

# TeSys™ T LTM R CANopen

## Motor Management Controller

### Quick Start Guide

1639574EN-01  
06/2023



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# Safety Information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this user guide or on the equipment to warn of hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

<b>⚠️⚠️ DANGER</b>
<b>DANGER</b> indicates a hazardous situation which, if not avoided, <b>will result in</b> death or serious injury.

<b>⚠️ WARNING</b>
<b>WARNING</b> indicates a hazardous situation which, if not avoided, <b>could result in</b> death or serious injury.

<b>⚠️ CAUTION</b>
<b>CAUTION</b> indicates a hazardous situation which, if not avoided, <b>could result in</b> minor or moderate injury.

<b>NOTICE</b>
<b>NOTICE</b> is used to address practices not related to physical injury.

**NOTE:** Provides additional information to clarify or simplify a procedure.

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Electrical equipment should be transported, stored, installed, and operated only in the environment for which it is designed.

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**WARNING:** This product can expose you to chemicals including lead and lead compounds, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).



# About the Book

## Document Scope

The Quick Start Guide uses an application example to describe the different steps to quickly install, configure and use TeSys™ T.

This document is not intended to replace the following documents:

- TeSys T LTM R CANopen Motor Management Controller User Manual
- TeSys T LTM R Instruction Sheet
- TeSys T LTM E Instruction Sheet

## Related Documents

Title of Documentation	Reference Number
TeSys T LTM R CANopen Motor Management Controller User Manual	1639503
TeSys T LTM R** Instruction Sheet	AAV7709901
TeSys T LTM E** Instruction Sheet	AAV7950501
TeSys T LTM CU Control Operator Unit User Manual	1639581
TeSys T LTM CU Instruction Sheet	1639582

You can download these technical publications and other technical information from our website at [www.se.com/ww/en/download/](http://www.se.com/ww/en/download/).

# Quick Start Guide

## Overview of the Application Example

### Introduction

The Quick Start Guide uses an application example to illustrate each step in the process of installing, configuring and using TeSys T.

The application example uses the LTM R controller to protect and control a motor and its driven load, in this case, a pump.

This application example is intended to:

- show you how to configure the LTM R controller in a few steps,
- provide an example you can modify to develop your own configuration,
- serve as a starting point for the development of more complex configurations, incorporating such additional features as HMI or network control.

### Functions Performed

When the LTM R controller has been configured in order to protect and control the motor and pump, it will perform the following functions:

- thermal overload protection
- motor temperature sensor protection
- voltage protection / undervoltage
- external ground current trip protection
- initial system configuration during commissioning using PC and PowerSuite software

### Operating Conditions

The operating conditions used in the application example are:

- motor power: 4 kW
- line-to-line voltage: 400 Vac
- current: 9 A
- control circuit voltage: 230 Vac
- 3-wire control
- motor trip class 10
- start button
- stop button
- reset button on enclosure door
- trip light
- alarm light
- full voltage, non-reversing starter (direct over the line starter)
- 24 Vdc power supply in the motor control center or control station for future use with LTM E expansion module inputs



## Network Conditions

The network conditions for the example are:

- protocol: CANopen
- address: 1
- baud rate: 250 kbits/s

The LTM R controller is configured via PowerSuite, not via the network (configuration via network port is disabled).

The network software setup described in this document is based on:

- Sycon network configuration software
- Unity programming software
- Premium PLC platform

## Components Used

The application example uses the following components:

Item	Component Description	Reference Number
1	LTM R 100-240 Vac CANopen motor management controller (1.35...27 A FLC)	LTMR27CFM
2	LTM E 24 Vdc expansion module	LTMEV40BD
3	LTM R to LTM E RJ45 connection cable	LTMCC004
4	PowerSuite cable kit	VW3A8106
5	PowerSuite software on CD-ROM, version $\geq 2.5$	PowerSuite
6	External ground current trip CT	TA30
7	External PTC binary motor temperature sensor	User supplied

## Presentation of the TeSys T Motor Management System

### System Overview

The TeSys T Motor Management System offers protection, control, and monitoring capabilities for single-phase and 3-phase AC induction motors.

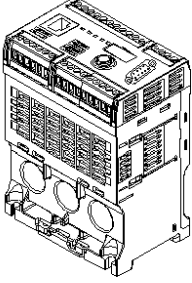
The system offers diagnostic and statistics functions and configurable alarms and trips, allowing better prediction of component maintenance, and provides data to continuously improve the entire system.

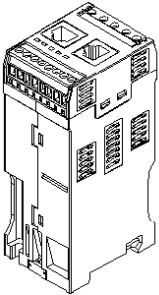
The 2 main hardware components of the system are:

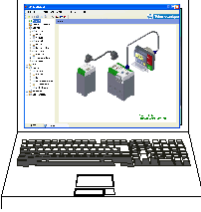
- the LTM R controller, and
- the LTM E expansion module.

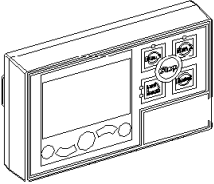
### System Presentation

The following tables describe the main components of the TeSys T Motor Management System.

LTM R controller	Functional Description	Reference Number
	<ul style="list-style-type: none"> <li>• current sensing 0.4...100 A</li> <li>• single-phase or 3-phase current inputs</li> <li>• 6 discrete logic inputs</li> <li>• 4 relay outputs: 3 SPST, 1 DPST</li> <li>• connections for a ground current sensor</li> <li>• connection for a motor temperature sensor</li> <li>• connection for network</li> <li>• connection for HMI device or expansion module</li> <li>• current protection, metering and monitoring functions</li> <li>• motor control functions</li> <li>• power indicator</li> <li>• trip and alarm LED indicators</li> <li>• network communication and alarm indicators</li> <li>• HMI communication LED indicator</li> <li>• test and reset function</li> </ul>	LTMR08CBD (24 Vdc, 0.4...8 A FLC)
		LTMR27CBD (24 Vdc, 1.35...27 A FLC)
		LTMR100CBD (24 Vdc, 5...100 A FLC)
		LTMR08CFM (100...240 Vac, 0.4...8 A FLC)
		LTMR27CFM (100...240 Vac, 1.35...27 A FLC)
		LTMR100CFM (100...240 Vac, 5...100 A FLC)

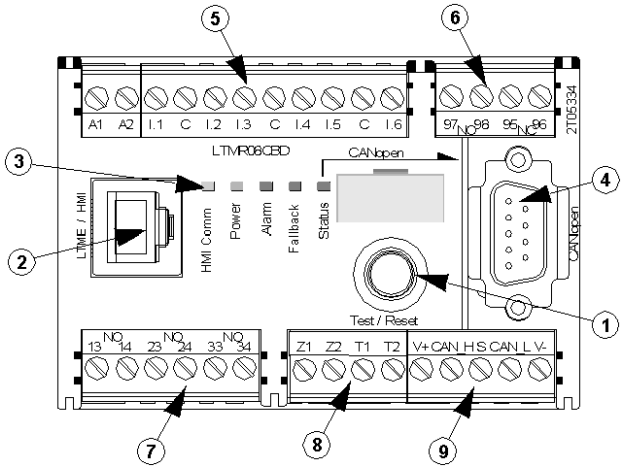
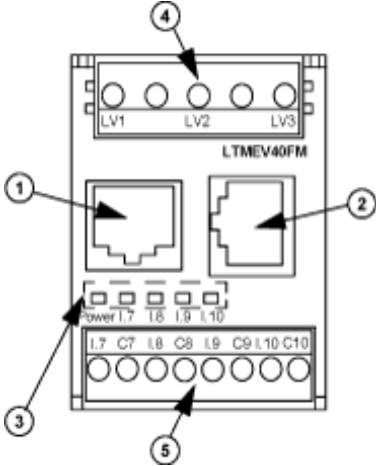
LTM E Expansion Module	Functional Description	Reference Number
	<ul style="list-style-type: none"> <li>• voltage sensing 110...690 Vac</li> <li>• 3-phase voltage inputs</li> <li>• 4 additional discrete logic inputs</li> <li>• additional voltage protection, metering and monitoring functions</li> <li>• power LED indicator</li> <li>• logic input status LED indicators</li> </ul> <p>Additional components required for an optional expansion module:</p> <ul style="list-style-type: none"> <li>• LTM R controller to LTM E connection cable</li> </ul>	LTMEV40BD (24 Vdc logic inputs)
		LTMEV40FM (100...240 Vac logic inputs)

PowerSuite Software	Functional Description	Reference Number
	<ul style="list-style-type: none"> <li>• configure the system through menu entries</li> <li>• display parameters, detected alarms and trips</li> <li>• control the motor</li> </ul> <p>Additional components required for PowerSuite software:</p> <ul style="list-style-type: none"> <li>• a PC</li> <li>• separate power source</li> <li>• LTM R/LTM E to PC communication cable</li> </ul>	PowerSuite ≥ v 2.5
		VW3A8106 (PowerSuite cable kit)

LTM CU Control Operator Unit	Functional Description	Reference Number
	<ul style="list-style-type: none"> <li>• configure the system through menu entries</li> <li>• display parameters, detected alarms and trips</li> <li>• control the motor</li> </ul> <p>Additional components required for an optional HMI device:</p> <ul style="list-style-type: none"> <li>• LTM R/LTM E to HMI communication cable</li> <li>• HMI to PC communication cable</li> </ul>	LTM CU
		VW3A1104R.0 (HMI communication cable)
		VW3A8106 (PowerSuite cable kit)
		LTM9KCU Kit for portable LTM CU

## LTM R and LTM E Description

The following diagrams show the features of the LTM R controller and expansion module:

LTM R Controller	LTM E Expansion Module
 <p>1 Test / Reset button</p> <p>2 HMI port with RJ45 connector connecting the LTM R controller to an HMI, PC, or LTM E expansion module</p> <p>3 Status-indicating LEDs</p> <p>4 Network port with 9-pin sub-D connector connecting the LTM R controller to a CANopen PLC</p> <p>5 Plug-in terminal: control power, and internally powered logic inputs and commons</p> <p>6 Plug-in terminal: double pole/single throw (DPST) output relay</p> <p>7 Plug-in terminal output relay</p> <p>8 Plug-in terminal: ground current trip input and temperature sensor input</p> <p>9 Plug-in terminal: PLC network</p>	 <p>1 Port with RJ45 connector to HMI or PC</p> <p>2 Port with RJ45 connector to LTM R controller</p> <p>3 Status-indicating LEDs</p> <p>4 Plug-in terminal: voltage inputs</p> <p>5 Plug-in terminal: logic inputs and common</p>

## Installation

### Overview

The following procedure describes how to install and physically configure the TeSys T system, according to the operating conditions used in the application example. The same procedure is used for other configurations.

The full installation procedure is shown on the Instruction sheets provided with the LTM R controller and the LTM E expansion module. It is also described in detail in the Installation chapter of the User Manual.

**⚠ DANGER**

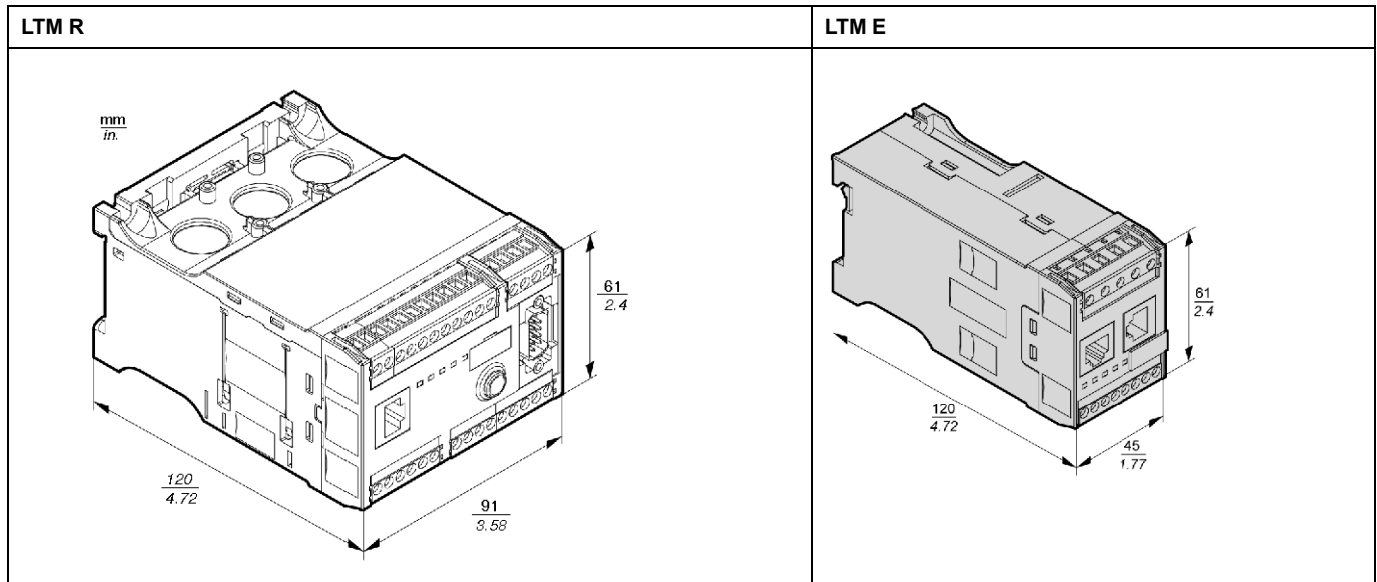
**HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH**

Turn off all power supplying this equipment before working on it.

Apply appropriate personal protective equipment (PPE) and follow safe electrical work practises.

**Failure to follow these instructions will result in death or serious injury.**

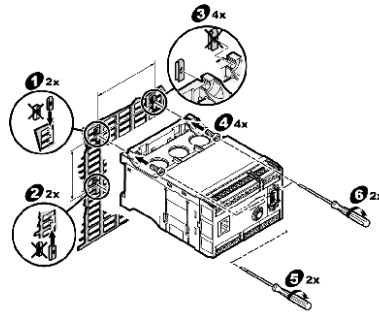
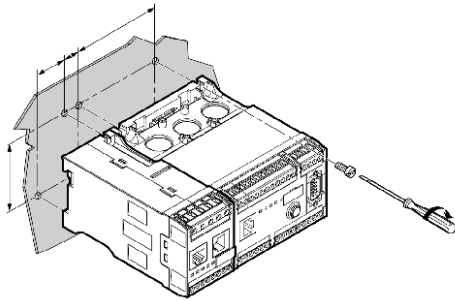
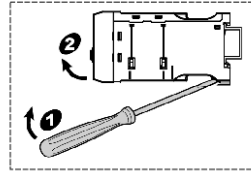
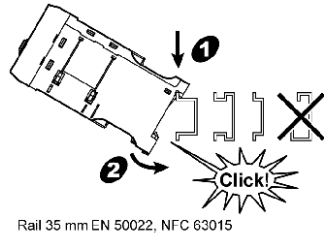
The following diagrams show the physical dimensions of the LTM R controller and the LTM E expansion module:



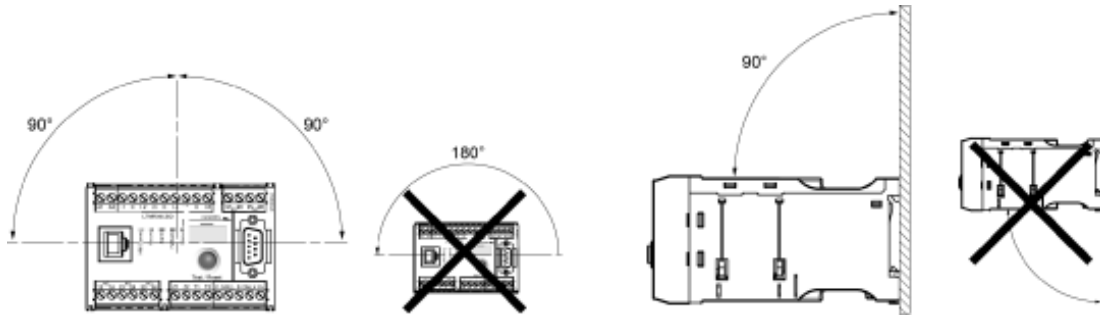
## Mount LTM R and LTM E

Mount the LTM R controller and the LTM E expansion module, respecting clearance zones and operating position.

The diagrams below show how to mount the LTM R and LTM E on a DIN rail, solid mounting plate, or Telequick plate:



This diagram shows the operating positions possible:

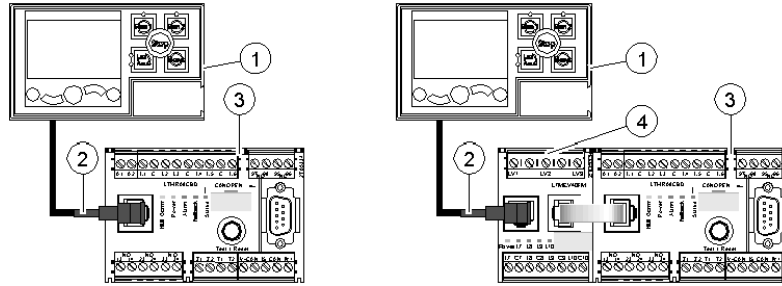


## Connect LTM R to LTM E

Connect the LTM R controller and the LTM E expansion module using the RJ45 cable.

## Connect to a TeSys T LTM CU HMI Device (Optional)

The diagrams below show the TeSys T LTM CU HMI device connected to the LTM R controller, with and without the LTM E expansion module:



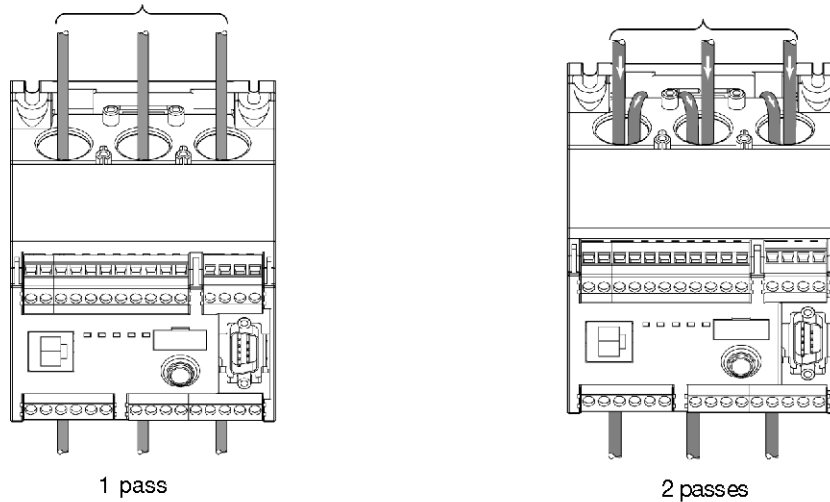
- 1 LTM CU Control Operator Unit
- 2 RJ45 cable (VW3 A1 104R30, in this example)
- 3 LTM R controller
- 4 LTM E expansion module

## Wire Current Transformers

Wire the current transformers according to the operating conditions:

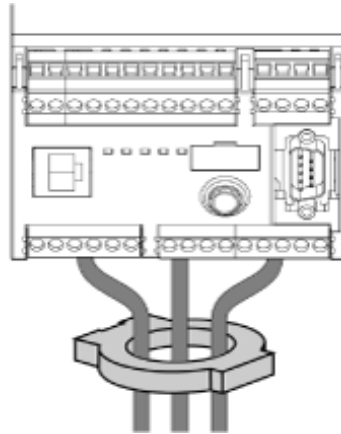
- Product range → 1.35...27 A
- Nominal motor current → 9 A

1 pass through the CT windows is sufficient in this case, although 2 passes are possible:



## Wire Ground Current Sensor

Wire the ground current sensor:



## Wire LTM R

- Wire the power supply and the I/O.
- Wire the temperature sensors.

### ***NOTICE***

#### **RISK OF DESTROYING THE INPUTS**

Connect the LTM R controller's inputs using the 3 Common (C) terminals connected to the A1 control voltage via an internal filter.

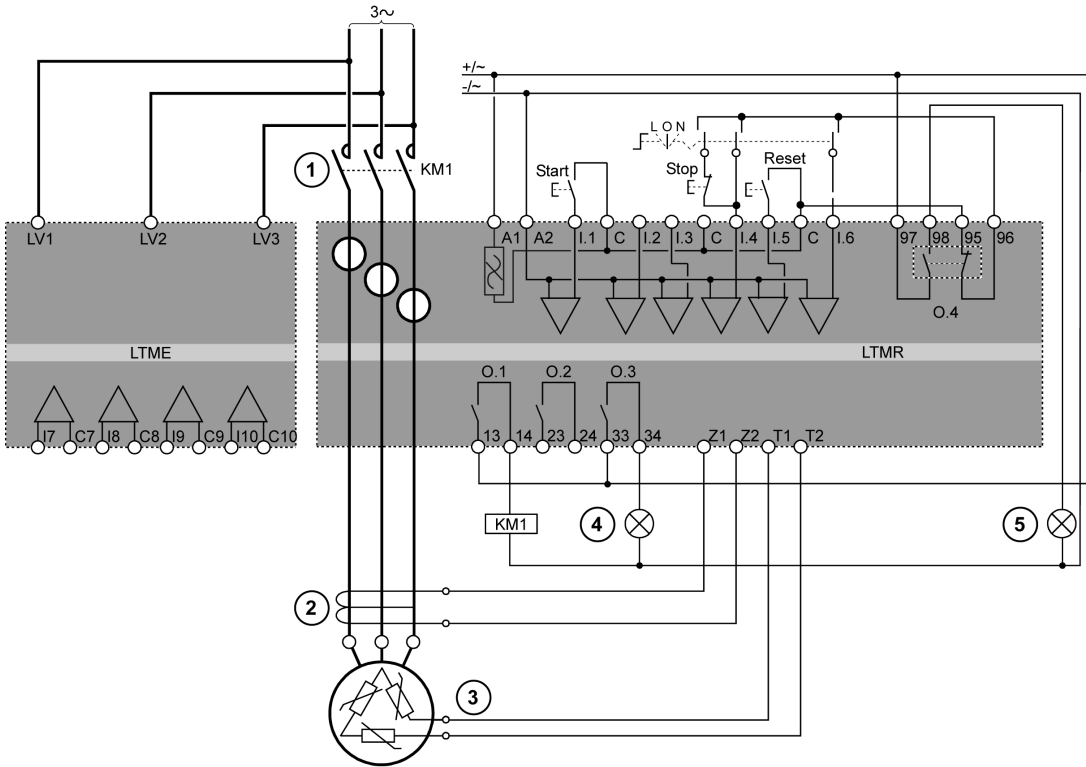
**Failure to follow these instructions can result in equipment damage.**

## Wire LTM E

Wire the voltage transformers and the I/O on the LTM E expansion module.

## LTM R Controller Wiring

The diagram below illustrates the main power circuit and the 3-wire (impulse) local control with network control selectable, corresponding to the application example.



- 1 Contactor
- 2 Ground current sensor
- 3 PTC binary thermistor
- 4 Alarm indication
- 5 Trip indication
- L Local control
- O Off
- N Network control

## Configuration

### Overview

After the wiring connections are made, the next step is to configure parameters using PowerSuite software (see PowerSuite chapter of the User Manual).



## ▲ WARNING

### UNINTENDED EQUIPMENT OPERATION

The application of this product requires expertise in the design and programming of control systems. Only persons with such expertise should be allowed to program and apply this product.

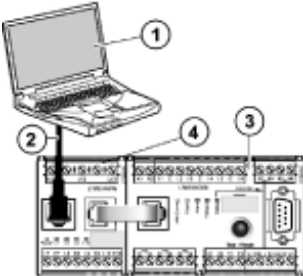
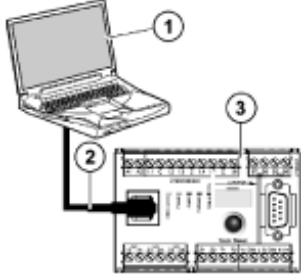
Follow all local and national safety codes and standards.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

## Install Software

Step	Description
1	Place the installation disk into your PC's CD/DVD drive.
2	Navigate to and click on the setup.exe file. The setup wizard begins.
3	Follow the instructions in the setup wizard.

## Connect to PowerSuite™ Software

<p>In the application example:</p>  <ol style="list-style-type: none"> <li>1 PC running PowerSuite software</li> <li>2 PowerSuite cable kit VW3 A8 106</li> <li>3 LTM R controller</li> <li>4 LTM E expansion module</li> </ol>	<p>If you are not using the expansion module, the HMI connects directly to the controller:</p>  <ol style="list-style-type: none"> <li>1 PC running PowerSuite software</li> <li>2 PowerSuite cable kit VW3 A8 106</li> <li>3 LTM R controller</li> </ol>
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## Set Parameters

Step	Description
1	Start up the PowerSuite software.
2	In the Load Configuration screen, select and open a configuration file with factory default settings.
3	Open the Device Information branch of the tree control and set the Operating parameter settings.
4	Open the Settings branch of the tree control.
5	Locate and set the Operating parameter settings in the Motor and Control sub-branch.
6	Repeat step 5 for all other setting item sub-branches.
7	Save a copy of the completed configuration settings to a new configuration file.

## List of Parameter Settings

Parameter settings for the application example:

Device Information Branch	Sub-branch	Parameter	Setting
Device information	–	Current range	1.35-27 A
		Network	Modbus/TCP
		Control voltage	100-240 Vac
Settings Branch	Sub-branch	Parameter	Setting
Motor and Control Settings	Motor operating mode	Nominal voltage	400 V
		Nominal power	4 kW
		Operating mode	3 wire independent
		Contact rating	9 A
		Phase	3 phase
	Motor temperature sensor	Sensor type	PTC binary
		Trip enable	Enable
		Trip level	According to motor
		Alarm level	According to motor
	Load CT	Load CT ratio	Internal
		Load CT passes	1 <sup>1</sup>
	Ground CT	Ground CT ratio	1000:1
	Control mode	Local control	Terminal trip
	Thermal Settings	Thermal overload	Trip type
Trip class			10
FLC1 <sup>1</sup>			<b>50 %<sup>1</sup> (equivalent to 9 A)</b>
Trip enable			Enable
Alarm enable			Enable
Current Settings	Ground current mode	Trip enable	Enable
		Trip level	1 A
		Trip timeout	0.5 s
		Alarm enable	Enable
		Alarm level	200 mA
Voltage Settings	Undervoltage	Trip enable	Enable
		Trip level	85 %
		Trip timeout	3 s
		Alarm enable	Enable
		Alarm level	90 %

1. See FLC (Full Load Current) Settings, page 19.

## Transfer the Configuration File

Step	Description
1	Open the configuration file to be transferred. <ul style="list-style-type: none"> <li>Be sure the file is in the Main window.</li> </ul>
2	Connect your PC to the LTM R controller. <ul style="list-style-type: none"> <li>Check the task bar to see whether your PC is connected to the LTM R controller.</li> </ul>
3	Transfer the configuration file: <ul style="list-style-type: none"> <li>Select PC to Device, in either the <b>Link &gt; File Transfer</b> sub-menu or the icon bar.</li> <li>In the Upload Configuration dialog, click Continue. A progress bar briefly appears.</li> <li>To confirm the success of the transfer, check the results in the Output window, which opens automatically at the bottom of the Main window.</li> </ul> <p><b>Result:</b> The product is now ready to use.</p>

## FLC (Full Load Current) Settings

### FLC Basics

**NOTE:** Before setting the FLC, you must first set the Contactor rating and Load CT ratio.

**Load CT ratio** = Load CT primary / (Load CT secondary \* Passes)

**Current sensor max** = Current range max \* Load CT ratio

**Current range max** is determined by the LTM R controller commercial reference. It is stored in units of 0.1 A and has one of the following values: 8.0, 27.0, or 100.0 A.

**Contactor rating** is stored in units of 0.1 A and is set by the user between 1.0 and 1000.0 A.

**FLCmax** is defined as the lower of the Current sensor max and the Contactor rating values.

**FLCmin** = Current sensor max / 20 (rounded to the nearest 0.01 A.). FLCmin is stored internally in units of 0.01 A.

**NOTE:** Do not set the FLC below the FLCmin.

## Conversion of Amperes to FLC Settings

FLC values are stored as a percentage of FLCmax

**FLC (in %) = FLC (in A) / FLCmax**

**NOTE:** FLC values must be expressed as a percentage of FLCmax (resolution of 1 %). If you enter an unauthorized value, the LTM R will round it up to the nearest authorized value. For example, on a 0.4-8 A unit, the step between FLCs is 0.08 A. If you try to set an FLC of 0.43 A, the LTM R will round it up to 0.4 A.

## Example (No External CTs)

Data:

- FLC (in A) = 9 A

- Current range max = 27.0 A
- Load CT primary = 1
- Load CT secondary = 1
- Passes = 1 or 2
- Contactor rating = 18.0 A

Calculated parameters with 1 pass:

- Load CT ratio = Load CT primary / (Load CT secondary \* passes) = 1 / (1 \* 1) = 1.0
- Current sensor max = Current range max \* Load CT ratio = 27.0 \* 1.0 = 27.0 A
- FLCmax = min (Current sensor max, Contactor rating) = min (27.0, 18.0) = 18.0 A
- FLCmin = Current sensor max / 20 = 27.0 / 20 = 1.35 A
- FLC (in %) = FLC (in A) / FLCmax = 9.0 / 18.0 = 50 %

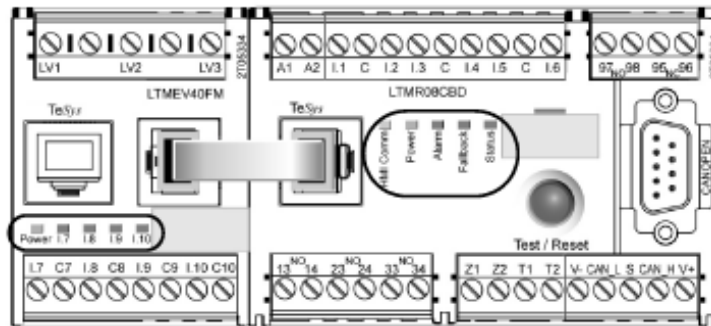
Calculated parameters with 2 passes:

- Load CT ratio = 1 / (1 \* 2) = 0.5
- Current sensor max = 27.0 \* 0.5 = 13.5 A
- FLCmax = min (13.5, 18.0) = 13.5 A
- FLCmin = Current sensor max / 20 = 13.5 / 20 = 0.67 A
- FLC (in %) = FLC (in A) / FLCmax = 9.0 / 13.5 = 66 %

## Diagnostic

### LTM R and LTM E LEDs

As the application example uses the LTM R and LTM E, check the LEDs on both components:



### LEDs

Use the 5 LEDs on the face of the LTM R controller to monitor its state, as follows:

LTM R LED	Color	Describes	Indicates
HMI Comm	Yellow	Communication activity between LTM R controller and expansion module	<ul style="list-style-type: none"> <li>Flashing yellow = communication</li> <li>Off = no communication</li> </ul>
Power	Green	LTM R controller power or internal trip condition	<ul style="list-style-type: none"> <li>Solid green = power on, no internal trips, and motor off</li> <li>Flashing green = power on, no internal trips, and motor on</li> <li>Off = power off, or internal trips exist.</li> </ul>
Alarm	Red	Protection trip or alarm, or internal trip condition	<ul style="list-style-type: none"> <li>Solid red = internal or protection trip</li> <li>Flashing red (2 x per second) = alarm</li> <li>Flashing red (5 x per second) = load shed or rapid cycle condition</li> <li>Off = no trips, alarms, load shed or rapid cycle (when power is On)</li> </ul>
Fallback	Red	Communication connection between LTM R controller and network module	<ul style="list-style-type: none"> <li>Solid red = in fallback</li> <li>Off = not in fallback (no power)</li> </ul>
Status	Yellow	Communication activity on the network bus	<ul style="list-style-type: none"> <li>Flashing yellow (0.2 s on, 1.0 s off) = network bus communication</li> <li>Off = no network bus communication</li> </ul>

Use the 5 LEDs on the face of the LTM E expansion module to monitor its state:

LTM E LED	Color	Describes	Indicates
Power	Green or red	Module power or internal trip condition	<ul style="list-style-type: none"> <li>Solid green = power on with no internal trips</li> <li>Solid red = power on with internal trips</li> <li>Off = power off</li> </ul>
Digital Inputs I.7, I.8, I.9 and I.10	Yellow	State of input	<ul style="list-style-type: none"> <li>On = input activated</li> <li>Off = input not activated</li> </ul>

## Use with TeSys T LTM CU Control Operator Unit

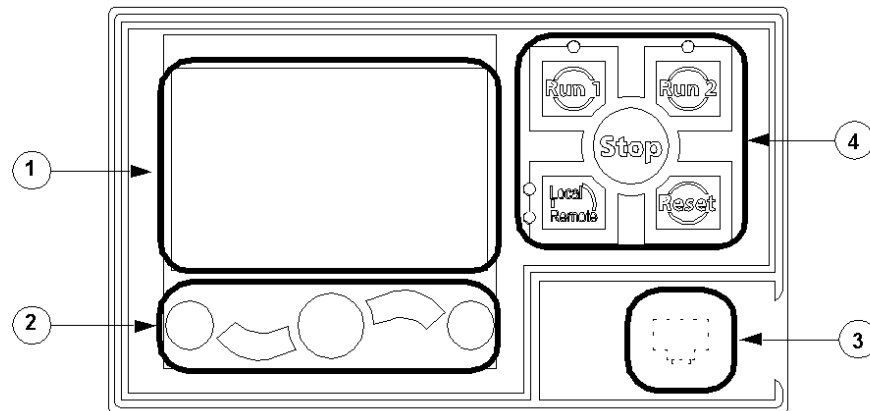
### Available Functions

Once connected to the LTM R, the LTM CU can be used to:

- configure parameters for the LTM R controller,
- display information about the LTM R controller configuration and operation,
- monitor trips and alarms generated by the controller,
- control the motor locally using the local control interface.

## LTM CU Front Face

The LTM CU front face is shown below:



- 1 LCD display
- 2 Contextual navigation keys
- 3 Front face RJ45 port for PC connection (covered)
- 4 Local control interface, including 5 control keys and 4 LEDs

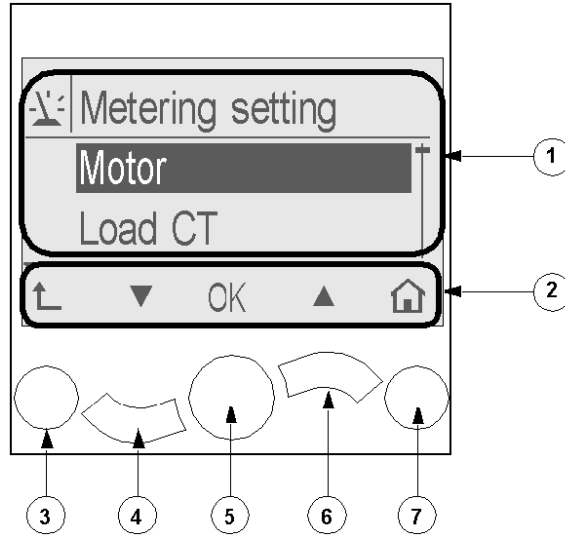
## Navigation Keys

The LTM CU navigation keys are contextual, that is, their function depends on the associated icons shown on the LCD display. These icons change for different displays, so the navigation key functions also change.

The navigation keys can be used to:

- navigate menus and sub-menus,
- scroll within a value list,
- select a setting in a value list,
- exit a value list without making a selection,
- return to the main (first-level) menu,
- switch between manual and automatic presentation mode in Quick View display.

The diagram below shows an example of the different functions of each of the navigation keys associated with an icon on the LCD display:



- 1 Information area of the LCD display
- 2 Contextual navigation icons area of the LCD display
- 3 Move up to the next higher-level menu
- 4 Move down to the next item in the menu
- 5 Select an item
- 6 Move up to the previous item in the menu
- 7 Return to the main menu












## LCD Displays

The LTM CU presents 3 different LCD displays:

LCD display	Functionality
Menu	<ul style="list-style-type: none"> <li>• Displaying and editing the configuration settings required for configuring the LTM R (metering, protection, control and services settings)</li> <li>• Displaying diagnostic and history data</li> </ul>
Quick View	<ul style="list-style-type: none"> <li>• Displaying real-time metering of pre-selected parameters by automatic or manual scrolling</li> </ul>
Detected Trips and Alarms	<ul style="list-style-type: none"> <li>• Displaying the most recent detected trip or alarm</li> </ul>

















## Contextual Navigation Icons

The following table describes the icons used with the contextual navigation buttons on the LTM CU:

Icon	Description	Icon	Description
	Enables access to the main menu from a sub-menu or from Quick View		Enables access to Quick View from the main menu or a sub-menu
	Scroll down		Enables access to manual scroll mode (when Quick View is in automatic scroll mode)
	Scroll up		Enables access to automatic scroll mode (when Quick View is in manual scroll mode)
	Validates a setting or value and enables access to a sub-menu when a menu is selected		Used to increment a setting in menu mode
	Move up to the next higher-level menu		Used to decrement a setting in menu mode
	When a menu item is password-protected, this icon enables access to the Enter Password screen		

## Information Icons

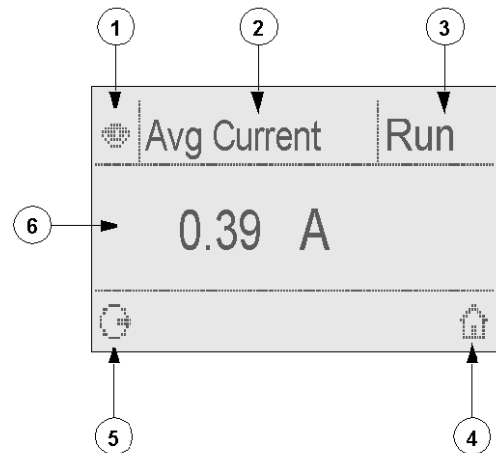
The following table describes the icons provided as information in the information area of the LCD display. They indicate, among others, the selected menu or parameter:

Icon	Description	Icon	Description
	Main menu		Indicates that the present display is Quick View
	Metering setting menu		Indicates that a detected alarm has occurred
	Protection setting menu		Indicates that a detected error has occurred
	Control setting menu		Information
	Services menu		Check box selected
	Language selection menu		Check box unselected
	Radio button selected		Item has been selected (for inclusion in Quick View display)
	Radio button unselected		LTM R in Configuration mode



## Example of an HMI Display

Here is an example of HMI LCD displaying an average current of 0.39 A in local control, run mode:

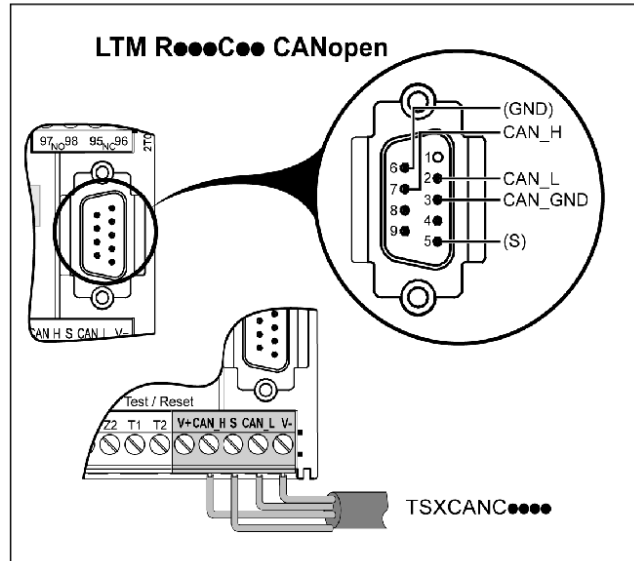


- 1 Quick View display icon
- 2 Name of the setting currently displayed
- 3 Motor state
- 4 Short key to main menu
- 5 Manual scroll mode icon; pressing the associated contextual navigation key switches to manual scroll mode
- 6 Value of the setting currently displayed

# Network Communication on CANopen

## Wire the Communication Port

This procedure is shown on the Instruction sheets provided with the LTM R and the LTM E, and described in the Installation chapter of the User Manual:



Use TSXCANKCDF180T connector (with ON/OFF line termination)

## Set the Parameters

For the application example, set the following parameters using PowerSuite software:

Settings Branch	Sub-branch	Parameter	Setting
Device information	–	Network	CANopen
Communication	Network port	Address	1
		Baud rate	250 kbits/s <sup>2</sup>
		Configuration via Network port	Disabled

Network Port Comm Loss parameter is enabled by default. If this is not suitable, you can disable this parameter.

## Introduction to CANopen

CANopen communication objects transmitted via the CAN network are described by services:

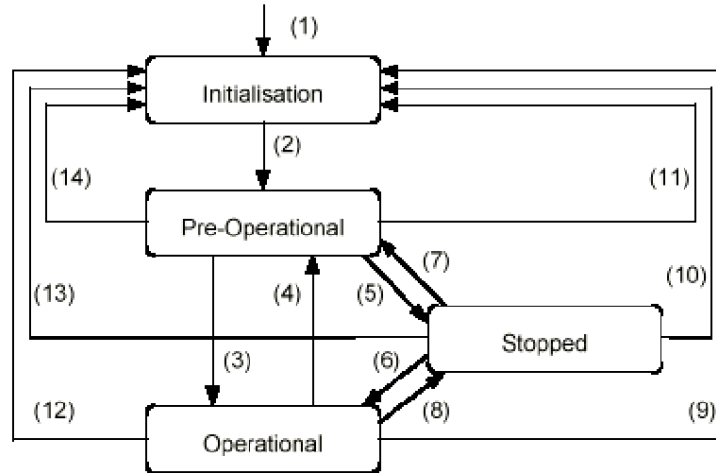
- **NETWORK MANAGEMENT**  
Starting the bus, parameter setting, monitoring.
- **HIGH SPEED TRANSMISSION OF PROCESS DATA**  
PDOs (Process Data Objects) for real time control command.

2. Baud rate can be selected as Autobaud if at least 1 secondary (slave) has been configured with a specific baud rate.

- **LOW SPEED TRANSMISSION OF SERVICE DATA**

SDOs (Service Data Objects)<sup>3</sup> for configuration, setting and diagnostics.

## Network Management (NMT)



**(1)** At power-up, the device enters the initialization state.

**(2)** Once initialization is finished, the pre-operational state is automatically entered (it is possible to send parameters). Note: in the pre-operational state, you can write some parameters selected by configuration.

**(3) (6)** Start\_Remote\_Node

**(4) (7)** Enter\_Pre-Operational\_State and apply fallback.

**(5) (8)** Stop\_Remote\_Node

**(9) (10) (11)** Reset\_Node

**(12) (13) (14)** Reset\_Communication

## Cyclic Data Use

The real time data transfer is performed by means of Process Data Object (PDO) telegrams. Process Data is time-critical data used to monitor and control the device. PDO telegrams are used to exchange periodic I/O data between the PLC and the LTM R controller.

The LMT R controller has 4 PDO sets:




- PDO1 set is predefined for control and monitoring. It is activated by default.
- PDO2 set is not predefined and is available to use. It is not activated by default.
- PDO3 set is not predefined and is available to use. It is not activated by default.
- PDO4 set is predefined to access any register (read or write) by programming using PKW objects. It is activated by default.
  - 4 words are reserved in Receive PDO4 to receive a request telegram.
  - 4 words are reserved in Transmit PDO4 to provide a response telegram.

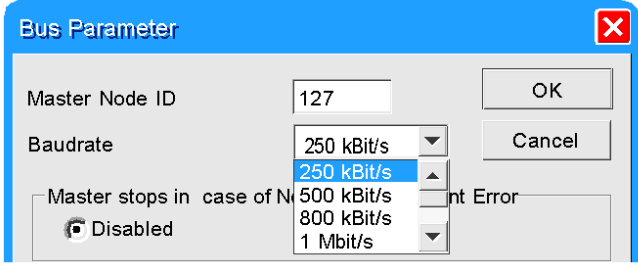
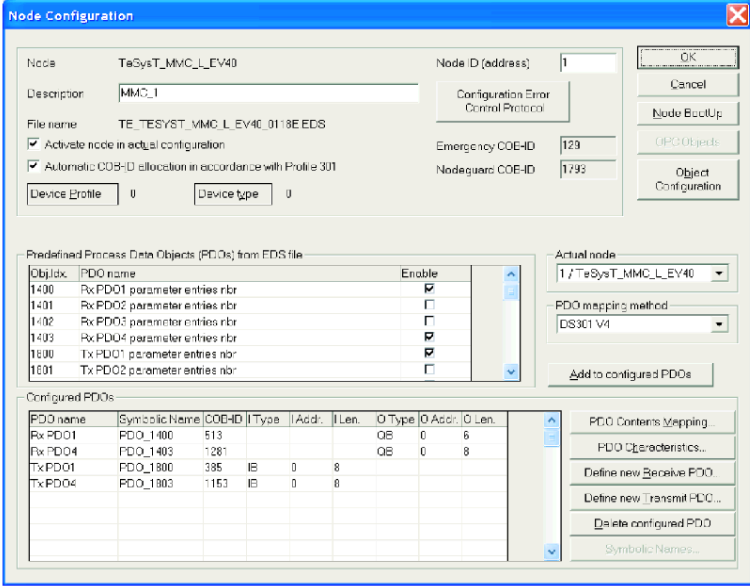
For TeSys T MMC L and TeSys T MMC LEV40, PKW use is restricted to read access.

3. For SDO use, refer to the User's Manual.

## Configure TeSys T via SyCon Software

Start configuring TeSys T via SyCon software. Example of a network configuration:

Step	Action
1	Import your GSD file with <b>File &gt; Copy ESD</b> .
2	Insert a master: <ul style="list-style-type: none"> <li>click <b>Insert &gt; Master...</b>, or</li> </ul>  <ul style="list-style-type: none"> <li>select</li> </ul>
3	In the <b>Insert Master</b> window, select the TSXCPP110 master from the <b>Available masters</b> list. Press the <b>Add&gt;&gt;</b> button and confirm with <b>OK</b> .
4	Insert a slave: <ul style="list-style-type: none"> <li>click <b>Insert &gt; Slave...</b>, or</li> </ul>  <ul style="list-style-type: none"> <li>select</li> </ul>
5	In the <b>Insert Slave</b> window, select TeSysT from the <b>Available slaves</b> list. Choose the right TeSys T variant (TeSys T MMC L EV40) and confirm with <b>OK</b> :  

Step	Action
6	<p>Set the bus parameter:</p> <ul style="list-style-type: none"> <li>• Double-click the Master and select <b>Setting &gt; Bus setting</b>.</li> <li>• Select the Speed and confirm with <b>OK</b>.</li> </ul> 
7	<p>Set the slave parameter:</p> <ul style="list-style-type: none"> <li>• Select the name of slave: <b>MMC_1</b></li> </ul> 

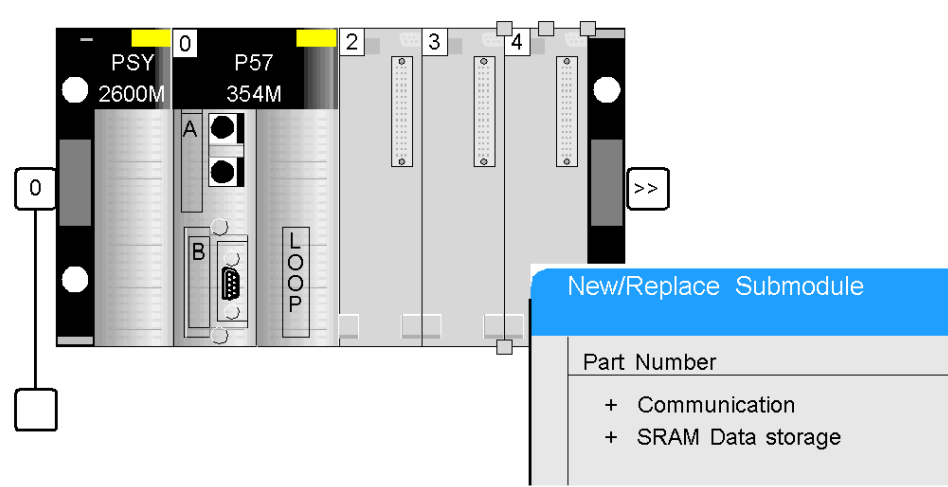
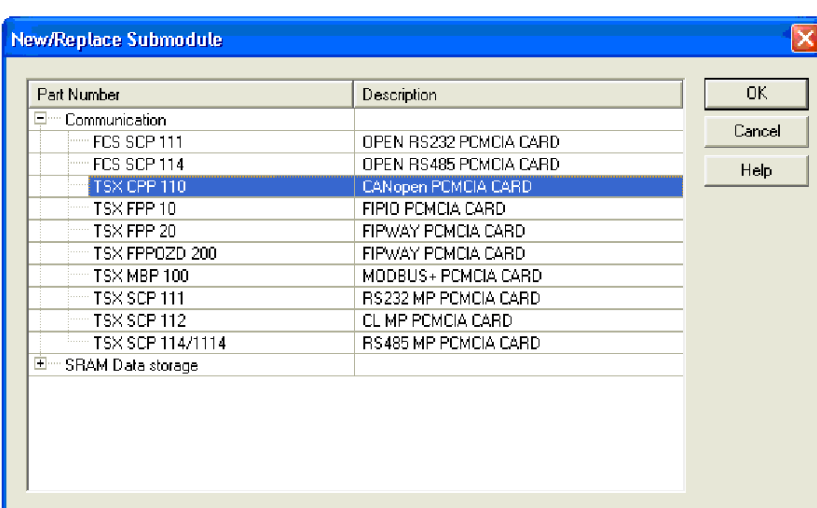
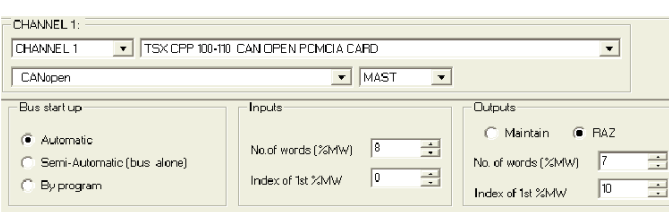
## Save and Export the Network Configuration

Save and export the configuration for importation into the PLC configuration:

Step	Action
1	Select <b>File &gt; Save As</b> to open the <b>Save as</b> window.
2	Choose the <b>Project path</b> and a <b>File name</b> and click <b>Save (.co file)</b> .
3	Select <b>File &gt; Export &gt; ASCII</b> to export the configuration as an ASCII file.
4	Import the CANopen configuration into the PLC configuration (PL7 or Unity Pro).

## Import the Network Configuration into a PLC via Unity Software

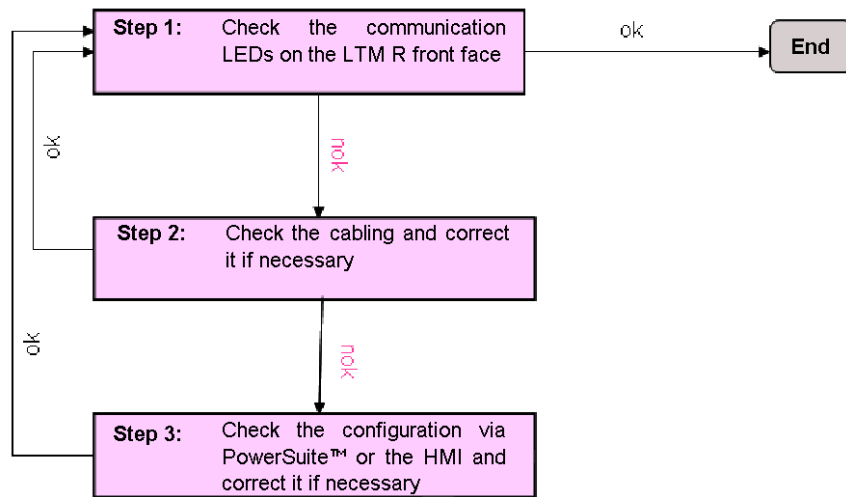
Example of a configuration import via Unity software:

Step	Description
1	<p>Declare the CANopen module in the Unity software:</p> <ul style="list-style-type: none"> <li>Right-click on slot B where the module is to be declared and add the module:</li> </ul>  <ul style="list-style-type: none"> <li>Select TSXCPP110 in the Communication family and click OK to confirm:</li> </ul> 
2	<p>Select the bus configuration file:</p> <ul style="list-style-type: none"> <li>Double-click on slot B to open the communication window.</li> <li>Click on Select Database and select your bus configuration file (.co file).</li> </ul>
3	<p>Check the bus configuration. Click on Bus configuration to check the CANopen devices; the number of words is the result of the product configuration, that must correspond to:</p> <ul style="list-style-type: none"> <li>%MW input = 8</li> <li>%MW output = 7.</li> </ul>
4	<p>Configure the user options:</p> <ul style="list-style-type: none"> <li>Type of task (Mast or Fast) = Mast</li> <li>Bus start up = Automatic</li> <li>Number of input words = 8. Index of 1st word for I/O = 0</li> <li>Output fallback strategy (in case of processor detected failure or stop): Number of word = 7. Index of 1st word = 10.</li> </ul> 

Step	Description
5	Transfer the configuration to the PLC and run: <ul style="list-style-type: none"> <li>Click <b>OK</b> to close the <b>Check</b> window</li> <li>Click <b>Validate</b> to confirm the configuration</li> <li>Load the configuration file in the PLC and run it.</li> </ul>
6	Communication test: <ul style="list-style-type: none"> <li>Open the debug screen to read and write cycle data.</li> </ul>
7	Develop and load the application program, then test it.

## CANopen Communication Test

The CANopen communication verification sequence is as follows:



## Receive PDO1 Mapping Description

Receive PDO1 is dedicated to commanding the controller from the PLC. This default mapping is predefined.

COB-ID		Word 1	Word 2	Word 3	Word 4
0x200 + Node-ID	Register	704	706	700	Empty
	CANopen index	2008:5	2008:7	2008:1	–
	Description	Control Register	Analog output 1 command	Logic output command register	–

## Transmit PDO1 Mapping Description

Transmit PDO1 is dedicated to monitoring the controller from the PLC. This default mapping is predefined.

COB-ID		Word 1	Word 2	Word 3	Word 4
0x180 + Node-ID	Register	455	456	457	458
	CANopen index	2004:6	2004:7	2004:8	2004:9
	Description	System status register 1	System status register 2	Logic inputs status	Logic outputs status

## Receive PDO4 Mapping Description

Receive PDO4 is dedicated to receiving PKW request telegrams.

CANopen Index	3000:01				3000:02	
Word number	Word 1	Word 2			Word 3	Word 4
		MSB		LSB	–	–
Description	Address register	Toggle bit (bit 7)	Function code (bit 6 to 0)	0x00	Value to write: 1st word MSW	Value to write: 2nd word LSW

## Transmit PDO4 Mapping Description

Transmit PDO4 is dedicated to providing responses to PKW request telegrams.

CANopen Index	3000:03				3000:04	
Word number	Word 1	Word 2			Word 3	Word 4
		MSB		LSB		-
Description	Same as request	Toggle bit (bit 7)	Function code (bit 6 to 0)	0x00	Read data: 1st word MSW	Read data: 2nd word LSW

### NOTE:

- MSB = Most Significant Bit
- LSB = Least Significant Bit
- MSW = Most Significant Word
- LSW = Least Significant Word

## Command Variables 700-705

Command variables 700-705 are described below:



Register	CANopen Address	Variable Type	Read / Write Variables
700	2008:01	Word	Logic outputs command register
			bit 0 Logic output 1 command
			bit 1 Logic output 2 command
			bit 2 Logic output 3 command
			bit 3 Logic output 4 command
			bit 4 Logic output 5 command
			bit 5 Logic output 6 command
			bit 6 Logic output 7 command
			bit 7 Logic output 8 command
bits 8-15 ( <i>Reserved</i> )			
704	2008:05	Word	Control register 1
			bit 0 Motor run forward command
			bit 1 Motor run reverse command
			bit 2 ( <i>Reserved</i> )
			bit 3 Trip reset command
			bit 4 ( <i>Reserved</i> )
			bit 5 Self test command
			bit 6 Motor low speed command
bits 7-15 ( <i>Reserved</i> )			
705	2008:06	Word	Control register 2
			bit 0 Clear all command
			bit 1 Clear statistics command
			bit 2 Clear thermal capacity level command
			bit 3 Clear controller settings command
			bit 4 Clear network port settings command
bits 5-15 ( <i>Reserved</i> )			

## Monitoring Variables 455-458

Monitoring variables 455, 456, 457 and 458 are described below:

Register	CANopen Address	Variable Type	Read-only Variables			
455	2004:06	Word	System status register 1			
			bit 0 System ready			
			bit 1 System on			
			bit 2 System trip			
			bit 3 System alarm			
			bit 4 System tripped			
			bit 5 Trip reset authorized			
			bit 6 Controller power			
			bit 7 Motor running (with detection of a current, if greater than 10% FLC)			
			bits 8-13 Motor average current ratio 32 = 100% FLC - 63 = 200% FLC			
			bit 14 Control via HMI			
			bit 15 Motor starting (start in progress) 0 = descending current is less than 150% FLC 1 = ascending current is greater than 10% FLC			
			456	2004:07	Word	System status register 2
						bit 0 Auto-reset active
bit 1 ( <i>Not significant</i> )						
bit 2 Trip power cycle requested						
bit 3 Motor restart time undefined						
bit 4 Rapid cycle lockout						
bit 5 Load shedding						
bit 6 Motor speed						
bit 7 HMI port comm loss						
bit 8 Network port comm loss						
bit 9 Motor transition lockout						
bits 10-15 ( <i>Not significant</i> )						

Register	CANopen Address	Variable Type	Read-only Variables
457	2004:08	Word	Logic inputs status
			bit 0 Logic input 1
			bit 1 Logic input 2
			bit 2 Logic input 3
			bit 3 Logic input 4
			bit 4 Logic input 5
			bit 5 Logic input 6
			bit 6 Logic input 7
			bit 7 Logic input 8
			bit 8 Logic input 9
			bit 9 Logic input 10
			bit 10 Logic input 11
			bit 11 Logic input 12
			bit 12 Logic input 13
			bit 13 Logic input 14
			bit 14 Logic input 15
bit 15 Logic input 16			
458	2004:09	Word	Logic outputs status
			bit 0 Logic output 1
			bit 1 Logic output 2
			bit 2 Logic output 3
			bit 3 Logic output 4
			bit 4 Logic output 5
			bit 5 Logic output 6
			bit 6 Logic output 7
			bit 7 Logic output 8
bits 8-15 ( <i>Reserved</i> )			





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