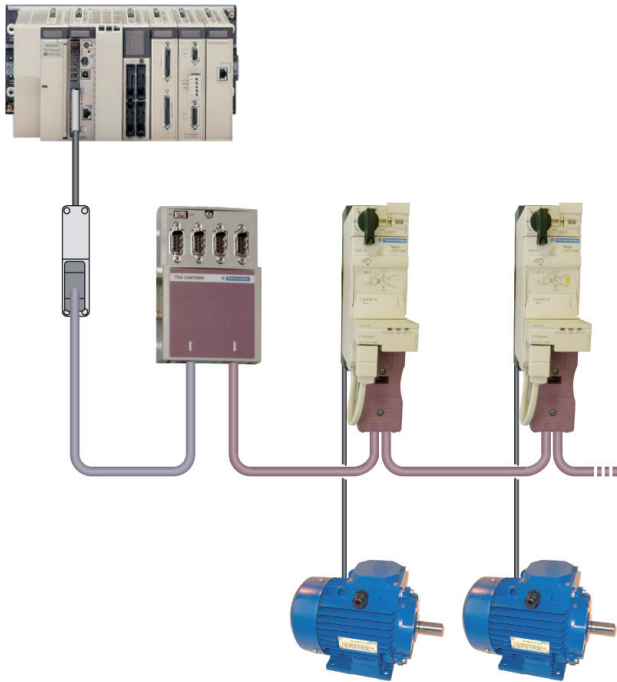


TeSys U CANopen

Quick Start Guide

01/2009



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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

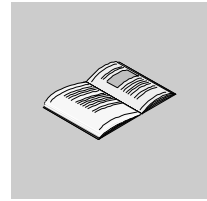
When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

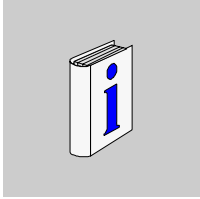
Failure to observe this information can result in injury or equipment damage.

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About the Book

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 a CANopen communication network, provided that you have a basic knowledge in PLCs and application software (Unity Pro, Sycon, ...). 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.

Related Documents

Title of Documentation	Reference Number
LULC08 CANopen Communication Module - User's Manual	1744084
TeSys U Communication Variables - User's Manual	1744082
LUB/LUS TeSys U Starters - Instruction Sheet	1629984
LUCA/LUCB/LUCC/LUCD Control Units - Instruction Sheet	AAV40503
CANopen Hardware Setup Manual	35010857
TeSys DFB Offer - User Manual	1672600

You can download these technical publications and other technical information from our website at www.schneider-electric.com.

User Comments

We welcome your comments about this document. You can reach us by e-mail at techcom@schneider-electric.com.

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:

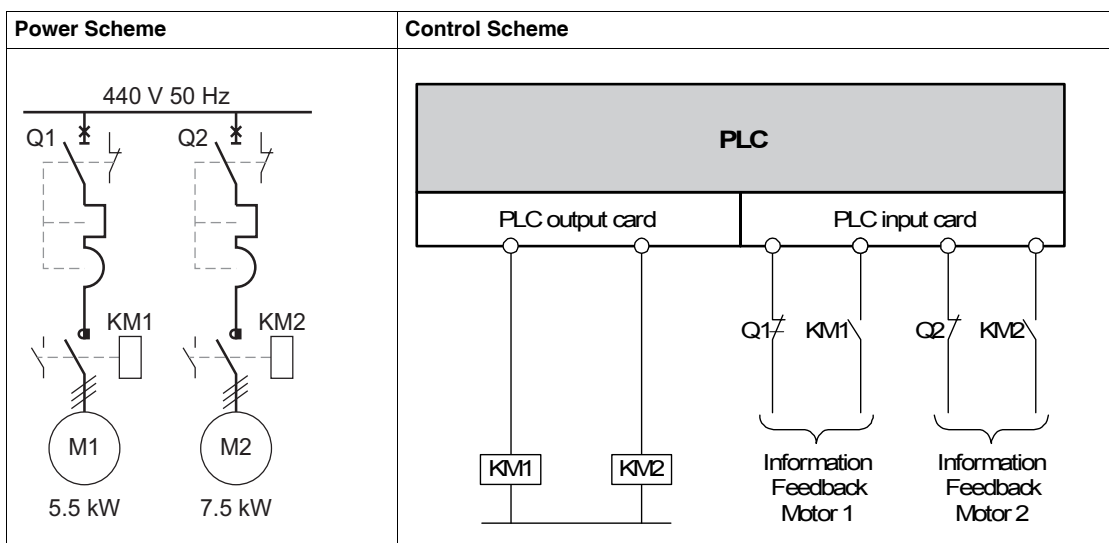
- provide thermal magnetic protection,
- control the motor, and
- obtain contactor feedback and circuit breaker trip feedback.

Description of the Application

- Motor 1 (M1):
3-phase motor, class 10, 5.5 kW (7.4 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 (10.1 hp) at 440 V, 50 Hz, rated current $I_n = 14.7$ A, D.O.L. with remote monitoring of motor load.

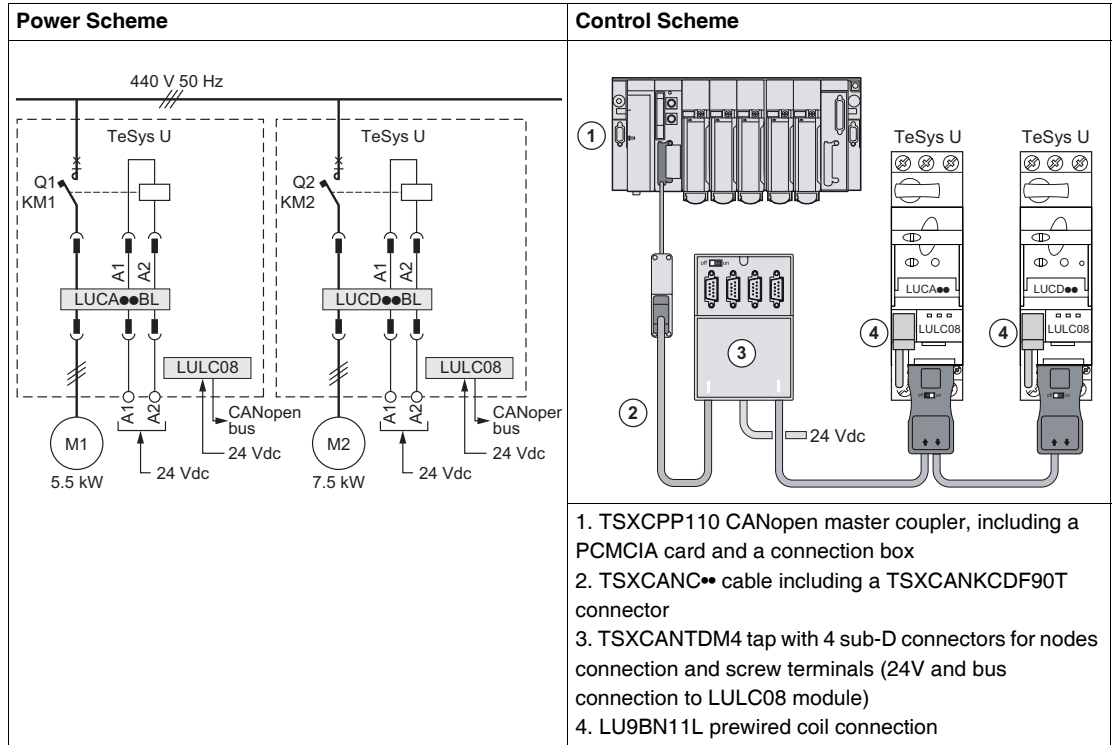
Traditional Solution

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



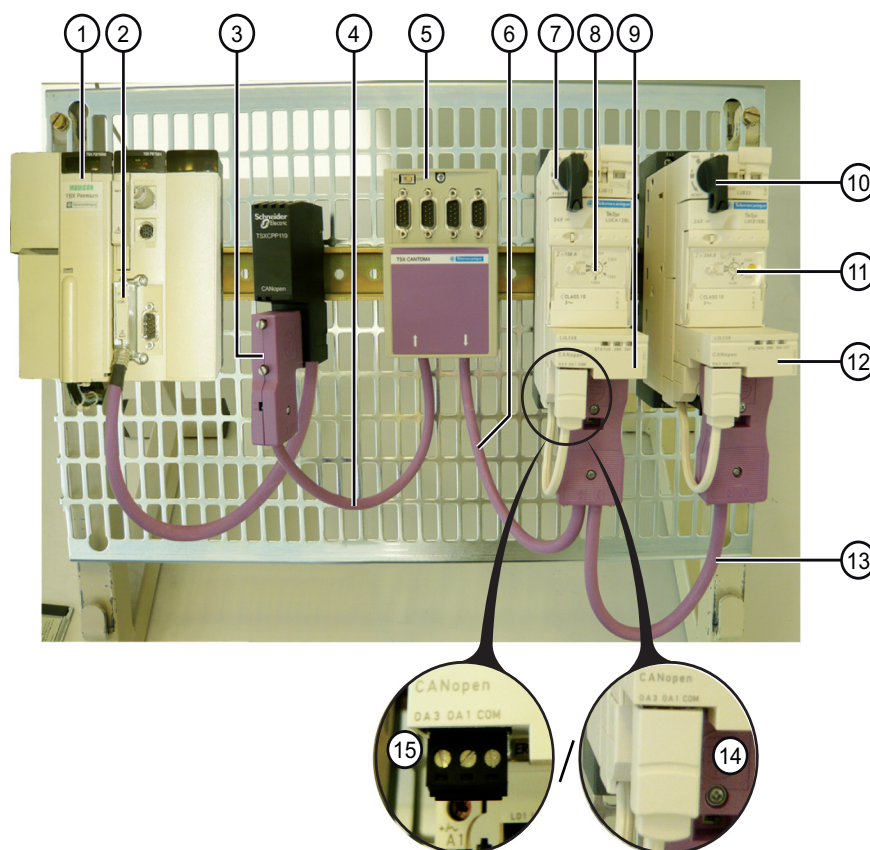
Control Units Used in the Schneider Electric Solution

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 describes the main components of the TeSys U system mounted on a plate:



Legend	Commercial Reference	Description
1	Premium	Programmable Logic Controller (PLC)
	Modicon M340	
2	TSXCAPP110	CANopen PC card (for Premium only)
3	TSXCANKCDF90T	Right angle connector
4	TSXCANCA50	Cable, maximum 50 m (164 ft)
5	TSXCANTDM4	Tap with 4 sub-D connectors (24V and bus connection)
6	TSXCANKCDF180T	Cable and a connector (slave-side) (with line termination = OFF)
7	LUB12	TeSys U power base
8	LUCA12BL	Standard control unit
9, 12	LULC08	CANopen communication module
10	LUB32	TeSys U power base
11	LUCD18BL	Advanced control unit
13	TSXCANKCDF180T	Daisy chaining connection including cable approx. 1 m (3.3 ft) and a connector (with line termination = ON)
14	LU9BN11L	Prewired coil connection (optional), or
15	(standard connection coming with LULC08)	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	Description
Unity Pro Unity Pro XL V4.0 (and later versions)	Programming platform. Programming software for Premium and M340 PLCs.
SYCSPULFUCD29M	Sycon V2.9 network configuration software for Premium PLC (single user license).
Ctrl_cmd_u	TeSys U cyclic control/command. Download the TeSys U DFB library from the www.schneider-electric.com website (<i>see page 19</i>).

Network Conditions

Protocol: CANopen

Baud Rate: 500 kbps

Addresses:

- 1 for TeSys U motor 1
- 2 for TeSys U motor 2

Fallback Strategy:

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"> ● If running, the motor will keep running. ● If stopped, the motor will remain stopped. 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?

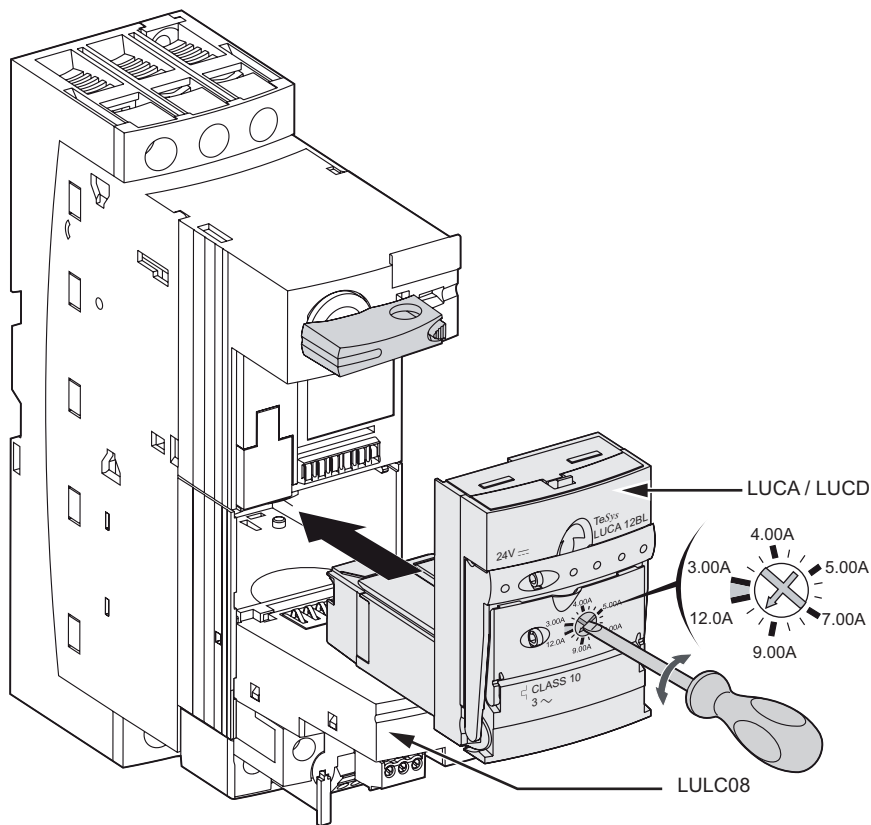
This chapter contains the following topics:

Topic	Page
LUCA12BL and LUCD18BL Settings	9
LULC08 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

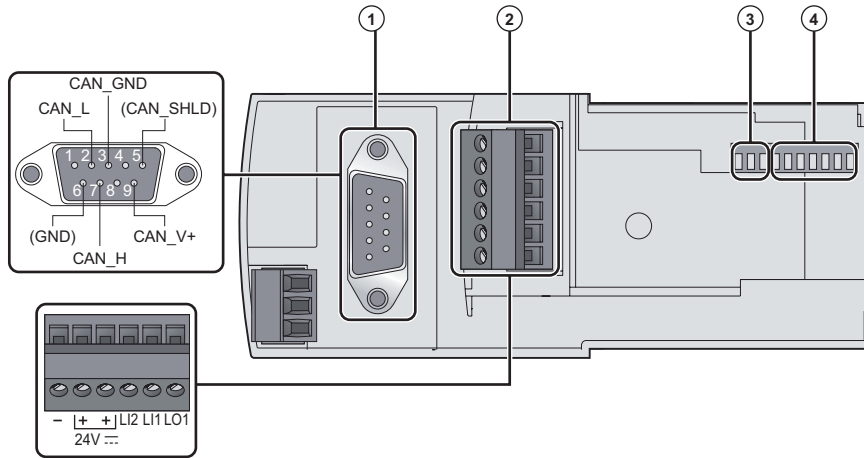
The table below shows the settings for LUCA12BL (Standard Control Unit) and LUCD18BL (Advanced Control Unit):

Control Unit	Motor	Current Setting Range	Motor Nominal Power	Current Setting Value = Motor Rated Current
LUCA12BL	M1	3..12 A	5.5 kW (7.4 hp)	10.5 A
LUCD18BL	M2	4.4..18 A	7.5 kW (10.1 hp)	14.7 A

LULC08 Connectors, Baud Rate and Address Settings

Presentation

Use the DIP switches, under the LULC08 communication module, to set the CANopen baud rate and address.



- 1 CANopen Sub-D 9 connector
- 2 Input/Output terminal block and 24 Vdc
- 3 Baud rate
- 4 Address

Baud Rate

Assign a baud rate (10, 20, 50, 125, 250, 500, 800, or 1,000 kbps) using the 3 left most switches (SW8 to SW10).

In the application, baud rate is 500 kbps:

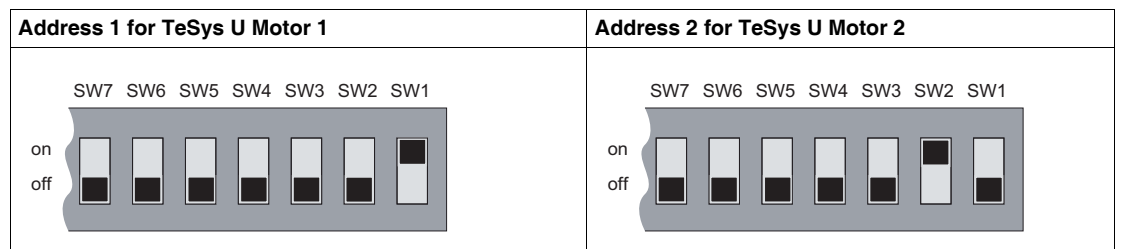
SW10	SW9	SW8	Baud Rate
1	0	1	500 kbps

Address

Assign an address from 1 to 127, using the 7 right most switches (SW1 to SW7). Address 0 (zero) is not allowed and is considered an invalid configuration.

In the application, addresses are 1 and 2:

SW7	SW6	SW5	SW4	SW3	SW2	SW1	Address
0	0	0	0	0	0	1	1 (default value)
0	0	0	0	0	1	0	2



Setting Up Communication Network to a PLC

3

Introduction

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

The table below indicates the software needed to set communication depending on the PLC used in the application.

PLC	Software Used to Set Communication
Premium	<ul style="list-style-type: none">● Unity Pro, and● Sycon
Modicon M340	Unity Pro

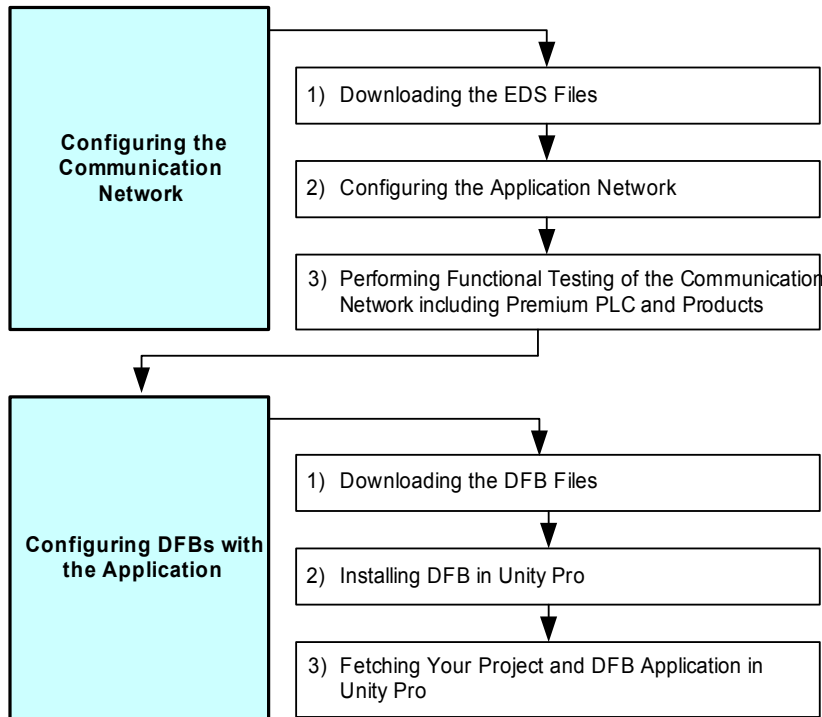
What's in this Chapter?

This chapter contains the following topics:

Topic	Page
3.1 Configuring TeSys U on the CANopen Network with Unity Pro and Sycon (for a Premium PLC)	12
3.2 Configuring TeSys U on the CANopen Network with Unity Pro (for an M340 PLC)	16
3.3. Configuring DFBs with the Application	19

3.1 Configuring TeSys U on the CANopen Network with Unity Pro and Sycon (for a Premium PLC)

Configuration Process for a Premium PLC



1) Downloading the EDS Files

The following table describes the steps to follow to download the EDS and icon files associated to Tesys U from the www.schneider-electric.com website:

Step	Action
1	Open the Schneider Electric website: www.schneider-electric.com .
2	Click Products and Services , and then click Automation and Control .
3	In the Downloads section of the left menu bar, click Current offers .
4	<ul style="list-style-type: none"> ● In the Choose a function drop-down list, select Motor Control. ● In the Choose a range drop-down list, select TeSys U. ● In the Choose a type of document drop-down list, select Software/Firmware. Click >Find.
5	Select Communication Module Tesys U Canopen and download LULC08_EDS_DIB_files_V100.exe file.
6	Double-click LULC08_EDS_DIB_files_V100.exe on your hard disk. Click Accept in the 'Licence for software downloaded from Schneider-Electric web sites' window which opens, and then browse for a destination folder and click Install .
7	Select the 2 EDS files corresponding to your 2 TeSys U configurations: <ul style="list-style-type: none"> ● TE_TESYSU_SC_ST0102E.eds ● TE_TESYSU_SC_AD0102E.eds

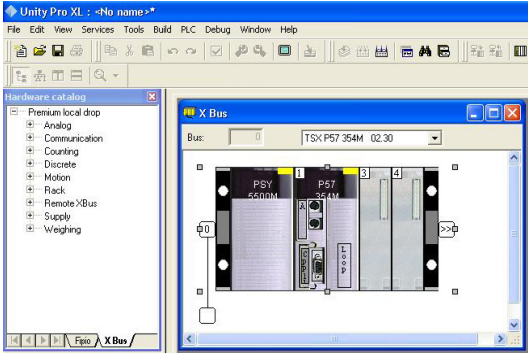
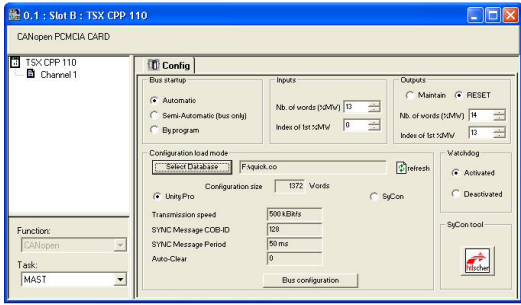
The table below gives the associations between the 2 TeSys U variants and the associated EDS file names.

Variants Names	EDS File Names	Motors (for the Application)
TeSys U Sc St	TE_TESYSU_SC_ST0102E.eds	Motor 1
TeSys U Sc Ad	TE_TESYSU_SC_AD0102E.eds	Motor 2



- Letters **Sc** stand for **Starter-Controller**.
- Letters **St** and **Ad** stand for **Standard** and **Advanced** control unit, respectively.

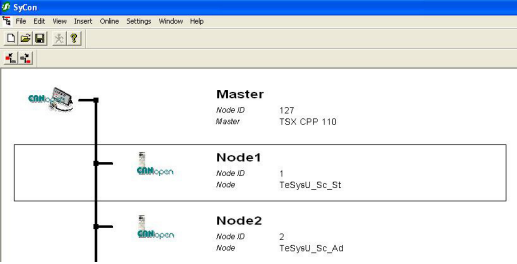
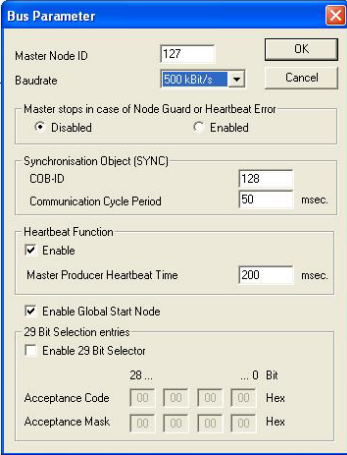
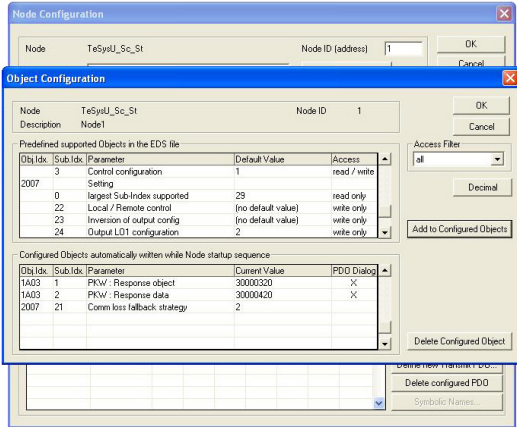
2) Configuring the Application Network

The first configuration steps with **Unity Pro XL** software are described below:

Step	Action
1	Start Unity Pro XL V4.0 software.
2	Configure your Premium PLC and communication accessories (PCMCIA card, etc.): 
3	Save your application as an .STU file.
4	Double-click on the PCMCIA card. The CANopen PCMCIA CARD window opens:  <p>You may not need to edit it. To continue the configuration process, click on the Sycon button. If it is not displayed, install Sycon software again.</p>

Continue the configuration process with **Sycon** software, as described below:

Step	Action
1	In Sycon V2.9 software, click File → New .
2	In the Select fieldbus dialog, choose CANopen and validate.
3	Import your EDS file by clicking File → Copy EDS .
4	Browse until you find your own TE_TESYSU_...eds file.
5	Insert a master: - click Insert → Master... , or - select 
6	In the Insert Master window, select the TSXCPP110 from the Available masters list. Click the Add>> button and confirm with OK .
7	Insert a node: - click Insert → Node... , or - select 

Step	Action
8	<p>In the Insert Node window, select TeSysU_Sc_St, and then TeSysU_Sc_Ad from the Available nodes list:</p>  <p>TeSysU_Sc_St is at address 1. TeSysU_Sc_Ad is at address 2.</p>
9	<p>To set the bus parameter, select Settings → Bus Parameter:</p>  <p>Select the Baudrate at 500kBit/s and confirm with OK.</p>
10	<p>Double-click a node to open the Node Configuration window. Click the Object Configuration button. The corresponding window opens:</p>  <ul style="list-style-type: none"> ● For Node1 (TeSysU_Sc_St), set the communication loss fallback strategy: 1 (frozen). ● For Node2 (TeSysU_Sc_Ad), keep the default communication loss fallback strategy: 2 (stop). <p>The CANopen address (with index:sub-index) for the communication loss fallback strategy is 2007:21. Select it in the upper area, and then edit it in the lower area.</p>
11	<p>Save your configuration by clicking File → Save as . Your configuration file will have a .CO extension. Quit Sycon software.</p>

Complete the configuration process with **Unity Pro XL** software, in the **CANopen PCMCIA CARD** window:

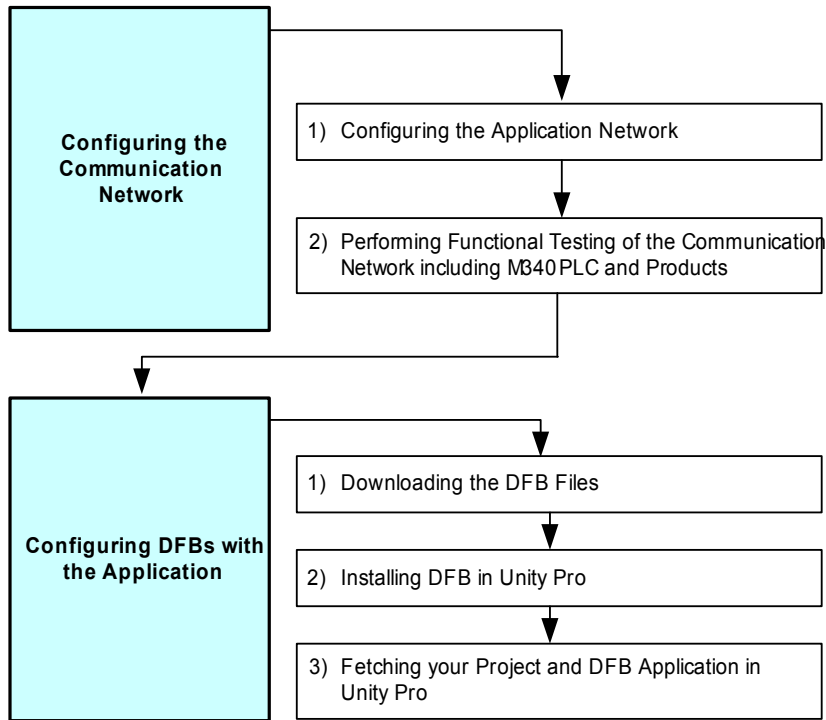
Step	Action
1	Click on the Select Database button and open the .CO file.
2	Select Edit → Validate to validate the configuration. NOTE: An error may be returned if inputs or outputs do not have the correct values. <ul style="list-style-type: none"> • Nb of words (%MW) must be at least 13 for inputs and 14 for outputs. • Index of 1st %MW must be 0 for inputs and at least 13 for outputs. If you change values, validate again.
3	Select Build → Rebuild all project .

3) Performing Functional Testing of the Communication Network Including Premium PLC and Products

Step	Action																														
1	Connect the appropriate programming cable from your PC to the Premium PLC.																														
2	Power up the Premium PLC.																														
3	Click Connect .																														
4	Click the PLC menu: the Transfer Project To PLC window opens. Click the Transfer button.																														
5	Power up the 2 TeSys U systems: the green STATUS LED on the LULC08 front face blinks and then remains constant.																														
6	Communication should be working correctly. NOTE: If communication is not working correctly (either green STATUS LED keeps blinking or red ERR LED is on), refer to the TeSys U LULC08 CANopen User's Manual.																														
7	<p>The CANopen PCMCIA CARD window has a Debug tab. The tables below are extracted from this tab, with the addresses containing the cyclic exchanges per equipment. Name the variables in such a way to avoid programming with names which do not provide any information on the contents of the memory location (e. g. Reg_455_motor_1 instead of %IW3.1\0.0.0.0).</p> <div style="border: 1px solid gray; padding: 5px; margin: 5px 0;"> <p>Inputs</p> <table border="1"> <thead> <tr> <th>Parameters</th> <th>Symbol</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>%IW3.1\0.0.0.0</td> <td>Reg_455_motor_1</td> <td>1</td> </tr> <tr> <td>%IW3.1\0.0.0.1</td> <td></td> <td>0</td> </tr> <tr> <td>%IW3.1\0.0.0.2</td> <td></td> <td>0</td> </tr> <tr> <td>%IW3.1\0.0.0.3</td> <td></td> <td>0</td> </tr> </tbody> </table> </div> <div style="border: 1px solid gray; padding: 5px; margin: 5px 0;"> <p>Outputs</p> <table border="1"> <thead> <tr> <th>Parameters</th> <th>Symbol</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>%QW3.1\0.0.0.0</td> <td>Reg_704_motor_1</td> <td>0</td> </tr> <tr> <td>%QW3.1\0.0.0.1</td> <td>Reg_703_motor_1</td> <td>0</td> </tr> <tr> <td>%QW3.1\0.0.0.2</td> <td></td> <td>0</td> </tr> <tr> <td>%QW3.1\0.0.0.3</td> <td></td> <td>0</td> </tr> </tbody> </table> </div> <p>The next tab in the CANopen PCMCIA CARD window is the Fault tab. It is usually disabled, except in case of a communication problem. A red bullet shows in the gray square before its name, and a diagnostic page opens.</p>	Parameters	Symbol	Value	%IW3.1\0.0.0.0	Reg_455_motor_1	1	%IW3.1\0.0.0.1		0	%IW3.1\0.0.0.2		0	%IW3.1\0.0.0.3		0	Parameters	Symbol	Value	%QW3.1\0.0.0.0	Reg_704_motor_1	0	%QW3.1\0.0.0.1	Reg_703_motor_1	0	%QW3.1\0.0.0.2		0	%QW3.1\0.0.0.3		0
Parameters	Symbol	Value																													
%IW3.1\0.0.0.0	Reg_455_motor_1	1																													
%IW3.1\0.0.0.1		0																													
%IW3.1\0.0.0.2		0																													
%IW3.1\0.0.0.3		0																													
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%QW3.1\0.0.0.3		0																													

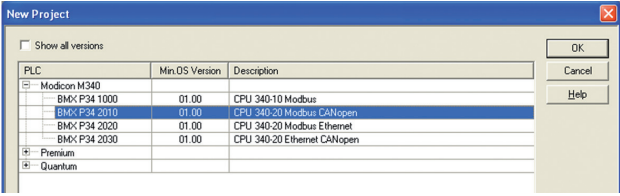
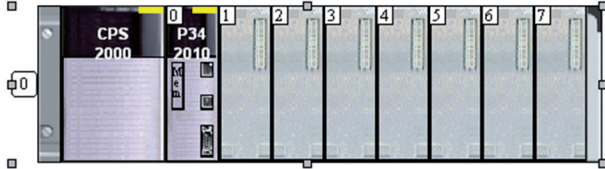
3.2 Configuring TeSys U on the CANopen Network with Unity Pro (for an M340 PLC)

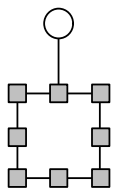
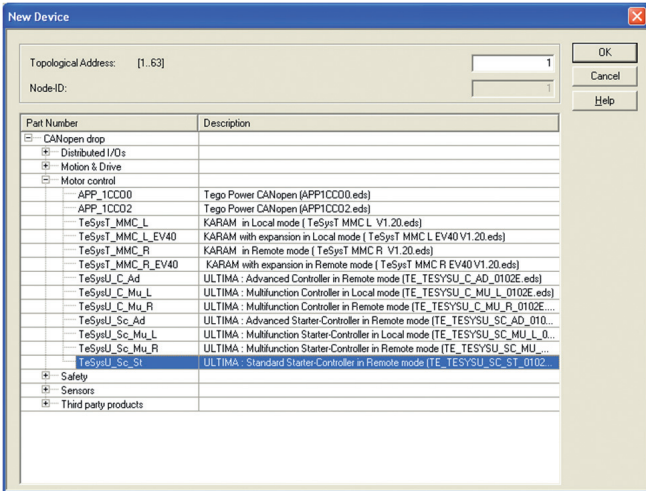
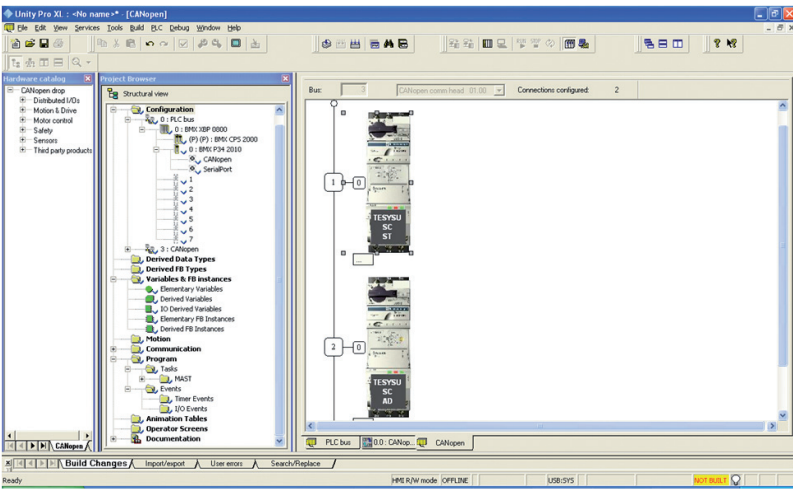
Configuration Process for a Modicon M340 PLC

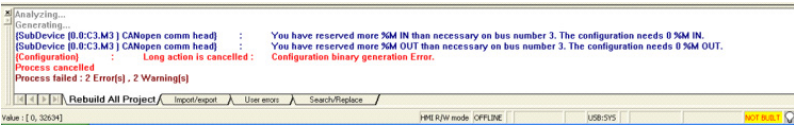
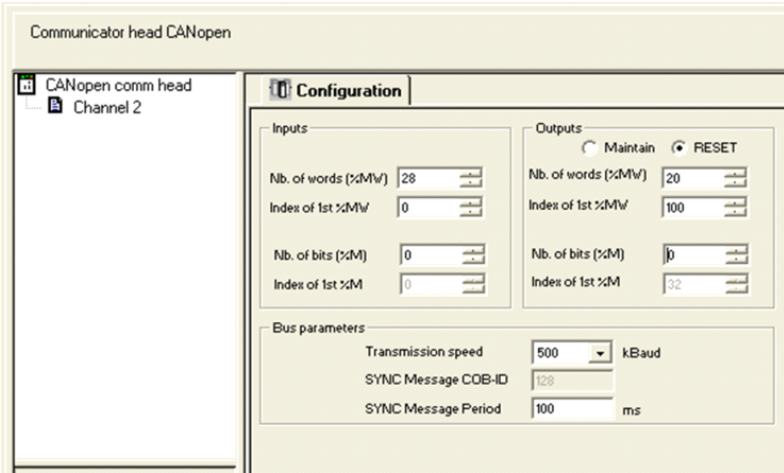


1) Configuring the Application Network

Configuration steps with **Unity Pro XL** software are as follows:

Step	Action																								
1	Start Unity Pro XL V4.0 software.																								
2	Configure the Modicon M340 PLC for CANopen: <ul style="list-style-type: none"> From the File menu, create a new project. In the New Project window, expand the Modicon M340 list and select BMX P34 2010 (CPU 340-20 Modbus CANopen).  <table border="1" data-bbox="507 1400 1045 1512"> <thead> <tr> <th>PLC</th> <th>Min.OS Version</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Modicon M340</td> <td></td> <td></td> </tr> <tr> <td>BMX P34 1000</td> <td>01.00</td> <td>CPU 340-10 Modbus</td> </tr> <tr> <td>BMX P34 2010</td> <td>01.00</td> <td>CPU 340-20 Modbus CANopen</td> </tr> <tr> <td>BMX P34 2020</td> <td>01.00</td> <td>CPU 340-20 Modbus Ethernet</td> </tr> <tr> <td>BMX P34 2030</td> <td>01.00</td> <td>CPU 340-20 Ethernet CANopen</td> </tr> <tr> <td>Premium</td> <td></td> <td></td> </tr> <tr> <td>Quantum</td> <td></td> <td></td> </tr> </tbody> </table> <ul style="list-style-type: none"> Confirm by clicking OK. 	PLC	Min.OS Version	Description	Modicon M340			BMX P34 1000	01.00	CPU 340-10 Modbus	BMX P34 2010	01.00	CPU 340-20 Modbus CANopen	BMX P34 2020	01.00	CPU 340-20 Modbus Ethernet	BMX P34 2030	01.00	CPU 340-20 Ethernet CANopen	Premium			Quantum		
PLC	Min.OS Version	Description																							
Modicon M340																									
BMX P34 1000	01.00	CPU 340-10 Modbus																							
BMX P34 2010	01.00	CPU 340-20 Modbus CANopen																							
BMX P34 2020	01.00	CPU 340-20 Modbus Ethernet																							
BMX P34 2030	01.00	CPU 340-20 Ethernet CANopen																							
Premium																									
Quantum																									
3	From the Structural view of the Project Browser , select Configuration → 0 : PLC bus → 0 : BMX XBP 0800 → 0 : BMX P34 2010 or double-click the P34 2010 module in the configuration. The Communicator head CANopen screen opens in a new tab: 																								
4	Select Configuration → 3 : CANopen .																								

Step	Action
5	<p>In the CANopen tab, double-click the device:</p>  <p>A New Device pop-up window opens.</p>
6	<p>In the New Device window, set the configuration of the first TeSys U device as follows:</p> <ul style="list-style-type: none"> ● Select CANopen drop → Motor control → TeSysU_Sc_St ● Set the Topological Address to 1 ● Confirm by clicking OK. 
7	<p>Open another New Device window, set the configuration of the second TeSys U device as follows:</p> <ul style="list-style-type: none"> ● Select CANopen drop → Motor control → TeSysU_Sc_Ad ● Set the Topological Address to 2 ● Confirm by clicking OK.
8	<p>The 2 TeSys U modules and the connections display in the CANopen tab.</p>  <p>Click each device picture in turn. A configuration table appears in which you can configure the communication loss fallback strategy:</p> <ul style="list-style-type: none"> ● For TeSysU_Sc_St, set the communication loss fallback strategy: 1 (frozen). ● For TeSysU_Sc_Ad, keep the default communication loss fallback strategy: 2 (stop).

Step	Action
9	<p>Select Edit → Validate to validate the configuration.</p> <p>NOTE: A message may appear in the Rebuild All Project area concerning the IN/OUT number of words and bits reserved. If this happens, return to the Configuration screen and enter values as indicated in the message.</p>  <p>Configure the options according to the application example:</p>  <ul style="list-style-type: none"> • Set the transmission speed to 500 kBaud. • Nb of words (%MW) must be 28 for inputs and 20 for outputs. • Index of 1st%MW must be 0 for inputs and 100 for outputs. • Nb of bits (%M) must be 0 for inputs and outputs.
10	Select Build → Rebuild all project to rebuild the project. Once the values are correct, the NOT BUILT state changes to BUILT.
11	Save the application with a specific name.

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

Step	Action
1	Via the USB port on your PC, connect a cable (e.g. TSXPXC3030) to the M340 PLC.
2	Power up the M340 PLC.
3	Click Connect .
4	Click the PLC menu: the Transfer Project to PLC window opens. Click the Transfer button.
5	Power up the 2 TeSys U systems: the green STATUS LED on the LULC08 front face blinks, and then remains constant. Communication is working correctly.

3.3. Configuring DFBs with the Application

Presentation

The TeSys DFB (Derived Function Blocks) 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) through cyclic data exchanges on a CANopen network.

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 User manual*.

1) Downloading the DFB Files

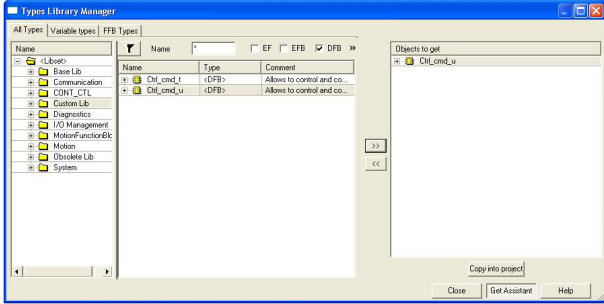
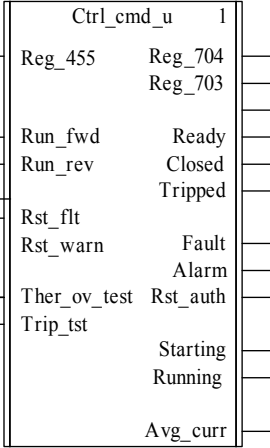
The following table describes the steps to follow to download the TeSys DFB offer from the www.schneider-electric.com website:

Step	Action
1	Open the Schneider Electric website: www.schneider-electric.com
2	Click Products and Services , and then click Automation and Control .
3	In the Downloads section of the left menu bar, click Current offers
4	<ul style="list-style-type: none"> ● In the Choose a function drop-down list, select Motor Control. ● In the Choose a range drop-down list, select TeSys U. ● In the Choose a type of document drop-down list, select Software/Firmware. Click > Find .
5	Select TeSys DFB offer package and download the zip file on your hard disk.
6	Extract the TeSys DFB offer package.zip file content to a single directory on your hard disk. 2 directories, PL7 Pro and Unity Pro, will be created, each of them containing the following folders: <ul style="list-style-type: none">  01 Modbus SL  02 Modbus SL and Modbus TCP  03 Profibus  04 Cyclic control command  05 PKW  06 Treatment  07 PLC application example

2) Installing DFB in Unity Pro

Step	Action
1	From  Start button, All Programs menu, browse to Schneider Electric → Unity Pro → Types Library Update .
2	In the Types Library Update window, browse to 04 Cyclic control command → FAMILY.DSC and open it. NOTE: The application version you select must be compliant with Unity Pro.
3	Click the Install family button. A pop-up window appears, with the following message: "The installation has succeeded". Then, exit.

3) Fetching Your Project and DFB Application in Unity Pro

Step	Action
1	Start Unity Pro software.
2	<p>From Tools menu, get Type Library Manager sub-menu. Click on the Access Assistant button. Select Ctrl_cmd_u and move it to the right-hand area entitled Objects to get:</p>  <p>Click on Copy into project.</p>
3	<p>The DFB graphical representation is displayed:</p> 

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

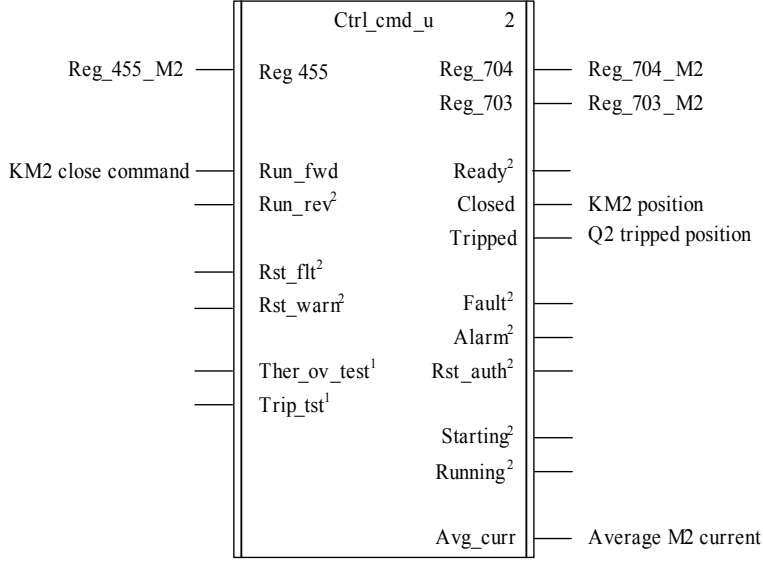
The following table describes the DFB outputs and their availability according to the control unit:

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) For node 1 (TeSys U_Sc_St): <ul style="list-style-type: none"> ● Reg_455_M1: %IW\3.1\0.0.0.0 ● Reg_704_M1: %QW\3.1\0.0.0.0 ● Reg_703_M1: %QW\3.1\0.0.0.1
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"> ● Closed DFB 1 output = position of the KM1 contactor ● Tripped DFB 1 output = tripped position of the Q1 TeSys U
4	<p>Check that the DFB 1 for Motor 1 displays as follows:</p> <p>1 Not applicable 2 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) For node 2 (TeSys U_Sc_Ad): <ul style="list-style-type: none"> ● Reg_455_M2: %IW3.2\0.0.0.0 ● Reg_704_M2: %QW3.2\0.0.0.0 ● Reg_703_M2: %QW3.2\0.0.0.1
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"> ● Closed DFB 2 output = position of the KM2 contactor ● Tripped DFB 2 output = tripped position of the Q2 TeSys U
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>The diagram shows a central box labeled 'Ctrl_cmd_u 2'. On the left side, there are inputs: 'Reg_455_M2' connected to 'Reg 455', 'KM2 close command' connected to 'Run_fwd' and 'Run_rev²', 'Rstflt²', 'Rstwarn²', 'Ther_ov_test¹', and 'Trip_tst¹'. On the right side, there are outputs: 'Reg_704' connected to 'Reg_704_M2', 'Reg_703' connected to 'Reg_703_M2', 'Ready²' (connected to 'Closed'), 'Tripped' (connected to 'KM2 position' and 'Q2 tripped position'), 'Fault²', 'Alarm²', 'Rst_auth²', 'Starting²', 'Running²', and 'Avg_curr' connected to 'Average M2 current'.</p> <p>1 Not applicable 2 Applicable but not used; can be managed by the PLC application</p>