LU9BN11L	Prewired coil connection (optional), or
17	Standard connection supplied with LULC15	Plug-in terminal block, for wire-to-wire control of A1/A2 terminals

## Software Tools

The following software tools must be used to set the applications. Their use requires a basic knowledge.

Commercial Reference	Freeware	Description
STB SPU 1000	–	Advantys V2.5 configuration software for the Advantys STB distributed I/O system.
UNY SPU EFM CD40	–	Unity Pro Extra Large V4.0 programming software for M340 PLC.
–	<i>STBNCO2212_0301E.eds</i> file	Electronic data sheet (EDS) file used by the Unity Pro XL configuration software to handle the devices properly. Download the .eds file from the <a href="http://www.schneider-electric.com">www.schneider-electric.com</a> website.
–	DFB library, including Ctrl_cmd_u	TeSys U cyclic control/command. Download the TeSys U DFB library from the <a href="http://www.schneider-electric.com">www.schneider-electric.com</a> website.

## Fieldbus Network

**Protocol:** CANopen

**Baud Rate:** 500 kbps

### Fallback Strategy Configuration for the TeSys U on the STB Sub-network

In case of a communication loss with the PLC, the fallback strategy offers the possibility to operate a motor in different ways. Set parameter 682 to one of the following values:

Value	Fallback Mode	Description
0	Disabled	No strategy is applied. This is not recommended.
1	Frozen	On detection of a communication loss, the motor will keep its status: <ul style="list-style-type: none"> <li>● If running, the motor will keep running.</li> <li>● If stopped, the motor will remain stopped.</li> </ul> No change in control status is authorized. A new control will be considered only after a communication loss reset (703.3).
2	Forced stop (default value)	The motor is forced to stop. Output OA1 = 0 Output OA3 = 0
3	Unchanged	Changes in control status are authorized. A new control will be considered even before a communication loss reset (703.3).
4	Forced to run forward	Output OA1 = 1 (direct) Output OA3 = 0
5	Forced to run reverse	Output OA1 = 0 Output OA3 = 1 (reversing)

The fallback strategy adapted to the application is:

- Value 1 = Frozen for motor 1
- Value 2 = Forced stop for motor 2



# Setting Up TeSys U

# 2

## What's in this Chapter?

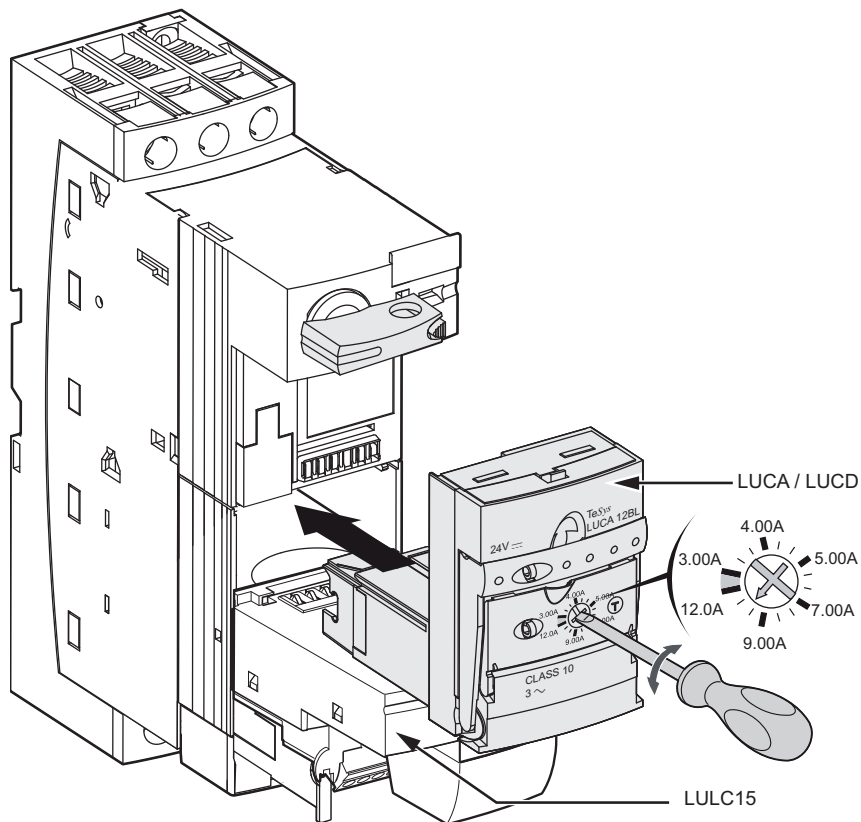
This chapter contains the following topics:

Topic	Page
LUCA12BL and LUCD18BL Settings	9
LULC15 Connectors, Baud Rate and Address Settings	10

## LUCA12BL and LUCD18BL Settings

### Setting Current on the Control Units

The figure below shows how to set current on the control unit using a screwdriver (LUCA12BL here):



### Current Setting Values

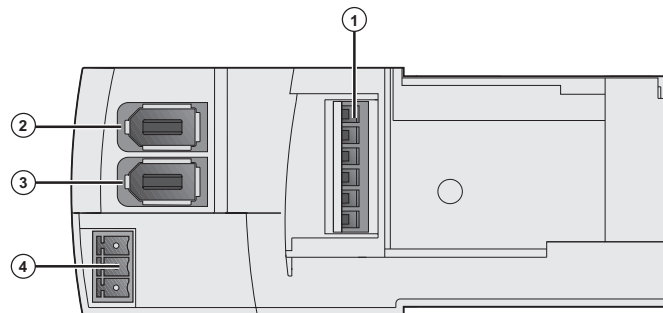
The table below shows the settings for LUCA12BL (Standard Control Unit) and LUCD18BL (Advanced Control Unit):

Control Unit	Motor	Current Setting Range	Motor Nominal Power	Current Setting Value = Motor Rated Current
LUCA12BL	M1	3...12 A	5.5 kW (7.5 hp)	10.5 A
LUCD18BL	M2	4.4...18 A	7.5 kW (10 hp)	14.7 A

## LULC15 Connectors, Baud Rate and Address Settings

### Presentation

The connectors under the LULC15 communication module are as follows:



- 1 Input/Output terminal blocks and 24 Vdc
- 2 Bus OUT (logic output 1)
- 3 Bus IN (logic inputs 1 and 2)
- 4 COM, OA1, OA3 outputs

### Baud Rate and Address Settings

Communication parameters, including address and baud rate settings, of the LULC15 communication module are automatically defined.

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# Setting Up Communication Network to a PLC

# 3

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## Introduction

This chapter describes step by step how to set communication to a PLC.

The following 2 software tools are needed to set communication to a Modicon M340:

- Advantys
- Unity Pro

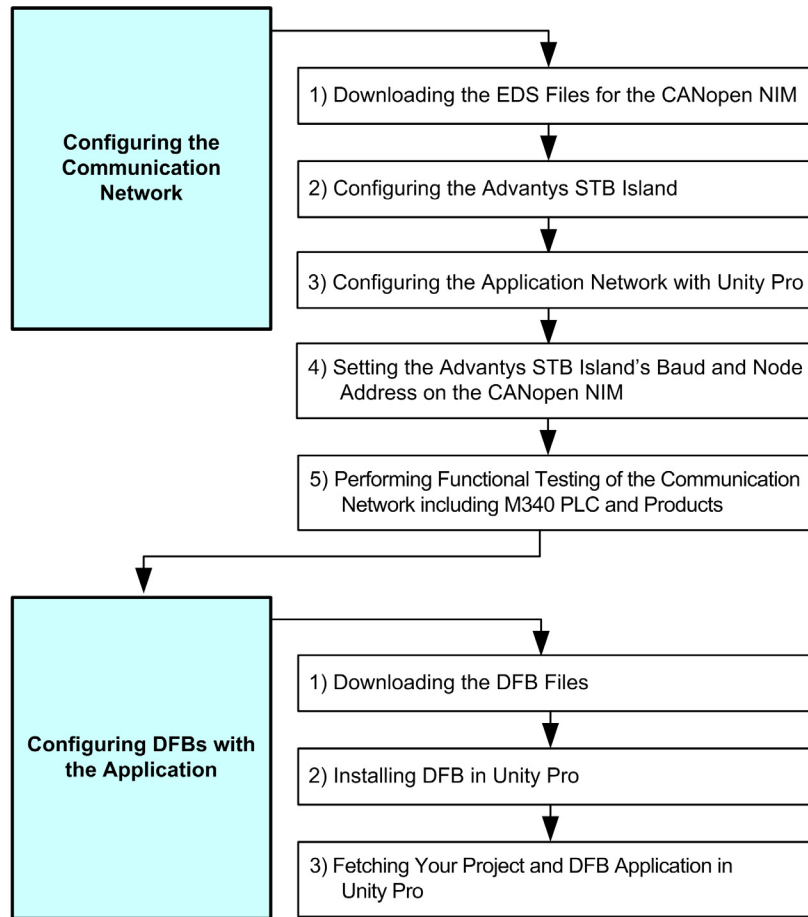
## What's in this Chapter?

This chapter contains the following topics:

Topic	Page
3.1 Configuring TeSys U on the Advantys STB Network with Advantys and Unity Pro	12
3.2. Configuring DFBs with the Application	17


### 3.1 Configuring TeSys U on the Advantys STB Network with Advantys and Unity Pro

#### Configuration Process



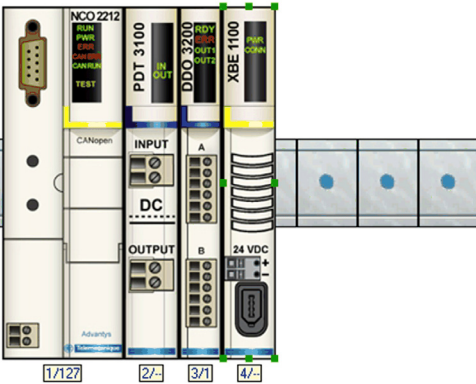
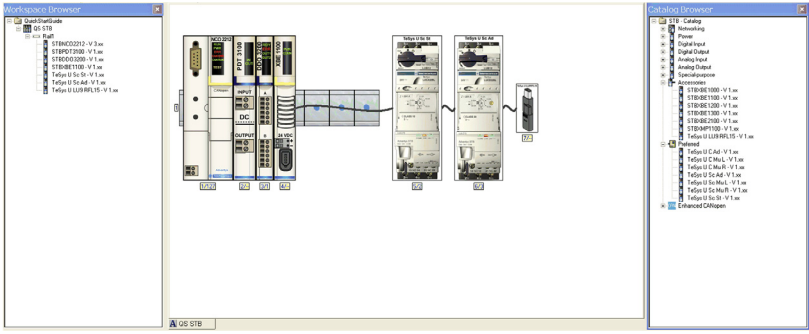
#### 1) Downloading and Installing the EDS Files

The relevant EDS files must be present in Unity. The following table describes the steps to follow to download and install the EDS and icon files associated with TeSys U from the [www.schneider-electric.com](http://www.schneider-electric.com) website, if needed:

Step	Action
1	Open the Schneider Electric website: <a href="http://www.schneider-electric.com">www.schneider-electric.com</a> .
2	Type <i>Advantys STB</i> in the Search field.
3	In the <b>Product Ranges</b> section, click <b>Advantys STB</b> .
4	Click the <b>Downloads</b> tab, and then <b>Software/Firmware</b> .
5	Select <b>STBNCO2212 CANopen .eds and .dib Files 2/8/06</b> and download the <i>stbnco2212_canopen_eds_1_2006.zip</i> file.
6	Extract the <i>stbnco2212_canopen_eds_1_2006.zip</i> file to your hard disk. It contains the <i>STBNCO2212_0301E.eds</i> file.
7	From the  <b>start</b> button, point to the <b>All Programs</b> menu, and browse to <b>Schneider Electric</b> → <b>Unity Pro</b> → <b>Hardware catalog manager</b> .
8	In the <b>Hardware Catalog Manager</b> window, select <b>Edit</b> → <b>Add</b> .
9	In the window that opens, browse to and then select the <i>STBNCO2212_0301E.eds</i> file.
10	Confirm by clicking <b>Open</b> .
11	In the <b>Device Profile</b> window, check that <b>Distributed I/Os</b> is selected in the <b>Family</b> field, and then confirm by clicking <b>OK</b> . <b>Result:</b> The device appears in the <b>Hardware Catalog Manager</b> window.
12	In the <b>Hardware Catalog Manager</b> window, click the <b>Build Catalog</b> button, and then click <b>Close</b> .

## 2) Configuring the STB Island with Advantys Software

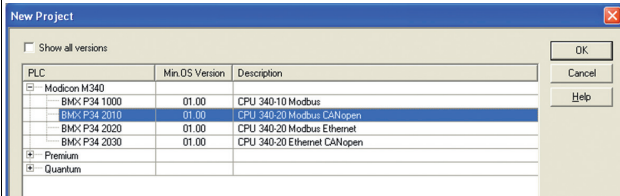
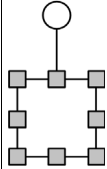
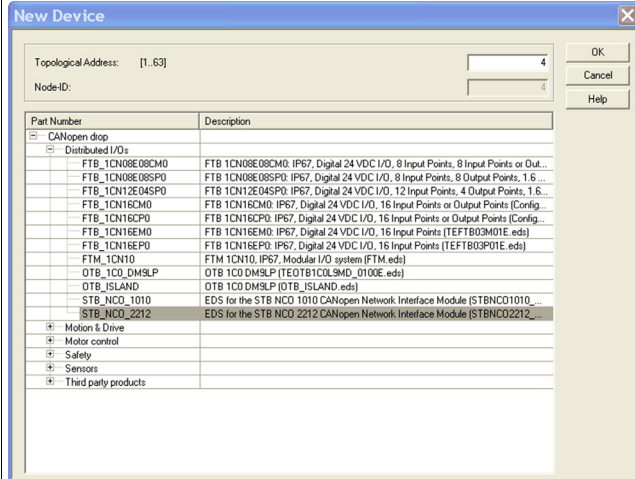
The part of the configuration process with **Advantys** software is described below:

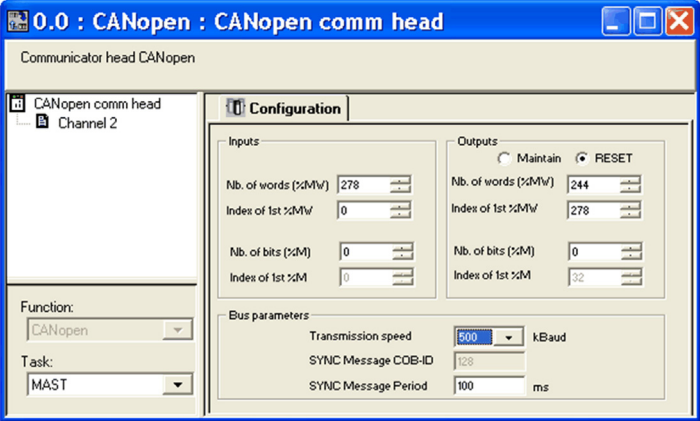
Step	Action
1	Start <b>Advantys V2.5</b> software.
2	Click the <b>STB</b> icon and then choose your language.
3	From the <b>File</b> menu, create a new workspace including an island file.
4	Check the island is unlocked: the key icon in the toolbar must not be selected.
5	<p>Configure the STB island from the modules available in the <b>STB - Catalog</b> folder in the <b>Catalog Browser</b>.</p> <p>Select and then double-click the following modules in order:</p> <ul style="list-style-type: none"> <li>● <b>Networking</b> → <b>STBNCO2212 - V3.xx</b> for the network interface module (NIM)</li> <li>● <b>Power</b> → <b>STBPDT3100 - V1.xx</b> for the power distribution module (PDM)</li> <li>● <b>Digital Output</b> → <b>STBDDO3200 - V1.xx</b> for the Advantys I/O module</li> <li>● <b>Accessories</b> → <b>STBXBE1100 - V1.xx</b> for the end of segment (EOS), given that a TeSys U device is the last module on the island bus.</li> </ul> <p><b>Result:</b> The selected modules are displayed in the island editor.</p> 
	<p><b>NOTE:</b> If the modules of your application are not available in the hardware catalog, update the catalog as follows:</p> <ul style="list-style-type: none"> <li>● Open the Schneider Electric website: <a href="http://www.schneider-electric.com">www.schneider-electric.com</a>.</li> <li>● Type <i>Advantys Database Update</i> in the Search field.</li> <li>● In the <b>Software</b> section, click <b>Advantys Database Update V 2.53 for Configuration Software</b>.</li> <li>● Download the file <i>advantys_csw_2501_database_update_253_english.exe</i>.</li> <li>● Double-click on <i>advantys_csw_2501_database_update_253_english.exe</i>.</li> <li>● Follow the procedure to install the file.</li> <li>● From <b>Advantys</b> software, select the menu command <b>Options</b> → <b>Settings</b>.</li> <li>● Under <b>Path settings</b>, set the path of <b>EDS files import</b> by browsing your hard disk to the folder in which you installed the <i>.exe</i> file.</li> <li>● Click <b>OK</b> to close the <b>Settings</b> dialog window.</li> </ul>
6	<p>Add the 2 TeSys U systems in the following order by selecting and then double-clicking the label:</p> <ul style="list-style-type: none"> <li>● <b>Preferred</b> → <b>TeSys U Sc St - V1.xx</b> for the standard TeSys U</li> <li>● <b>Preferred</b> → <b>TeSys U Sc Ad - V1.xx</b> for the advanced TeSys U</li> </ul> <p><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>● The letters <b>Sc</b> stand for <b>Starter-Controller</b>.</li> <li>● The letters <b>St</b> and <b>Ad</b> stand for <b>Standard</b> and <b>Advanced</b> control unit, respectively.</li> </ul>
7	<p>Add the termination device by selecting <b>Accessories</b> → <b>TeSys U LU9RFL15 - V1.xx</b>, and then double-clicking the line end adapter's name.</p> 

Step	Action
8	Double-click each TeSys U picture in order. In the configuration dialog which appears, configure the communication loss fallback strategy: expand the <b>Setting</b> list in the <b>Parameters</b> tab, and then select <b>Fallback Strategy (682)</b> . Under <b>Configured Value</b> : <ul style="list-style-type: none"> <li>For <b>TeSys U Sc St</b>, set the communication loss fallback strategy to <b>Frozen</b> in the drop-down list, and then confirm by clicking <b>OK</b>.</li> <li>For <b>TeSys U Sc Ad</b>, keep the default communication loss fallback strategy: <b>Forced Stop</b>.</li> </ul>
9	Save the application and then click the <b>Build</b> icon. <b>Result:</b> The log window should display the following message: "Build completed successfully"
10	Select <b>File</b> → <b>Export [project name]</b> and export your project as a <b>.dcfile</b> .
11	Save the application again, and then exit Advantys software.

### 3) Configuring the Application Network with Unity Pro XL Software

Continue the configuration process with **Unity Pro XL** software, as described below:

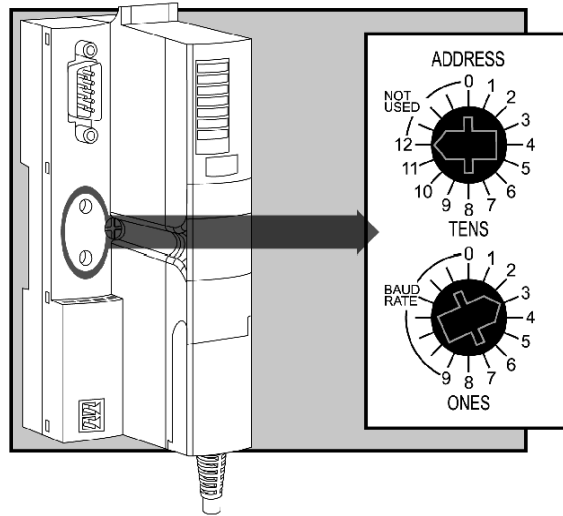
Step	Action
1	Start <b>Unity Pro XL V4.0</b> software.
2	Configure the processor of Modicon M340 PLC: <ul style="list-style-type: none"> <li>From the <b>File</b> menu, create a new project.</li> <li>In the <b>New Project</b> window, expand the Modicon M340 list and select <b>BMX P34 2010 (CPU 340-20 Modbus CANopen)</b>.</li> </ul>  <ul style="list-style-type: none"> <li>Confirm by clicking <b>OK</b>.</li> </ul>
3	From the <b>Structural view</b> of the <b>Project Browser</b> , select <b>Configuration</b> → <b>3 : CANopen</b> .
4	In the <b>CANopen</b> tab, double-click the device:  <p>A <b>New Device</b> dialog window opens.</p>
5	In the <b>New Device</b> window, set the configuration of the CANopen network interface module (NIM) as follows: <ul style="list-style-type: none"> <li>Select <b>CANopen drop</b> → <b>Distributed I/Os</b> → <b>STB_NCO_2212</b></li> <li><b>NOTE:</b> If the network interface module of the application does not appear in the Distributed I/Os list, you must download and install the relevant <b>.eds</b> files (see page 12).</li> <li>Set the <b>Topological Address</b> to <b>4</b>.</li> <li>Confirm by clicking <b>OK</b>.</li> </ul> 

Step	Action
6	From the <b>Structural view</b> of the <b>Project Browser</b> , select <b>Configuration</b> → <b>3 : CANopen</b> → <b>4 : CANopen drop</b> → <b>0.0 : STB_NCO_2212</b> , and double-click on the name of the network interface module (NIM). The <b>STB_NCO_2212</b> screen opens in a new tab.
7	In the <b>PDO</b> tab, mask the empty PDOs, then click the <b>Import DCF...</b> button, and then browse to the <b>.dcf</b> file you exported when configuring the application in Advantys. <b>Result:</b> The PDOs display on screen with the related topological addresses. <b>NOTE:</b> Refer to the user's manuals <i>TeSys U LULC15 Advantys STB Communication Module</i> and <i>TeSys U Communication Variables</i> for details on how to name the topological addresses in such a way to avoid programming with names which do not provide any information of the contents of the memory location. For example: in the application, the following symbols are used for programming the DFB of Motor 1 (standard TeSys U): <ul style="list-style-type: none"> <li>• Input data map:                             <ul style="list-style-type: none"> <li>• PDO4: symbol reg_455_M1 instead of %IW3.4\0.0.0.96</li> </ul> </li> <li>• Output data map:                             <ul style="list-style-type: none"> <li>• PDO3: symbol reg_704_M1 instead of %QW3.4\0.0.0.96</li> <li>• PDO3: symbol reg_703_M1 instead of %QW3.4\0.0.0.97</li> </ul> </li> </ul>
8	From the <b>Structural view</b> of the <b>Project Browser</b> , select <b>Configuration</b> → <b>0 : PLC bus</b> → <b>0 : BMX XBP 0800</b> → <b>0 : BMX P34 2010</b> → <b>CANopen</b> . The <b>CANopen communicator head</b> screen opens in a new tab.
9	Select <b>Build</b> → <b>Rebuild All Project</b> . <b>NOTE:</b> A message appears in the <b>Rebuild All Project</b> area concerning the IN/OUT number of words and bits reserved. Return to the <b>CANopen communicator head</b> screen and enter the values as indicated in the message. Configure the options according to the application example:  <ul style="list-style-type: none"> <li>• Set the transmission speed to <b>500</b> kBaud.</li> <li>• <b>Nb. of words (%MW)</b> must be <b>278</b> for inputs and <b>244</b> for outputs.</li> <li>• <b>Index of 1st %MW</b> must be <b>0</b> for inputs and <b>278</b> for outputs.</li> <li>• <b>Nb. of bits (%M)</b> must be <b>0</b> for inputs and outputs.</li> </ul>
10	Select <b>Edit</b> → <b>Validate</b> to validate the configuration.
11	Select <b>Build</b> → <b>Rebuild All Project</b> to rebuild the project. When the values are correct, the NOT BUILT state changes to BUILT.
12	Save the application with a specific name, and then exit Unity software.

**4) Setting the Advantys STB Island's Baud Rate and Node Address**

The rotary switches on the STBNCO2212 CANopen NIM are used to set the Advantys STB island's node address and baud rate.

The 2 rotary switches are located on the front of the CANopen NIM, below the fieldbus connection port. Each switch has 16 positions.



Proceed as follows to set the Advantys STB island's baud, and then the node address:

Step	Action
1	Set the baud rate of the Advantys STB island to 500 kBaud by turning the rotary switches on the STBNCO2212 CANopen NIM in order: <ul style="list-style-type: none"> <li>● Set the lower switch (BAUD RATE) to any unmarked position</li> <li>● Set the upper switch (TENS) to the selected baud: <b>5</b></li> </ul>
2	Power up the island to enable the NIM to read the baud settings.
3	Power off the island.
4	Set the node address of the Advantys STB island to 4 by turning the rotary switches on the STBNCO2212 CANopen NIM: <ul style="list-style-type: none"> <li>● Set the lower switch (ONES) to <b>4</b></li> <li>● Set the upper switch (TENS) to <b>0</b></li> </ul>
5	Power up the island to enable the NIM to read the address settings.

**5) Performing Functional Testing of the Communication Network Including M340 PLC and Products**

Step	Action
1	Connect a cable from the CANopen island to the M340 PLC.
2	Via the USB port on your PC, connect a cable (e.g. TSXPCX3030) to the M340 PLC.
3	Power up the M340 PLC.
4	Click <b>Connect</b> in Unity Pro XL software.
5	Click the <b>PLC</b> menu: the <b>Transfer Project to PLC</b> window opens. Click the <b>Transfer</b> button.
6	Power up the 2 TeSys U systems: the green COM LED on the LULC15 front face blinks, and then remains constant. Communication is working correctly.



## 3.2. Configuring DFBs with the Application

### Presentation

The TeSys DFB (Derived Function Block) offer has been developed to simplify and optimize the integration of TeSys U starter-controllers in PLC applications.

The Ctrl\_cmd\_u DFB is dedicated to the control and command of a single TeSys U starter-controller (up to 32 A/15 kW or 20 hp) through cyclic data exchanges on a CANopen network.

The steps for configuring DFB are as follows:

1. Downloading the DFB Files
2. Installing DFB in Unity Pro
3. Fetching Your Project and DFB Application in Unity Pro

For more information, see the *TeSys DFB Offer V2 for Unity Pro User Manual*.

#### 1) Downloading the DFB Files

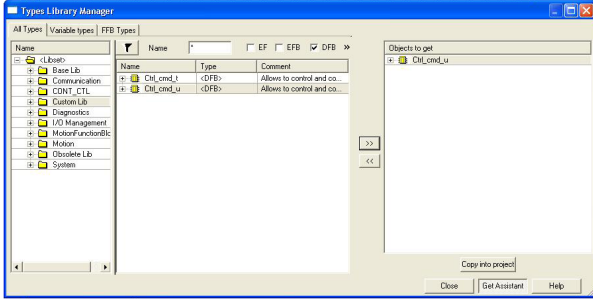

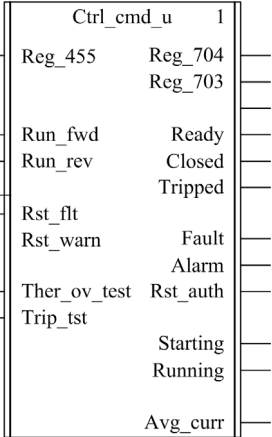
The following table describes the steps to follow to download the TeSys DFB offer from the [www.schneider-electric.com](http://www.schneider-electric.com) website:

Step	Action
1	Open the Schneider Electric website: <a href="http://www.schneider-electric.com">www.schneider-electric.com</a>
2	Type <i>TeSys U</i> in the Search field.
3	In the <b>Product Ranges</b> section, click <b>TeSys U</b> .
4	Click the <b>Downloads</b> tab, and then <b>Software/Firmware</b> .
5	Select <b>TeSys DFB Library for UnityPro</b> and download the <i>.zip</i> file to your hard disk.

#### 2) Installing DFB in Unity Pro

Step	Action
1	Extract the <i>tesys library for unitypro-1.0.2.zip</i> file content to your hard disk, and then double-click the <i>Setup.exe</i> file.
2	Choose a language for installation.
3	In the Installation Wizard for TeSys Library, click <b>Next</b> 5 times.
4	Accept the terms in the license agreement, and then click <b>Next</b> .
5	Enter your customer information, and then click <b>Next</b> twice.
6	Select one or several languages for the application, including a default language, and then click <b>Next</b> .
7	Click <b>Install</b> to begin the installation.
8	In the window that opens, select the version of the Unity Pro library and the family to install.
9	A dialog window appears, with the following message: "The Installation Wizard has successfully installed TeSys Library". Then exit the installation wizard.

### 3) Fetching Your Project and DFB Application in Unity Pro

Step	Action
1	Start Unity Pro software.
2	From the <b>Tools</b> menu, select <b>Type Library Manager</b> sub-menu. Click on the <b>Access Assistant</b> button. Select the <b>Ctrl_cmd_u</b> folder and move it to the right-hand area entitled <b>Objects to get</b> :  Click on <b>Copy into project</b> .
3	Right-click in the section window, and then select <b>FFB Input Assistant....</b> An empty <b>Function Input Assistant</b> dialog box opens.
4	Select the following icon next to the <b>FFB type</b> field: 
5	In the <b>Function Input Assistant: FFB Selection</b> dialog box, browse to obtain the <b>Ctrl_cmd_u</b> DFB.
6	Select <b>Ctrl_cmd_u</b> , and then confirm with <b>OK</b> .
7	Click anywhere in the section window: the DFB graphical representation is displayed. 

#### Input Characteristics

The following table describes the DFB inputs and their availability according to the control unit:

Input	Type	Range	Default Value	Description	LUCA	LUCD
Reg_455	INT	0...65535	0	To link to register 455 of cyclic data inputs	√	√
Run_fwd	EBOOL	0...1	0	Motor run forward command	√	√
Run_rev	EBOOL	0...1	0	Motor run reverse command	√	√
Rstflt	EBOOL	0...1	0	Reset fault (in case of a communication module internal fault, Reset fault resets the communication module to factory settings)	√	√
Rst_warn	EBOOL	0...1	0	Reset warning (for example, communication loss)	√	√
Ther_ov_test	EBOOL	0...1	0	Automatic thermal overload fault test		
Trip_tst	EBOOL	0...1	0	Overcurrent trip test via communication bus		

### Output Characteristics

The following table describes the DFB outputs and their availability according to the control unit:

Output	Type	Range	Default Value	Description	LUCA	LUCD
Reg_704	INT	0...65535	0	To link to register 704 of cyclic data outputs	√	√
Reg_703	INT	0...65535	0	To link to register 703 of cyclic data outputs	√	√
Ready	EBOOL	0...1	0	System ready: the rotary handle is turned to the On position and no faults detected	√	√
Closed	EBOOL	0...1	0	Pole status: closed	√	√
Tripped	EBOOL	0...1	0	System tripped: the rotary handle is turned to Trip position	√	√
Fault	EBOOL	0...1	0	All faults	√	√
Alarm	EBOOL	0...1	0	All warnings	√	√
Rst_auth	EBOOL	0...1	0	Fault reset authorized		√
Starting	EBOOL	0...1	0	Start-up in progress: 1 = ascending current is greater than 10 % FLA 0 = descending current is lower than 150 % FLA		√
Running	EBOOL	0...1	0	Motor running with detection of current, if greater than 10 % FLA		√
Avg_curr	INT	0...200	0	Average motor current (% FLA)		√

### Programming DFB 1 for Motor 1

Step	Action
1	Name the PLC registers (%IW..., %QW...) corresponding to TeSys U registers (455, 703, and 704). <b>For node 1 (TeSys U_Sc_St):</b> <ul style="list-style-type: none"> <li>● Reg_455_M1: %IW\3.4\0.0.0.96</li> <li>● Reg_704_M1: %QW\3.4\0.0.0.96</li> <li>● Reg_703_M1: %QW\3.4\0.0.0.97</li> </ul>
2	Link the Run_fw DFB1 input to the motor 1 start condition.
3	Link the DFB 1 outputs to PLC variables for use in the program: <ul style="list-style-type: none"> <li>● Closed DFB 1 output = position of the KM1 contactor</li> <li>● Tripped DFB 1 output = tripped position of the Q1 TeSys U</li> </ul>
4	<p>Check that the DFB 1 for Motor 1 displays as follows:</p> <p><b>1</b> Not applicable <b>2</b> Applicable but not used; can be managed by the PLC application</p>

**Programming DFB 2 for Motor 2**

Step	Action
1	Name the PLC registers (%IW..., %QW...) corresponding to TeSys U registers (455, 703, and 704) <b>For node 2</b> (TeSys U_Sc_Ad): <ul style="list-style-type: none"> <li>● Reg_455_M2: %IW3.4\0.0.0.98</li> <li>● Reg_704_M2: %QW3.4\0.0.0.99</li> <li>● Reg_703_M2: %QW3.4\0.0.0.100</li> </ul>
2	Link the Run_fw DFB 2 input to the motor 2 start condition.
3	Link the DFB 2 outputs to PLC variables for use in the program: <ul style="list-style-type: none"> <li>● Closed DFB 2 output = position of the KM2 contactor</li> <li>● Tripped DFB 2 output = tripped position of the Q2 TeSys U</li> </ul>
4	Link the Avg_curr DFB 2 output to a PLC register for use of motor 2 average current in the program.
5	<p>Check that the DFB 2 for Motor 2 displays as follows:</p> <p>1 Not applicable            2 Applicable but not used; can be managed by the PLC application</p>