This document is based on European standards and is not valid for use in U.S.A.

Compact / CANopen / Logic Controller / M258 + Performance Packaging

System User Guide



EIO0000000293.01

Schneider

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Important Information

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



The addition of this 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 potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.

WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.

CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.

CAUTION

CAUTION, used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, **can result in** equipment damage.

PLEASE NOTE Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and the installation, and has received safety training to recognize and avoid the hazards involved

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Before You Begin

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to **the operator of that machine.**

⚠ WARNING

UNGUARDED MACHINERY CAN CAUSE SERIOUS INJURY

- Do not use this software and related automation products on equipment which does not have point-of-operation protection.
- Do not reach into machine during operation.

Failure to follow these instructions can cause death, serious injury or equipment damage.

This automation equipment and related software is used to control a variety of industrial processes. The type or model of automation equipment suitable for each application will vary depending on factors such as the control function required, degree of protection required, production methods, unusual conditions, government regulations, etc. In some applications, more than one processor may be required, as when backup redundancy is needed.

Only the user can be aware of all the conditions and factors present during setup, operation and maintenance of the machine; therefore, only the user can determine the automation equipment and the related safeties and interlocks which can be properly used. When selecting automation and control equipment and related software for a particular application, the user should refer to the applicable local and national standards and regulations. A "National Safety Council's" Accident Prevention Manual also provides much useful information.

In some applications, such as packaging machinery, additional operator protection such as point-of-operation guarding must be provided. This is necessary if the operator's hands and other parts of the body are free to enter the pinch points or other hazardous areas and serious injury can occur. Software products by itself cannot protect an operator from injury. For this reason the software cannot be substituted for or take the place of point-of-operation protection.

Ensure that appropriate safeties and mechanical/electrical interlocks for point-of-operation protection have been installed and are operational before placing the equipment into service. All mechanical/electrical interlocks and safeties for point-of-operation protection must be coordinated with the related automation equipment and software programming.

NOTE: Coordination of safeties and mechanical/electrical interlocks for point-of-operation protection is outside the scope of this document.

START UP AND TEST

Before using electrical control and automation equipment for regular operation after installation, the system should be given a start up test by qualified personnel to verify correct operation of the equipment. It is important that arrangements for such a check be made and that enough time is allowed to perform complete and satisfactory testing.

⚠ CAUTION

EQUIPMENT OPERATION HAZARD

- Verify that all installation and set up procedures have been completed.
- Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.
- Remove tools, meters and debris from equipment.

Failure to follow these instructions can result in injury or equipment damage.

Follow all start up tests recommended in the equipment documentation. Store all equipment documentation for future reference.

Software testing must be done in both simulated and real environments.

Verify that the completed system is free from all short circuits and grounds, except those grounds installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Before energizing equipment:

- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Remove ground from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

OPERATION AND ADJUSTMENTS

The following precautions are from NEMA Standards Publication ICS 7.1-1995 (English version prevails):

- Regardless of the care exercised in the design and manufacture of equipment or in the selection and rating of components, there are hazards that can be encountered if such equipment is improperly operated.

- It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer's instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer's instructions and the machinery used with the electrical equipment.

- Only those operational adjustments actually required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Only use software tools approved by Schneider Electric for use with this equipment.
- Update your application program every time you change the physical hardware configuration.

Failure to follow these instructions can cause death, serious injury or equipment damage.

Introduction

Introduction

This document is intended to provide a quick introduction to the described system. It is not intended to replace any specific product documentation, nor any of your own design documentation. On the contrary, it offers additional information to the product documentation, for installing, configuring and implementing the system.

The architecture described in this document is not a specific product in the normal commercial sense. It describes an example of how Schneider Electric and third-party components may be integrated to fulfill an industrial application.

A detailed functional description or the specification for a specific user application is not part of this document. Nevertheless, the document outlines some typical applications where the system might be implemented.

The architecture described in this document has been fully tested in our laboratories using all the specific references you will find in the component list near the end of this document. Of course, your specific application requirements may be different and will require additional and/or different components. In this case, you will have to adapt the information provided in this document to your particular needs. To do so, you will need to consult the specific product documentation of the components that you are substituting in this architecture. Pay particular attention in conforming to any safety information, different electrical requirements and normative standards that would apply to your adaptation.

It should be noted that there are some major components in the architecture described in this document that cannot be substituted without completely invalidating the architecture, descriptions, instructions, wiring diagrams and compatibility between the various software and hardware components specified herein. You must be aware of the consequences of component substitution in the architecture described in this document as substitutions may impair the compatibility and interoperability of software and hardware.

⚠ CAUTION

EQUIPMENT INCOMPATIBILITY OR INOPERABLE EQUIPMENT

Read and thoroughly understand all hardware and software documentation before attempting any component substitutions.

Failure to follow these instructions can result in injury or equipment damage.

This document describes a generic architecture based on Modicon M258 Logic controller G-Type and a packaging architecture based on Modicon M258 Logic controller S-Type.

Abbreviations

Abbreviation	Signification
AC	Alternating Current
CB	Circuit Breaker
CFC	Continuous Function Chart - a programming language based on function chart
DI	Digital Input
DO	Digital Output
DC	Direct Current
DFB	Derived Function Blocks
EDS	Electronic Data Sheet
E-STOP	Emergency Stop
FBD	Function Block Diagram - an IEC-61131 programming language
HMI	Human Machine Interface
I/O	Input/Output
IL	Instruction List - a textual IEC-61131 programming language
IP	Internet Protocol
LD	Ladder Diagram - a graphic IEC-61131 programming language
MBTCP	Communications protocol with Modbus over TCP (Ethernet)
MFB	PLCopen Motion Function Block
PC	Personal Computer
POU	Programmable Object Unit, Program Section in SoMachine
PDO	Process Data Object (CANopen)
PS	Power Supply
RMS	Root Mean Square
RPM	Revolution Per Minute
RPDO	Receive Process Data Object (CANopen)
SD	Stepper motor Drive
SE	Schneider Electric
SFC	Sequential Function Chart - an IEC-61131 programming language
SDO	Service Data Object
ST	Structured Text - an IEC-61131 programming language
TCP	Transmission Control Protocol
TPDO	Transmit Process Data Object (CANopen)
TVDA	Tested, Validated and Documented Architecture
VSD	Variable Speed Drive
WxHxD	Dimensions: Width, Height and Depth

Glossary

Expression	Signification
Altivar (ATV)	SE product name for a family of VSDs
CANopen	Name for a communications machine bus system
Harmony	SE product name for a family of switches and indicators
ILA, ILE	SE product name for a integrated drive Lexium
Lexium (LXM)	SE product name for a family of servo drives
Magelis	SE product name for a family of HMI devices
MB - SL	SE name for a serial Modbus communications protocol
Modbus	A Communications protocol
Modicon M258 Logic controller	SE product name for Logic Controller
Modicon TM5/TM7	SE product name for I/O island
OsiSense	SE product name for a family of sensors
Phaseo	SE product name for a family of power supplies
PLCopen	An international standard for industrial controller programming.
Preventa	SE product name for a family of safety devices
SD3	SE product name for Lexium stepper motor drives SD3
SoMachine	SE product name for an integrated software tool
TeSys	SE product name for a family of motor protection devices and load contactors
Vijeo Designer	SE product name for Magelis HMI devices configuration software

Application Source Code

Introduction

The example source code is in the form of configuration, application and import files. Use the appropriate software tool to either open or import the files.

Extension	File Type	Software Tool Required
CSV	Comma Separated Values, Spreadsheet	MS Excel
DOC	Document file	Microsoft Word
DWG	Project file	AutoCAD
EDS	Electronic Data Sheet - Device Definition	Industrial standard
PDF	Portable Document Format - document	Adobe Acrobat
PROJECT	Project file	SoMachine
VDZ	Project file	Vijeo Designer
ZW1	Project archive file	EPLAN P8

Typical Applications

Introduction

Here you will find a list of the typical applications and market segments, where this system or subsystem can be applied:

Hoisting
- Gantry crane
- Overhead traveling crane

Conveying
- Roller Bed
- Chain conveyor
- Turn table
- Transfer

Packaging
- Filling & closing machines
- Vertical bagging machines
- Boxing machines
- Carton closing / erecting machines
- Shrink wrapping machines
- Labeling machines
- Horizontal bagging machines

Textile
- Opening and closing machines
- Circular knitting machines
- Plucking machines
- Blending machines
- Carding machines
- Drawing frame machines
- Combing machines
- Ring Spinning machines
- Scouring Bleaching machines
- Jigger machines
- Pre shrinking machines
- Beaming warping machines
- Sizing machines

Pumping
- Booster stations
- Compressors
- Vacuum pumps

other
- Winding / Unwinding machines
- Wood working machines
- Cutting machines
- Sander machines
- Sawing machines

SPECIAL NOTE
The products specified in this document have been tested under actual service conditions. Of course, your specific application requirements may be different from those assumed for this and any related examples described herein. In that case, you will have to adapt the information provided in this and other related documents to your particular needs. To do so, you will need to consult the specific product documentation of the hardware and/or software components that you may add or substitute for any examples specified in this documentation. Pay particular attention and conform to any safety information, different electrical requirements and normative standards that would apply to your adaptation.

The application examples and descriptions contained in this document have been developed based on products and standards available and defined for Europe. Some or all of the application examples may contain recommendations of products that are not available in your country or locality, or may recommend wiring, products, procedures or functions that are in conflict with your local, regional or national electrical or safety codes and/or normative standards.

⚠ WARNING

REGULATORY INCOMPATIBILITY

Be sure that all equipment applied and systems designed comply with all applicable local, regional and national regulations and standards.

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

NOTE:
The information in this document is based on European standards and may not be valid for use in the U.S.A.

The use and application of the information contained herein require expertise in the design and programming of automated control systems. Only the user or integrator can be aware of all the conditions and factors present during installation and setup, operation, and maintenance of the machine or process, and can therefore determine the automation and associated equipment and the related safety provisions and interlocks which can be effectively and properly used. When selecting automation and control equipment, and any other related equipment or software, for a particular application, the user or integrator must also consider any applicable local, regional or national standards and/or regulations.

System

Introduction

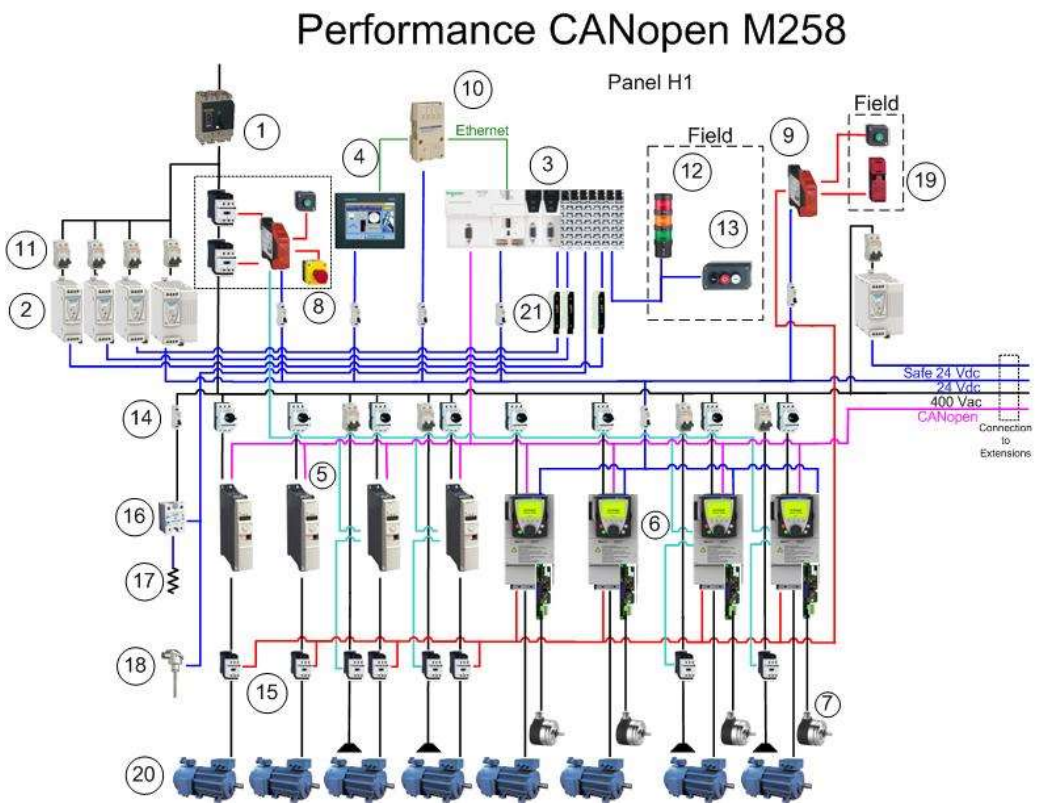
The system chapter describes the architecture, the dimensions, the quantities and different types of components used within this system.

Architecture

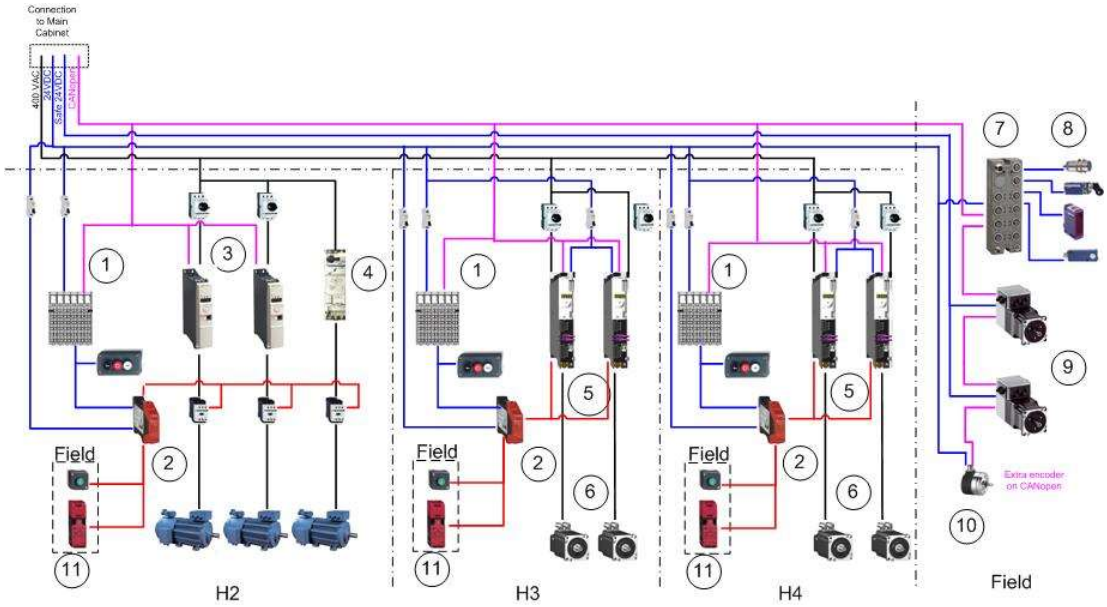
General

The controller in this application is a Modicon M258 Logic Controller. The user can control the application using the Magelis HMI device. The VSDs, motor starter, integrated drives and servo drives are connected to the controller via a CANopen fieldbus. The example application includes two functional safety options according to EN ISO 13849-1 standards: an Emergency Stop function supervised by a Preventa safety module (see the appropriate hardware manual), and a second Preventa safety module to evaluate protective door sensors

Layout



1. Compact NSX main switch
2. Phaseo ABL8 power supply
3. Modicon M258 Logic Controller
4. Magelis XBTGT HMI
5. Altivar 32 variable speed drive
6. Altivar 71 variable speed drive + encoder card
7. OsiSense (Osicoder) encoder
8. Harmony E-Stop
9. Preventa XPS safety module
10. ConneXium Ethernet switch
11. Multi 9 circuit breaker
12. Harmony XVBC Tower light
13. Harmony XALD pushbuttons
14. TeSys GVL2 motor circuit breaker
15. TeSysD load contactors
16. Crouzet solid state relay
17. Heating device
18. Pt100 temperature sensor
19. Preventa XCS safety switch
20. AC motor
21. Slow blow fuse



1. Modicon I/O-island TM5
2. Preventa safety module XPS
3. Altivar 32 variable speed drives
4. TeSysU motor starter
5. Lexium 32A servo drives
6. Lexium servo motor BSH
7. Modicon IP65 I/O-island TM7
8. OsiSense sensors
9. Lexium integrated drive ILA
10. CANopen encoder XCC
11. Preventa safety switch XCS

Components

Hardware:

- Compact NSX main switch
- Phaseo power supply ABL8
- Modicon M258 Logic Controller
- Modicon TM5/TM7 I/O-island
- Magelis XBTGT HMI
- Altivar 32 and 71 variable speed drive
- Lexium 32A servo drive
- Lexium ILA integrated drive
- TeSysU motor starter
- OsiSense osicoder encoder
- Harmony pushbuttons
- Preventa XPS safety module
- TeSys GV2L motor circuit breaker
- TeSysD load contactors
- Connexium Ethernet switch

Software:

- SoMachine V3.0

Quantities of Components

For a complete and detailed list of components, the quantities required and the order numbers, please refer to the components list at the rear of this document.

Degree of Protection

Not all the components in this configuration are designed to withstand the same environmental conditions. Some components may need additional protection, in the form of housings, depending on the environment in which you intend to use them. For environmental details of the individual components please refer to the list in the appendix of this document and the corresponding user manual.

Cabinet Technical Data

Input	Mains voltage	400 Vac
	Power requirement	~ 11 kW
	Cable size	5 x 2.5 mm² (L1, L2, L3, N, PE)
	Cable connection	3 phase + Neutral + Ground Neutral is needed for 230 Vac (Phase and Neutral)
Output	Motor power ratings	6 asynchronous motors controlled by ATV32 (0.37 kW and 0.75 kW) 4 asynchronous motors controlled by ATV71 (0.75 kW) 4 servo motors (BSH type with brake) controlled by LXM32 (continuous output current : 6 A RMS at 6000 RPM)

Functional Safety Notice

(EN ISO 13849-1 EN IEC 62061)

The standard and level of functional safety you apply to your application is determined by your system design and the overall extent to which your system may be a hazard to people and machinery.

Whether or not a specific functional safety category should be applied to your system should be ascertained with a proper risk analysis.

This document is not comprehensive for any systems using the given architecture and does not absolve users of their duty to uphold the functional safety requirements with respect to the equipment used in their systems or of compliance with either national or international safety laws and regulations

Emergency Stop

Emergency Stop/Emergency Disconnection function

This function for stopping in an emergency is a protective measure which complements the safety functions for the safeguarding of hazardous zones according to prEN ISO 12100-2.

Safety Function

Door guarding

up to Performance Level (PL) = b, Safety Integrity Level (SIL) = 1

Dimensions

The dimensions of the individual devices used; controller, drive, power supply, etc. require a main cabinet size of at least 1200 x 1800 x 600 mm (WxHxD), two remote cabinets with the size of 600 x 600 x 400 mm (WxHxD) and one with the size of 600 x 800 x 400 mm (WxHxD).

The HMI display, illuminated indicators such as “SYSTEM ON“, “SYSTEM OFF“ or “ACKNOWLEDGE EMERGENCY STOP“ as well as the Emergency Stop switch itself, can be built into the door of the cabinet.

Installation

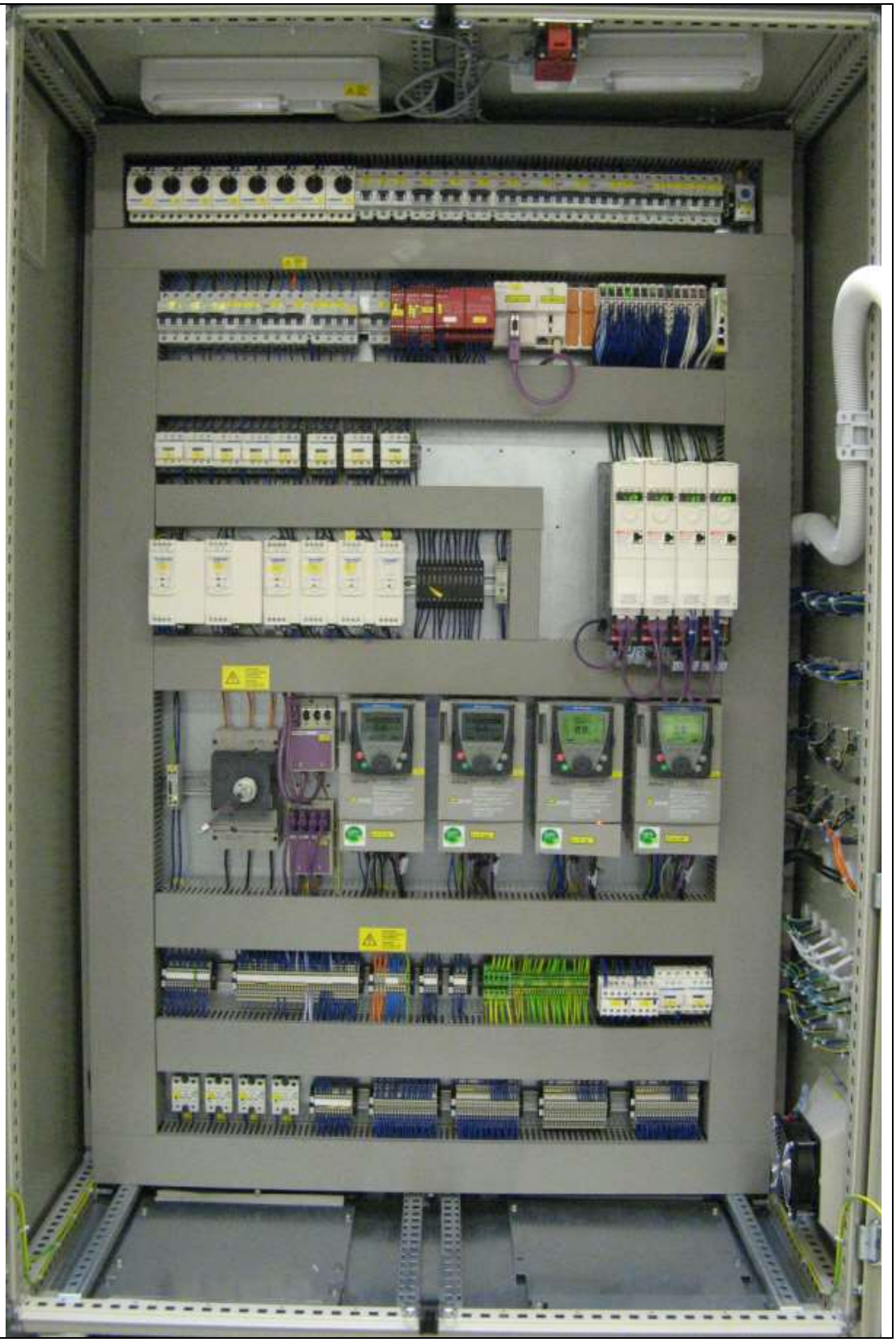
Introduction

This chapter describes the steps necessary to set up the hardware and configure the software required to fulfill the described function of the application.

Assembly

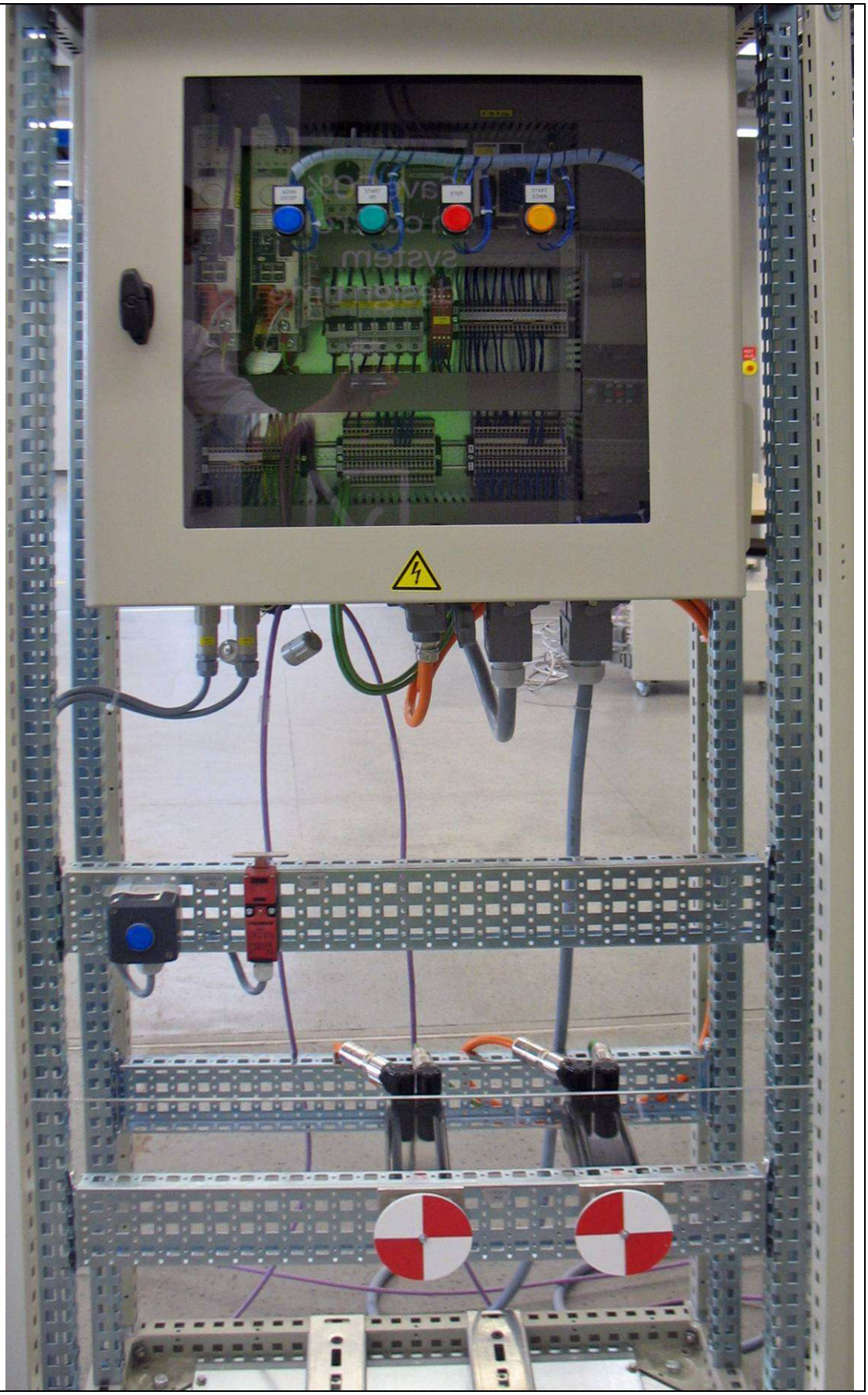
Main cabinet H1 front

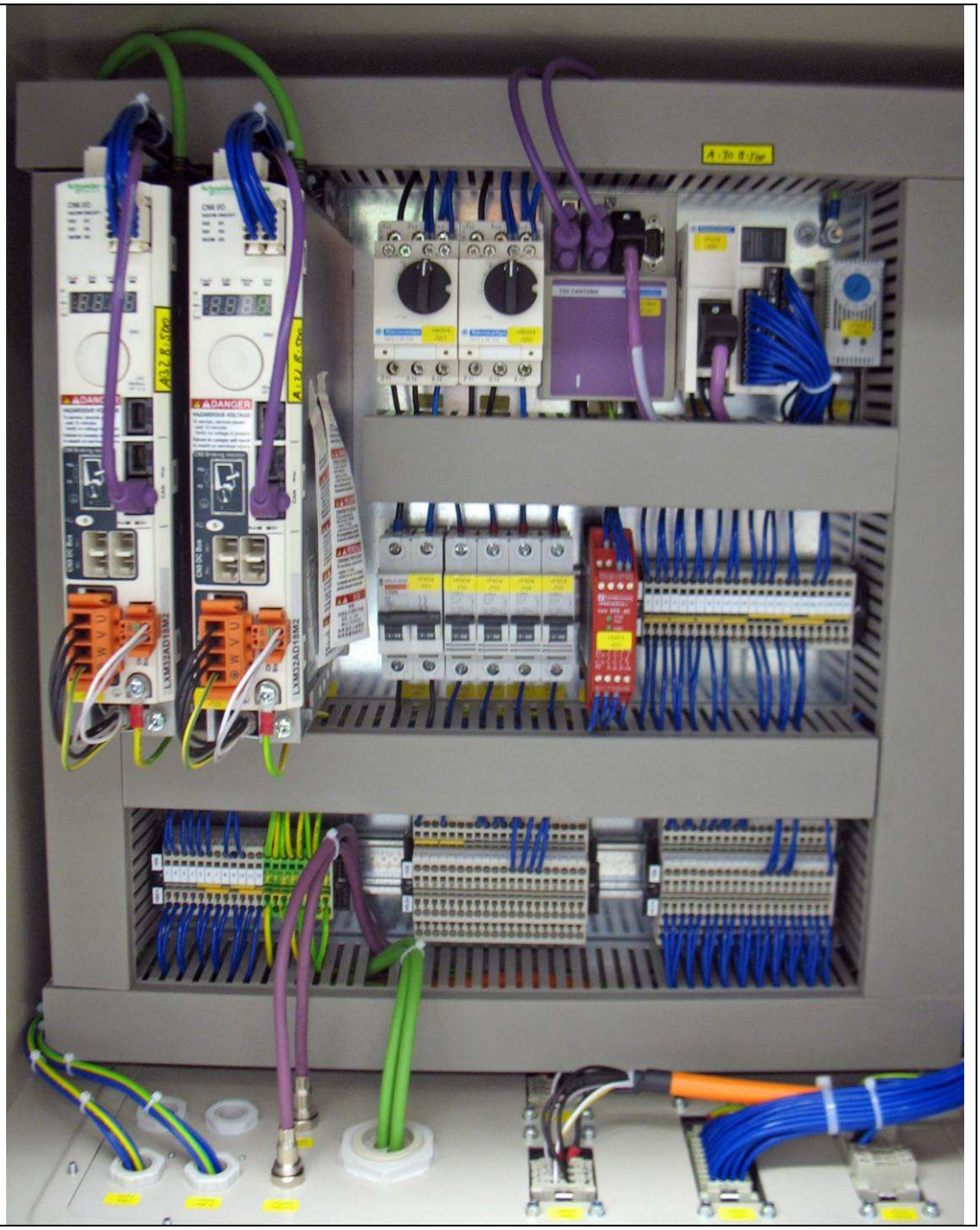


Main cabinet H1 interior	

Distributed cabinet H2 Frontview	

Distributed cabinet H2 Interior	

Distributed cabinet H3 & H4 Front	

Distributed cabinet H3 & H4 Interior	

Field devices and motors	

Notes

The components designed for installation in a cabinet, i.e. the controller, safety modules, circuit breakers, contactors, motor circuit breakers, power supply, TeSysU motor starters and TM5 I/O island modules can be mounted on a 35 mm DIN rail.

Main switch, solid state relays, Lexium 32A servo drives and Altivar variable speed drives are screwed directly onto the mounting plate.

The ILA integrated drives, the Osicoder CANopen encoder and the TM7 I/O islands are installed in the field.

The Emergency Stop button, the door guard switches and the pushbutton housing for the display and acknowledgement indicators are designed for on-wall mounting in the field. All switches (except the door guard switch) can also be installed directly in a control cabinet (e.g., in a cabinet door) without special housings.

There are two options for installing XB5 pushbuttons or indicator lamps: These pushbuttons or switches can be installed either in a 22 mm hole, e.g., drilled into the front door of the control cabinet, or in an XALD-type housing suitable for up to 5 pushbuttons or indicator lamps. The XALD pushbutton housing is designed for backplane assembly or direct wall mounting.

The individual components must be interconnected in accordance with the detailed circuit diagram in order to ensure that they function correctly.

- 400 Vac / 3-phase or 230 Vac / 1-phase wiring for the motion and drive circuitry (LXM32A, ATV32, ATV71, TeSysU and ILA).
- 230 Vac and 400 Vac wiring for the power supply.
- 24 Vdc wiring for control circuits and the controller power supply, I/O modules and the HMI.

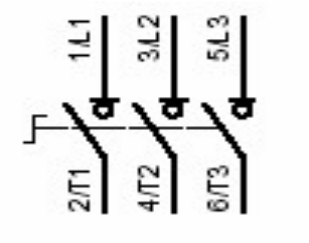
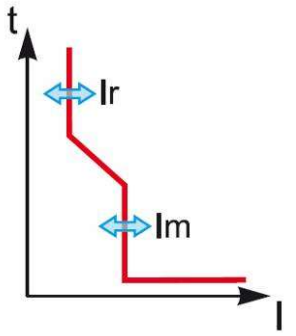
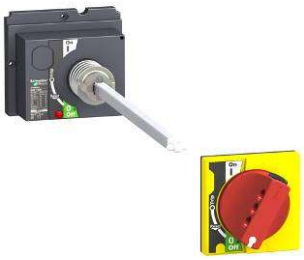
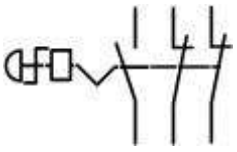
CANopen cables are installed for the communications link between the controller and the ATV32, LXM32A, ATV71, ILA, OsiSense (Osicoder), TeSysU, TM5 and TM7 I/O islands.

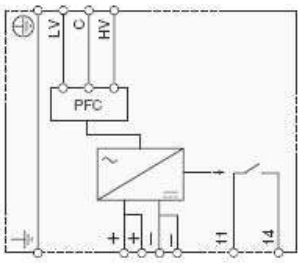
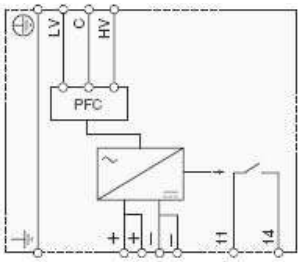
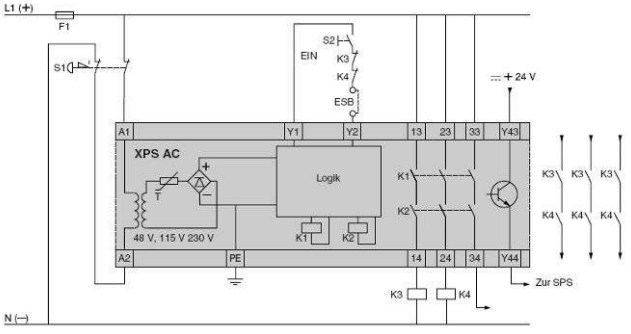
Ethernet cables are installed for the communications link between the controller and the HMI.

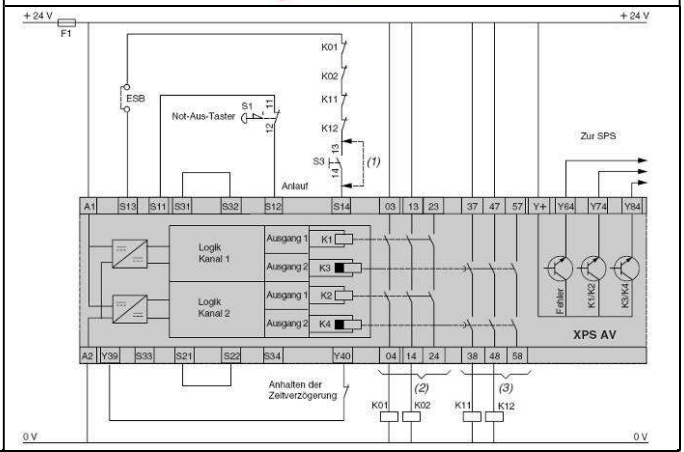
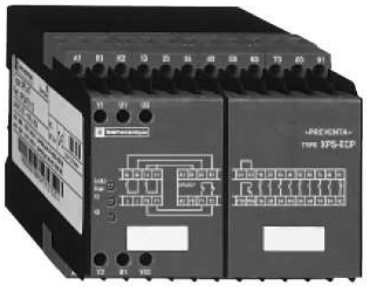
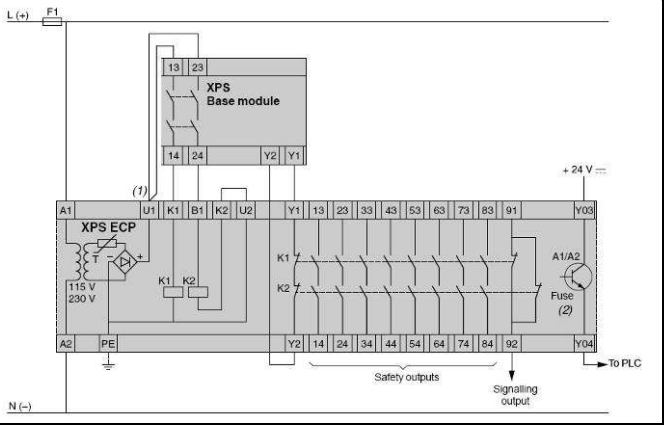
Hardware

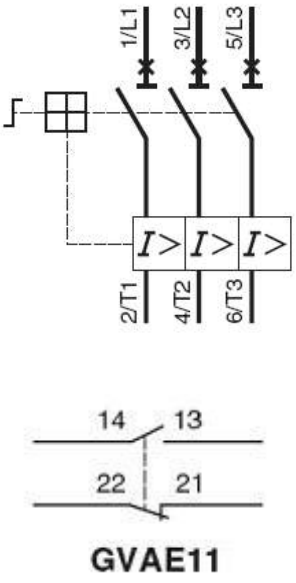
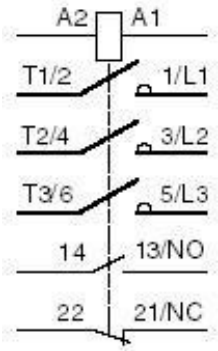
General

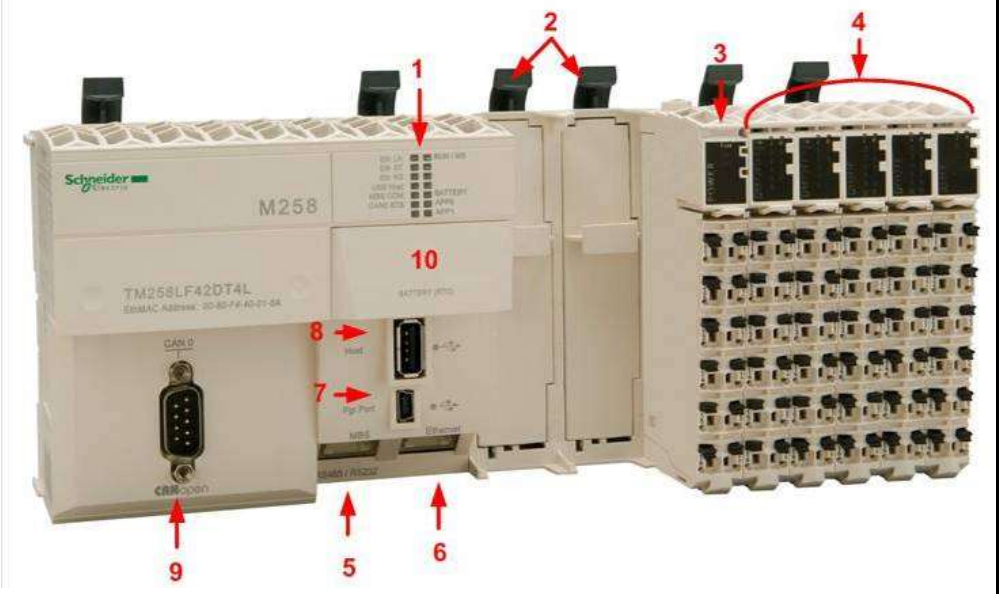
General description of the hardware.

Main Switch **Compact NSX100F** **LV429003** 36 kA 380/415 Vac		
Main Switch **Compact NSX100F** **LV429037** Trip unit TM16D Thermal-magnetic 16 A		 Ir - Thermal protection Im - Magnetic protection
Main Switch **Compact NSX100F** **Rotary handle** **LV429340** **Terminal shield** **LV429515**	 Rotary handle with red handle on yellow front	 Terminal shield short
Harmony **Emergency Stop** **switch** (trigger action) **XALK178G**		

Power supply **Phaseo** **ABL8RPS24050** 24 Vdc, 5 A		
Power supply **Phaseo** **ABL8RPS24100** 24 Vdc, 10 A		
Safety Module **Preventa** **XPSAC5121**		

Safety Module **Preventa** **XPSAV1113Z002**	 
Expansion Module **Preventa** **XPSECP5131**	 

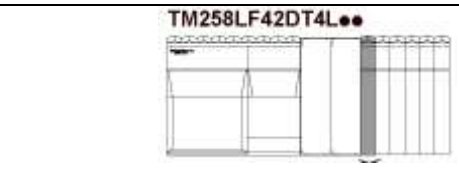
Motor Circuit Breaker **GV2L08** **and** **GV2L14** **with** **auxiliary contact** **GVAE11**		
Load Contactor **TeSysD** **LC1D18BL**		

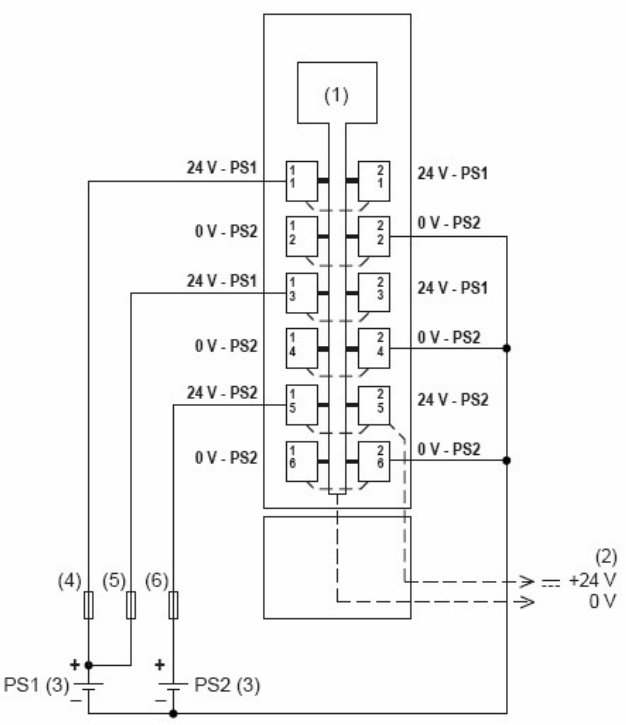
Modicon M258 Logic Controller **TM258LF42DT4L**	1. Status LEDs 2. IF slots 3. Power supply 4. Internal I/O area 5. RS485 port 6. Ethernet port 7. Mini USB port 8. USB A port 9. CANopen port 10. Battery area
	

Modicon M258
Logic Controller

Embedded
power supply

TM258LF42DT4L●●



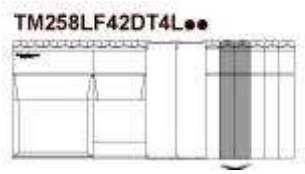


(1) Internal electronics
(2) 24 Vdc I/O power segment integrated into the bus bases
(3) PS1/PS2: External isolated power supply 24Vdc
(4) External fuse, Type T slow-blow, 3 A, 250V
(5) External fuse, Type T slow-blow, 2 A, 250V
(6) External fuse, Type T slow-blow, 10 A max., 250V

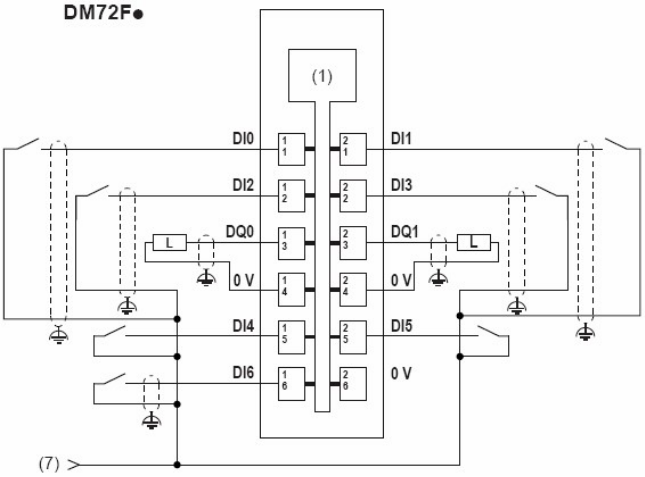
Modicon M258
Logic Controller

Embedded
expert I/Os

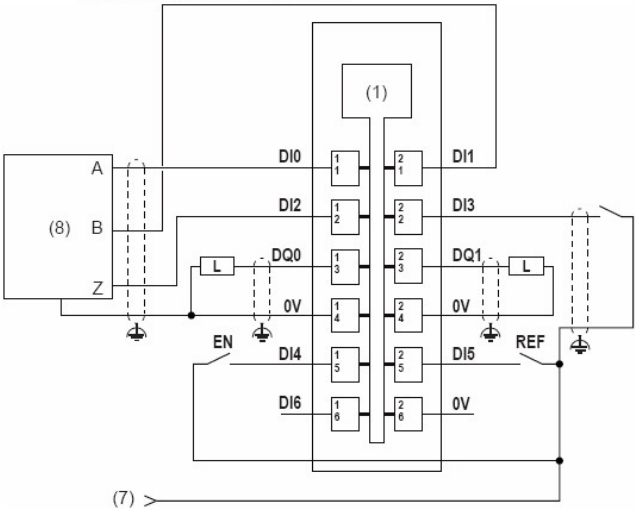
TM258LF42DT4L●●



DM72F●



DM72F● WITH ENCODER



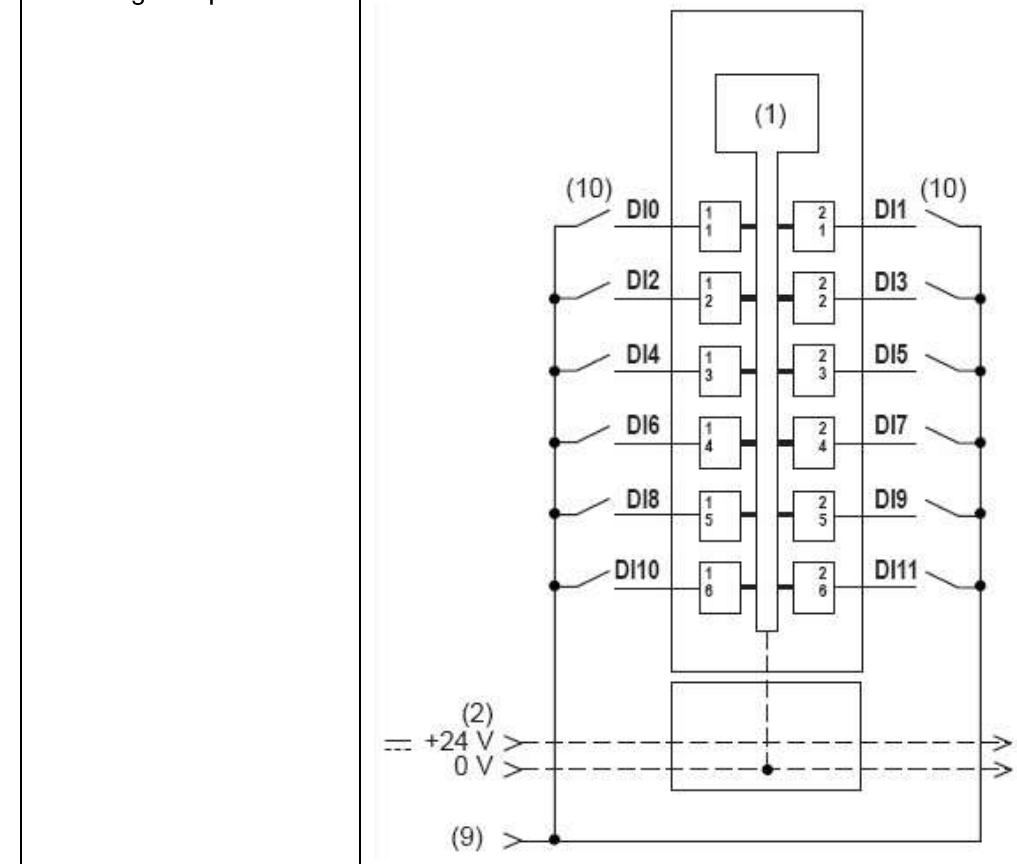
(1) Internal electronics
(7) 24 Vdc embedded expert modules power by external connection
(8) Encoder

DI0..DI3, DI6	Fast input
DI4, DI5	Regular input
DQ0, DQ1	Fast output

Modicon M258
Logic Controller

Embedded
digital inputs

TM258LF42DT4L●●



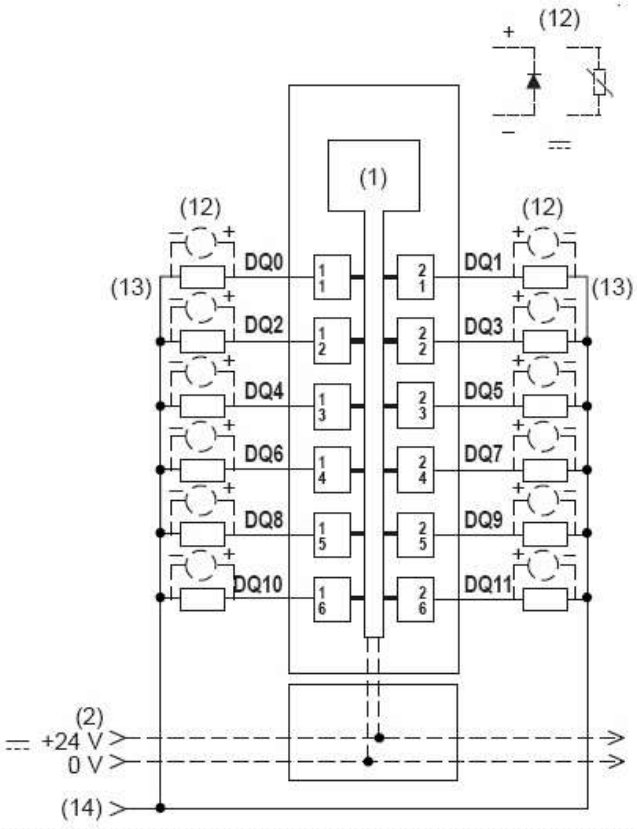
(1) Internal electronics
(2) 24 Vdc I/O power segment integrated into the bus bases
(9) 24 Vdc I/O power segment by external connection
(10) 2-wire sensor

Modicon M258
Logic Controller

Embedded
12 digital outputs

TM258LF42DT4L●●

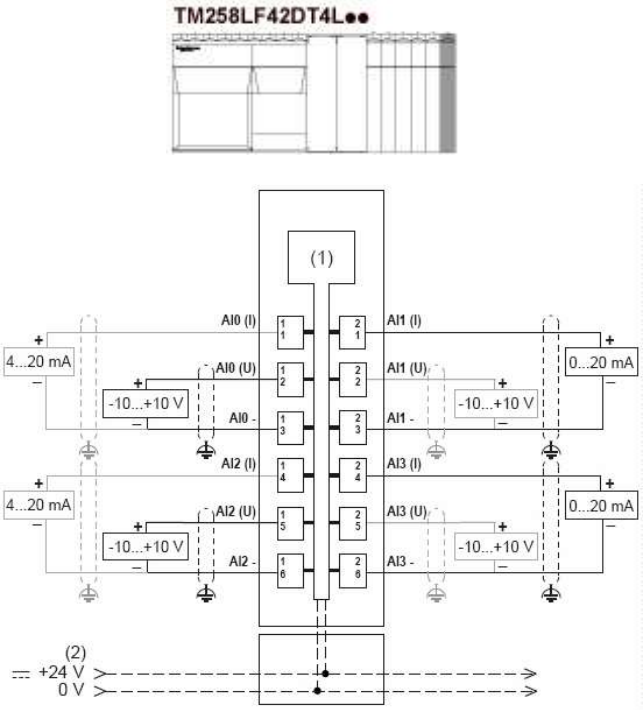




(1) Internal electronics
(2) 24 Vdc I/O power segment integrated into the bus bases
(12) Inductive load protection
(13) 2-wire load
(14) 0 Vdc I/O power segment by external connection

Modicon M258
Logic Controller

Embedded
4 analog inputs

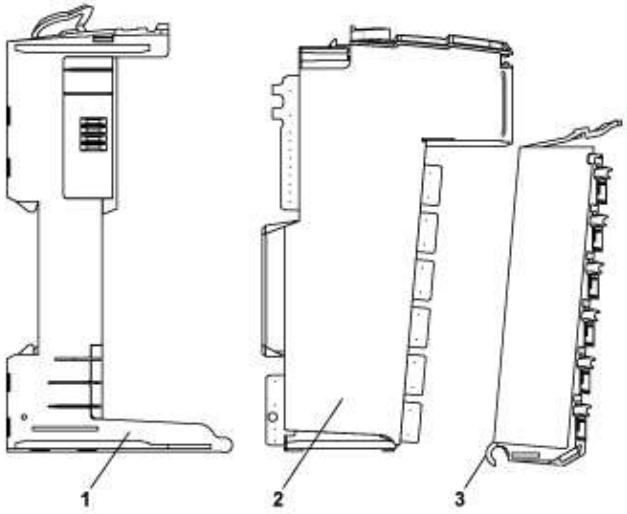


(1) Internal electronics
(2) 24 Vdc I/O power segment integrated into the bus bases

(I) Current
(U) Voltage

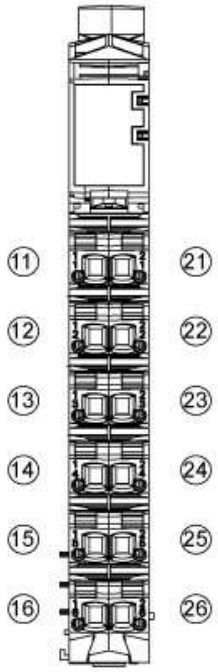
Modicon M258
Logic Controller

Expansion
module elements



1. Bus base
2. Electronic module
3. Terminal block

Modicon M258 **Logic Controller** Bus base for electronic module **TM5ACBM11** and for additional power supply **TM5ACBM01R** left side isolated	
Modicon M258 **Logic Controller** **Electronic module**	

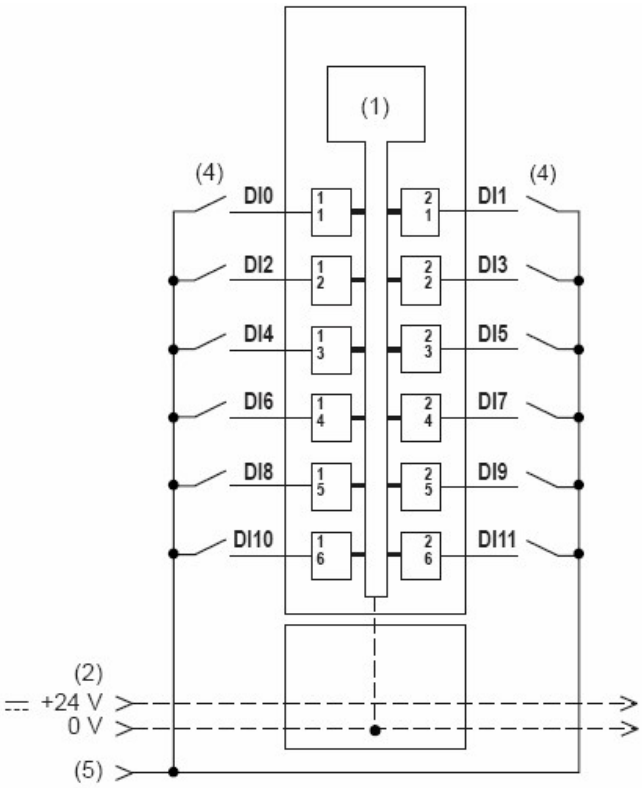
Modicon M258 Logic Controller **Terminal block** **TM5ACTB12**		 pin assignment
Modicon M258 Logic Controller **Bus base locking** **Plate Right** **TM5ACLPR1**		

Modicon M258
Logic Controller

Expansion module

TM5SDI12D

with 12 digital inputs



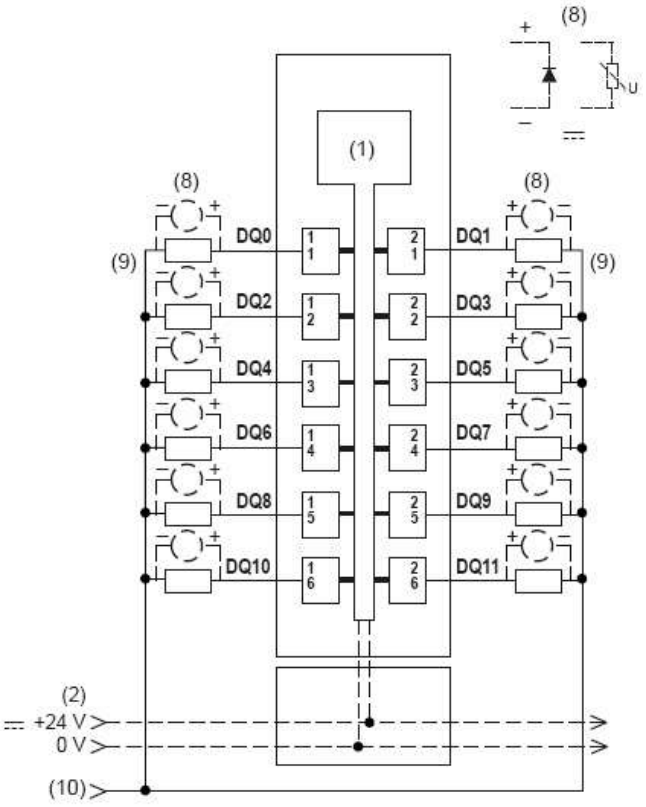
(1) Internal electronics
(2) 24 Vdc I/O power segment integrated into the bus bases
(4) 2-wire sensor
(5) 24 Vdc I/O power segment by external connection

Modicon M258
Logic Controller

Expansion module

TM5SDO12T

with 12 digital outputs



(1) Internal electronics
(2) 24 Vdc I/O power segment integrated into the bus bases
(8) Inductive load protection
(9) 2-wire load
(10) 0 Vdc I/O power segment by external connection

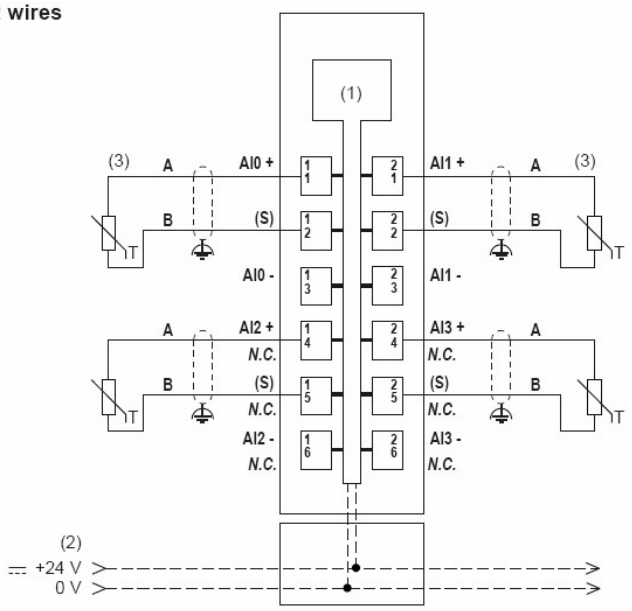
Modicon M258
Logic Controller

Expansion module

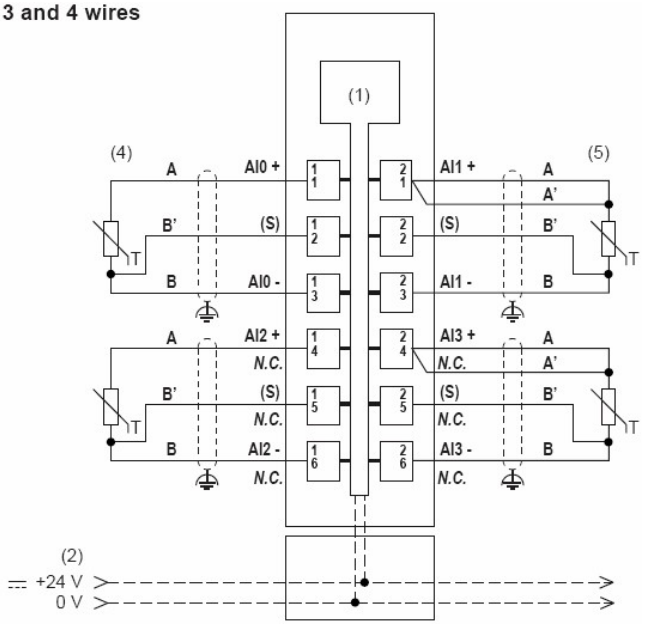
TM5SAI4PH

with 4 Pt100 inputs

2 wires

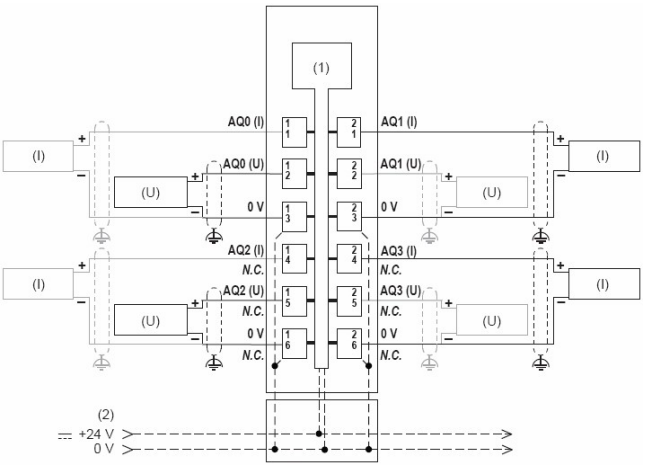
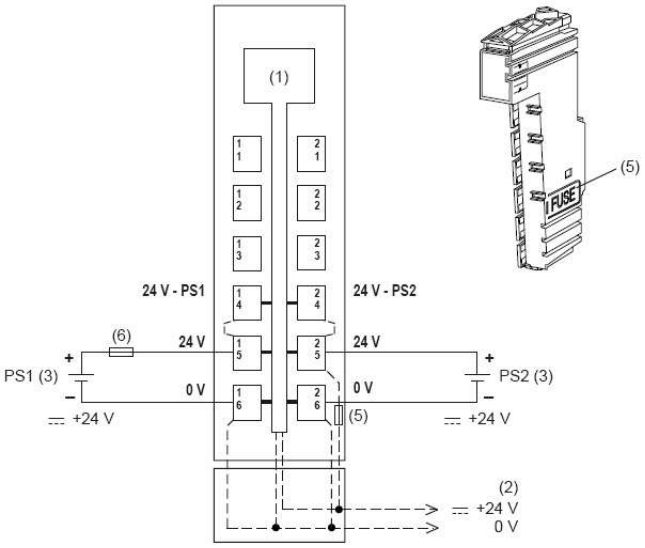


3 and 4 wires



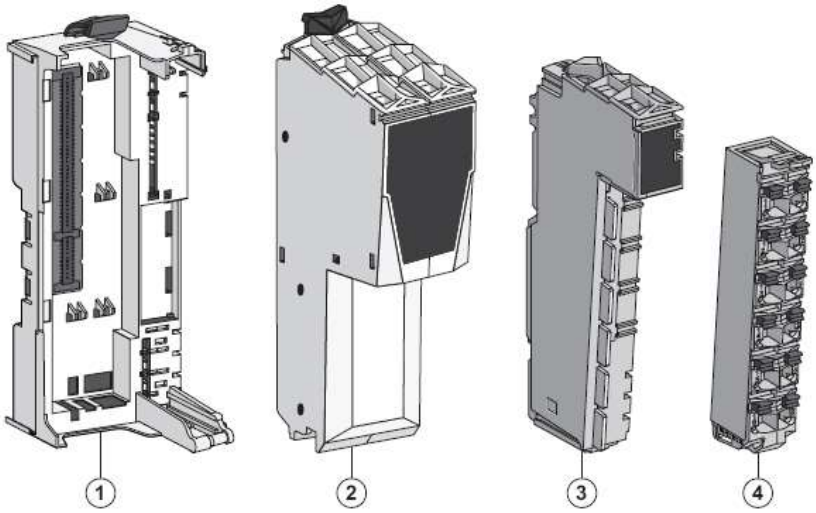
(1) Internal electronics
(2) 24 Vdc I/O power segment integrated into the bus bases
(3) 2-wire sensor
(4) 3-wire sensor
(5) 4-wire sensor

(I) Current
(U) Voltage

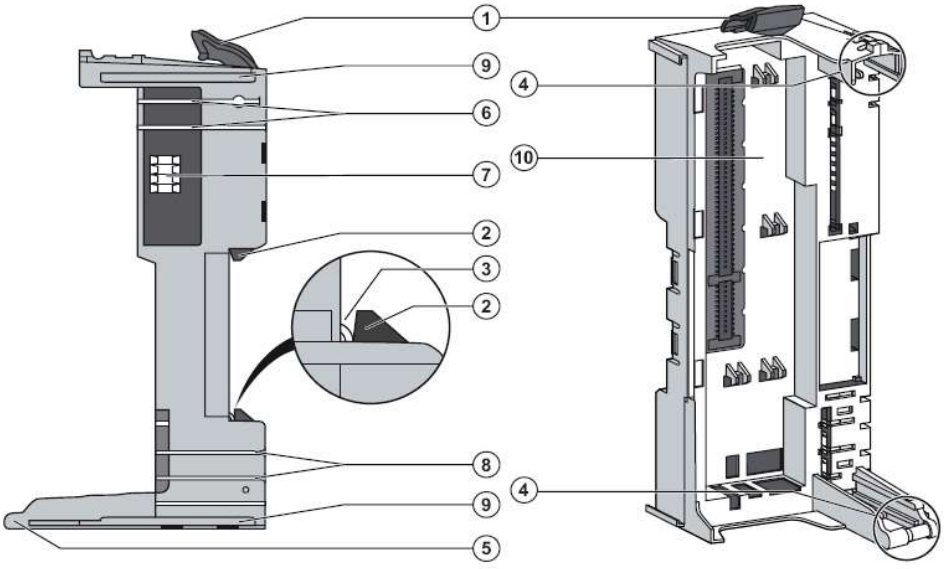
Modicon M258 Logic Controller **Expansion module** **TM5SAO2L** with 2 analog outputs	 (1) Internal electronics (2) 24 Vdc I/O power segment integrated into the bus bases (I) Current (U) Voltage
Modicon M258 Logic Controller **Expansion module** **TM5SPS2F** power supply	 (1) Internal electronics (2) 24 Vdc I/O power segment integrated into the bus bases (3) PS1/PS2: External isolated power supply 24Vdc (5) Internal fuse, Type T slow-blow, 6.3 A, 250V exchangeable (6) External fuse, Type T slow-blow, 1 A, 250V

Modicon TM5 I/O island CANopen Interface

TM5ACBN1 bus base



Item	Description
1	Field bus interface bus base *(see page 41)*
2	Field bus interface module *(see page 42)*
3	Interface Power Distribution Module (IPDM) *(see page 42)*
4	Terminal block *(see page 43)*



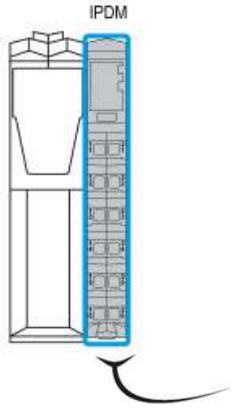
1 Locking lever
2 DIN rail locking mechanism
3 DIN rail contact
4 Guides for assembly of the IPDM
5 Rotation axle for terminal block
6 TM5 bus power contacts
7 TM5 bus data contacts
8 24 Vdc I/O power segment contacts
9 Interlocking guides
10 Slot for field bus interface module

The following table gives the available reference:

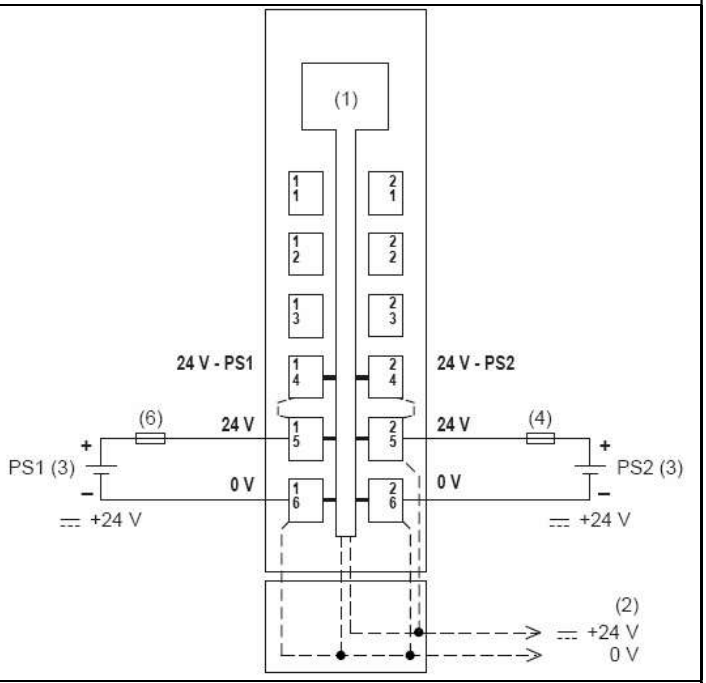
Reference	Field Bus Interface Bus Base Description	Color
TM5ACBN1	Bus base for field bus interface module and Interface Power Distribution Module (IPDM)	White

Modicon TM5 I/O island CANopen Interface

TM5SPS3 Power supply (on bus base TM5ACBN1)



(A)



(A) Interface Power Distribution Module (IPDM)
(1) Internal electronics
(2) 24 Vdc I/O power segment integrated into the bus bases
(3) PS1/PS2: External isolated power supplies 24 Vdc
(4) External fuse type T slow-blow 10 A max., 250 V
(6) External fuse type T slow-blow 1 A, 250 V

Servo Drive

Lexium 32A

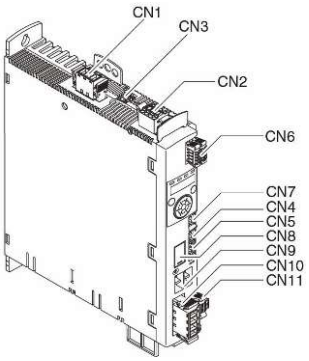
LXM32AD18M2

1-phase

230 Vac,

Continuous output current:
6 A RMS at 6000 RPM





Connection	Assignment
CN1	Power stage supply voltage
CN2	24 controller supply voltage and STO safety function
CN3	Motor encoder (encoder 1)
CN4	PTO (encoder simulation ESIM)
CN5	PTI (pulse/direction, A/B, CW/CCW)
CN6	Analog inputs and digital inputs/outputs
CN7	Modbus (commissioning interface)
CN8	External braking resistor
CN9	DC bus connection for parallel operation
CN10	Motor phases
CN11	Holding brake

Servo Drive

Lexium 32A

LXM32AD18M2

Embedded Human Machine Interface



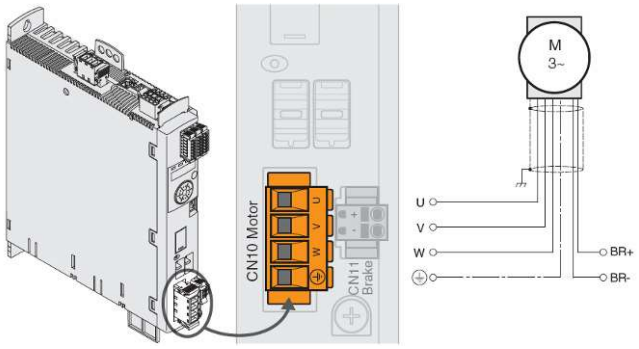
Servo Drive

Lexium 32A

LXM32AD18M2

1-phase

Wiring diagram
Power cable connection to motor (Length 3 m)



Connection	Meaning	Color
U	Motor phase	Black L1 (BK)
V	Motor phase	Black L2 (BK)
W	Motor phase	Black L3 (BK)
PE	Protective ground conductor	Green/yellow (GN/YE)
BR+	Holding brake +	White (WH)
BR-	Holding brake -	Gray (GR)

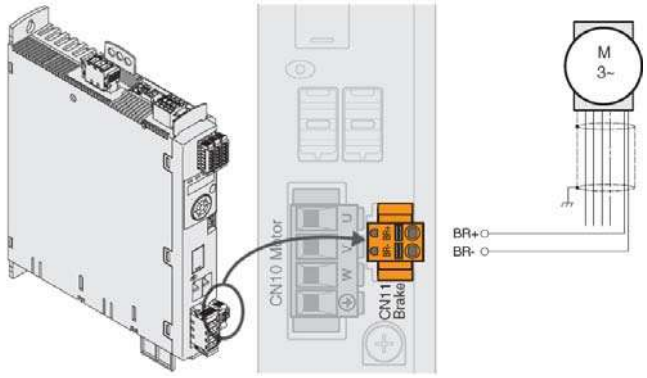
Servo Drive

Lexium 32A

LXM32AD18M2

1-phase

Wiring diagram holding brake



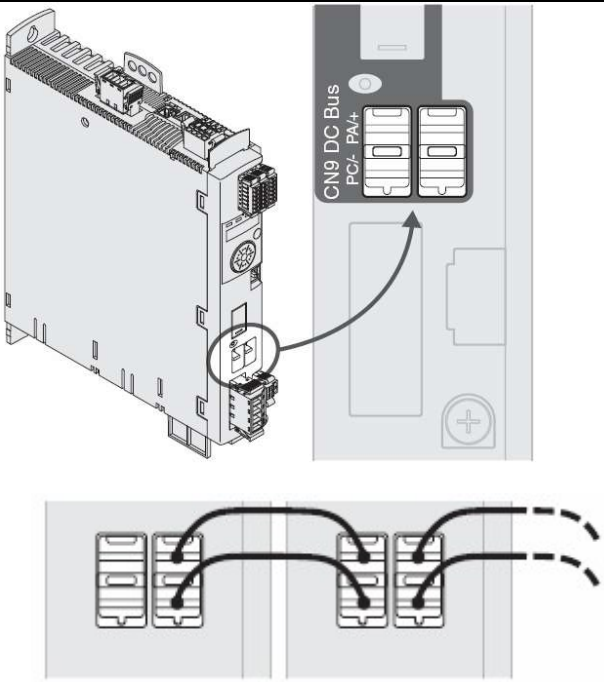
Servo Drive

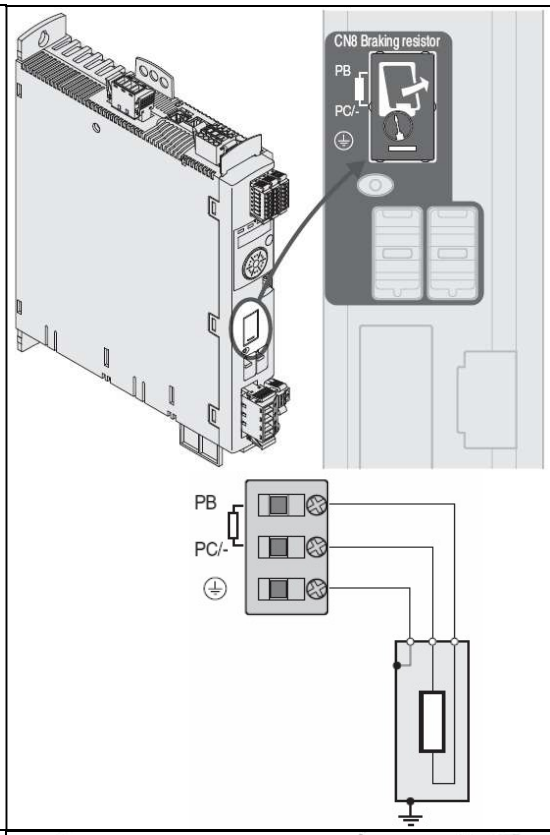
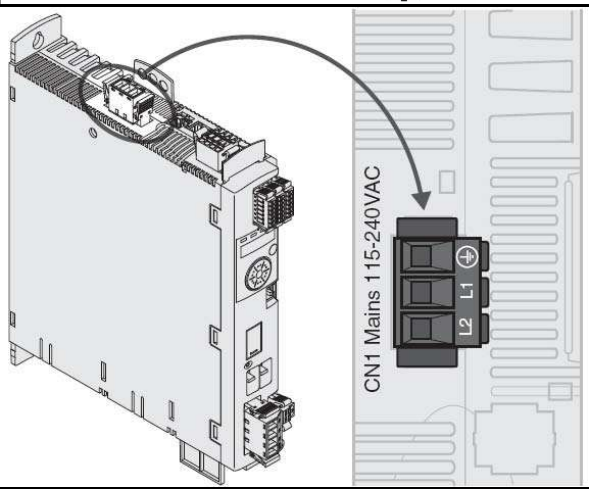
Lexium 32A

LXM32AD18M2

1-phase

Parallel connection DC bus



Servo Drive **Lexium 32A** **LXM32AD18M2** 1-phase Connecting the external braking resistor	
Servo Drive **Lexium 32A** **LXM32AD18M2** 1-phase 115-240 Vac Wiring diagram power stage supply voltage for 1-phase device	

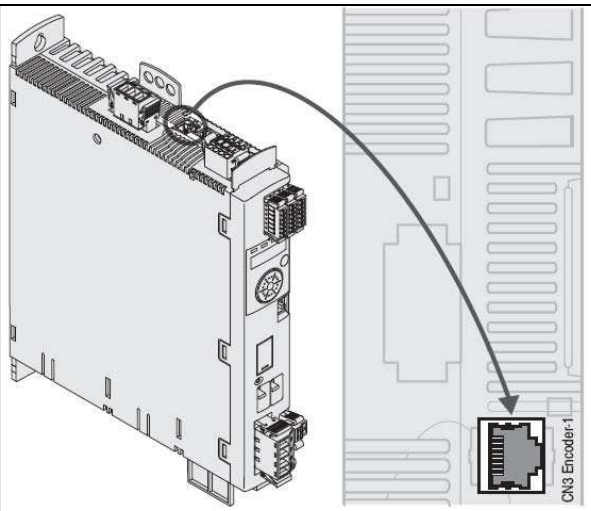
Servo Drive

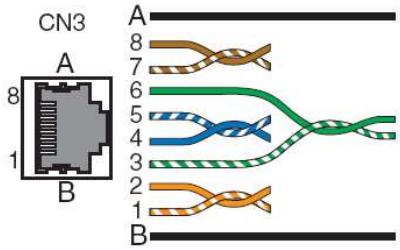
Lexium 32A

LXM32AD18M2

1-phase

Wiring diagram motor encoder





Pin	Signal	Motor, pin	Pair	Meaning	I/O
1	COS+	9	2	Cosine signal	I
2	REFCOS	5	2	Reference for cosine signal	I
3	SIN+	8	3	Sine signal	I
6	REFSIN	4	3	Reference for sine signal	I
4	Data	6	1	Receive data, transmit data	I/O
5	$\overline{\text{Data}}$	7	1	Receive data and transmit data, inverted	I/O
7	reserved		4	Not assigned	
8	reserved		4	Not assigned	
A	ENC+10V_OUT	10	5	Encoder supply	O
B	ENC_0V	11	5	Reference potential for encoder supply	
	SHLD			Shield	

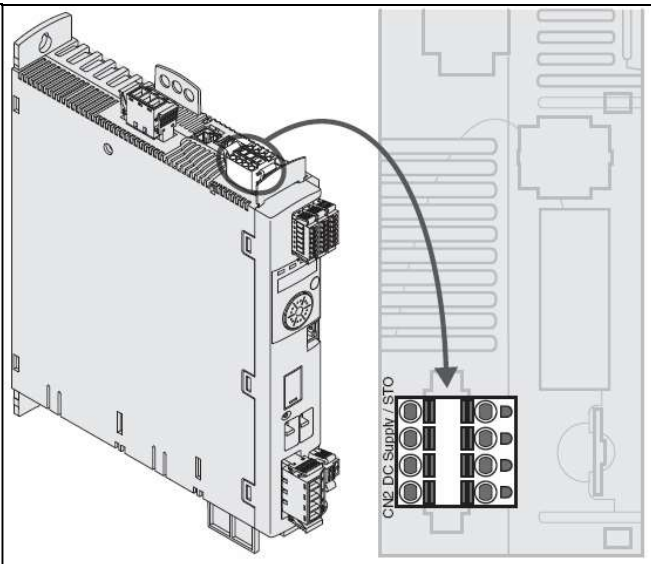
Servo Drive

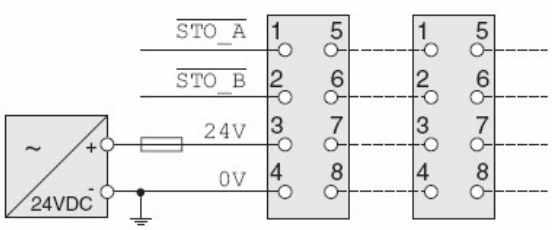
Lexium 32A

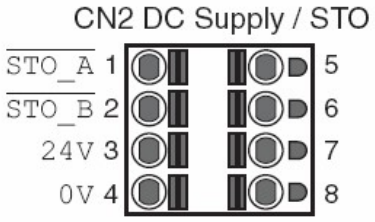
LXM32AD18M2

1-phase

controller supply voltage







Pin	Signal	Meaning
1, 5	STO_A	Safety function STO: Dual-channel connection, connection A
2, 6	STO_B	Safety function STO: Dual-channel connection, connection B
3, 7	+24VDC	24 V controller supply voltage
4, 8	0VDC	Reference potential for 24 V controller supply voltage; Reference potential for STO

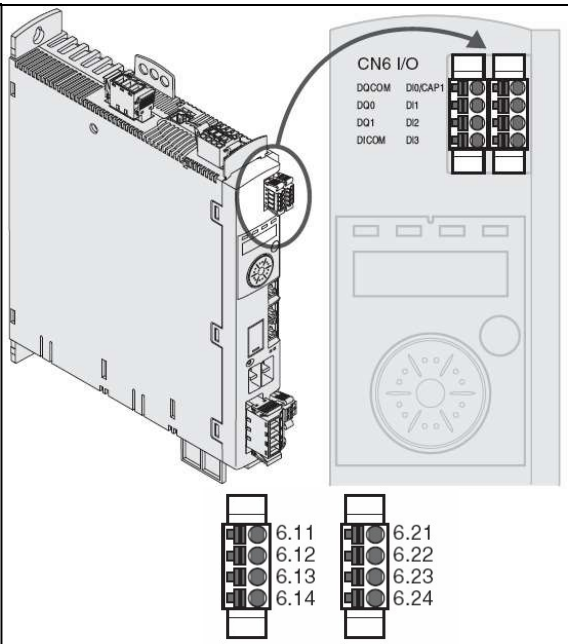
Servo Drive

Lexium 32A

LXM32AD18M2

1-phase

digital inputs/outputs



Pin	Signal	1)	Meaning	I/O
CN6.11	DQ_COM		Reference potential digital outputs	
CN6.12	DQ0	X	Digital output 0	O (24 V)
CN6.13	DQ1	X	Digital output 1	O (24 V)
CN6.14	DI_COM		Reference potential digital inputs	

1) Connector coding, X=coding

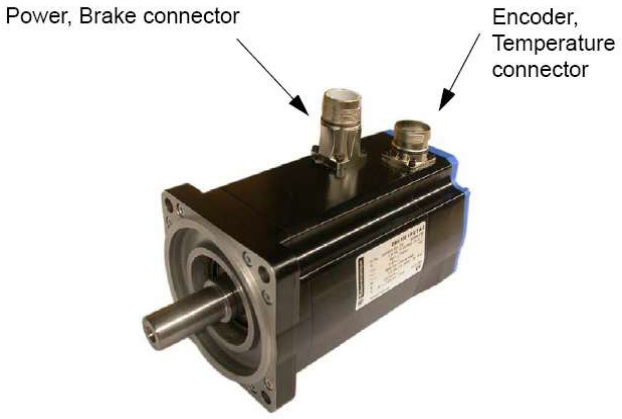
Pin	Signal	1)	Meaning	I/O
CN6.21	DI0 / CAP1	X	Digital input 0 / touch probe 0	I (24 V)
CN6.22	DI1		Digital input 1	I (24 V)
CN6.23	DI2		Digital input 2	I (24 V)
CN6.24	DI3	X	Digital input 3	I (24 V)
	DI_COM		Reference potential digital inputs: CN6.14	

1) Connector coding, X=coding

Servo motor

BSH0551T02F2A

with brake



Variable Speed Drives

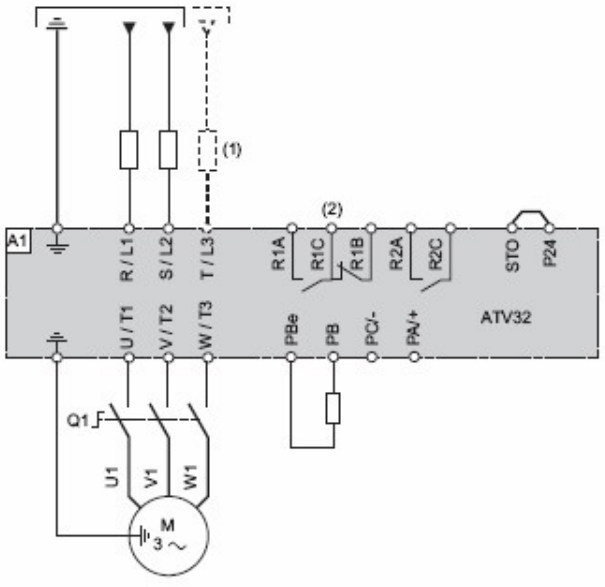
Altivar 32

ATV32H018M2

3-phase

230 Vac, 0.37/0.75 kW





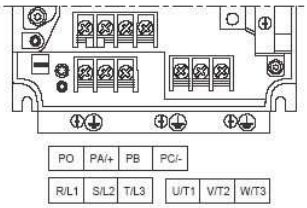
(1) Line choke (if used)
(2) Fault relay contacts, for remote signalling of drive status

Variable Speed Drive

Altivar 71

ATV71H075N4





Description of terminals:

Terminal	Function
⏚	Ground terminal
R/L1 S/L2	Power supply
R/L1 S/L2 T/L3	
PO	DC bus + polarity
PA/+	Output to braking resistor (+ polarity)
PB	Output to braking resistor
PC/-	DC bus - polarity
U/T1 V/T2 W/T3	Outputs to the motor

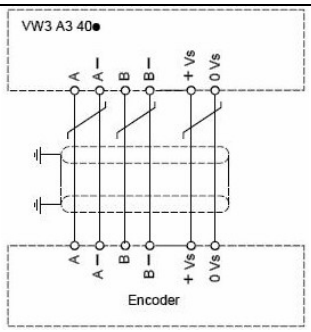
Variable Speed Drive

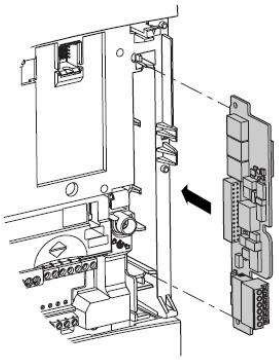
Altivar 71

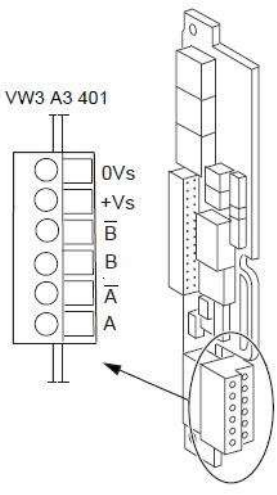
Encoder Card RS422

VW3A3401









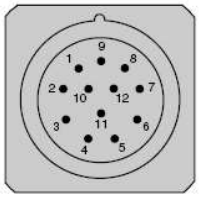
Incremental encoder

XCC1510PS11X

with fixing bracket

XCCRE5SN



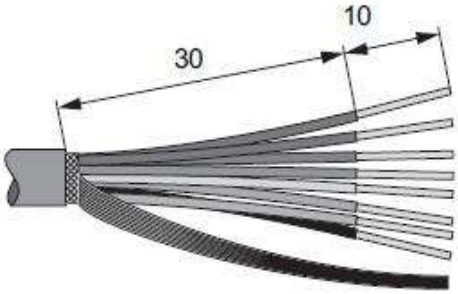


Pin number	1	2	3	4	5	6	7	8	9	10	11	12
Signal	$\overline{A}$	+V	0	$\overline{0}$	B	$\overline{B}$	R	A	R	0 V	0 V	+V
Supply												

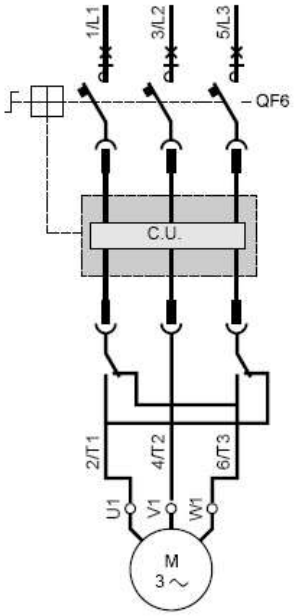
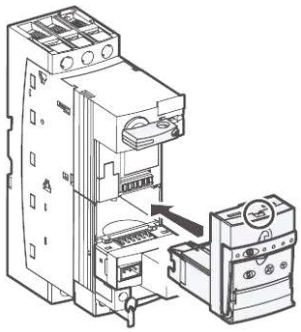
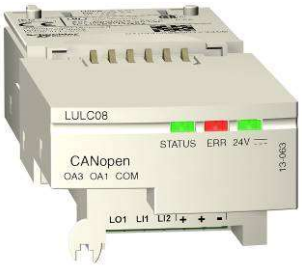
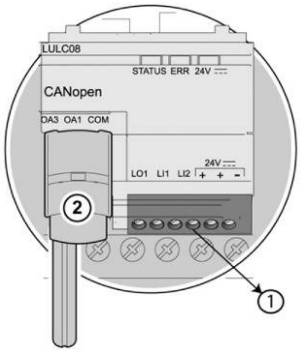
Encoder Cable 5 m

XCCPM2312L5





BN	RD	VT	BU	YE	OG	GN	BK
$\overline{A}$	+V	0	$\overline{0}$	B	$\overline{B}$	A	0 V

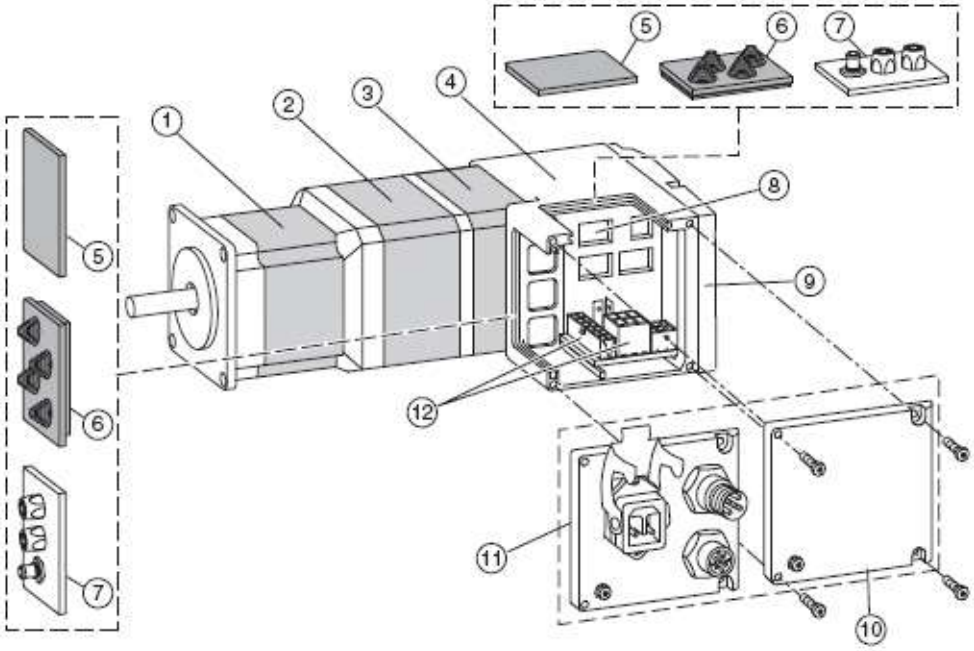
Motor Starter **TeSysU** Power base **LUB12BL** two directions Coil wiring kit **LU9BN11C**		
Control unit **TeSysU** **LUCA05BL**		
TeSysU **CANopen communication module** **LULC08**		 1 24 Vdc power supply 2 Terminal for coil wiring kit

Integrated Drive

ILA

ILA1F571PC2A





(1) Synchronous AC servo motor
(2) Holding brake (optional)
(3) Encoder
(4) Electronics housing
(5) Insert for sealing (accessory)
(6) Insert with cable entry (accessory)
(7) I/O insert with industrial connector (accessory)
(8) Switches for settings
(9) Cover of electronics housing, must not be removed
(10) Cover of connector housing, to be removed for installation
(11) Cover with industrial connector for Vdc supply voltage and IN/OUT fieldbus connection (optional)
(12) Electrical interfaces

Integrated Drive

ILA

power connection

ILA1F571PC2A

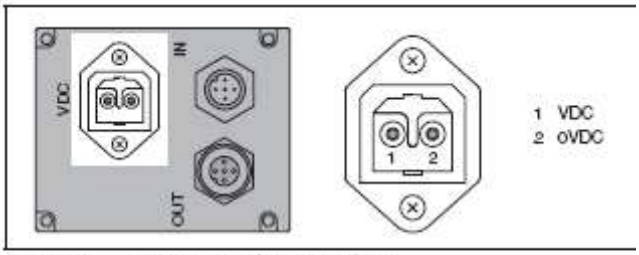


Figure 6.7 Pin assignment supply voltage

Pin	Signal	Meaning	Number
1	VDC	Supply voltage	1
2	oVDC	Reference potential to VDC	2

for power connection the cable

VW3L30001R50, 5 m



I/O Module IP67

Modicon TM7

CANopen Interface I/O Block

TM7NCOM16A

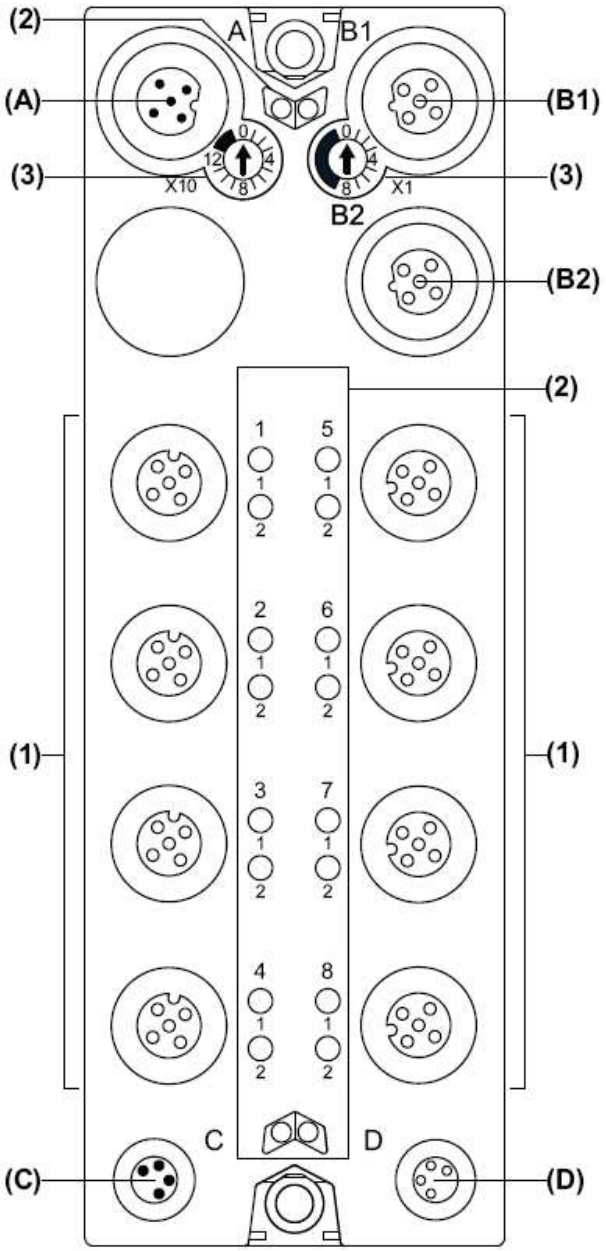


I/O Module IP67

Modicon TM7

CANopen Interface I/O Block

TM7NCOM16A



(A) CANopen bus IN connector
(B1) CANopen bus OUT connector
(B2) TM7 bus OUT connector

(C) 24 Vdc power IN connector
(D) 24 Vdc power OUT connector
(1) Input / Output connectors
(2) Status LEDs
(3) CANopen Address settings rotary switches

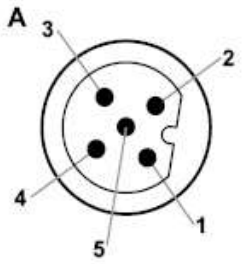
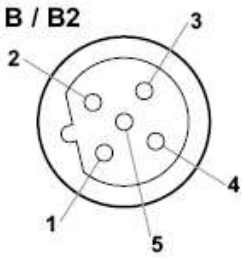
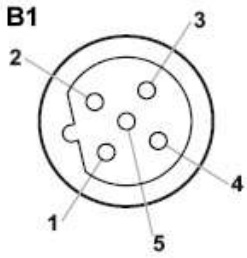
I/O Module IP67

Modicon TM7

CANopen Interface I/O Block

TM7NCOM16A

Bus connectors

Connectors	Pin	Designation
	1	(CAN_SHLD)
	2	(CAN_V+)
	3	CAN_GND
	4	CAN_H
	5	CAN_L
	1	TM7 V+
	2	TM7 Bus Data
	3	TM7 0V
	4	TM7 Bus $\overline{\text{Data}}$
	5	N.C.
	1	(CAN_SHLD)
	2	(CAN_V+)
	3	CAN_GND
	4	CAN_H
	5	CAN_L

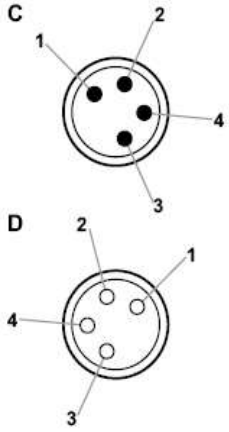
I/O Module IP67

Modicon TM7

CANopen Interface I/O Block

TM7NCOM16A

24 Vdc connectors

Connectors	Pin	Designation
	1	24 Vdc main power
	2	24 Vdc I/O power segment
	3	0 Vdc
	4	0 Vdc
	1	24 Vdc I/O power segment
	2	24 Vdc I/O power segment
	3	0 Vdc
	4	0 Vdc

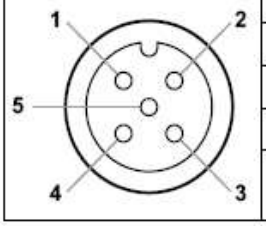
I/O Module IP67

Modicon TM7

CANopen Interface I/O Block

TM7NCOM16A

I/O connector

Connection	Pin	Designation
	1	24 Vdc sensor supply
	2	DI: input signal channel 1
	3	0 Vdc
	4	DI: input signal channel 2
	5	N.C.

Modicon TM7

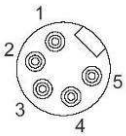
Power Supply Cable

TCSCCN1M1F2

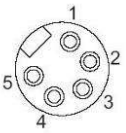
The **Modicon TM7** power supply cables are linked in line from one module to the next.



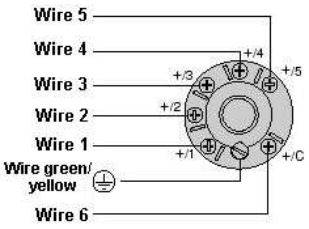
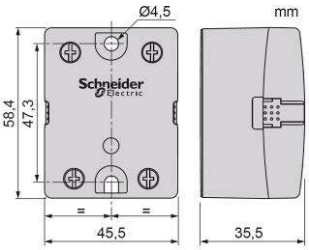
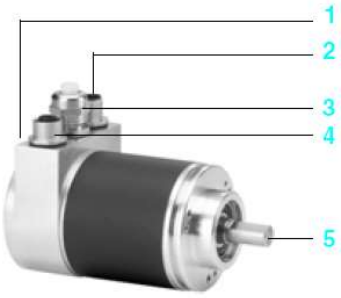
POWER IN



POWER OUT



PIN	Signal	Cable
1	0 Vdc	1
2	0 Vdc	2
3	PE	Green/Yellow
4	+24 Vdc DI	3
5	+24 Vdc DO	4

Tower Light **XVBC**		
Solid state relay **SSRPCDS10A1** Input: 3 … 32 Vdc Output: 24 … 280 Vac 10 A		
CANopen multi-turn absolute encoder **XCC3510PS84CB**	 1 2 LEDs 2 M12 male connector (CANopen incoming bus) 3 PG9 connection for supply cable 4 M12 female connector (CANopen outgoing bus) 5 Encoder shaft	

Photoelectric Sensor **OsiSense** **XUB1APANM12** **with Reflector** **XUZC50**	 **Connections** **M12 connector** / **Pre-cabled** / **PNP** 3 (-) — (-) BU (Blue) 1 (+) — (+) BN (Brown) 4 OUT/Output — (OUT/Output) BK (Black) 2 Beam break input *(1)* — Beam break input *(1)* VI (Violet) BN/1 + PNP BK/4 (NO/NC) BU/3 –
Inductive Proximity Sensor **OsiSense** **XS608B1PAM12**	 **Connections** **M12 connector** / **Pre-cabled** / **PNP** 3 (-) — (-) BU (Blue) 1 (+) — (+) BN (Brown) 4 OUT/Output — (OUT/Output) BK (Black) 2 Beam break input *(1)* — Beam break input *(1)* VI (Violet) BN/1 + PNP BK/4 (NO/NC) BU/3 –
OsiSense **Cable for photo barriers and proximity sensor** **XZCP1264L2** Only 1x M12 connector for sensor: other side must be extended with connector XZCC12FDM40B	 **Connections** **M12 connector** / **Pre-cabled** / **PNP** 3 (-) — (-) BU (Blue) 1 (+) — (+) BN (Brown) 4 OUT/Output — (OUT/Output) BK (Black) 2 Beam break input *(1)* — Beam break input *(1)* VI (Violet) BN/1 + PNP BK/4 (NO/NC) BU/3 –

Software

General

The main programming work lies in programming the Modicon M258 Logic controller, the configuration of the CANopen fieldbus and creating the screens for the HMI display.

Programming the Modicon M258 Logic controller is done using SoMachine.

Programming of the HMI XBTGT 5330 is done by using Vijeo Designer which is integrated into SoMachine.

Configuration of the drives (ATV32, ATV71 and LXM32A) is done using the control panel on the drive.

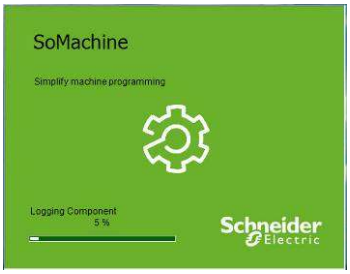
Configuration of the TM5 and TM7 modules of the distributed I/O islands is done using SoMachine DTMs.

To use the software packages, your PC must have the appropriate Microsoft Windows operating system installed:

- Windows XP Professional

The software tools have the following default install paths:

- SoMachine
  C:\Program Files\Schneider Electric\SoMachine



- Vijeo Designer (Installed with SoMachine)
  C:\Program Files\Schneider Electric\Vijeo Designer



Communication

General

The TVDA architecture includes two different communication networks. The CANopen fieldbus connects the Modicon M258 Logic controller as CANopen Master and Altivar drives, Modicon TM5 and TM7 I/O islands, ILA drives, TeSysU and Lexium 32A Servo Drives as CANopen nodes.

All the drives and the I/O islands are connected to the CANopen via CANopen TAPs. The CANopen transmission rate is 500 kb/s.

The M258 and the Magelis HMI communicate using the SoMachine protocol. The download from the PC to the M258 and to the HMI is done using a single connection. The PC has to be connected to the M258 via USB. Using this connection the data is also sent across to the HMI.

The front panel on the device itself is used to configure the ATV32, the ATV71 and the LXM32A.

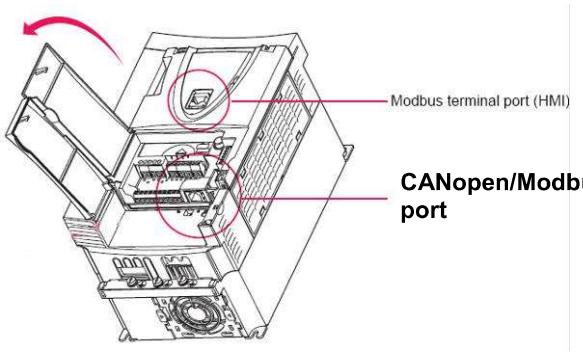
Altivar 32 onboard Modbus and CANopen networks RJ45 connector VW3A3608	 *Example of installing a communication card 3 (view of underside)* 1 Integrated RJ45 communication port for Modbus/CANopen on the front 2 Slot for the communication card 3 Communication card  *VW3 A3 608*

Altivar 71

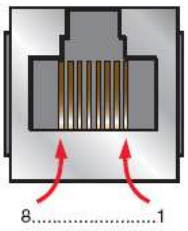
Modbus CANopen connection

In this application, the CANopen Tap **TSXCANTDM4** is used to connect the VSD drive to the CANopen via RJ45 socket.

Node ID: 5..8



View from underneath



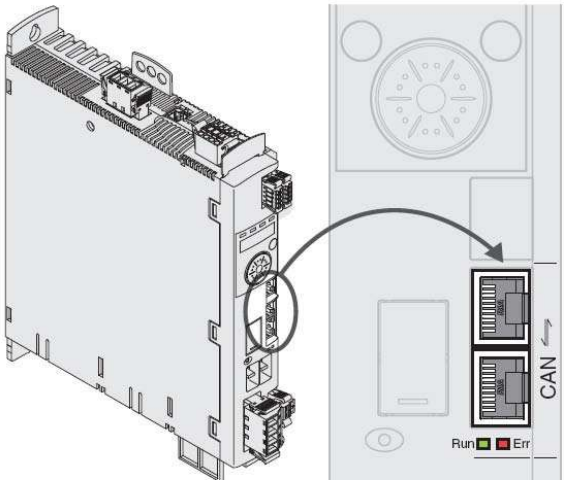
Pin	Signal
1	CAN_H
2	CAN_L
3	CAN_GND
4	D1 (1)
5	D0 (1)
6	Not connected
7	VP (2)
8	Common (1)

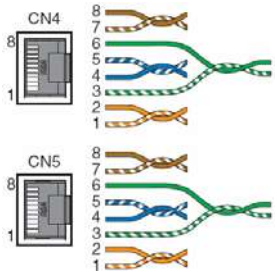
(1) Modbus signal
(2) Power supply for an RS232/RS485 converter (to PowerSuite)

Lexium 32A

CANopen connection

Node ID: 21, 22, 31, 32





Pin Signal Meaning I/O

1. CAN_H CAN interface CAN level
2. CAN_L CAN interface CAN level
3. CAN_0V Reference potential CAN -
4. nc not used -
5. nc not used -
6. nc not used -
7. nc not used -
8. nc not used -

Integrated Drive

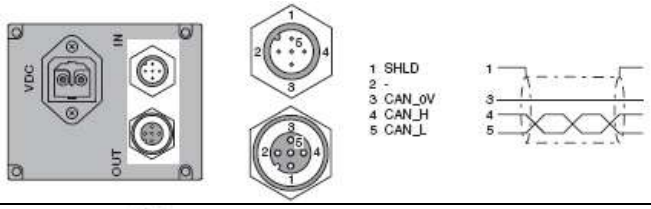
ILA

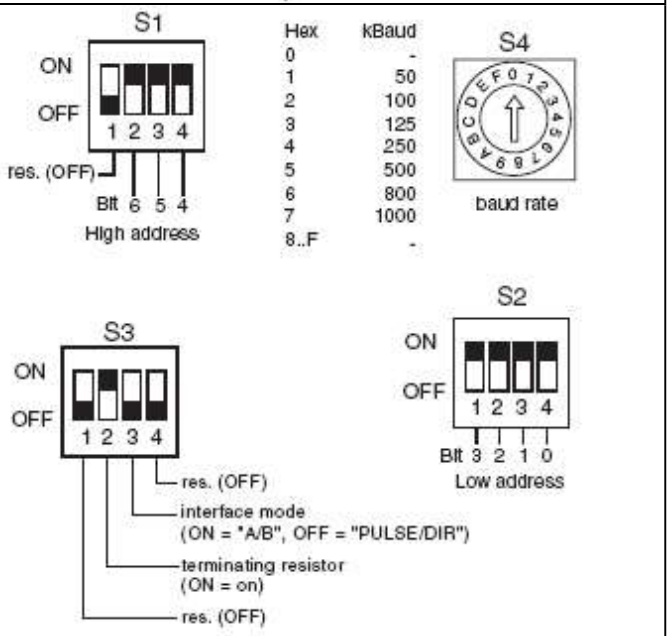
ILA1F571PC2A

CANopen connection

Node ID: 40, 41

Baudrate 500 kBits/s





Integrated Drive

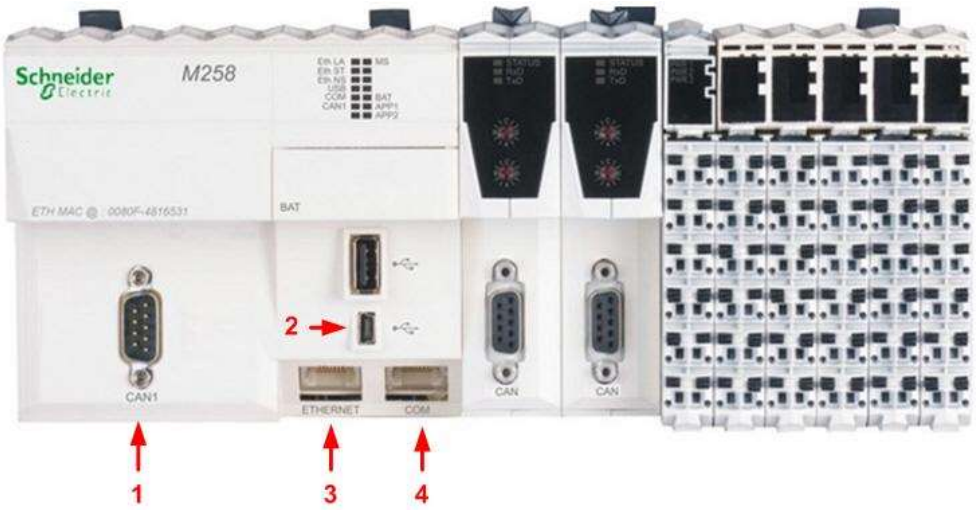
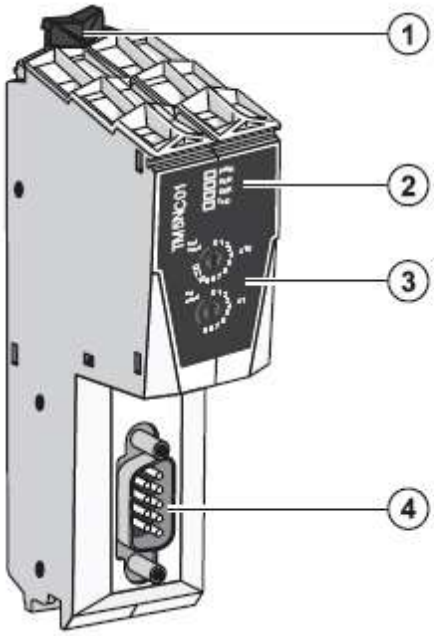
ILA

ILA1F571PC2A

CANopen connection

Switch settings S1 and S2:	S1.2	S1.3	S1.4	S2.1	S2.2	S2.3	S2.4
Address bit:	6	5	4	3	2	1	0
Fieldbus address 127 (default)	1	1	1	1	1	1	1
Fieldbus address 25 (example)	0	0	1	1	0	0	1

Switch setting S4	Baud rate (Kbaud)
1	50
2	100
3	125
4	250
5	500
6	800
7	1000

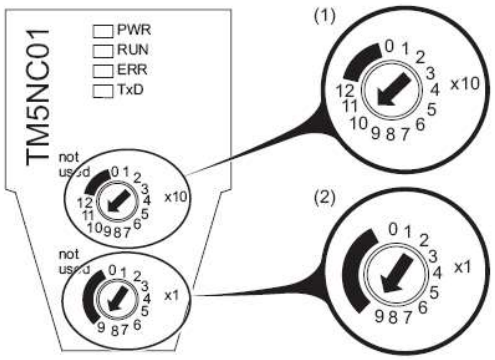
Modicon M258 Logic controller **TM258LF42DT4L**	1. CANopen port 2. Mini USB port 3. Ethernet port 4. RS485 port
	
I/O island **Modicon TM5** **CANopen Interface** **TM5NC01** **Node ID: 10, 20 and 30**	 **(1)** Locking clip **(2)** Status LEDs **(3)** CANopen address settings rotary switches **(4)** CANopen bus connector (SUB-D 9)

I/O island

Modicon TM5

CANopen Interface

TM5NC01



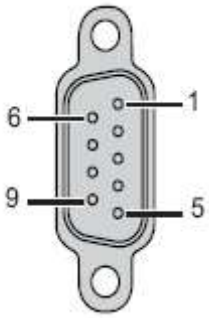
(1) High order rotary switch: represents the 'tens' of the CANopen address
(2) Second order rotary switch: represents the 'ones' of the CANopen address

I/O island

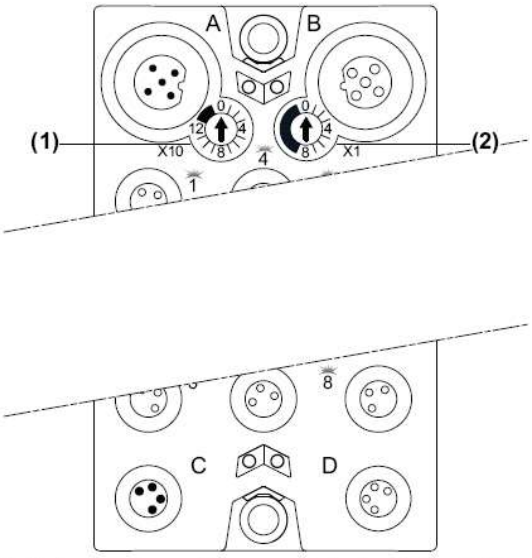
Modicon TM5

CANopen Interface

TM5NC01



Pin	Designation	Description
1	–	Reserved (N.C.)
2	CAN_L	CAN_L bus Line (Low)
3	CAN_GND	CAN ground
4	–	Reserved (N.C.)
5	(CAN_SHLD)	Optional CAN shield
6	GND	Ground, connection to pin 3
7	CAN_H	CAN_H bus Line (High)
8	–	Reserved (N.C.)
9	(CAN_V+)	Reserved (N.C.)

M258 USB **programming cable** **TCSXCNAMUM3P**	
I/O island IP67 **Modicon TM7** **CANopen Interface I/O Block** **TM7NCOM16A** **Node ID: 42** Baudrate 500 kBits/s	 **(1)** High order rotary switch: represents the 'tens' of the CANopen address **(2)** Second order rotary switch: represents the 'ones' of the CANopen address  **(1)** High order rotary switch: represents the 'tens' of the CANopen address **(2)** Second order rotary switch: represents the 'ones' of the CANopen address

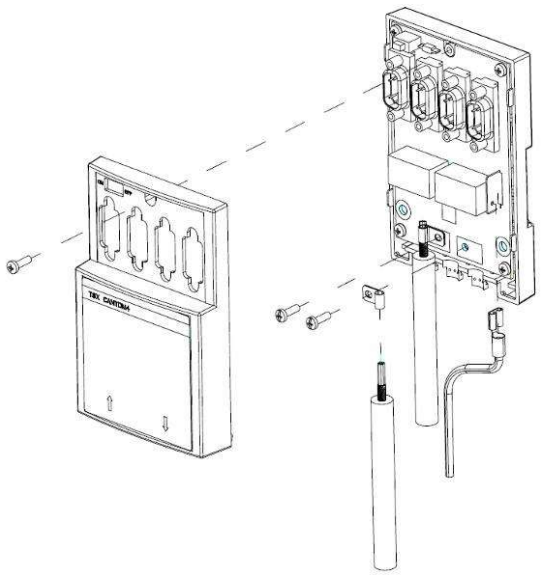
CANopen TAP

TSXCANTDM4

4 port CANopen junction box

For the purpose of this application, the sliding switch should be set to **OFF** if it is not at the end of the CANopen line.





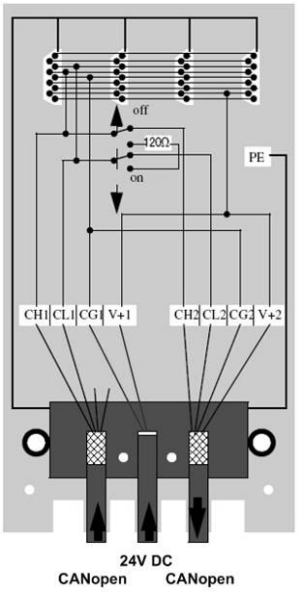
CANopen TAP

TSXCANTDM4

Note:
When using devices which require a 24 Vdc power supply on CANopen line (such as TeSysU) the 24 Vdc power must be connected.

Power supply:

V+1 24 Vdc
CG1 0 Vdc



Signal	Terminal block 1	Terminal block 2	Wire color
CAN_H	CH1	CH2	white
CAN_L	CL1	CL2	blue
CAN_GND	CG1	CG2	black
CAN_V+	V+1	V+2	red

CANopen connector **VW3CANKCDF90T, VW3CANKCDF90TP** or **VW3CANKCDF180T** These connectors are used for the link to the CANopen node.	 **VW3CANKCDF90T, VW3CANKCDF90TP**	 **VW3CANKCDF180T**
CANopen pre-assembled connection cable	 **TCSCCN4F3M1T (length: 1.0 m)** Used for connecting ATV312 or ATV71 or LXM32A with TSXCANTDM4.	 **TSXCANCADD1 (length: 1.0 m)** Used to connect the controller, TM5 island, TeSysU and TSXCANTDM4.
	 **VW3CANCARR03 (length: 0.3 m)** **VW3CANCARR1 (length: 1.0 m)** Used to connect the LXM32A and ATV32.	

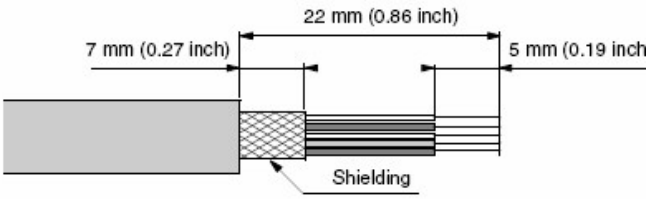
CANopen cable

TSXCANCxy

The cable is available in various versions (**x**):
A - Standard
B - No Flame
D - Heavy Duty

and various lengths (**y**):
50 - for 50 m
100 - for 100 m,
300 - for 300 m.



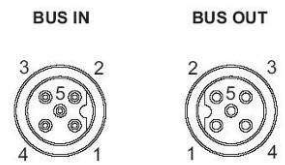


CANopen pre-assembled IP67 connection cable

FTXCN32xx

Used for the connection between the racks and the field devices.





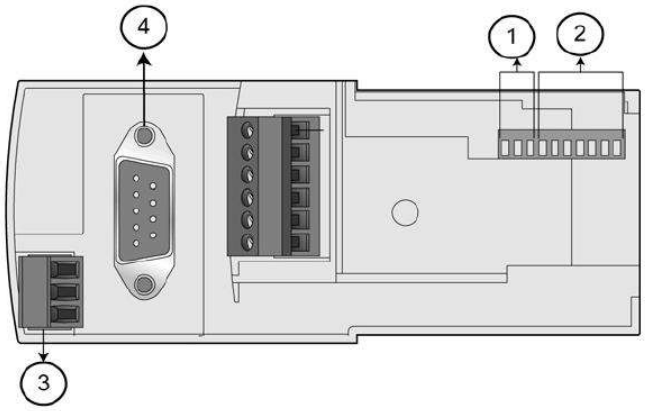
PIN	Signal	Colour
1	Shield	-
2	V+	Red
3	GND	black
4	CAN_H	White
5	CAN_L	Blue

TeSysU CANopen communication module

LULC08

The communication module is connected to the CANopen bus using the cable

TSXCANCADD1



1 Baud rate
2 Address
3 Power base connector
4 CAN bus connector

TeSysU CANopen communication module

LULC08

The baud rate is set to **500 kbps**

The following address is used:

Bus address 13

SW10	SW9	SW8	Baud Rate
0	0	0	10 kbps
0	0	1	20 kbps
0	1	0	50 kbps
0	1	1	125 kbps
1	0	0	250 kbps (default)
1	0	1	500 kbps
1	1	0	800 kbps
1	1	1	1,000 kbps

SW7	SW6	SW5	SW4	SW3	SW2	SW1	Address
0	0	0	0	0	0	0	Not valid
0	0	0	0	0	0	1	1 (default)
0	0	0	0	0	1	0	2
0	0	0	0	0	1	1	3
0	0	0	0	1	0	0	4
0	0	0	0	1	0	1	5

0 0 0 1 1 0 1 13

Ethernet 5 port switch

TCSESU053FN0

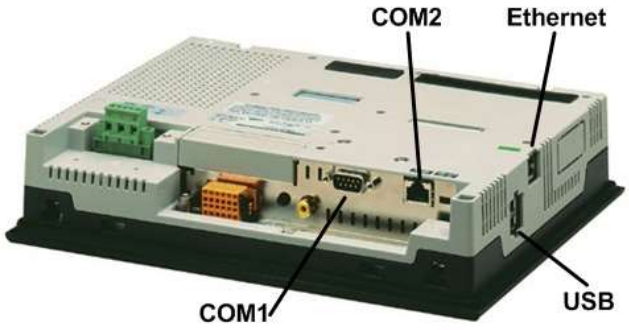
for the connection of the HMI and the controller



Magelis HMI

XBTGT5330

The Ethernet connection is used to communicate with the controller and the PC.



ConneXium Ethernet cable

490NTW0000x

Ethernet cable is used for the switch<->Controller and the switch<->HMI connection.

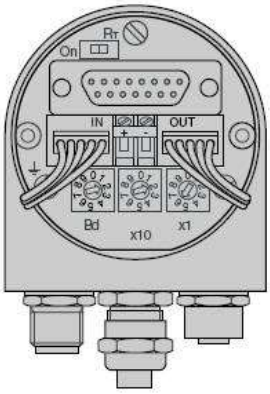


CANopen multi-turn absolute encoder

XCC3510PS84CB

Node ID: 43

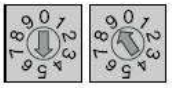
Baudrate (**Bd**) is set to **5** which is 500 kBits/s



Bus termination resistor



Permissible address range



1 => 89
0 => reserved

Example: 59



Bus IN
M12 male connector



Bus OUT
M12 female connector

Pin	1	2	3	4	5
Function	CAN_SHLD	(CAN_V+)	CAN_GND	CAN_H	CAN_L
Terminal	+	–			
Function	24 V	0 V			

Implementation

Introduction

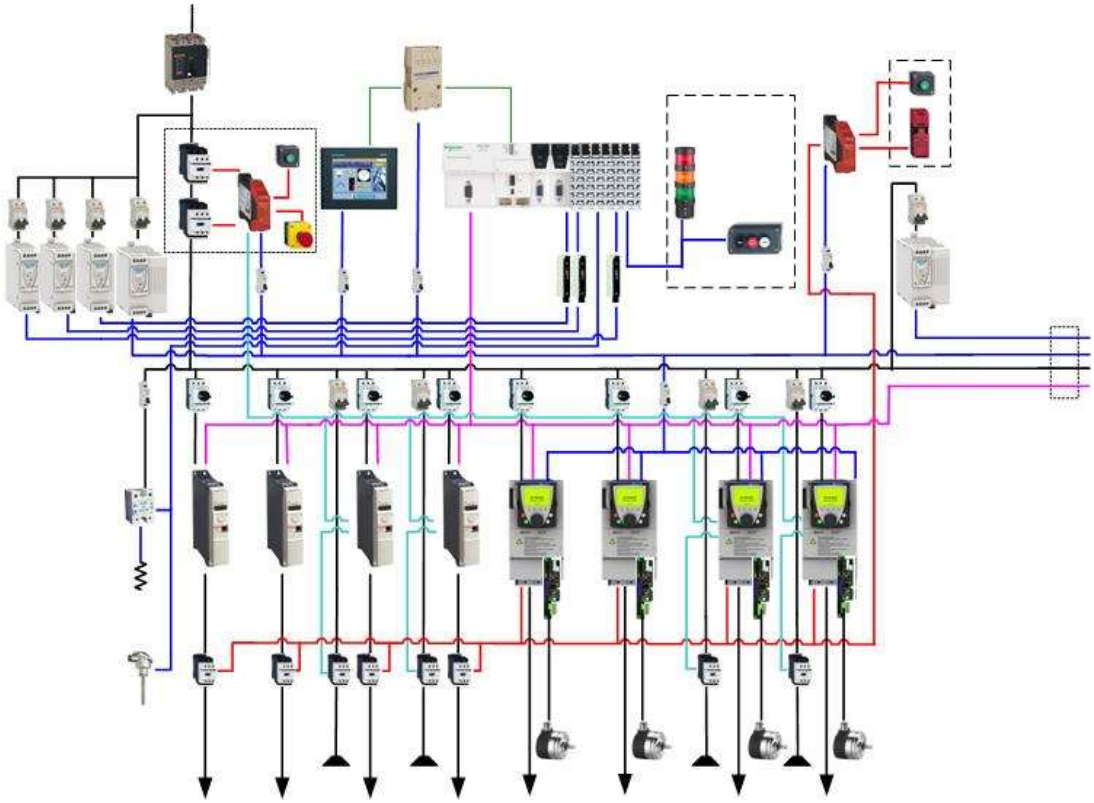
The implementation chapter describes all the steps necessary to initialize, to configure, to program and start-up the system to achieve the application functions as listed below.

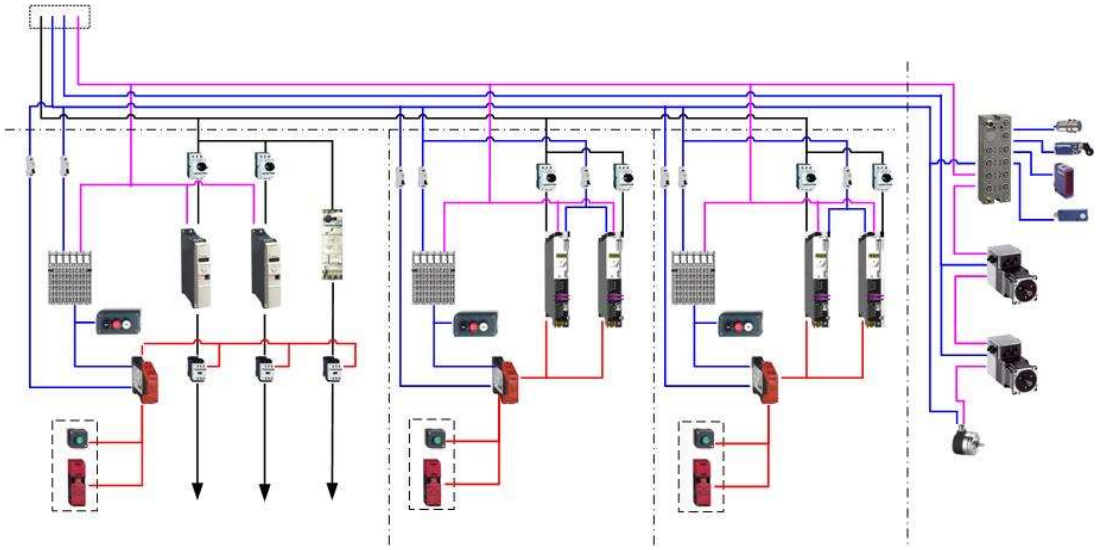
Function

Start up and functional description

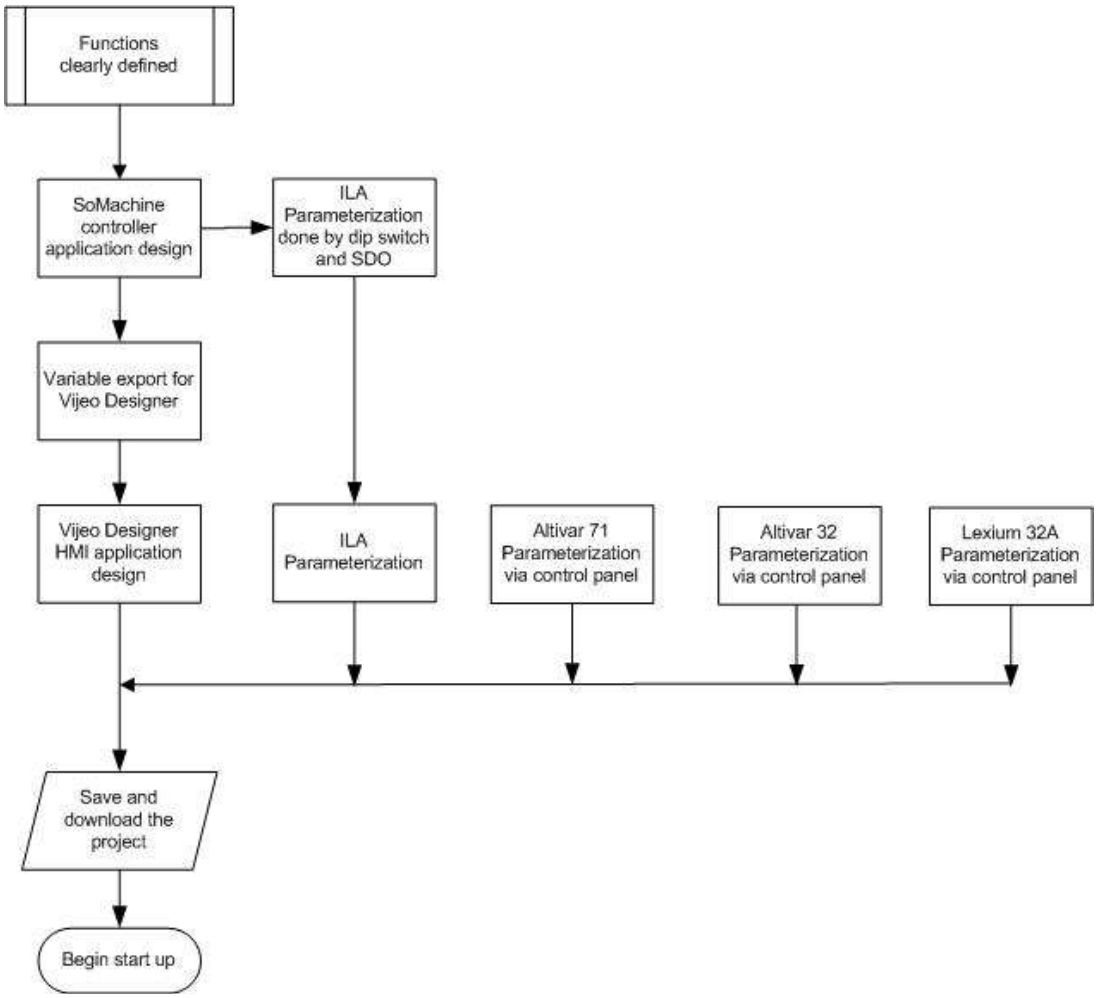
1. Switch on all fuses and contactors.
2. Switch on at the main switch
3. Acknowledge the Emergency Stop
4. Check safety door(s) and acknowledge
5. Wait for the blue light to turn off
6. You can now control and observe all drives from the HMI

Functional Layout





Course of Action



Communication

Introduction

This chapter describes the data passed via the communications networks (e.g. CANopen fieldbus or Ethernet) that is not bound directly with digital or analog hardware.

The list contains:

- The device links
- Direction of data flow
- symbolic name and
- Bus address of the device concerned.

Device Links

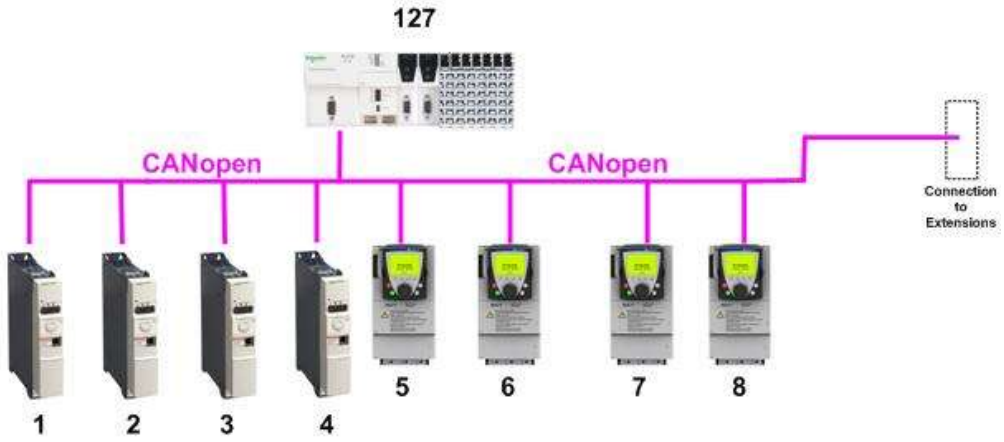
This application uses Ethernet and CANopen networks.

The SoMachine protocol over Ethernet connects:
Magelis XBTGT HMI (IP 192.168.100.20)
Modicon M258 Logic controller (IP 192.168.100.30)

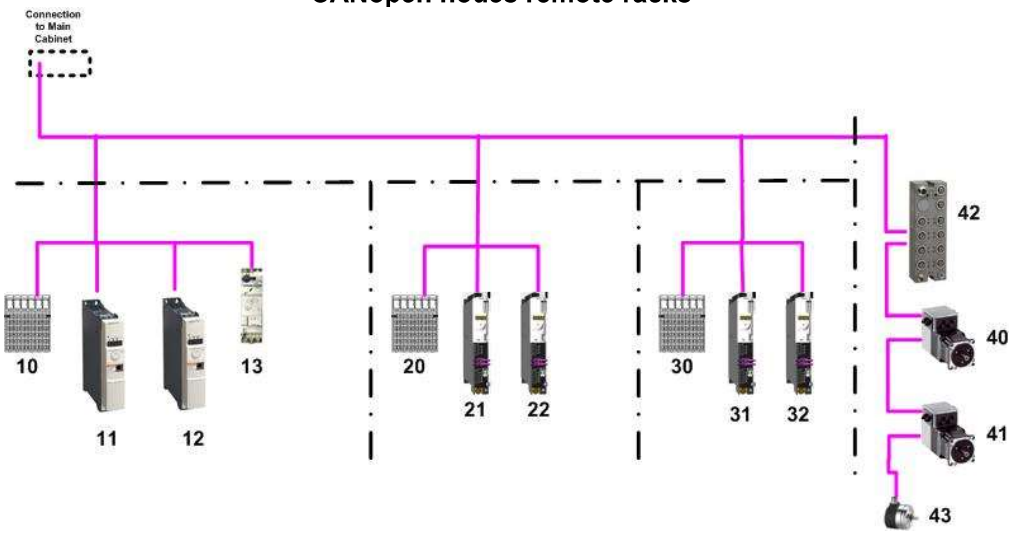
CANopen connects the following devices:
1 Modicon M258 Logic controller on bus address 127
6 Altivar 32 variable speed drives, bus addresses 1..4 and 11..12
4 Altivar 71 variable speed drives, bus addresses 5..8
4 Lexium 32A servo drives, bus addresses 21, 22, 31 and 32
1 TeSysU motor starter, bus address 13
3 Modicon TM5 I/O Island, bus address 10, 20 and 30
2 ILA integrated drives, bus addresses 40 and 41
1 Modicon TM7 I/O island, bus address 42
1 OsiSense (Osicoder) CANopen encoder, bus address 43

The used CANopen Baudrate is 500 kBit/s

CANopen nodes main rack



CANopen nodes remote racks



NOTE

For the data exchange between the controller and the Lexium 32A, the Altivar 32, the Altivar 71 and the Integrated Drive Lexium, PLCopen function blocks are used. It is not necessary to configure the data exchange manually.

Controller

Introduction

The Controller chapter describes the steps required for the initialization and configuration and the source program required to fulfill the functions.

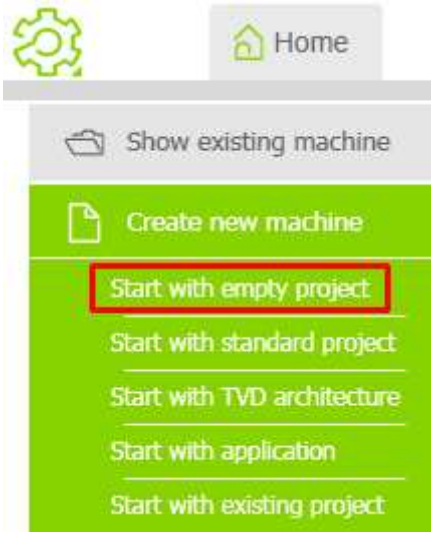
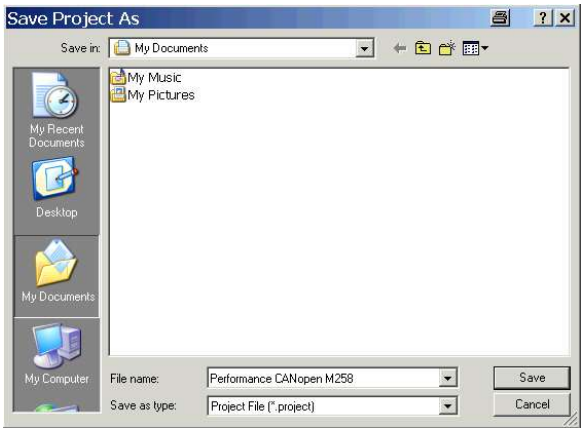
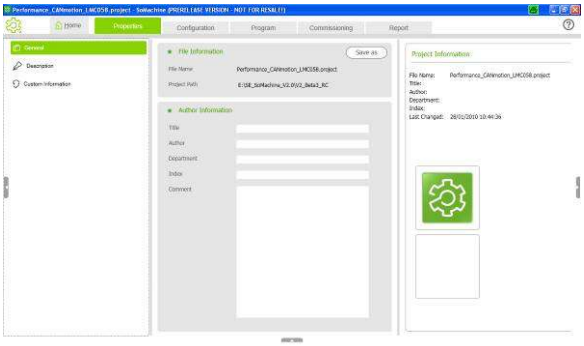
Requirements

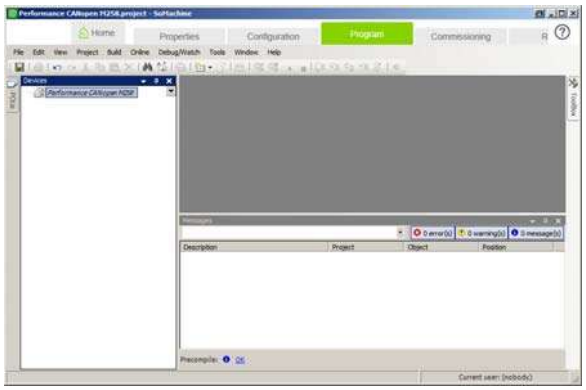
- SoMachine V3 is installed on your PC
- The Modicon M258 Logic controller is switched on and running
- The controller is connected to the HMI with the Ethernet cable **490NTW0000x** (controller to HMI)
- The controller is connected the PC via the cable USB **TCSXCNAMUM3P** (controller to PC)

Setting up the controller is done as follows:

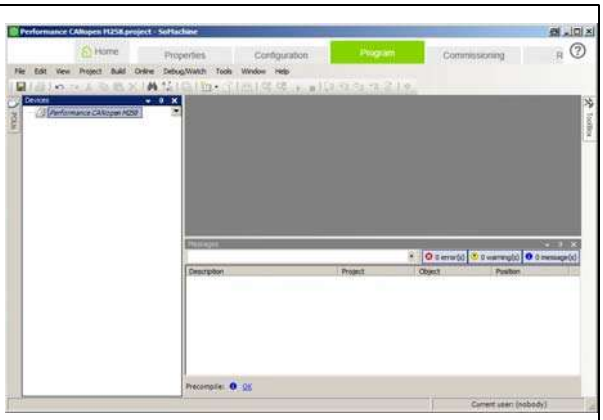
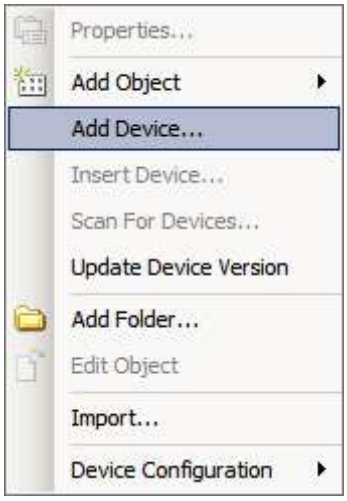
- Create a new project
- Add the controller
- Add Expansion Cards
- Install DTM for TM5 & TM7 islands
- Add the CANopen fieldbus
- Add CANopen devices
- ATV32 CANopen configuration
- ATV71 CANopen configuration
- LXM32A CANopen configuration
- TM5 CANopen configuration
- TeSysU CANopen configuration
- TM7 CANopen configuration
- OsiSense (Osicoder) CANopen configuration
- Lexium ILA CANopen configuration
- Add Toolbox library
- Add POU
- Task configuration
- Configure controller ↔ HMI data exchange
- Add Vijeo Designer HMI
- Ethernet settings
- Communication setting controller ↔ PC
- Communication setting controller ↔ HMI
- Save the Project
- Build Application
- Download the controller and HMI program
- Login to the controller
- Application overview

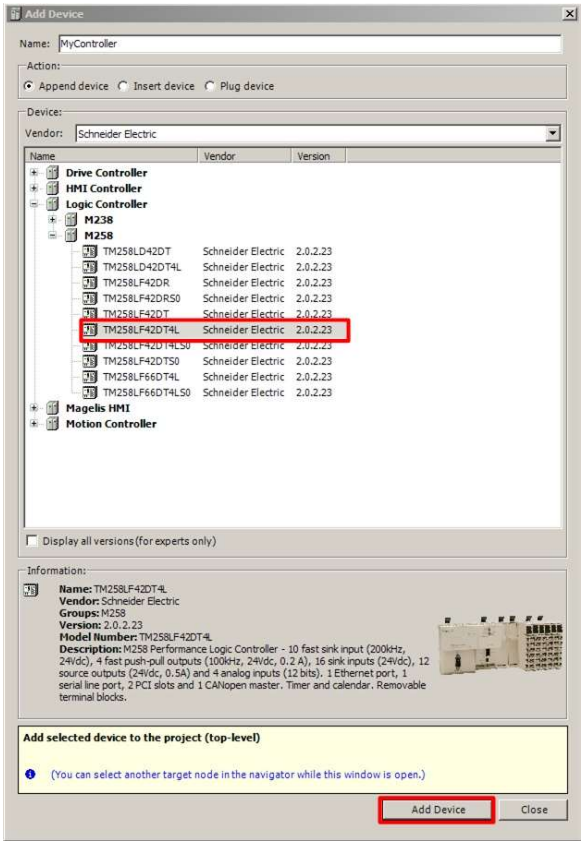
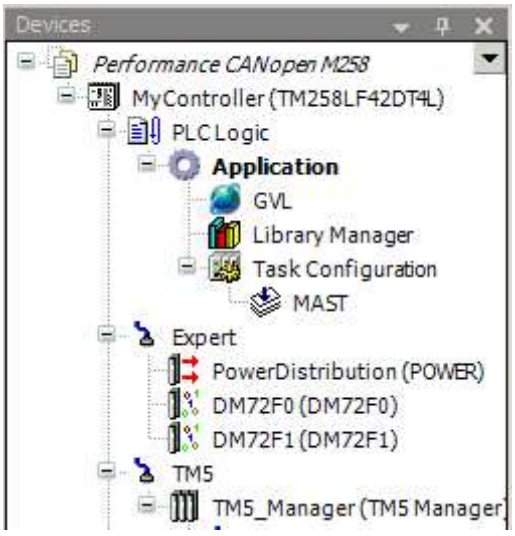
Create a new project

1	To create a new project select: **Create new machine** → **Start with empty project**	
2	In the **Save Project As** dialog enter a **File name** and click on **Save.** **Note:** As a default the project is saved under **My Documents.**	
3	The SoMachine User Interface opens.	
4	In the User Interface select the **Program** tab	

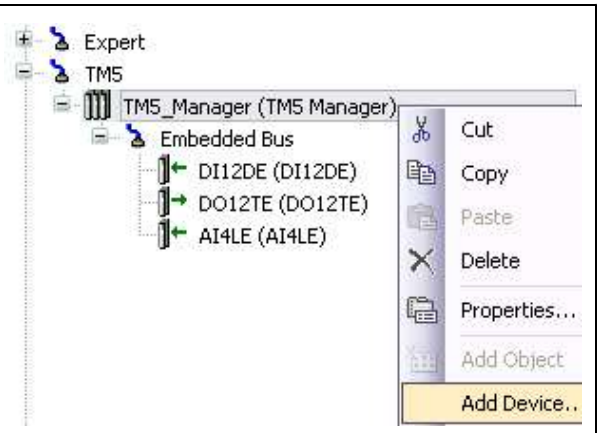
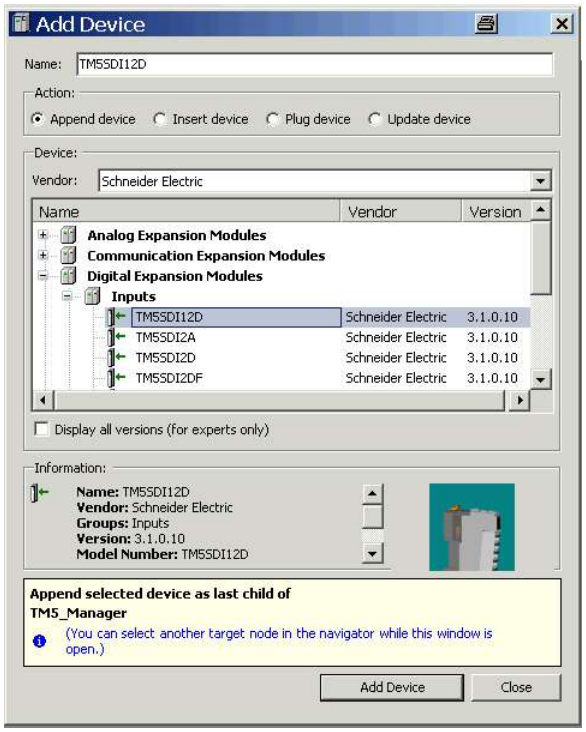
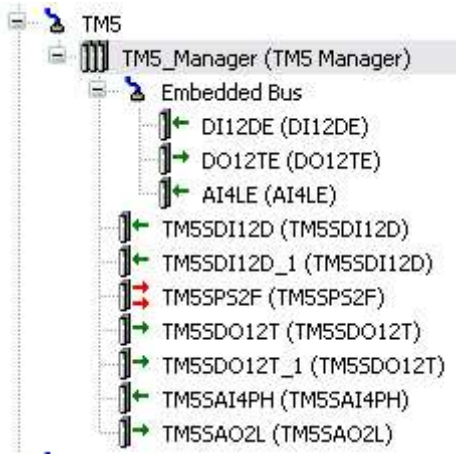
5	The Program window appears.	

Add the controller

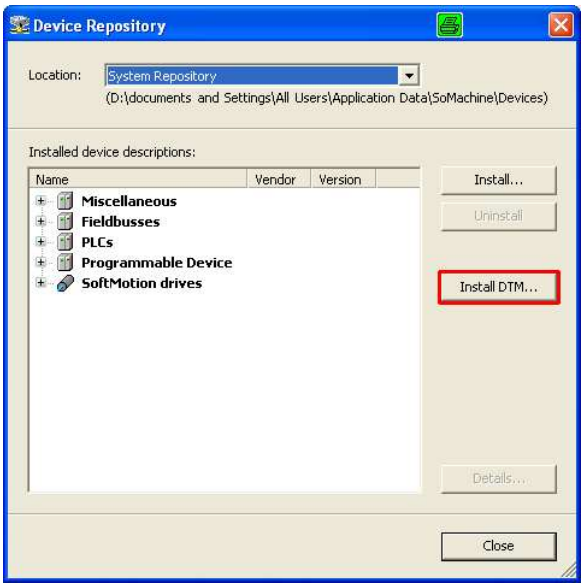
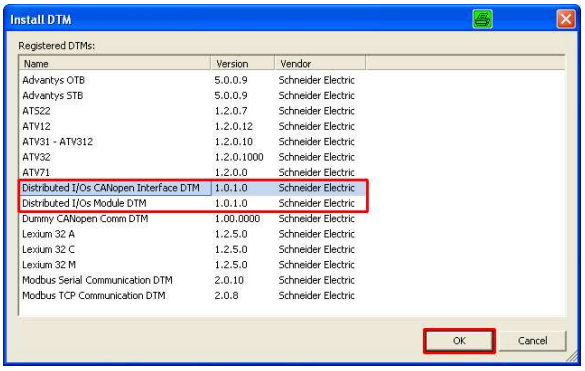
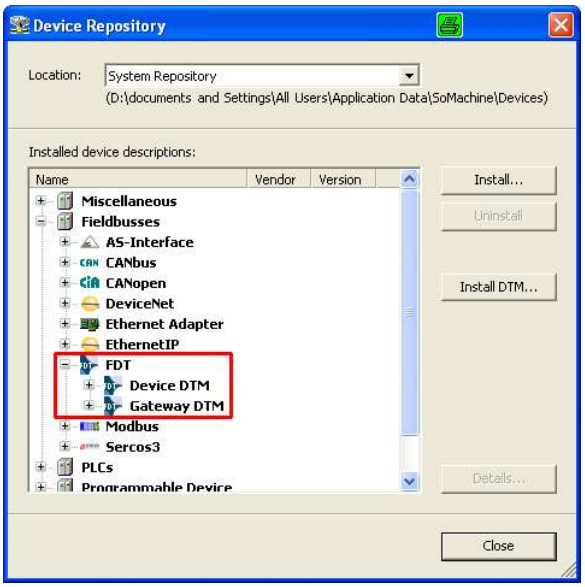
1	In the **Devices** browser, right click on: **Performance CANopen M258** Select **Add Device…** in the pop-up menu.	 

2	Select **Schneider Electric** as **Vendor**. Then select: **Logic Controller ->** **TM258LF42DT4L** as device. Click on **Add Device.**	
3	The **Devices** browser now displays the new controller.	

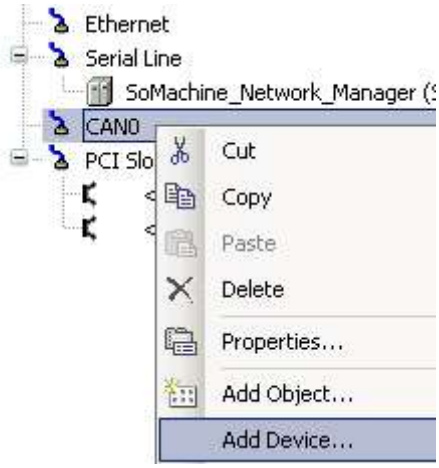
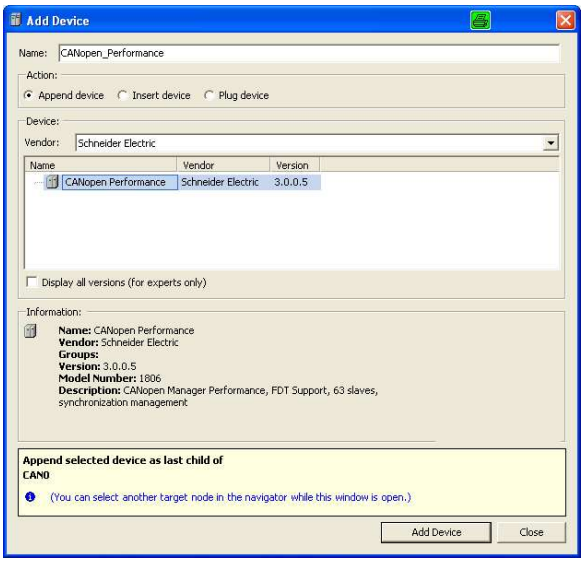
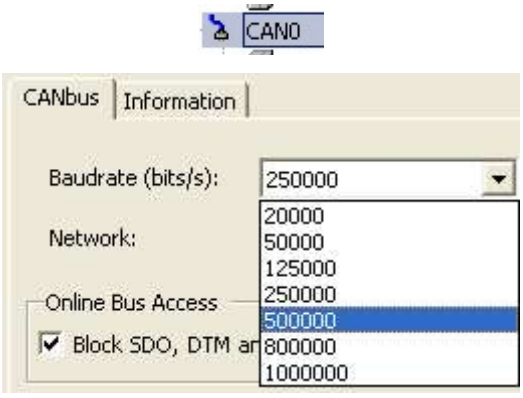
Add Expansion Cards

1	To add an expansion card, right click on **TM5_Manager** in the devices browser and select: **Add Device…**	
2	Select the expansion module you wish to add and click on **Add Device.** This project requires the following cards: **2x TM5SDI12D** **1x TM5SPS2F** **2x TM5SDO12T** **1x TM5SAI4PH** **1x TM5SAO2L** Once you have added all the cards exit the dialog by clicking on **Close**.	
3	The added expansion modules can now be seen in the device browser.	

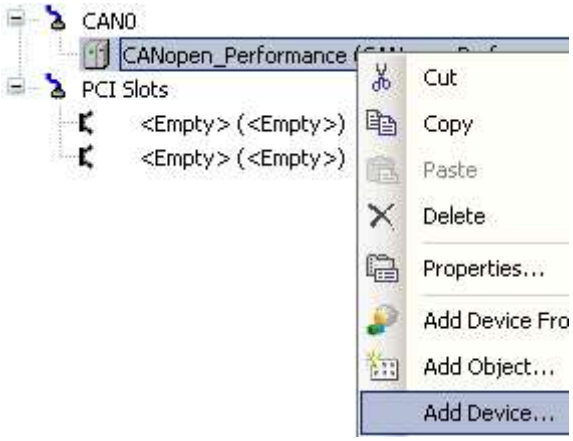
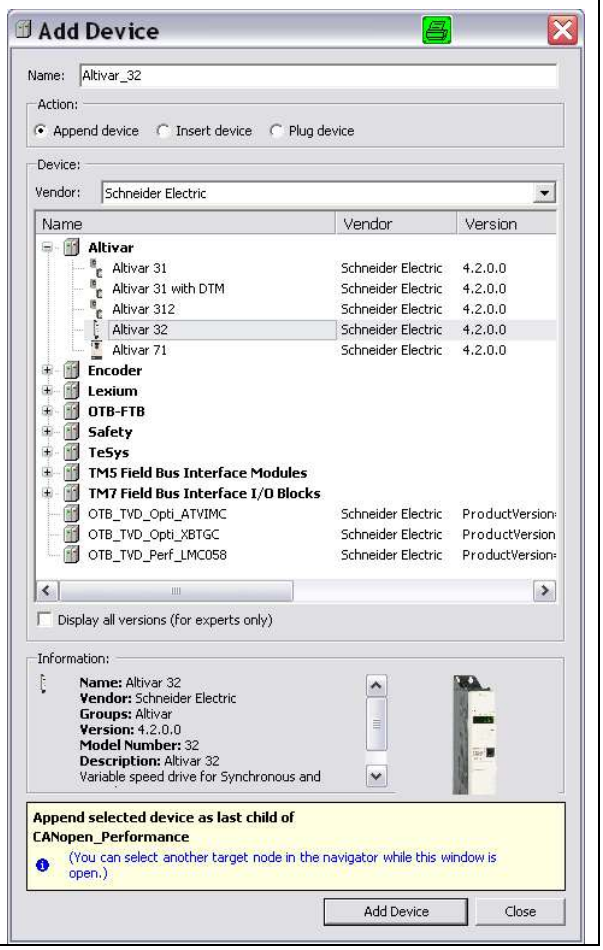
Install DTM for TM5 & TM7 islands

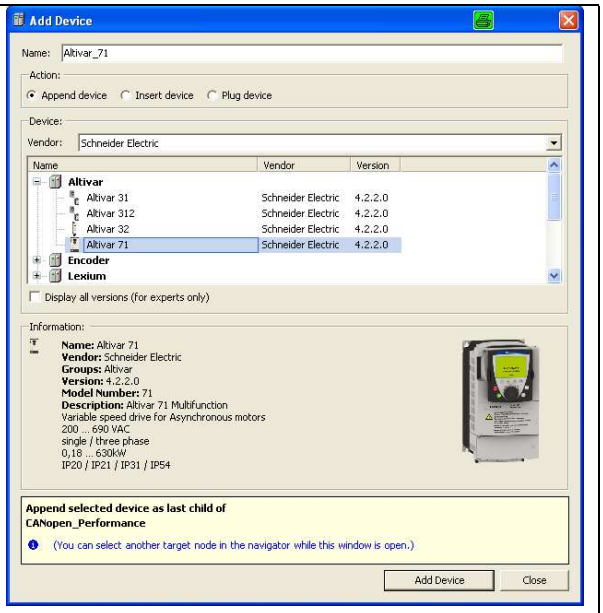
1	To install the DTM for TM5 & TM7 islands click on: **Tools ->** **Device Repository…**	
2	In the Device Repository click on **Install DTM…**	
3	In the Install DTM dialog select **Distributed I/Os CANopen Interface DTM** and press **OK.** Do step 2 again and select **Distributed I/Os Module DTM** and press **OK**	
4	The added DTMs can now seen in the **Device Repository.** Click on **Close** to close the dialog.	

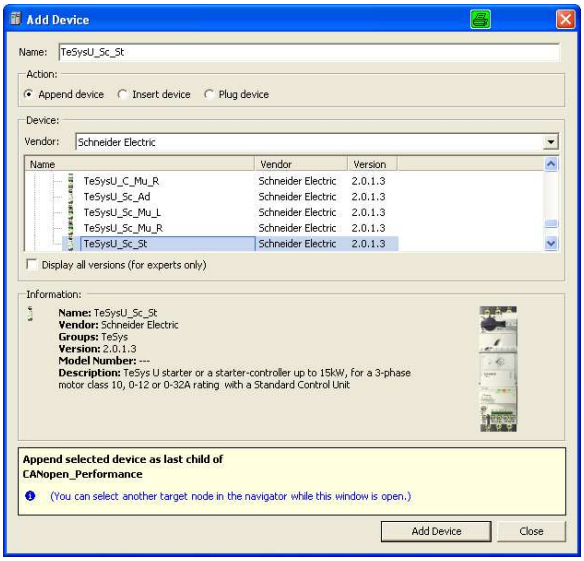
Add the CANopen fieldbus

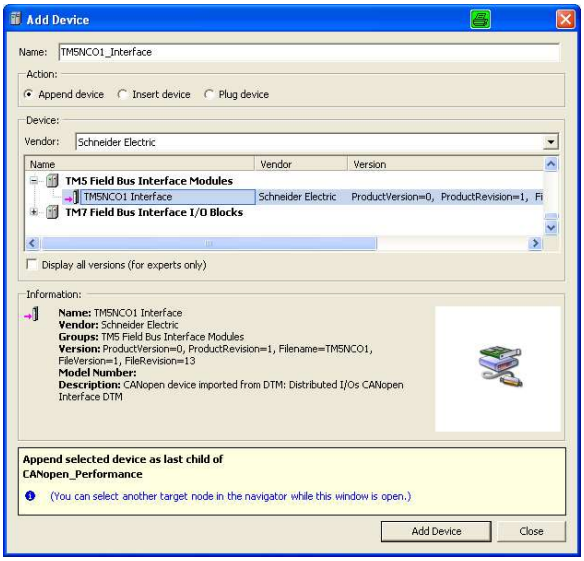
1	In the browser right click on **CAN0** and select: **Add Device...**	
2	In the **Device** list, select: **CANopen Performance** and click on **Add Device** and then **Close.**	
3	Double click on **CAN0** and select a **Baudrate (bit/s)** of **500000** the drop down list.	

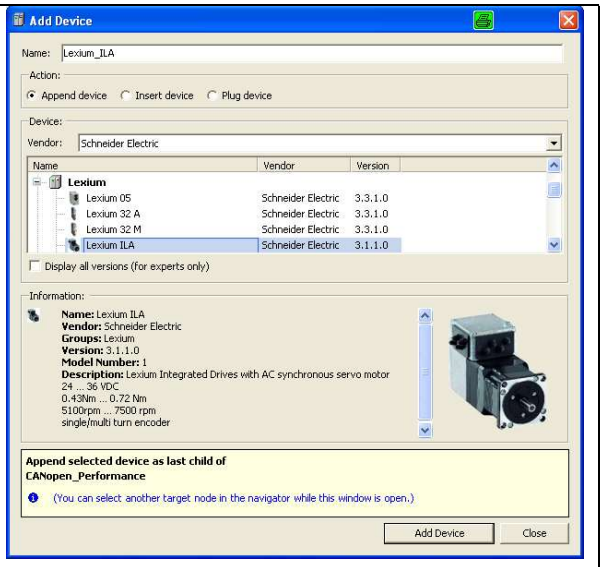
Add CANopen Devices

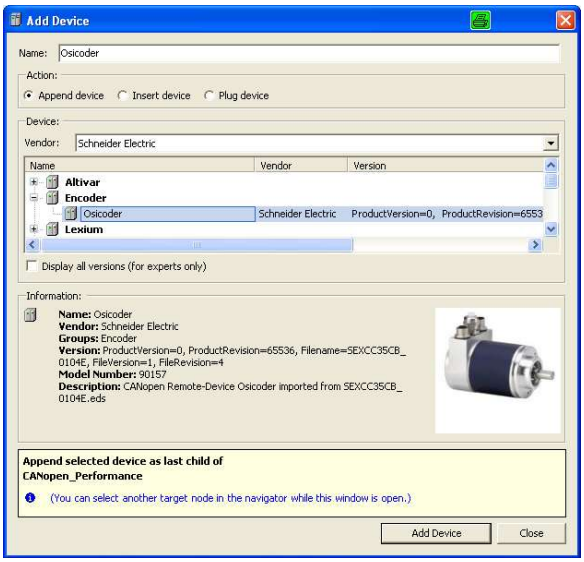
1	In the devices browser, right click on: **CANopen_Performance** and select **Add Device…** in the pop-up menu.	
2	Select the device that you wish to connect to the CANopen bus. In this project the following devices are connected to the CANopen bus: **6x Altivar 32** **4x Altivar 71** **4x Lexium 32 A** **2x Lexium ILA** **3x TM5NCO1** **1x TM7NCOM16A** **1x Osicoder** **1x TeSysU_Sc_St** Under **Name** the name for the new node can be set. Add each device by clicking on **Add Device**. Once you have added all devices click on **Close.**	

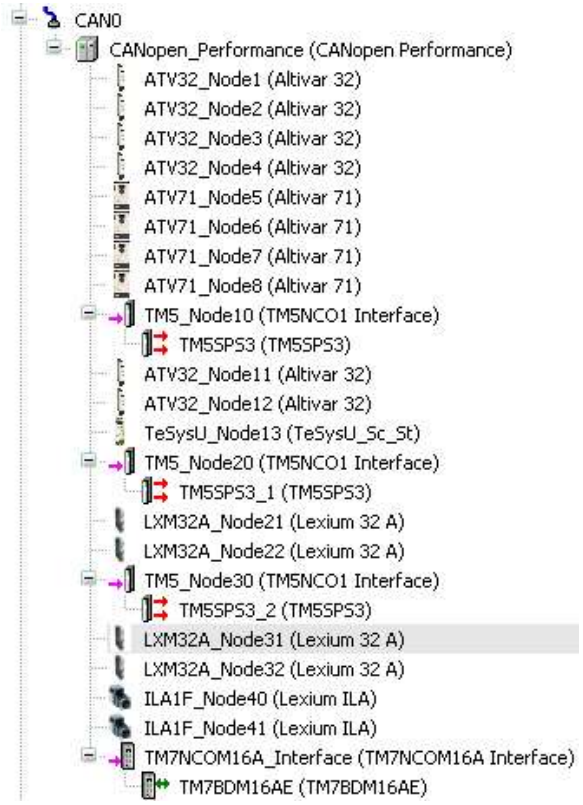

Add Device
Name: Altivar_71
Action:
Append device
Insert device
Plug device
Device:
Vendor: Schneider Electric
Name
Vendor
Version
Altivar
Altivar 31 Schneider Electric 4.2.2.0
Altivar 312 Schneider Electric 4.2.2.0
Altivar 32 Schneider Electric 4.2.2.0
Altivar 71 Schneider Electric 4.2.2.0
Encoder
Lexium
Display all versions (for experts only)
Information:
Name: Altivar 71
Vendor: Schneider Electric
Groups: Altivar
Version: 4.2.2.0
Model Number: 71
Description: Altivar 71 Multifunction
Variable speed drive for Asynchronous motors
200 ... 690 VAC
single / three phase
0,18 ... 630kW
IP20 / IP21 / IP31 / IP54
Append selected device as last child of
CANopen_Performance
(You can select another target node in the navigator while this window is open.)
Add Device
Close


Add Device
Name: TeSysU_Sc_St
Action:
Append device
Insert device
Plug device
Device:
Vendor: Schneider Electric
Name
Vendor
Version
TeSysU_C_Mu_R Schneider Electric 2.0.1.3
TeSysU_Sc_Ad Schneider Electric 2.0.1.3
TeSysU_Sc_Mu_L Schneider Electric 2.0.1.3
TeSysU_Sc_Mu_R Schneider Electric 2.0.1.3
TeSysU_Sc_St Schneider Electric 2.0.1.3
Display all versions (for experts only)
Information:
Name: TeSysU_Sc_St
Vendor: Schneider Electric
Groups: TeSys
Version: 2.0.1.3
Model Number: ---
Description: TeSys U starter or a starter-controller up to 15kW, for a 3-phase motor class 10, 0-12 or 0-32A rating with a Standard Control Unit
Append selected device as last child of
CANopen_Performance
(You can select another target node in the navigator while this window is open.)
Add Device
Close

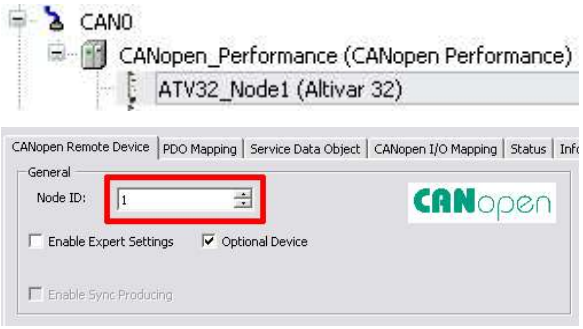

Add Device
Name: TM5NCO1_Interface
Action:
Append device
Insert device
Plug device
Device:
Vendor: Schneider Electric
Name
Vendor
Version
TM5 Field Bus Interface Modules
TM5NCO1 Interface Schneider Electric ProductVersion=0, ProductRevision=1, Fi
TM7 Field Bus Interface I/O Blocks
Display all versions (for experts only)
Information:
Name: TM5NCO1 Interface
Vendor: Schneider Electric
Groups: TM5 Field Bus Interface Modules
Version: ProductVersion=0, ProductRevision=1, Filename=TM5NCO1, FileVersion=1, FileRevision=13
Model Number:
Description: CANopen device imported from DTM: Distributed I/Os CANopen Interface DTM
Append selected device as last child of
CANopen_Performance
(You can select another target node in the navigator while this window is open.)
Add Device
Close


Add Device
Name: Lexium_ILA
Action:
Append device
Insert device
Plug device
Device:
Vendor: Schneider Electric
Name
Vendor
Version
Lexium
Lexium 05 Schneider Electric 3.3.1.0
Lexium 32 A Schneider Electric 3.3.1.0
Lexium 32 M Schneider Electric 3.3.1.0
Lexium ILA Schneider Electric 3.1.1.0
Display all versions (for experts only)
Information:
Name: Lexium ILA
Vendor: Schneider Electric
Groups: Lexium
Version: 3.1.1.0
Model Number: 1
Description: Lexium Integrated Drives with AC synchronous servo motor
24 ... 36 VDC
0.43Nm ... 0.72 Nm
5100rpm ... 7500 rpm
single/multi turn encoder
Append selected device as last child of
CANopen_Performance
(You can select another target node in the navigator while this window is open.)
Add Device
Close


Add Device
Name: Osicoder
Action:
Append device
Insert device
Plug device
Device:
Vendor: Schneider Electric
Name
Vendor
Version
Altivar
Encoder
Osicoder Schneider Electric ProductVersion=0, ProductRevision=6553
Lexium
Display all versions (for experts only)
Information:
Name: Osicoder
Vendor: Schneider Electric
Groups: Encoder
Version: ProductVersion=0, ProductRevision=65536, Filename=SEXCC35CB_
0104E, FileVersion=1, FileRevision=4
Model Number: 9015?
Description: CANopen Remote-Device Osicoder imported from SEXCC35CB_
0104E.eds
Append selected device as last child of
CANopen_Performance
(You can select another target node in the navigator while this window is open.)
Add Device
Close

3	The new devices are now listed in the device browser under: **CANopen_Performance**. To configure the devices, double click on the specific item.	

ATV32 CANopen configuration

1	In the browser double click on the **ATV32_Node1**. **Note:** In this project PLCopen EDS files are used. For this reason all PDO settings remain at their defaults. Set the **Node ID** to **1** (Node ID for the Altivar 32 is **1…4** and **11 + 12**).	

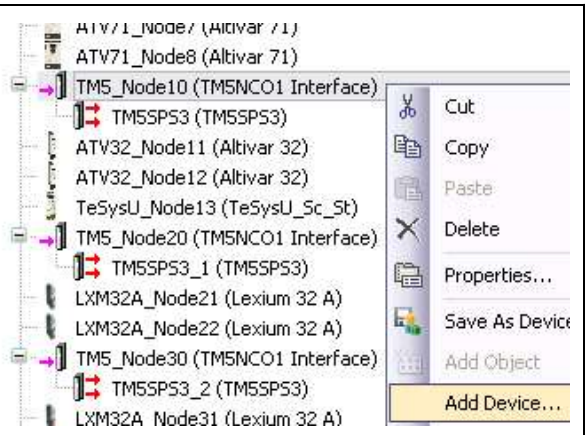
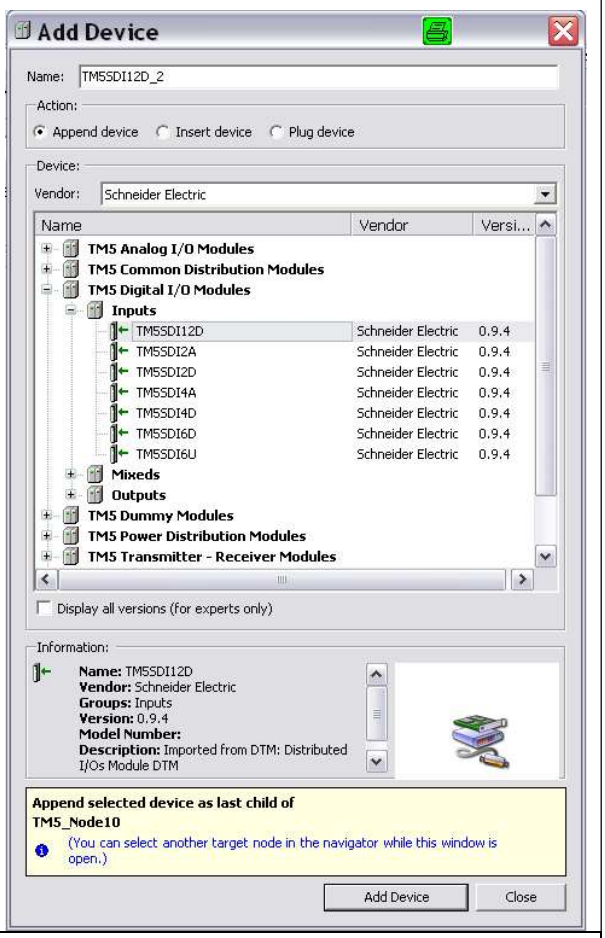
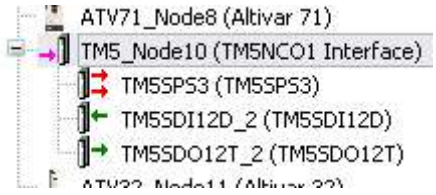
ATV71 CANopen configuration

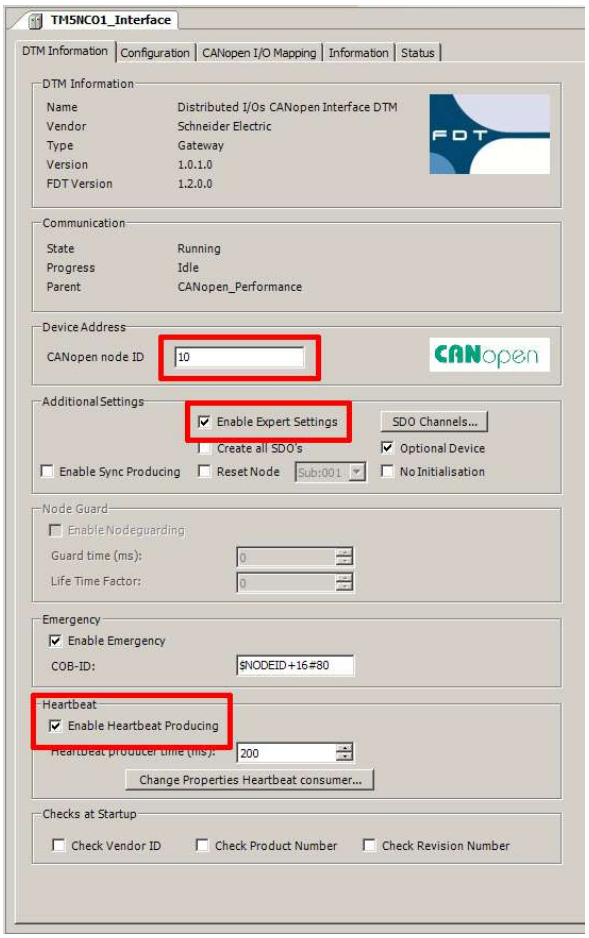
1	The configuration is done in the same way as the ATV32 configuration. The only difference is the **CANopen (5…8)** address.

LXM32A CANopen configuration

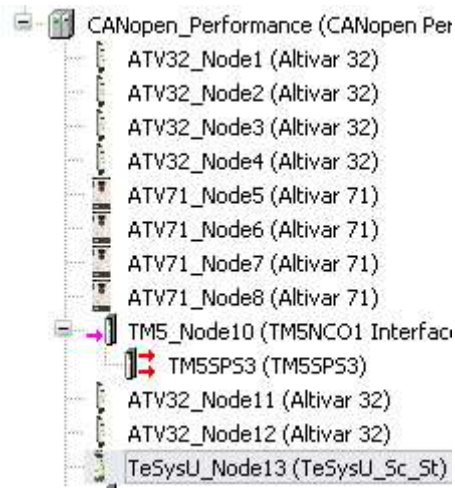
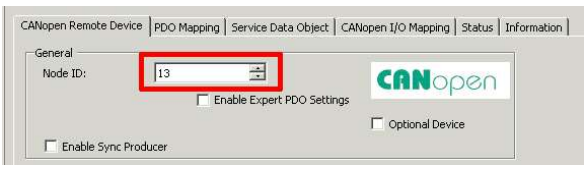
1	The configuration is done in the same way as the ATV32 configuration. The only difference is the **CANopen (21 + 22 and 31 + 32)** address.

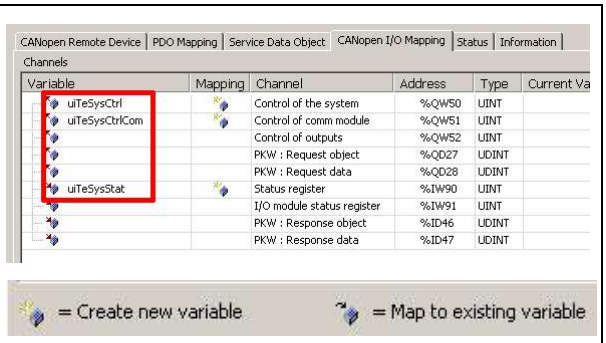
TM5 CANopen configuration

1	To configure the TM5 with its I/O cards right click on: **TM5_Node10** in the devices browser. Then select **Add Device…**	
2	Select : **TM5SDI12D** and the **TM5SDO12T** I/O cards. Then select **Add Device…**	
3	The device editor shows the two new cards. Double click on **TM5_Node10** in the devices browser to configure the CANopen Node ID.	

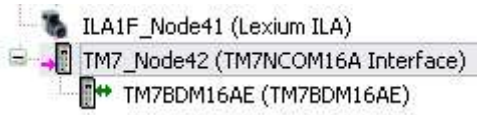
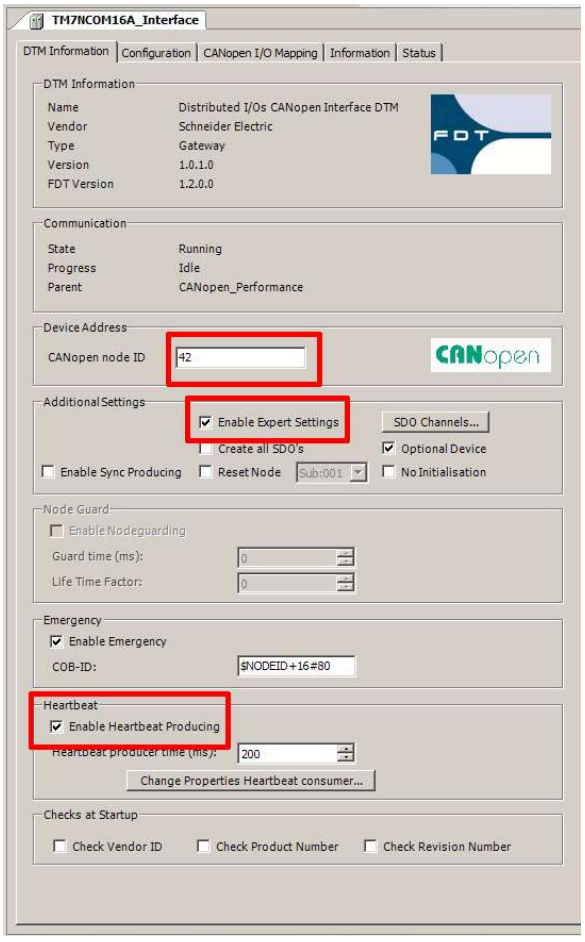
4	Select **10** as **Node ID**and select **Enable Expert Settings** and the select **Enable Heartbeat Producing.** **Note**: For the 2nd and 3rd TM5 select the **Node ID 20** and **30.**	

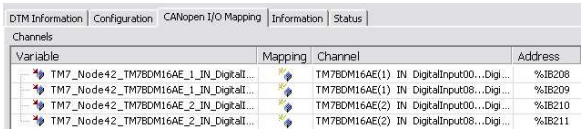
TeSysU CANopen configuration

1	To configure the TeSysU double click on: **TeSysU_Sc_St** in the devices browser.	
2	Select **13** as **Node ID.**	

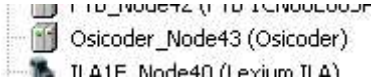
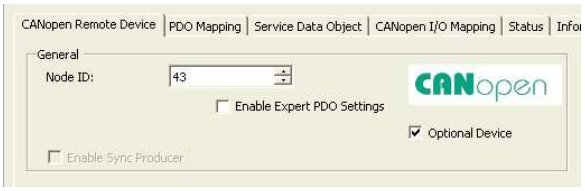
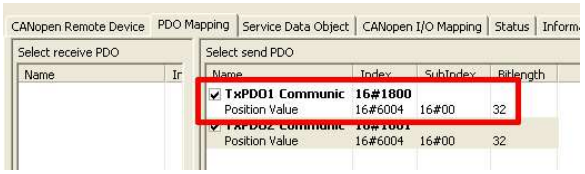
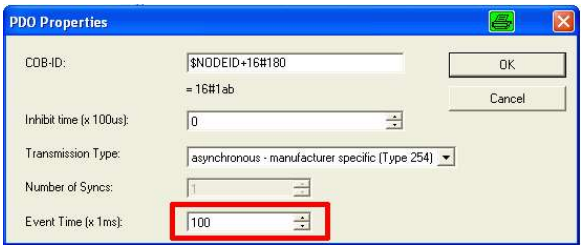
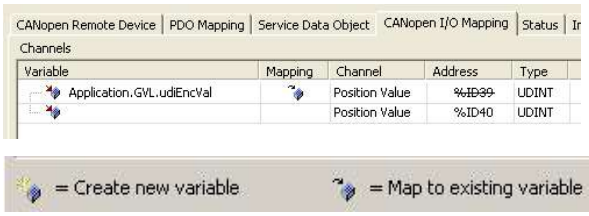
3	In the **CANopen I/O Mapping** tab, the inputs and outputs are mapped to variables. There are two ways of **Mapping:** 1.Mapping to an existing variable 2.Creating a new variable In this project **create a new variable** was chosen. This means SoMachine creates a global variable which can be used throughout the whole program. The names of the variables can be entered in the **Variable** field.	

TM7 CANopen configuration

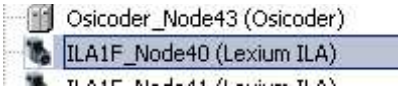
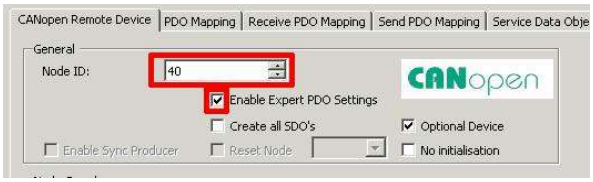
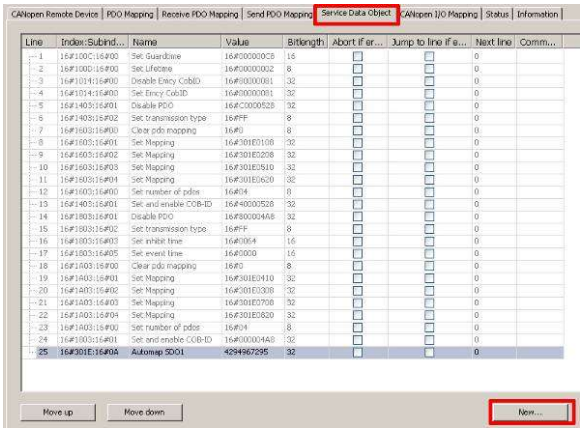
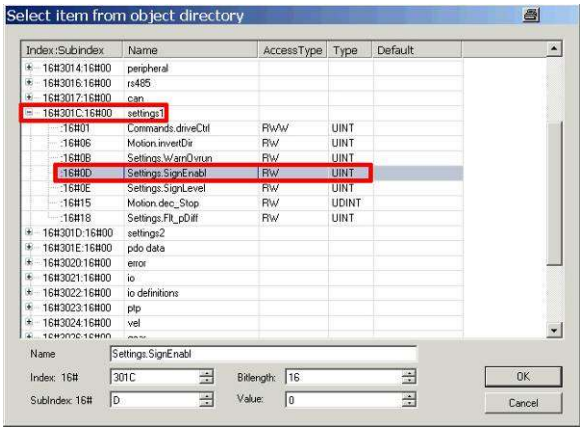
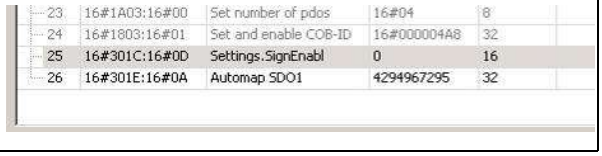
1	To configure the TM7 double click on: **TM7_Node42** in the devices browser.	
2	Select **42** as **Node ID** and select **Enable Expert Settings** and the select **Enable Heartbeat Producing**	

3	The input and output data of the TM7 is mapped to pre-defined variables shown in the **CANopen I/O Mapping** tab.	

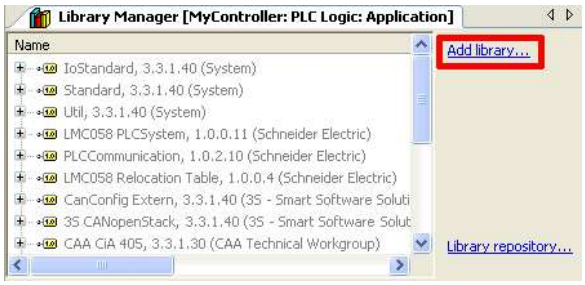
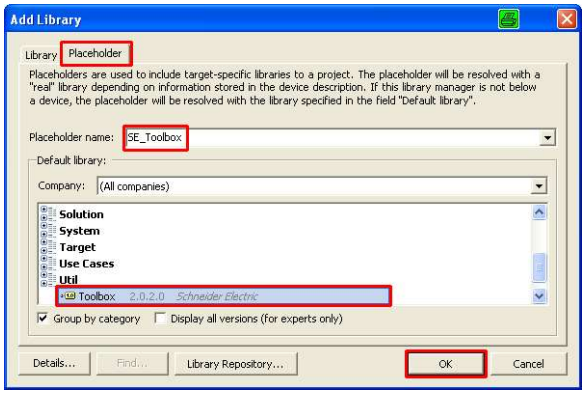
Osicoder CANopen configuration

1	To configure the Osicoder double click on the Osicoder entry in the devices browser.	
2	Select **43** as the **Node ID**	
3	Go to the **PDO Mapping tab** and double click on **TxPDO1**.	
4	Set the **Event Time** to a value greater than 0. In this project it is **100 ms.** If the value is 0, the Osicoder will not send any data. Click on **OK**.	
5	On the **CANopen I/O Mapping** tab, the inputs and outputs are mapped to variables. There are two ways of **Mapping:** 1.Mapping to an existing variable 2.Creating a new variable In this project **Map to existing variable** was chosen. This means the encoder data is mapped to a variable which is created in the GVL (Global Variable List)	

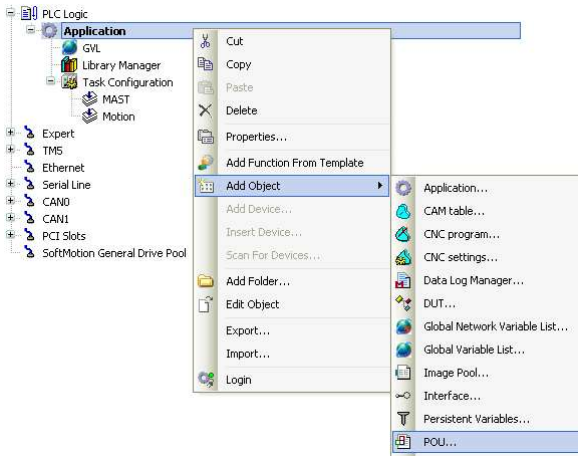
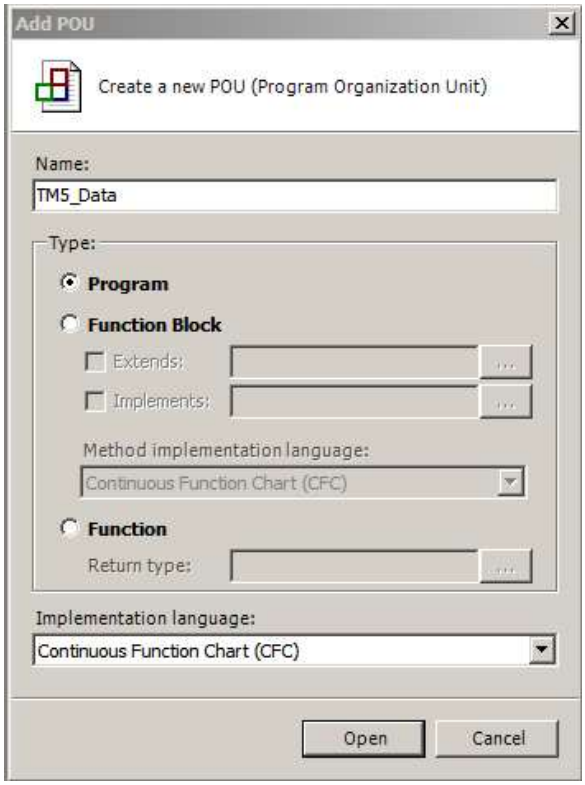
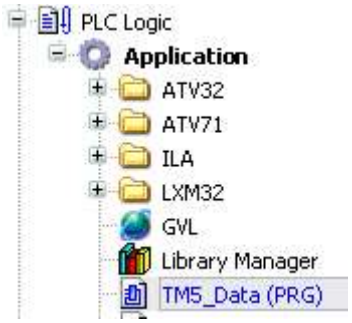
Lexium ILA CANopen configuration

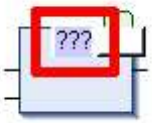
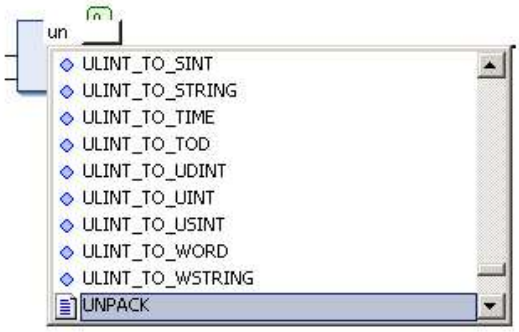
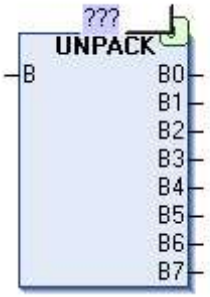
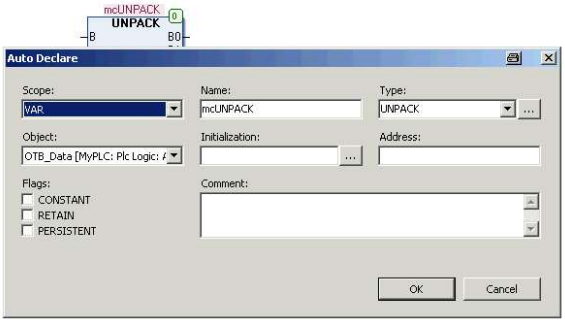
1	To configure the **Lexium ILA** double click on **Lexium ILA** in the devices browser. **Note:** In this project Motion EDS files are used. For this reason all PDO settings remain at their defaults.	
2	On the **CANopen Remote Device** tab select **40** as **Node ID** (For the 2nd **41** as **Node ID**) and checkmark: **Enable Expert PDO Settings.**	
3	Go to the **Service Data Object** tab and click on **New…**	
4	In the **Select item from object directory** dialog select **Settings1 ->** **Settings.SignEnabl** and click **OK.**	
	Note: In our example application we set the Settings.SignEnabl to 0 because we use the modulo motion mode (endless movements). If your application requires the end of travel limits then set the Settings.SignEnabl to 1. Verify that your application does not require these signals before disabling them.	
5	The new SDO is now visible in the Service Data Object tab.	

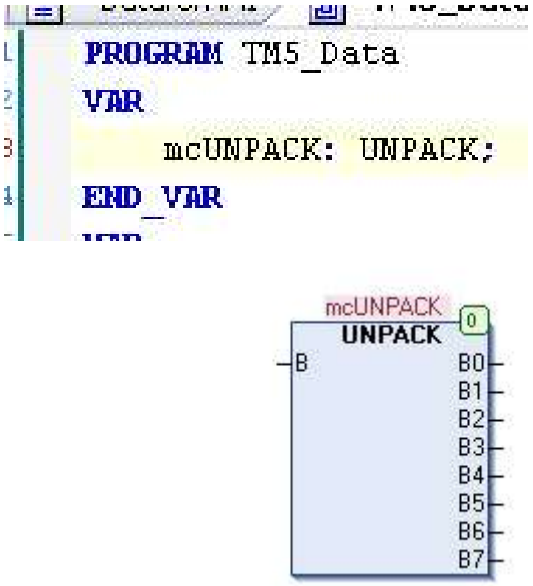
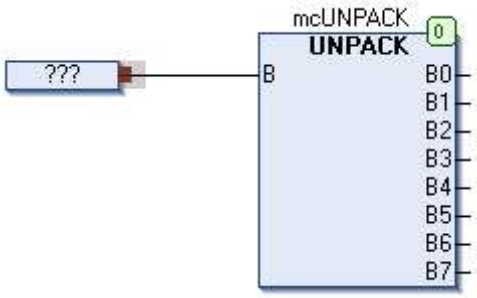
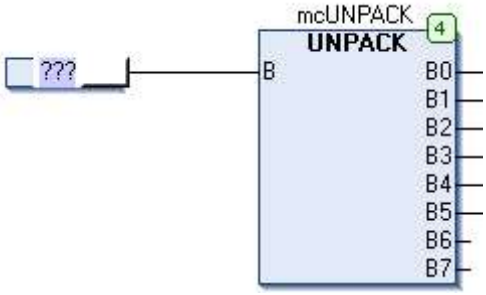
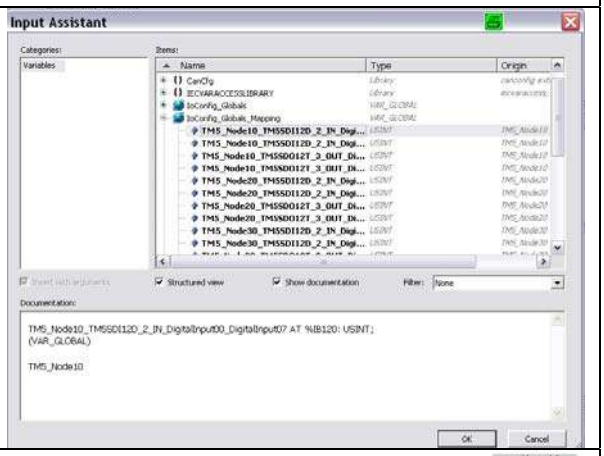
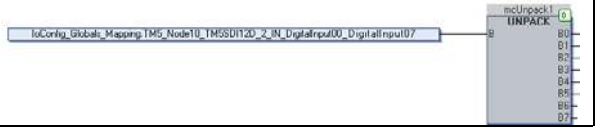
Add Toolbox Library

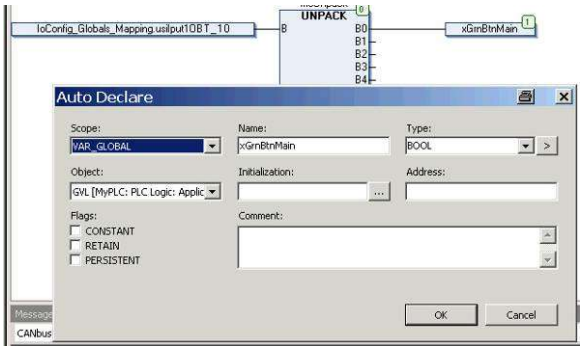
1	To use additional functions you need special libraries. These can be inserted by double clicking on the **Library Manager** in the devices browser. **Note:** The addition of the Toolbox lib is given as an example to show how this is done. To run this project no additional libraries need to be added.	
2	In the Library Manager click on **Add library…**	
3	In the **Add library** dialog on the **Placeholder** tab select: **Placeholder name->** **SE_Toolbox** and as **Default Library** select: **Util -> Toolbox** for the **Toolbox** lib. In each case, click on **OK** to add the library.	
4	If you wish to add more libraries repeat steps 1 to 4.	

Add a POU

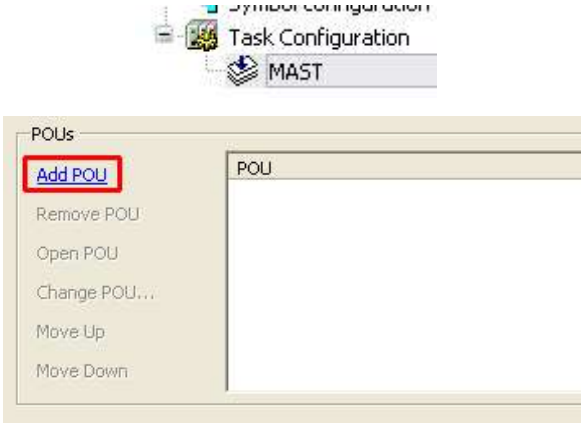
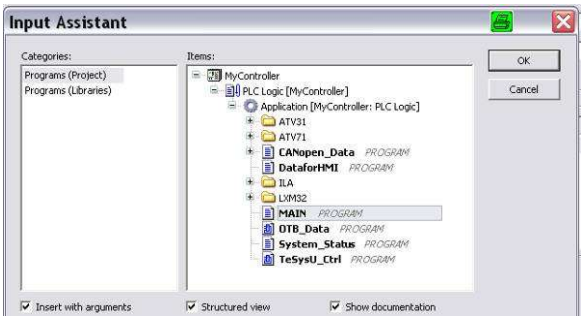
1	In the devices browser, right click on: **Application→Add Object →POU**	
2	Select **POU** and enter a **Name.** As **Type** select **Program** and as **Implementation language** select **CFC.** It is possible to select all the IEC languages and to generate functions and function blocks. Click on **Open.**	
3	The new **POU TM5_Data** is now visible under **Application** in the devices browser. Double click on **TM5_Data** to open it.	

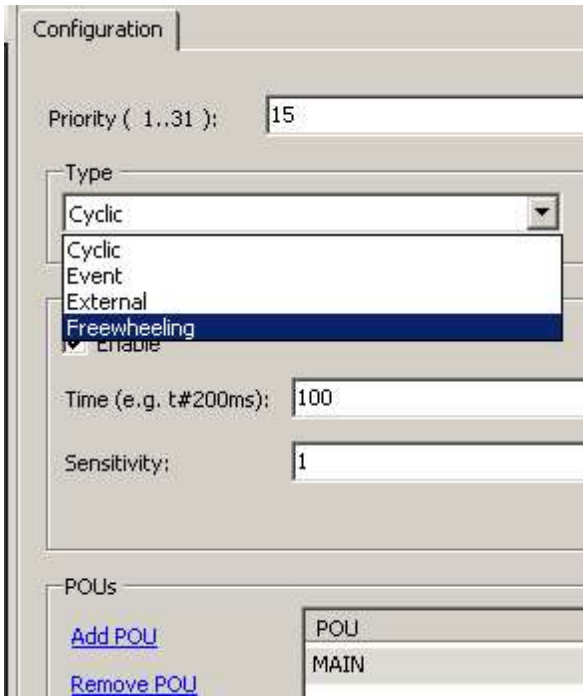
4	The upper frame displays the variable declaration section. The lower frame is for programming. On the right side is the **ToolBox** window**.** Use drag and drop with the toolbox to place example templates in the programming section.	
5	Once you have placed a template in the programming section click on **???**	
6	Type in a name for the function or function block. As the first letters are typed a pop-up menu opens with hints for the name. In this project example an **UNPACK FB** was chosen. The UNPACK FB converts bytes to bits.	
7	To instantiate the FB click **???...**	
8	… and type in a name (for example mcUNPACK). Now press Enter. The **Auto Declare** dialog opens. Here click on **OK** to create the instance. **Note:** If you wish to add a comment you can do this in the **Comment** box**.**	

9	The new FB UNPACK is instantiated in the declaration section of the **TM5_Data.**	
10	To connect a variable to an input place an input field from the **ToolBox** on the input side of the FB and connect the input box to the FB input by clicking on the red field and dragging it to the input pin of the FB.	
11	Click the input field and press **F2.** The Input Assistant is displayed.	
12	In the **Input Assistant** select **IOConfig_Globals_Mapping** and then the variable. In this project the variable is the first input byte of the TM5 node. Click on **OK.**	
13	This image shows the FB with the connected input.	

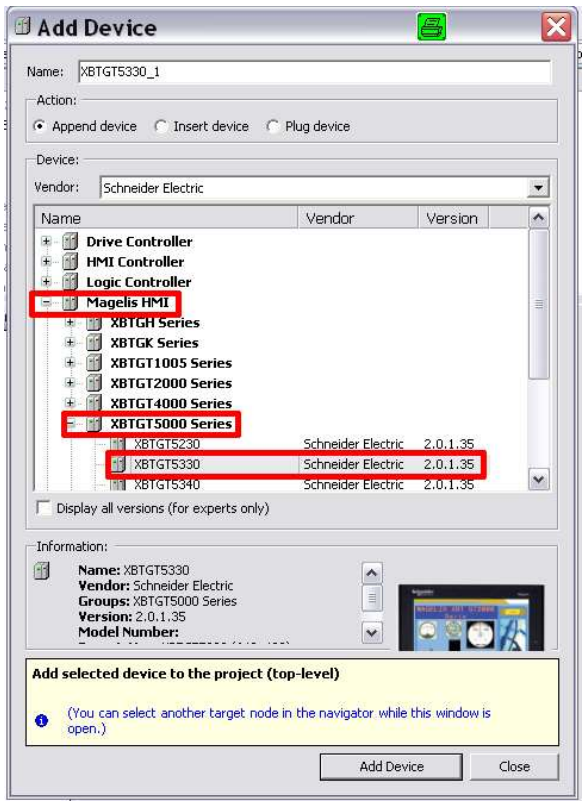
14	Output definition is similar to input definition, but here we create a new variable. Place the output field, type in the name of the variable and press Enter. In the **Auto Declare** dialog select the **Scope**, the **Name** and the **Type.** In this example **VAR_GLOBAL** is chosen as **Scope.** When finished click on **OK.**	
15	The **VAR_GLOBAL** variables are located in the **GVL** folder. All variables located in this folder can be accessed throughout the entire **Application**. If the variables are located in the POU, they can only be accessed by the POU (local variables).	

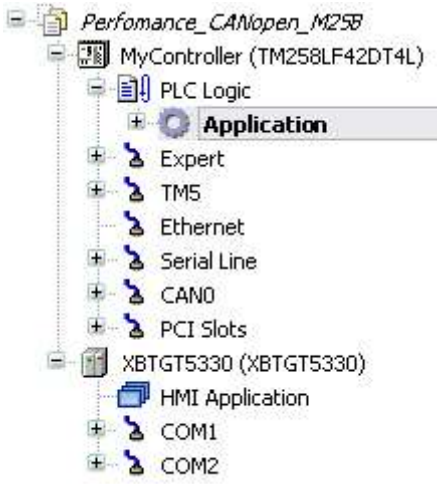
Task Configuration

1	Before you can start working with the new POU you have to add it to a task. Here, the POU's are added to the **MAST** task. To do this double click on the **MAST** task in the devices browser and click on **Add POU.** **Note:** If a POU is not included in a TASK, or added to another POU which is cyclically invoked, it will not be cyclically invoked.	
2	In **Categories** select **Programs (Project)** and select the new POU in the **Items list.** Then click **OK**. **Note:** You have to add all POUs in the program!	

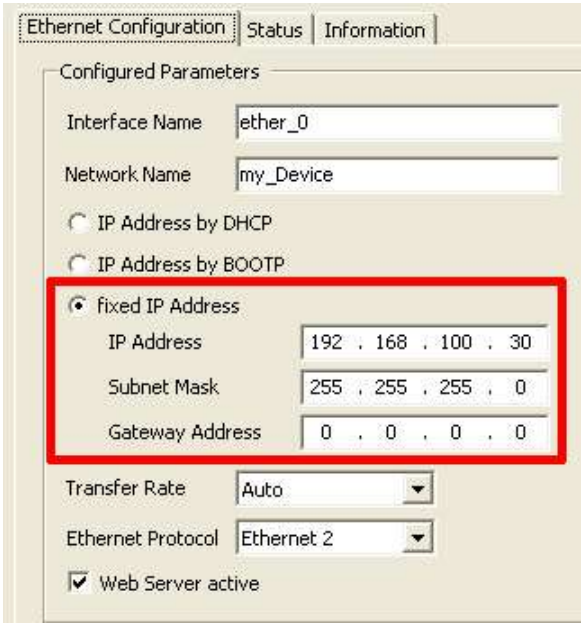
3	Now the POU has been added to the **MAST** task. In the upper part of the **MAST** task configuration you can change the **Type** of the task. In this project it is **Freewheeling.**	

Add Vijeo Designer HMI

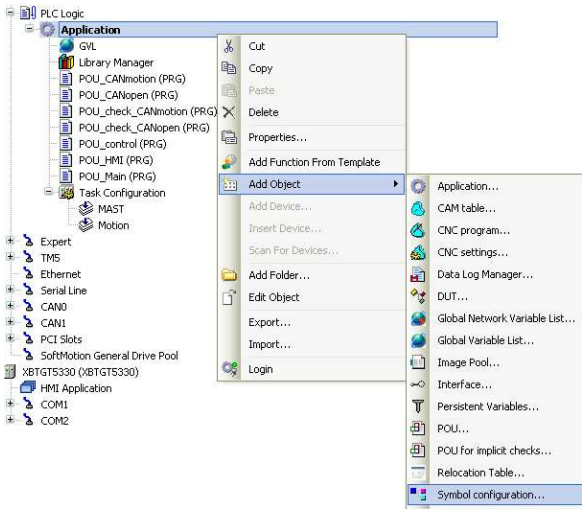
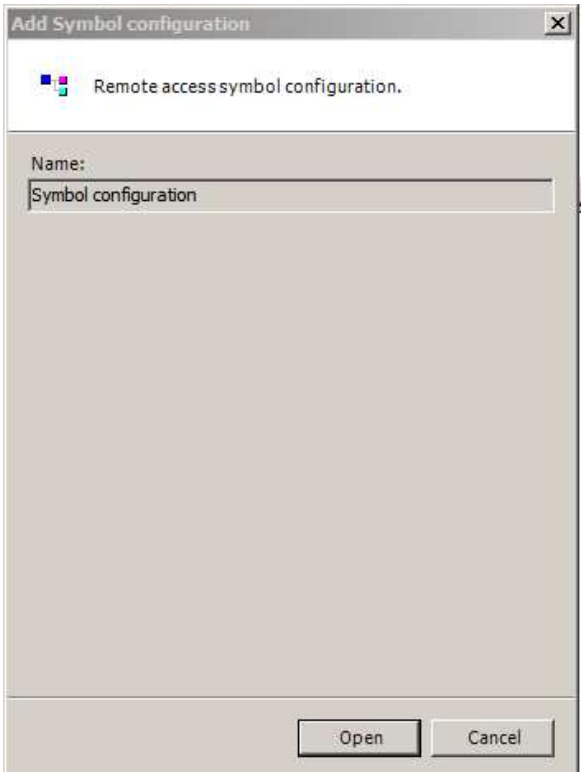
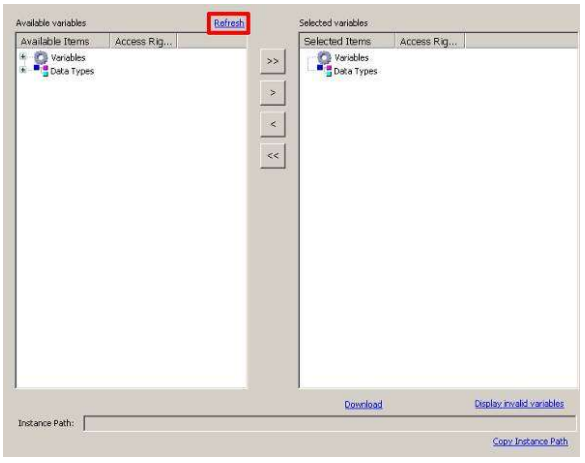
1	To add a Vijeo Designer HMI unit to the project right click on **Performance CANopen M258** → **Add Device…**	
2	In the **Add Device** dialog select **Schneider Electric** as **Vendor.** Select the HMI type: **Magelis HMI->** **XBTGT5000 Series->** **XBTGT5330** Click on **Add Device**	

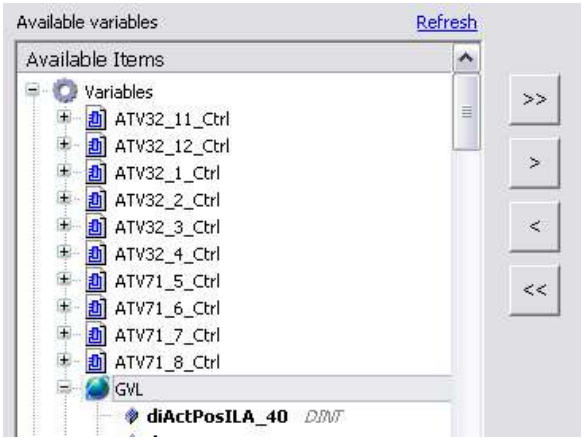
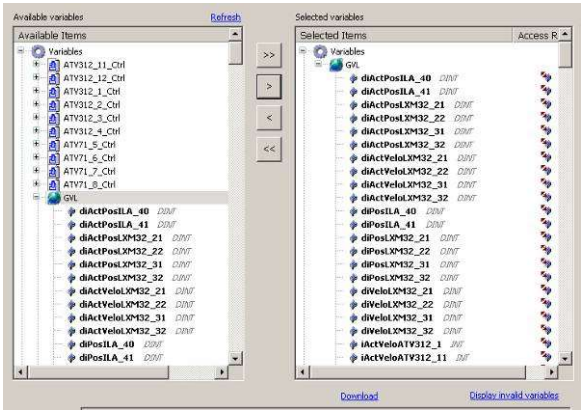
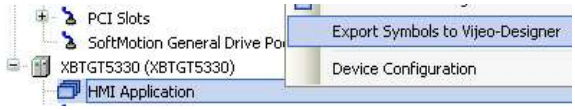
3	The new **XBTGT5330** is now listed in the configuration. **Note:** With this **XBTGT5330,** the Program, Vijeo Designer, opens and you can start programming the HMI device. (See chapter HMI)	

Ethernet settings

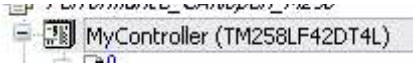
1	To change the Ethernet settings double click on **Ethernet**. In the devices browser.	
2	Select **fixed IP Address** and set an **IP Address** (here **192.168.100.30**) and a **Subnet Mask** (here **255.255.255.0**) **Note:** For the initial project download via the USB cable **TCSXCNAMUM3P** is required.	

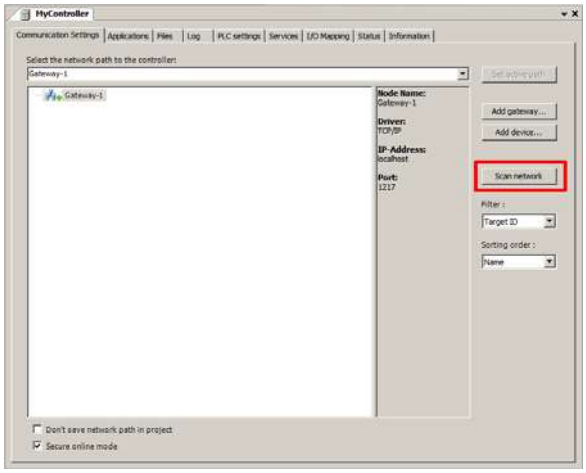
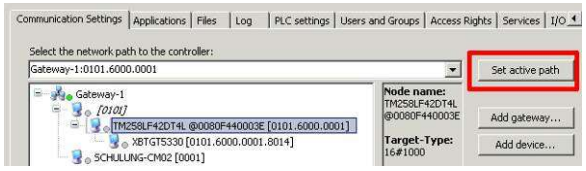
Configure Controller <-> HMI Data Exchange

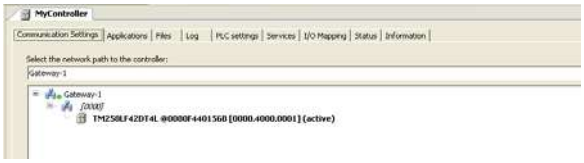
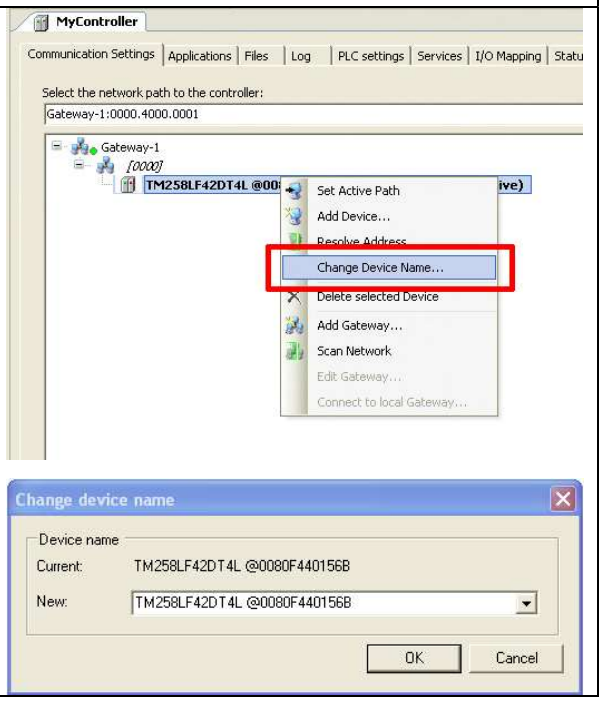
1	Right click on: **Application → Add Object → Symbol configuration**	
2	Select **Symbol configuration** in the **Add Object** dialog. Click on **Open**.	
3	Click on **Refresh** in the now open Symbol configuration.	

4	All variables created in the user program are shown in the **Variables** list. In this project all variables are global variables and are located in the GVL folder. To export variables to the HMI, select them and click on **>**.	
5	The right frame lists the selected **Variables** which are to be used in the HMI.	
6	To export the selected variables to Vijeo Designer right click on **HMI Application** in the browser and select **Export Symbols to Vijeo-Designer.**	

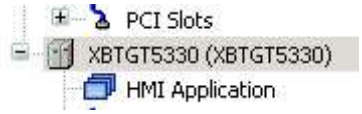
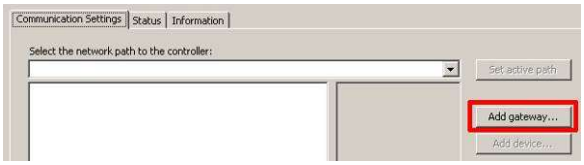
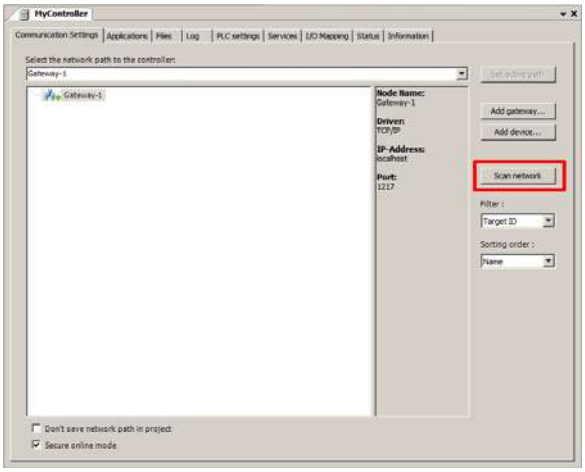
Communication Setting Controller <-> PC

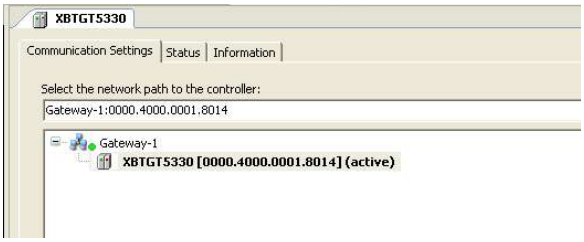
1	To configure the communication gateway double click on **MyController** in the devices browser.	
2	On the tab **Communication Settings** click on: **Add gateway...**	

3	In the **Gateway** dialog, retain the default settings and click on **OK.**	
4	Select **Gateway-1** and click on **Scan Network.**	
5	When the scan is finished, the devices appear under the gateway. Select the PLC used and click **Set active path.**	

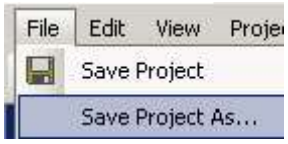
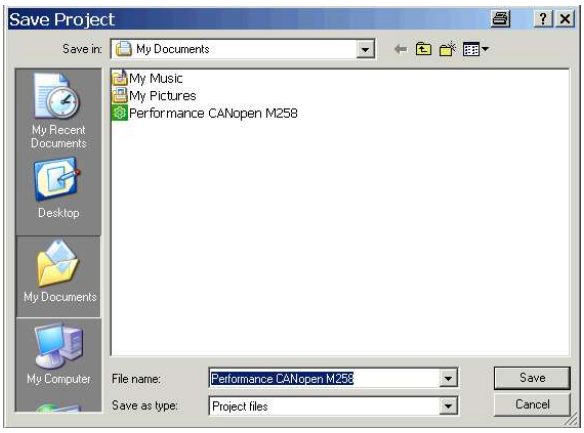
6	A hazard message is displayed and must be read. Read the message and confirm to continue.	
7	The used controller is now marked as **active.**	
8	**Note:** Every M258 has a unique MAC address that is a part of the default name (in this case: **@0080F440156B).** If you wish to change the default name of your controller: Right click on the controller and select **Change Device Name…** In the displayed pop-up window go to the **Device Name** field and enter the new unique name for your controller. In our example we keep the factory setting name.	

Communication Setting HMI <-> PC

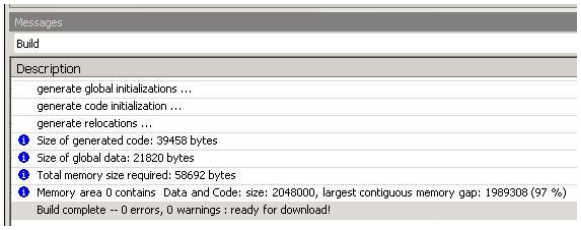
1	To configure the communication gateway double click on **XBTGT5330** in the devices browser.	
2	On the tab **Communication Settings**, click on **Add gateway…**	
3	In the **Gateway** dialog, retain the default settings and click on **OK.**	
4	Select **Gateway-1** and click **Scan Network.**	
5	When the scan is finished, the devices are displayed below the gateway. Select the HMI used and click on: **Set active path.**	

6	A hazard message is displayed and must be read. Read the message and confirm to continue.	
7	The used HMI is now marked as active.	

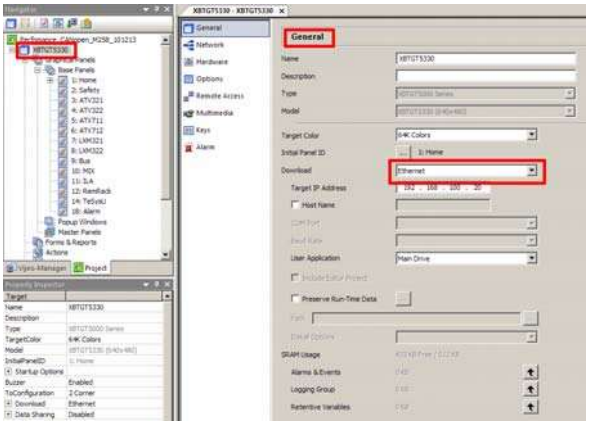
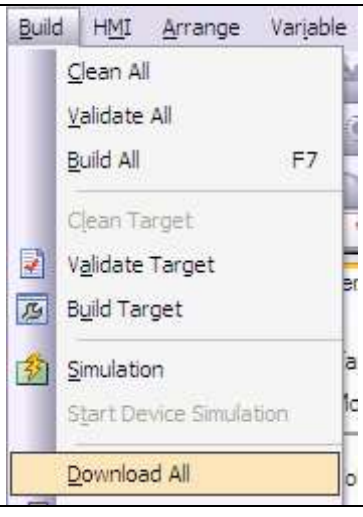
Save the Project

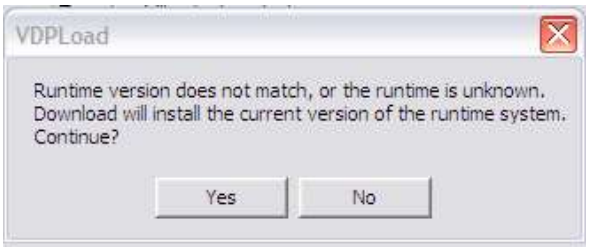
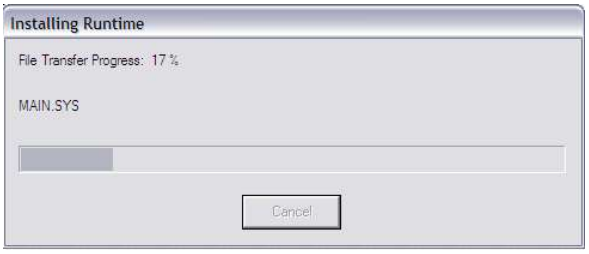
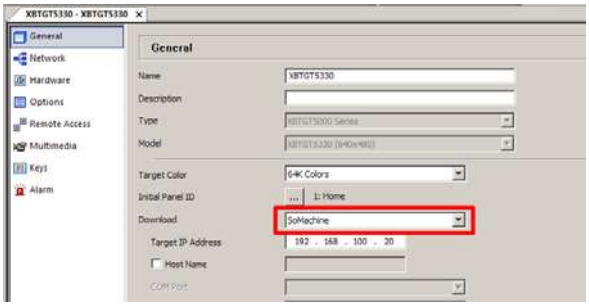
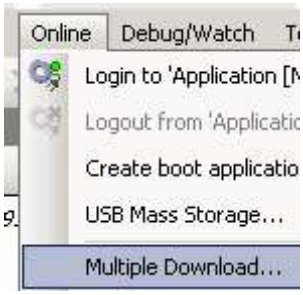
1	To save the project and change the name select: **File->Save Project As…**	
2	Enter the **File name** and click on **Save.** **Note:** As a default the project is saved under **My Documents**.	

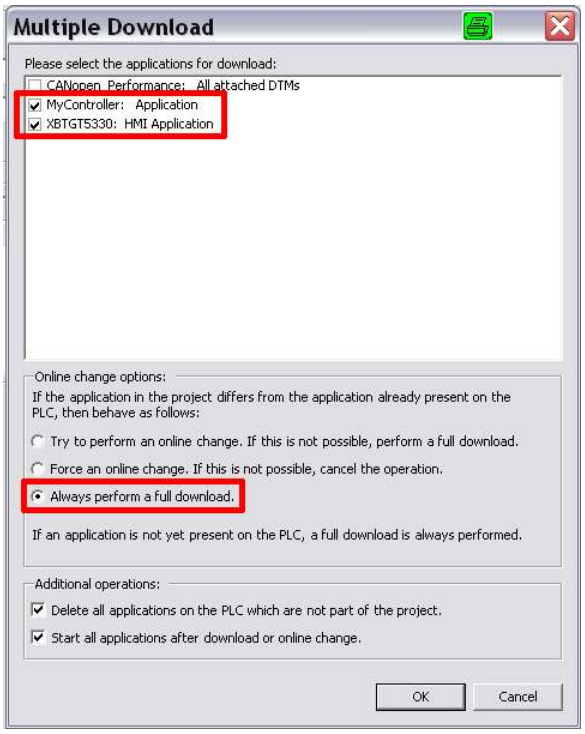
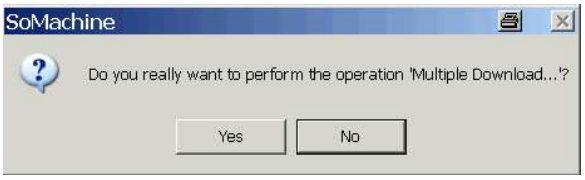
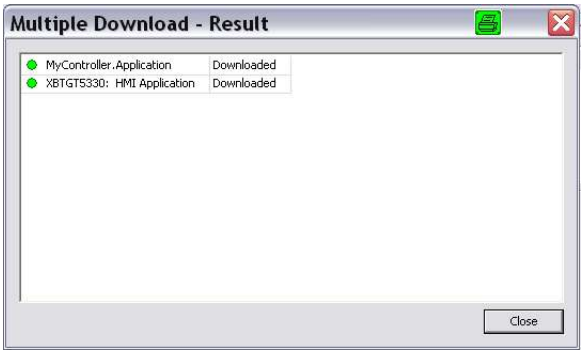
Build Application

1	To build the application click on **Build → Build.** **Note:** If you wish to build the entire project (HMI and Controller) click on **Build all**	
2	After the build you are notified in the **Messages** field as to whether the build was successful or not. If the build was not successful there will be a list of detected compilation errors that you must remedy in the **Messages** field.	

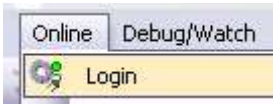
Download the Controller and HMI project

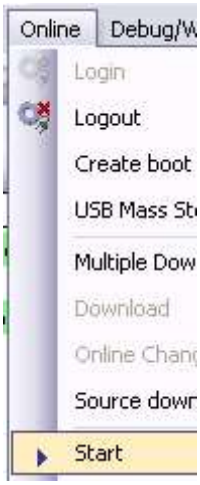
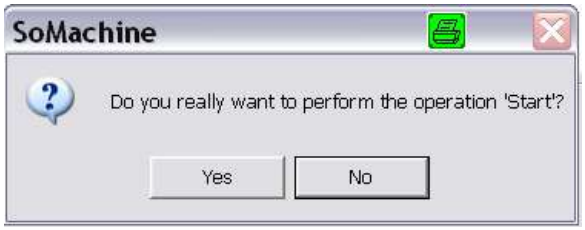
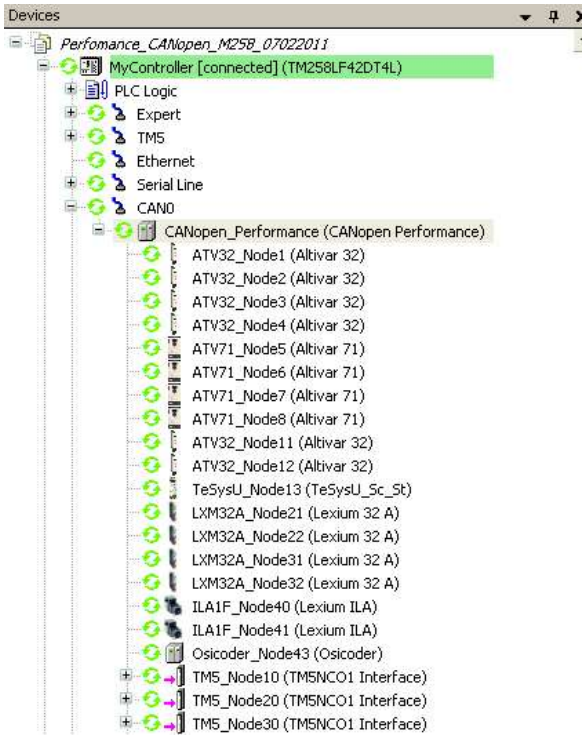
1	**Note:** For the initial download, the Magelis HMI requires the latest version of the runtime kernel and the Controller address. This is accomplished by using Vijeo Designer for the initial download. This first download is described in the following steps. If this is not the first time you are downloading to the Magelis HMI, go directly to step 7.	
2	In Vijeo Designer Navigator window click on **XBTGT5330** to display the **General** screen and select **Download** via **Ethernet.** **Note:** The PC should be connected to the HMI via the Ethernet switch **TCSESU053FN0.**	
3	Select: **Build -> Download all**	

4	The **VDPLoad** dialog indicates that the runtime versions do not match. Start the download of the new version by clicking on **Yes**.	
5	The progress of the download is indicated.	
6	Once the download is complete, change the **Download** connection in the **Property Inspector** back to **SoMachine.**	
7	Change back from the Vijeo window to the SoMaschine program window. To download the application to the controller and the HMI click: **Online ->** **Multiple Download …**	

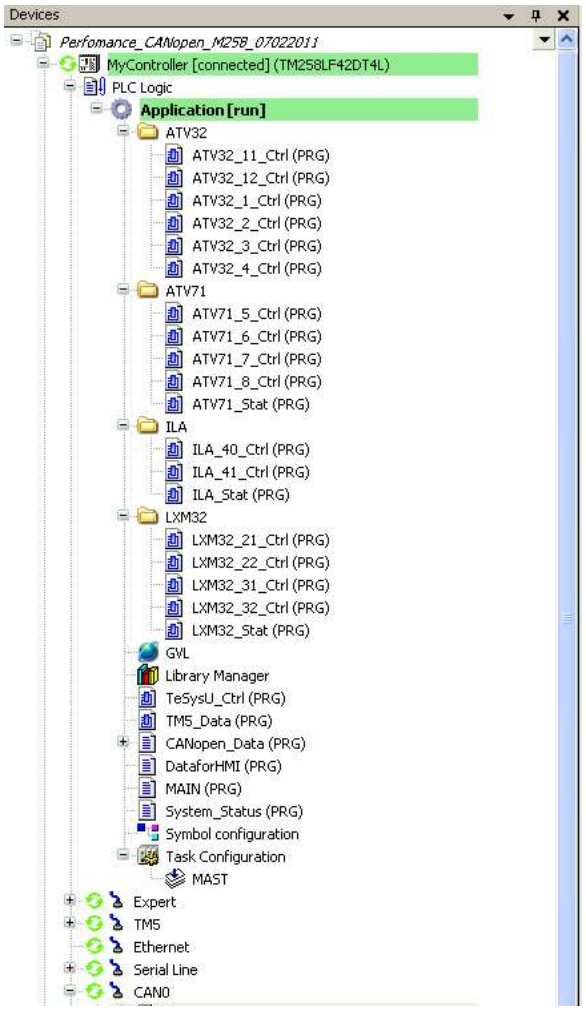
8	Check the controller **(MyController),** the HMI **(XBTGT5330)** and select **Always perform a full download** Now click on **OK**.	
9	Click **Yes** to download.	
10	Click **Yes** to update the HMI runtime. **Note:** This step will only appear when there is a runtime version mismatch of the PC and the Magelis HMI.	
11	The results of the download to the controller and the HMI are displayed in the **Multiple Download – Result** window**.** Click on **Close** to close to the results window**.**	

Login to Controller

1	To login to the controller click **Online →** **Login**	

2	To start the new Application select: **Online → Start**	
3	Click **Yes** to confirm the start.	
4	If everything is running normally the devices and folders are marked in green otherwise they will be marked in red.	

Application overview

1	The picture on the right shows the structure of the project. Every device has its own entry in the structure. Additionally there are entries for bus state, status LED and the conveyor drives.	

HMI

Introduction

This application uses a Magelis XBTGT5330 HMI. This HMI device communicates via the SoMachine protocol over Ethernet with the controller. The HMI is programmed using the software tool **Vijeo Designer**, described briefly in the following pages. For the connection between the controller and the HMI use the cable **Ethernet cable 490NTW0000x**.

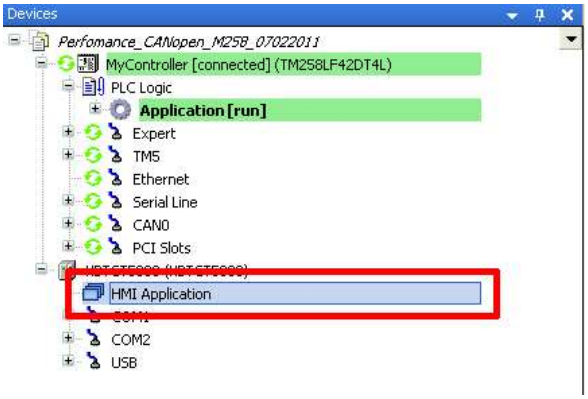
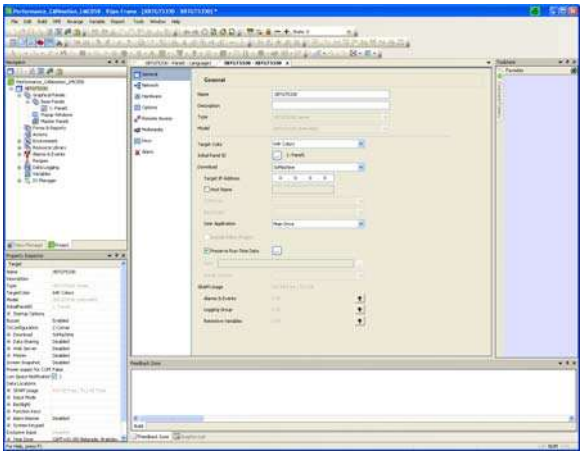
Note:
The Vijeo Designer tool is opened and closed via SoMachine software. For more information see the chapter:

Controller: Add Vijeo Designer HMI

Setting up the HMI is done as follows:

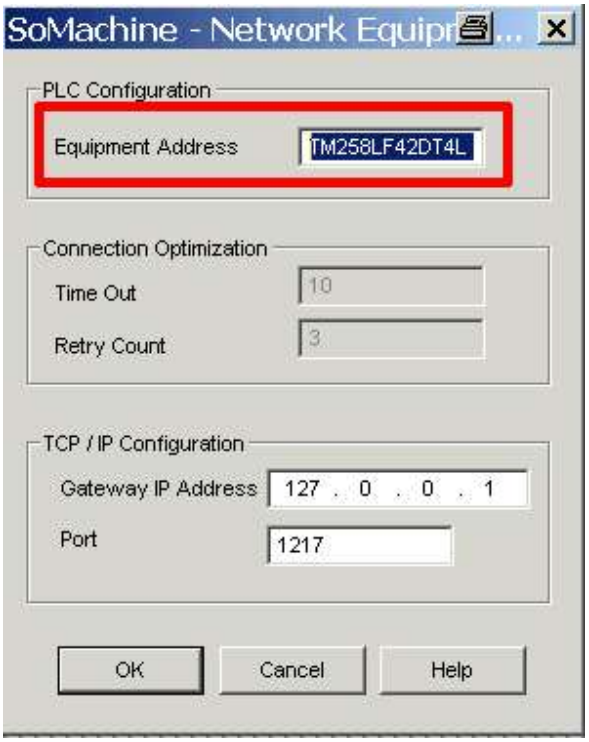
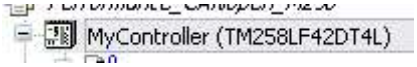
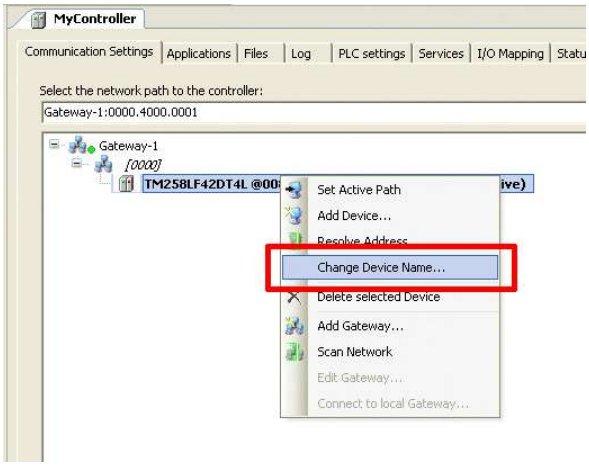
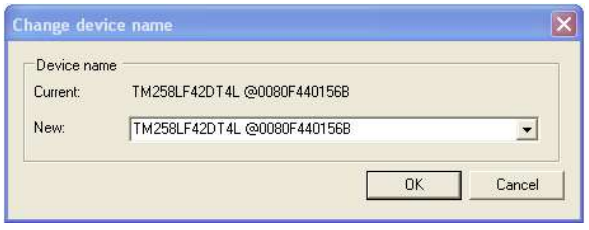
- Main Window
- Communication settings
- Create a switch
- Create a numeric display
- Example screens

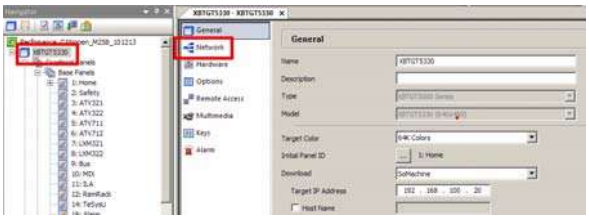
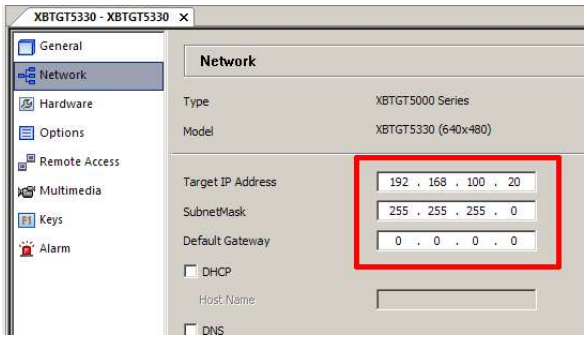
Main Window

1	After double clicking on the HMI application in SoMachine Vijeo Designer creates the HMI program main window.	 

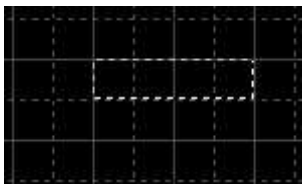
Communi-cation settings

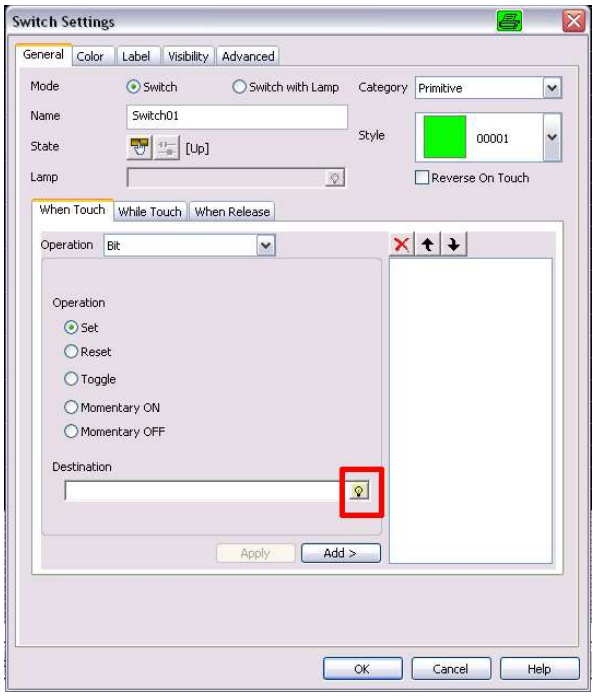
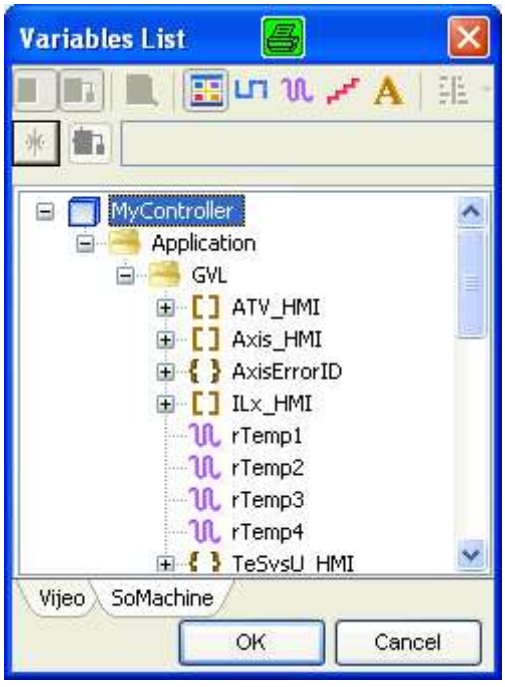
1	To set the communication parameters, in the navigator select: **IO Manager->** **SoMachineNetwork01->** **SOM_MyController**	

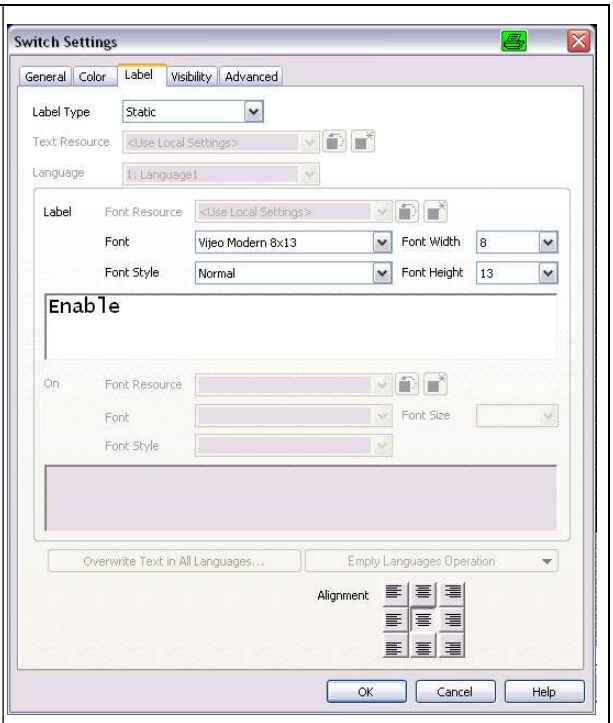
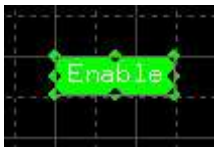
2	In the dialog that opens set the controller **Equipment Address.** You will find this address in SoMachine…	
3	… by double clicking on **MyController** in the devices browser.	
4	In the **Communication Settings** tab select the controller and click on **Edit.**	
5	The equipment address of the controller is displayed as the **Device Name**.	

6	In addition to the device name of the PLC, the Ethernet address of the HMI also needs to be set. Click back again to the **Vijeo Designer** program window and click on **XBTGT5330 in the Navigator window,** then select the **Network** tab..	
7	Select **Download** in the **Property Inspector** and set: **IPAddress : 192.168.100.20** **SubnetMask : 255.255.255.0** **Note:** Even though the communication uses the SoMachine protocol, both devices need to be in the same network group.	

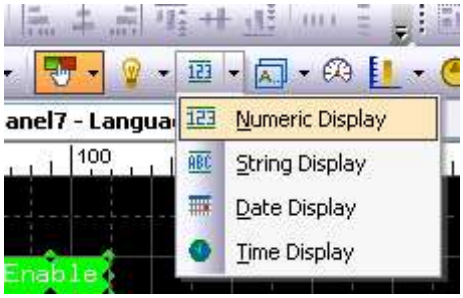
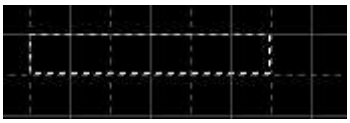
Create a switch

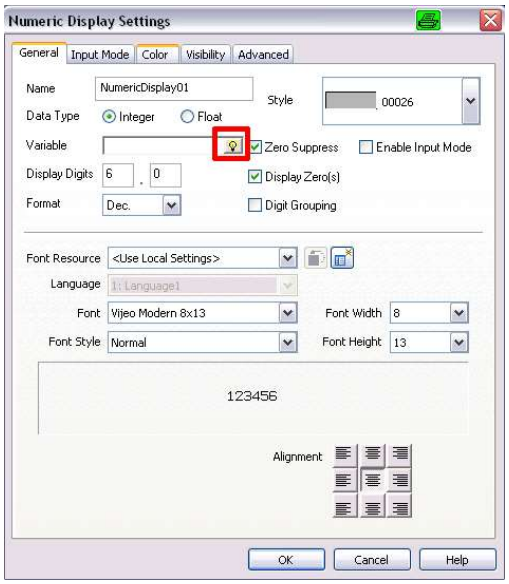
1	Click on the **Switch** icon in the tool bar.	
2	Select the position where you wish to place the button by opening a rectangle on the display. Resize the rectangle to your liking and press Enter.	

3	In the **Switch Settings** dialog, select the variable that is to be linked to the button. Click on the bulb icon on the right hand side of the box to browse for a variable name.	
4	Clicking on the bulb icon (as indicated in the image above) opens the **Variable List**. Go to the **SoMachine** tab, select the required variable and click **OK.**	

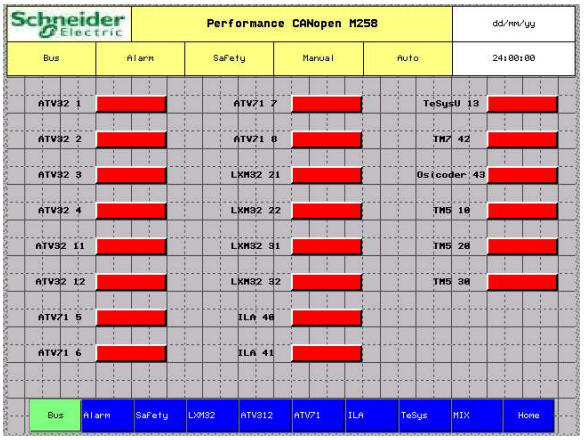
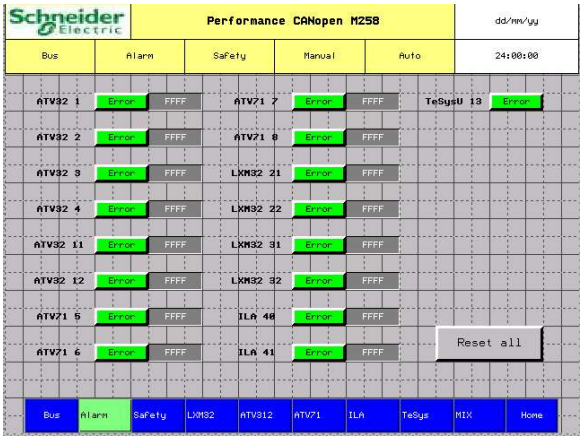
5	Back in the **Switch Settings** dialog, go to the **Label** tab. Here select **Label Type: Static** and enter a label for the button, e.g. **Enable**. Once you have finished inputting your settings click on **OK**.	
6	The display now shows the new button with the label you gave it.	

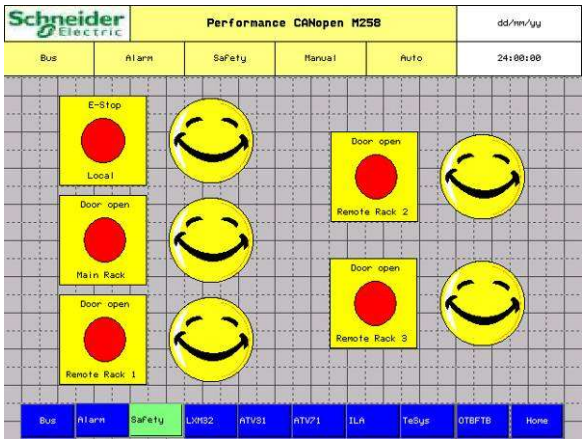
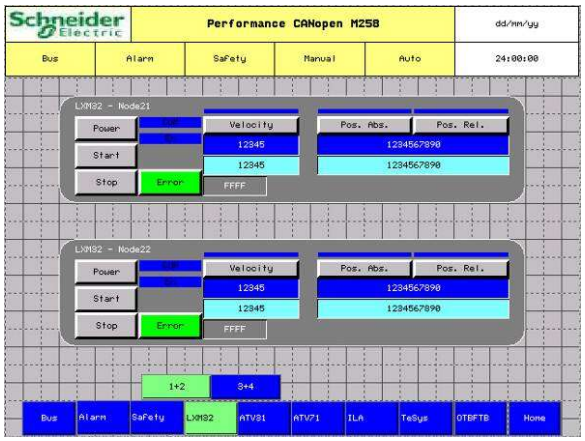
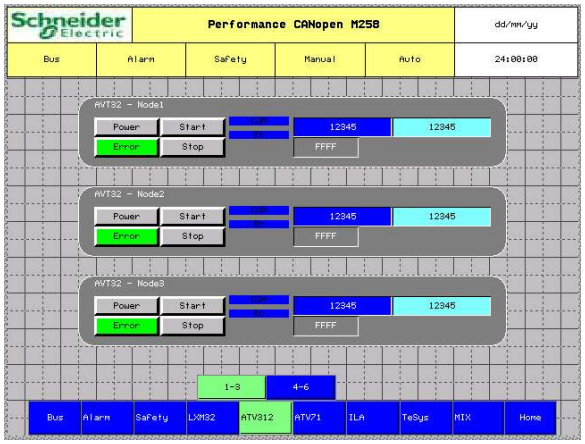
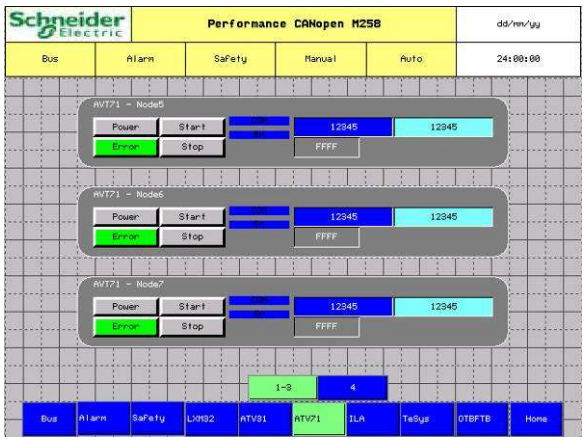
Create a Numeric Display

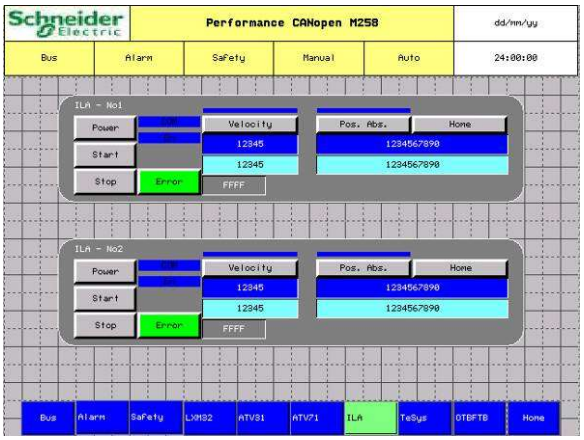
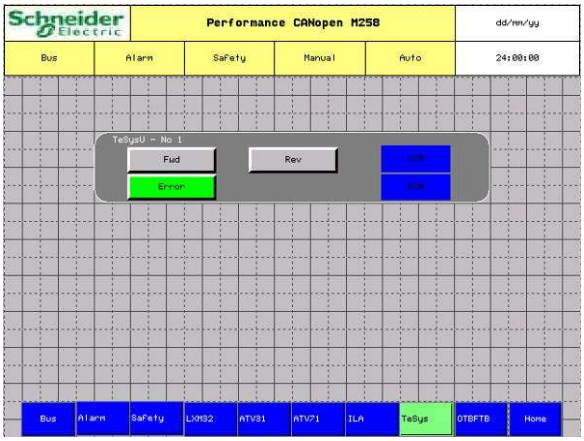
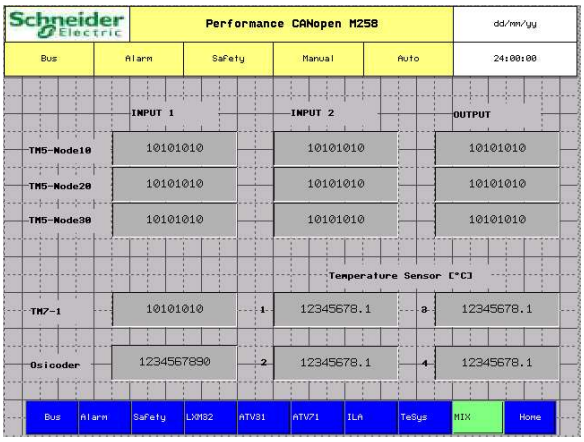
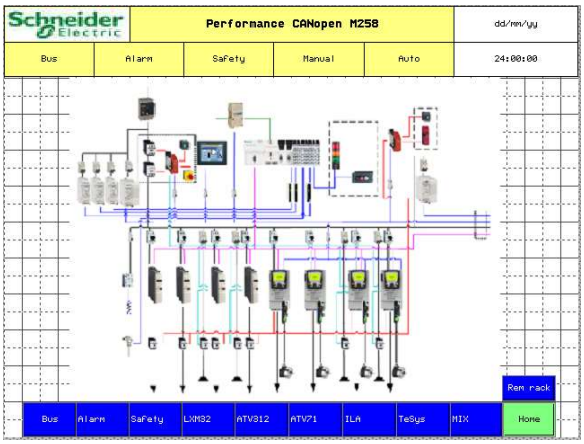
1	Click on the **Numeric Display** icon in the tool bar.	
2	Select the spot where you wish to position the numeric display by opening a rectangle, resizing it and pressing Enter.	

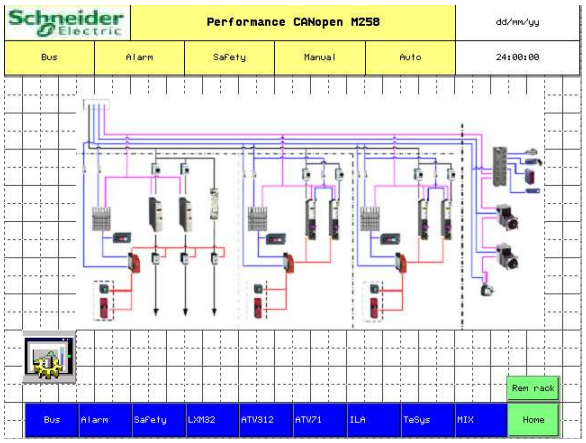
3	In the **Numeric Display Settings** dialog go to the **General** tab. In **Display Digits** you can set the maximum number of digits to be displayed for both the integral and the fractional part of the value. To link a **Variable** to the display click on the bulb icon to browse for a variable. Click on **OK** when finished.	
4	The display shows the new numeric display with the maximum number of digits you defined.	

Example screens

1	The **Bus** page shows the CANopen status for all devices.	
2	The **Alarm** page shows if an alarm was generated and by which device.	

3	The “**Safety”** page shows the status of the emergency stop relay.	
4	Via the **LXM32** page it is possible to control and monitor the Lexium 32A servo drives.	
5	Via the **ATV32** page it is possible to control and monitor the Altivar 32 variable speed drives.	
6	Via the **ATV71** page it is possible to control and monitor the Altivar 71 variable speed drives.	

7	Via the **ILA** page it is possible to control and monitor the integrated drive Lexium.	
8	Via the **TeSys** page it is possible to control and monitor the TeSysU motor starters.	
9	The **MIX** page shows the status of the input and output bits of the I/O device.	
10	The **Home** page of the HMI displays the layout of the main cabinet.	

11	The **Rem rack** page of the HMI displays the layout of the remote rack and the field devices.	

Devices

Introduction

This chapter describes the steps required to initialize and configure the different devices required to attain the described system function.

General

Altivar 32, Altivar 71 and Lexium 32A drives are configured by using the local control panel on the device itself.

Note

If this is not a new drive you should re-establish the factory settings. If you need instructions on how to do this, please read the drive documentation.

Be sure that the controller is in STOP state before parameterizing the drives.

Altivar 32

Introduction

The ATV32 parameters can be entered or modified via the local control panel on the front of the device itself.

Note

If this is not a new drive you should re-establish the factory settings. If you need instructions on how to do this, please refer to the drive documentation.

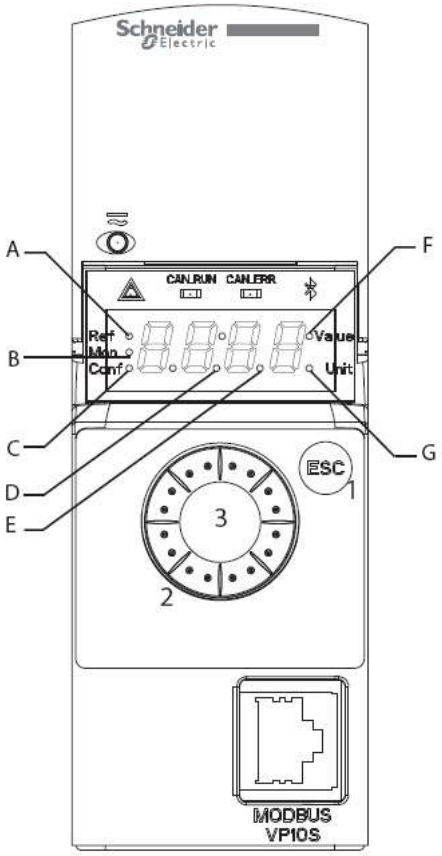
The Jog dial is part of the local control panel and can be used for navigation by turning it clockwise or counter-clockwise. Pressing the jog dial enables the user to make a selection or confirm information.

Control panel

1 The CANopen-Address and Baud rate can be input using the buttons and the jog dial on the control panel of the Altivar.

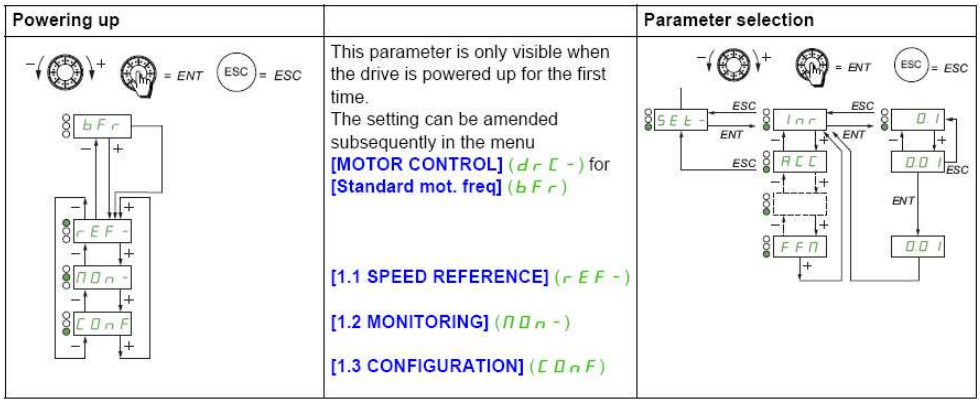
Functions of the Display and the Keys

1 The **ESC** key is used for menu navigation (backward) and parameters adjustment (cancel)
2 The **Jog dial** is used for menu navigation (up or down) and parameters adjustment (increase/decrease value or element choice). It can be used as Virtual analogic input 1 for drive frequency reference.
3 The **ENT** key (push on the Jog dial) is used for menu navigation (forward) and parameters adjustment (validate)



2

A	REF mode selected (rEF-)	E	Dot used to display parameter value (1/10 unit)
B	MON mode selected (MOn-)	F	Current display is parameter value
C	CONF mode selected (CONF)	G	Current display is parameter unit
D	Dot used to display parameter value (1/100 unit)		

	3	**Normal display, with no fault code displayed and no startup**: Displays the parameter selected in the **[1.2 MONITORING]** (nOn -) menu (default: **[Frequency ref.]** (FrH)). • InIt: Initialization sequence (only on remote display terminal) • tUn: AutoTuning • dCb: Injection braking • rdY: Drive ready • nSt: Freewheel stop control • CLI: Current limit • FSt: Fast stop • FLU: Fluxing function is activated • nLP: Control is powered on but the DC bus is not loaded • CtL: Controlled stop • Obr: Adapted deceleration • SOC: Stand by output cut • USA: Undervoltage alarm • SS1: Safety SS1 level • SLS: Safety SLS level • StO: Safety STO level	
Structure of the menus	4		
CANopen Address adjustment	5	**CANopen Address:** **→ Conf→FULL→ COM→ Cn0→AdC0→1**	**Node 1, 2, 3, 4 and 11 + 12**
CANopen Baudrate adjustment	6	**CANopen Baudrate:** **→ Conf→FULL→ COM→ Cn0→bd0→500**	**500 kbps**
Command Channel adjustment	7	**Command Channel:** **→ Conf→FULL→ CtL→ Fr1→CAn**	**CANopen as command channel**
	8	The following settings are necessary for the 1st and 2nd Altivar 32 with break contact.	
Access Level adjustment	9	**Access Level:** **→ COnF → FULL → LAC → EPr**	Expert (EPr)

Motor control type adjustment	**10**	**Motor control type:** **→ COnF → FULL → drC– → Ctt → UUC**	Brake logic control can only be assigned if [Motor control type] (Ctt) is not set to [Standard] (Std), [V/F 5pts] (UF5), [V/F Quad.] (UFq) or [Sync. mot] (SYn).
Asynchron-ous motor parameters adjustment	**11**	**Asynchronous motor parameters:** **→ COnF → FULL → drC– → ASY–** **→ nPR → 0.18 or 0.55** **→ nCr → 0.6 or 1.5** **→ nSp → 1360 or 1375** The values above base on the motor ratings used in this example: ▪ first value is for 0.18 kW motors ▪ second value is for 0.55 kW motors **Note:** The motor parameters have to be checked with the connected drive.	Rated motor power [kW]: According to drive rating Rated motor current [A]: According to drive rating Rated motor speed [rpm]: According to drive rating
Brake logic settings adjustment	**12**	**Brake logic settings:** **→ COnF → FULL → FUn → bIC– → bIC → r2**	Control relay R2
	13	For the drive to operate with the new parameters, a power cycle (on, off, on) is required.	

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

After making any configuration changes or adjustments, be sure to cycle power (remove and reapply power) on the drive.

Failure to follow these instructions can cause death, serious injury or equipment damage.

Altivar 71

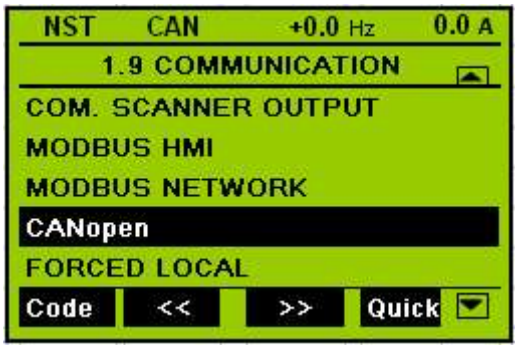
Introduction

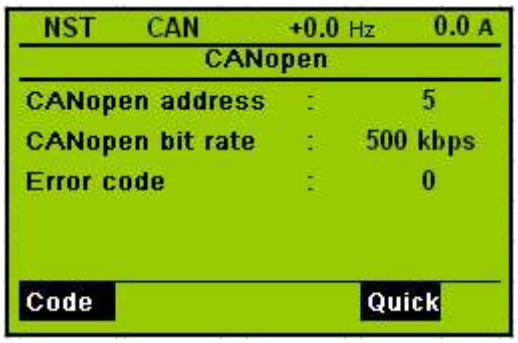
The ATV71 parameters can be entered or modified using the graphic keypad panel on the device itself.

Note

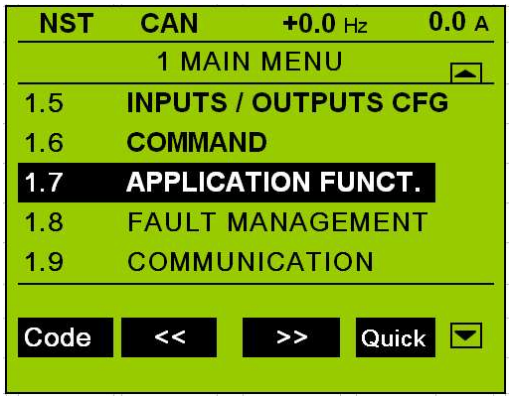
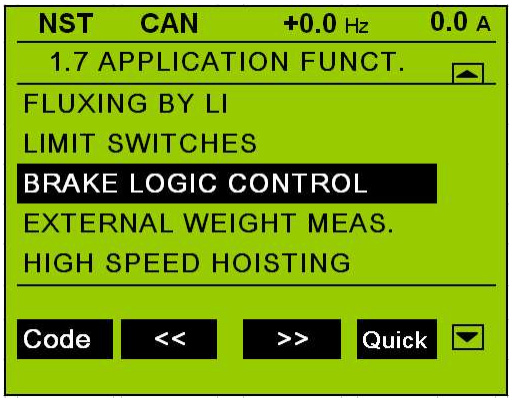
If this is not a new drive you should re-establish the factory settings. If you need instructions on how to do this, please refer the drive documentation.

CANopen settings

1	The CANopen address and Baudrate can be input using the jog dial on the front panel of the Altivar.	
2	To set the **CANopen address** and the **Baudrate** go to **1 DRIVE MENU->** and press ENT (ENT is the enter of the jog dial).	
3	Go to **1.9 COMMUNICATION ->** and press ENT.	
4	Go to **CANopen ->** and press ENT.	

5	Set the **CANopen address** to **5** for the first one. For the rest of the drives it is **6…8**. Set the **CANopen bit rate** to **500 kbps.**	

Brake settings

1	To change the brake settings go to: **1 DRIVE MENU** and press ENT.	
2	Go to **1.7 APPLICATION FUNCT.** and press ENT.	
3	Go to **BRAKE LOGIC CONTROL** and press ENT.	

4	Set the parameters to the values shown here on the right. **Note:** These parameters are for the machine described in this example only. In all likelihood, you will need to adapt these parameters for your specific machine.	

Parameter name	Value
Brake assignment	R2
Movement type	Hoisting
Brake contact	No
Brake impulse	No
Brake release I FW	0 A
Brake release time	0 s
Brake release freq.	0 Hz
Brake engage freq	0 Hz

5	For the drive to operate with the new parameters, a power cycle (on, off, on) is required.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

After making any configuration changes or adjustments, be sure to cycle power (remove and reapply power) on the drive.

Failure to follow these instructions can cause death, serious injury or equipment damage.

Lexium 32A

Introduction

The LXM32A parameters can be entered or modified using the local control panel on the front of the device itself.

Note

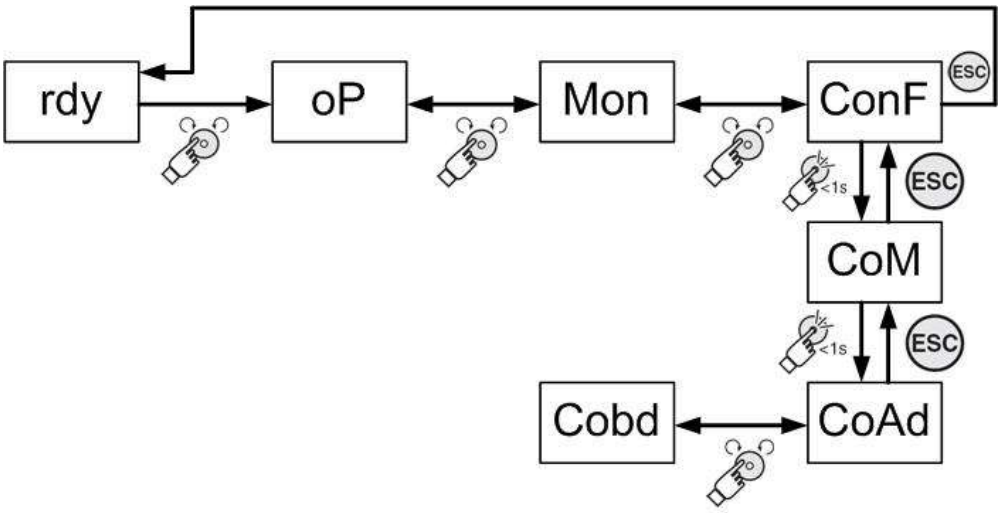
If this is not a new drive you should re-establish the factory settings. If you need instructions on how to do this, please refer to the drive documentation.

CANopen settings

1 If the drive is being started for the first time, the **FSu** (First Setup) is invoked. Only the CANopen address (**CoAd**) and the baudrate (**Cobd**) are initially needed.

If the drive has never been started before, follow the steps below to change the address or the baudrate.

In this project the **CANopen addresses** for the drives are **21 + 22** and **31 +32**. The **Baudrate** for the drives is **500 kBaud**.



Parameter name HMI menu HMI name	Description
CANaddress ConF → CoN- ConF → FSu- CoAd	CANopen address (node number) Changed settings become active the next time the product is switched on.
CANbaud ConF → CoN- ConF → FSu- Cobd	CANopen baud rate **50 / 50 kBaud /** 50: 50 kBaud **125 / 125 kBaud /** 125: 125 kBaud **250 / 250 kBaud /** 250: 250 kBaud **500 / 500 kBaud /** 500: 500 kBaud **1000 / 1 MBaud /** 1000: 1 MBaud Changed settings become active the next time the product is switched on.

2	For the drive to operate with the new parameters, a power cycle (on, off, on) is required.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

After making any configuration changes or adjustments, be sure to cycle power (remove and reapply power) on the drive.

Failure to follow these instructions can cause death, serious injury or equipment damage.

TeSysU

Introduction

This chapter concerns the TeSysU motor starter components used in this system. They can be adapted according to the application (motor output, reversing or non-reversing drive).

Basically, the TeSysU motor control unit comprises of a:

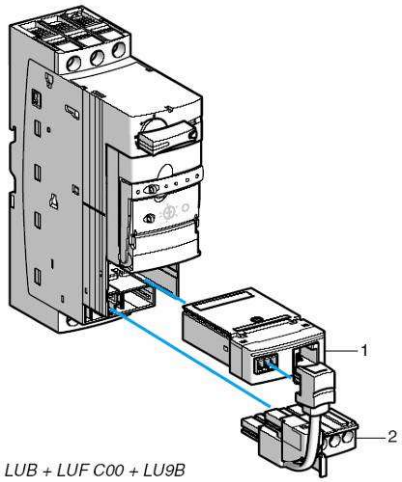
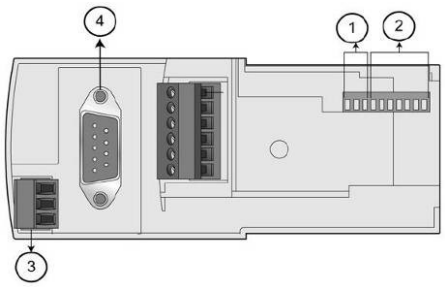
- Power base
- Control unit
- Communication module
- Coil wiring kit
- Optional: reversing block, I_s limiter/isolation block and other modules

The following points should be taken into account when selecting components:

A 24 Vdc LU2B xx BL control unit must be used. Make sure it has the BL extension on the part number.

There are different versions of the coil wiring kit, according to the power base. LU9B N11C should be used if the power base has one direction of rotation (LU2Bxx) and LU9M RL should be used if the power base has two directions of rotation (LU2Bxx).

TeSysU

1	**TeSysU** **Power base** LU2B12BL **Control unit** LUC A05BL **Communication module for CANopen** LUL C08 (1) **Coil wiring kit** LU9 MRL (2)	 *LUB + LUF C00 + LU9B*
2	**TeSysU CANopen communication module** **LULC08** The communication module is connected to the CANopen bus using the cable: **TSXCANCADD1**	 **1** Baud rate **2** Address **3** Power base connector **4** CAN bus connector

<table>
<tr>
<td>3</td>
<td>TeSysU CANopen communication module

LULC08

The baud rate is set to 500 kbps.</td>
<td>
<table>
<tr><th>SW10</th><th>SW9</th><th>SW8</th><th>Baud Rate</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>10 kbps</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>20 kbps</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>50 kbps</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>125 kbps</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>250 kbps (default)</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>500 kbps</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>800 kbps</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1,000 kbps</td></tr>
</table>
</td>
</tr>
<tr>
<td>4</td>
<td colspan="2">The following address is used:

Bus address 13

<table>
<tr><th>SW7</th><th>SW6</th><th>SW5</th><th>SW4</th><th>SW3</th><th>SW2</th><th>SW1</th><th>Address</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>Not valid</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1 (default)</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>2</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>3</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>5</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td><td>13</td></tr>
</table>
</td>
</tr>
<tr>
<td>5</td>
<td colspan="2">Note: TeSysU needs a 24 Vdc signal on CANopen cable to operate. See the chapter:

Communication: CANopen TAP: TSXCANTDM4 wiring.</td>
</tr>
</table>

Appendix

The Packaging Application

Introduction

Different machines and processes share the same initial requirements that can be implemented with a generic architecture employing the current Schneider Electric product offer. These generic architectures include power supply, controller, motion, visual indication, communication and functional machine safety aspects. The use of these generic architectures to implement customer solutions covers not only a large section of customer automation requirements but allows the implementation of a tested and validated software and hardware solution.

This chapter describes the Schneider Electric application function blocks, running on the architecture described here. This document does not provide a functional description for application solutions. The functions listed here are not comprehensive and form only a foundation for real life applications. It is not intended to provide an application that fulfills a real life situation in all aspects.

The information given here is intended to give the user a brief overview of the function blocks which are running on the described architecture. For additional information concerning the Packaging Application Function Blocks please refer to the SoMachine help.

It is expected that the reader has at least a basic knowledge of the industrial application for which these function blocks are provided and understands the professional jargon normally used in that type of application. This document is not an introduction into the specific type of industrial application for which this solution is provided.

Note:
The packaging application function blocks can only be used with S-type controllers.
If you use G-type controllers, the message *"Use of <Name of FB> is not authorized with the current type of device*" appears during the build phase.
The packaging library and the S-type option will be available after installation of the solution extension of SoMachine.

Application Basics

Usually packaging applications consist of the following three machine types:

- Primary machines

  These machines work in direct contact with the products to be packaged:

  - Horizontal bagging machines
  - Vertical bagging machines
  - Flexible package form, fill & seal machines
  - Rigid package fill and close machines
  - Blister fill and seal machine
  - Filling and closing machines

- Secondary machines

  Secondary machines are linked to products that are required to pack the primary product and any accessories that must be combined in the package:

  - Boxing and carton machines
  - Wrapping machines (sleeve, wrap-around, shrink wrapping)
  - Palletizing / de-palletizing machines
  - Pallet securing (stripping, shrink wrapping, stretch ...)

- Others

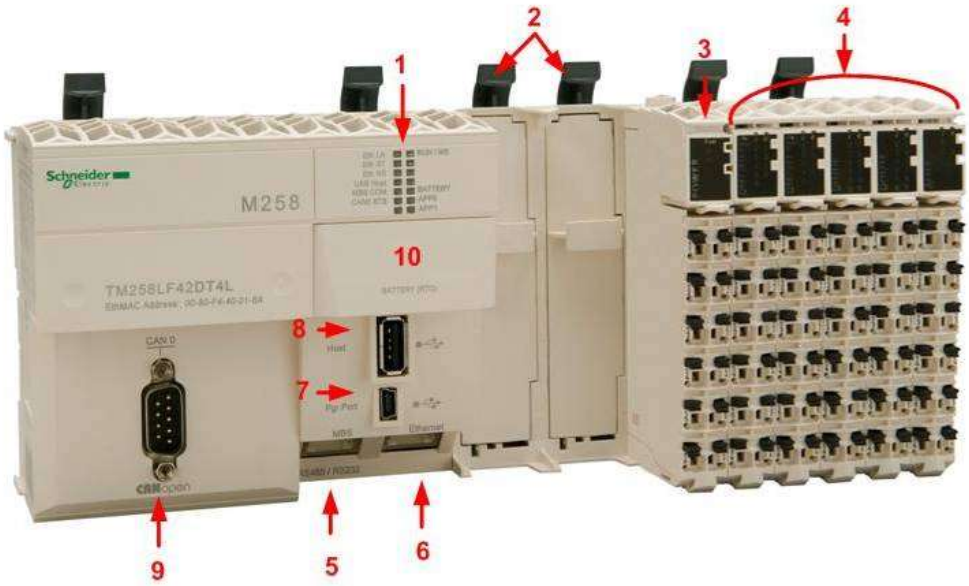
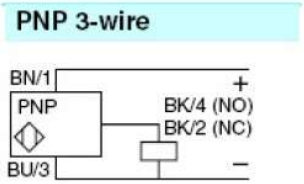
  Machines that are not linked to packaging functions but are a part of the packaging process:

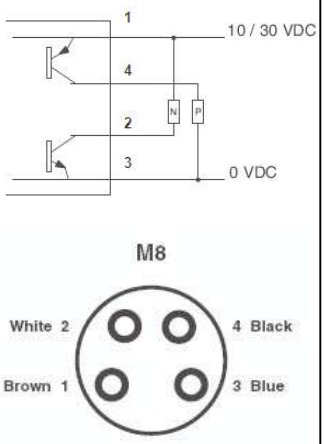
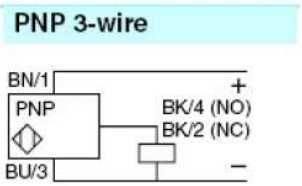
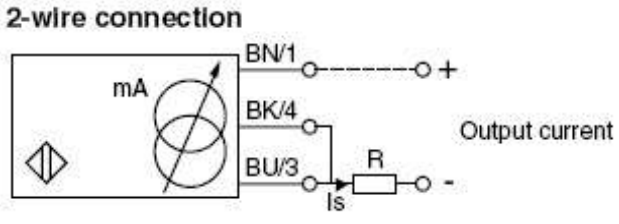
  - Labeling
  - Marking
  - Decorating
  - Cleaning machines
  - Feeding machines and systems
  - Rinsing & washing machines
  - Cooling machines
  - Drying machines
  - Testing & inspection machines

Application Specifics

Application Dedicated Hardware

General description of the hardware

Modicon M258 Logic Controller **S-Type** TM258LF42DT4L**S0**	1. Status LEDs 2. IF slots 3. Power supply 4. Internal I/O area 5. RS485 port 6. Ethernet port 7. Mini USB port 8. USB A port 9. CANopen port 10. Battery area
	
OsiSense (Osiprox) **Inductive proximity sensor** **XS612B1PAL2** Ready-cabled (L = 2 m) for Digital Tension Control		

OsiSense (Neptune) **Photo-electric sensor** **XUYFANEP40015** for Lateral Position Control with cable **XZCP0941L5**		
OsiSense (Osiprox) **Inductive proximity sensor** **XS508B1PBM8** for Pick and Place with cable **XZCP0166L5**		
OsiSense (Osiprox) **Inductive proximity sensor** **XS4P12AB120** 4…20 mA Pre-cabled (L = 2 m) for Analog Tension Control		
Sensor for Temperature Measurement Pt100 **PT46X150** **Labfacility** **(Third Party)**		

Application Function Blocks

To facilitate the software engineering tasks associated with the application described, Schneider Electric has developed the Packaging Application Function Block Library that has been tested and validated.

The following pages show the application function blocks that are running on the architecture described here.

The **Packaging** and the **Toolbox** libraries need to be included in the application program (See the chapter *Controller: Include library*)

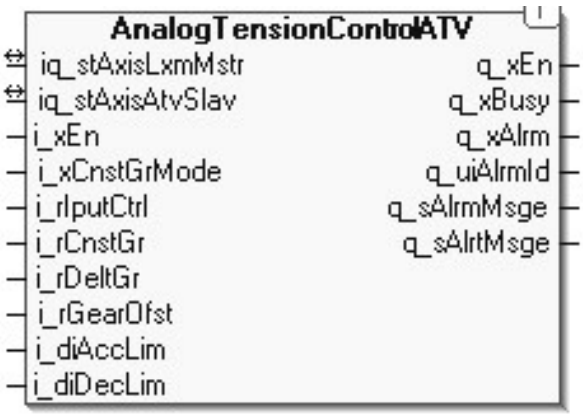
For additional information concerning the packaging AFBs please refer to the SoMachine help.

The following is a list of packaging functions which are running on the Performance CANopen M258 architecture:

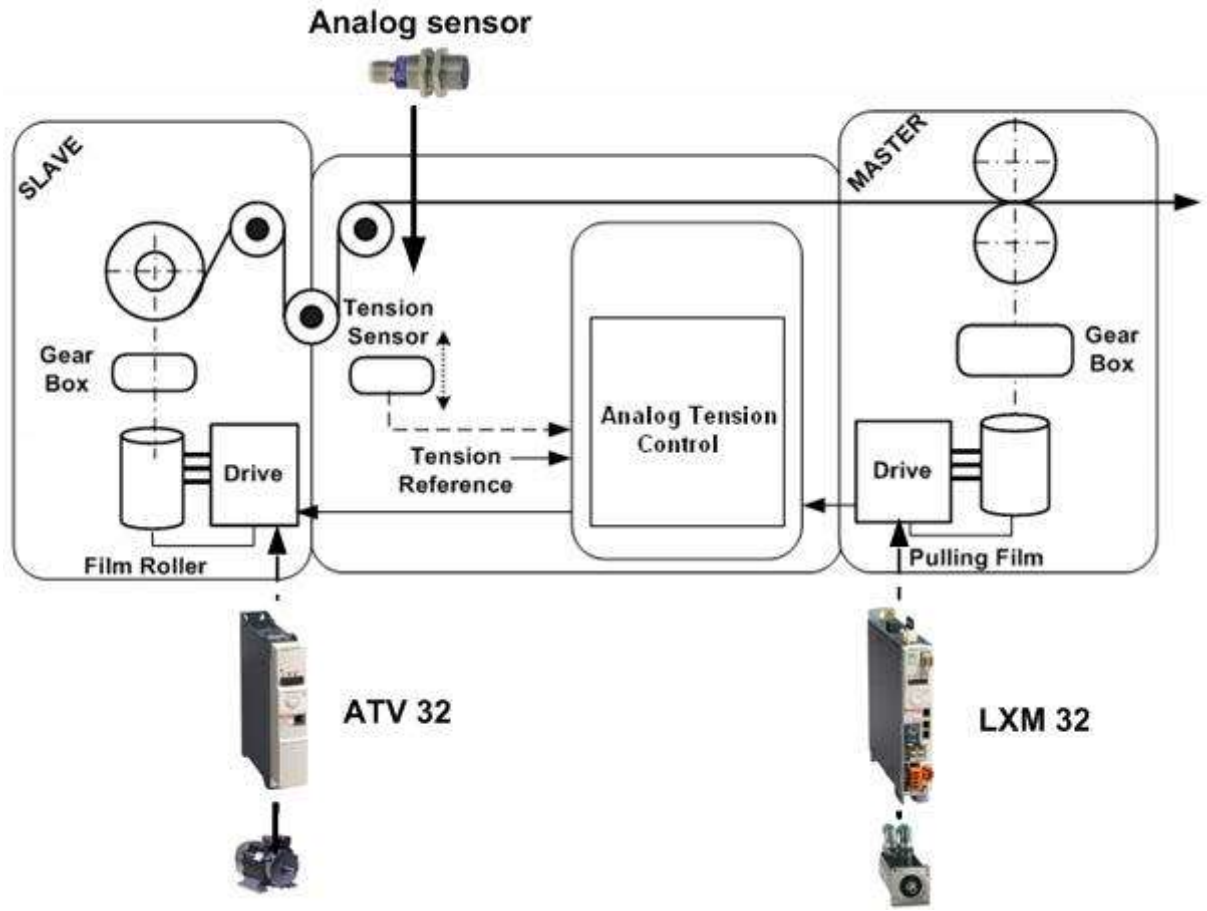
- AnalogTensionControlATV
- DigitalTensionControlATV
- TemperatureControl
- LateralPositionControl
- XYPickAndPlace and MoveJog

FB AnalogTensionControlATV

The goal of this Application Function Block is to maintain the tension of the film between two points. This is achieved by controlling the position of the arm dancer. This Application Function Block is the link between a slave axis and a master axis via an analog sensor.

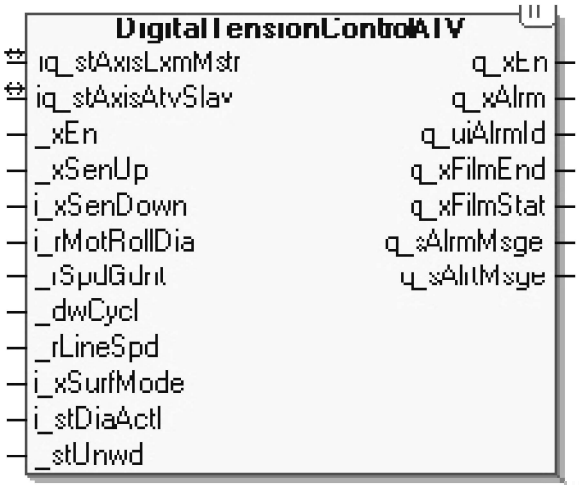


AnalogTensionControl setup

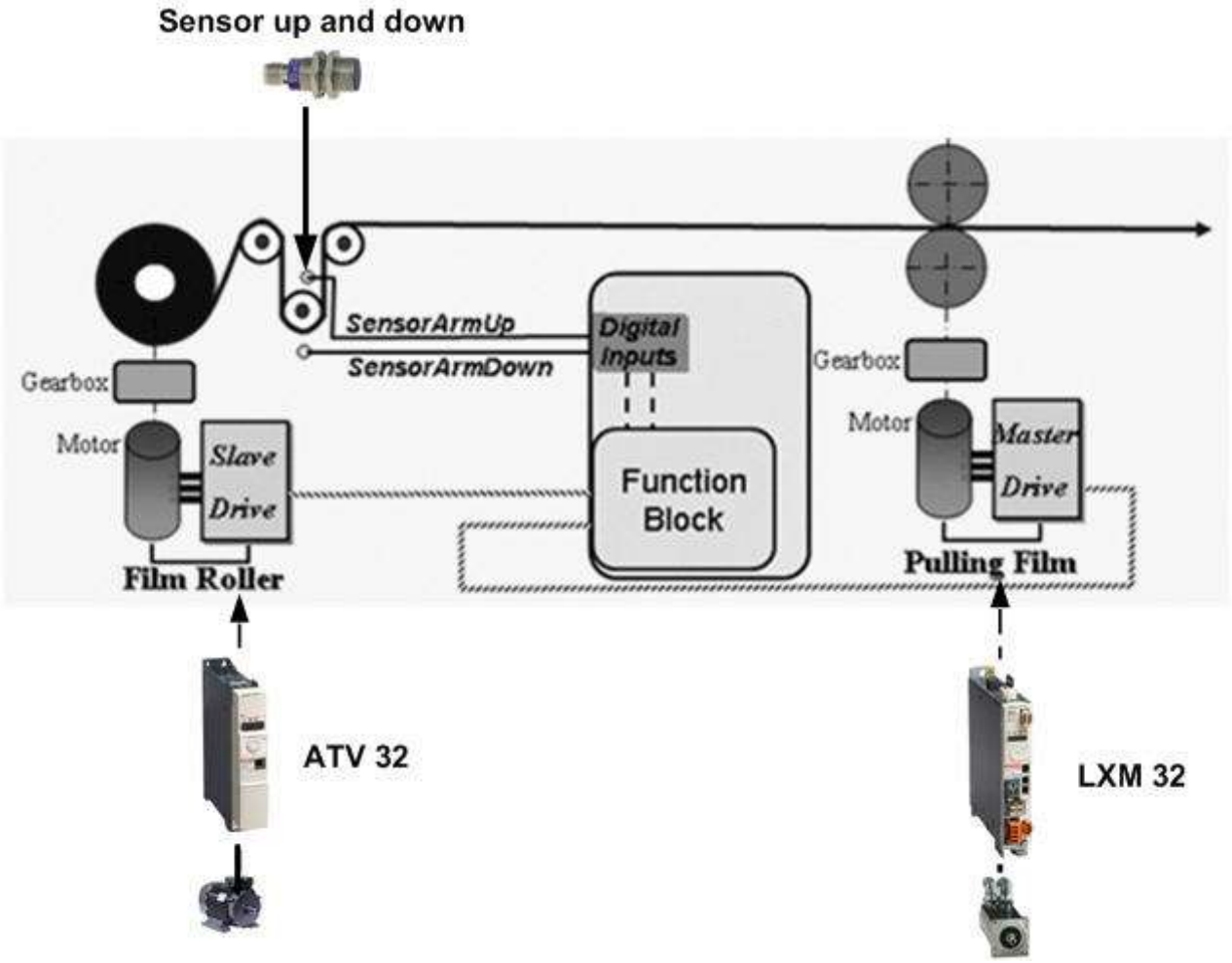


FB DigitalTensionControlATV

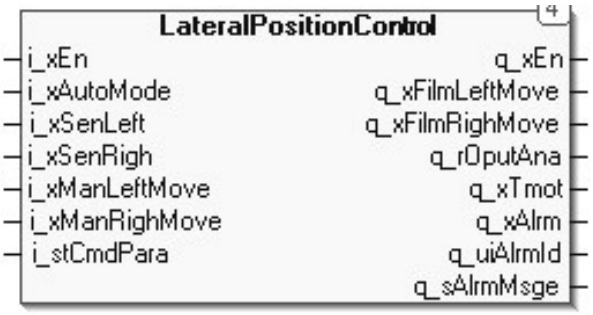
The goal of this Application Function Block template is to maintain the tension of the film between two limits. This is achieved by controlling the position of the arm dancer. This Application Function Block provides the coupling between a slave axis and a master axis via a digital sensor.



DigitalTensionControl setup



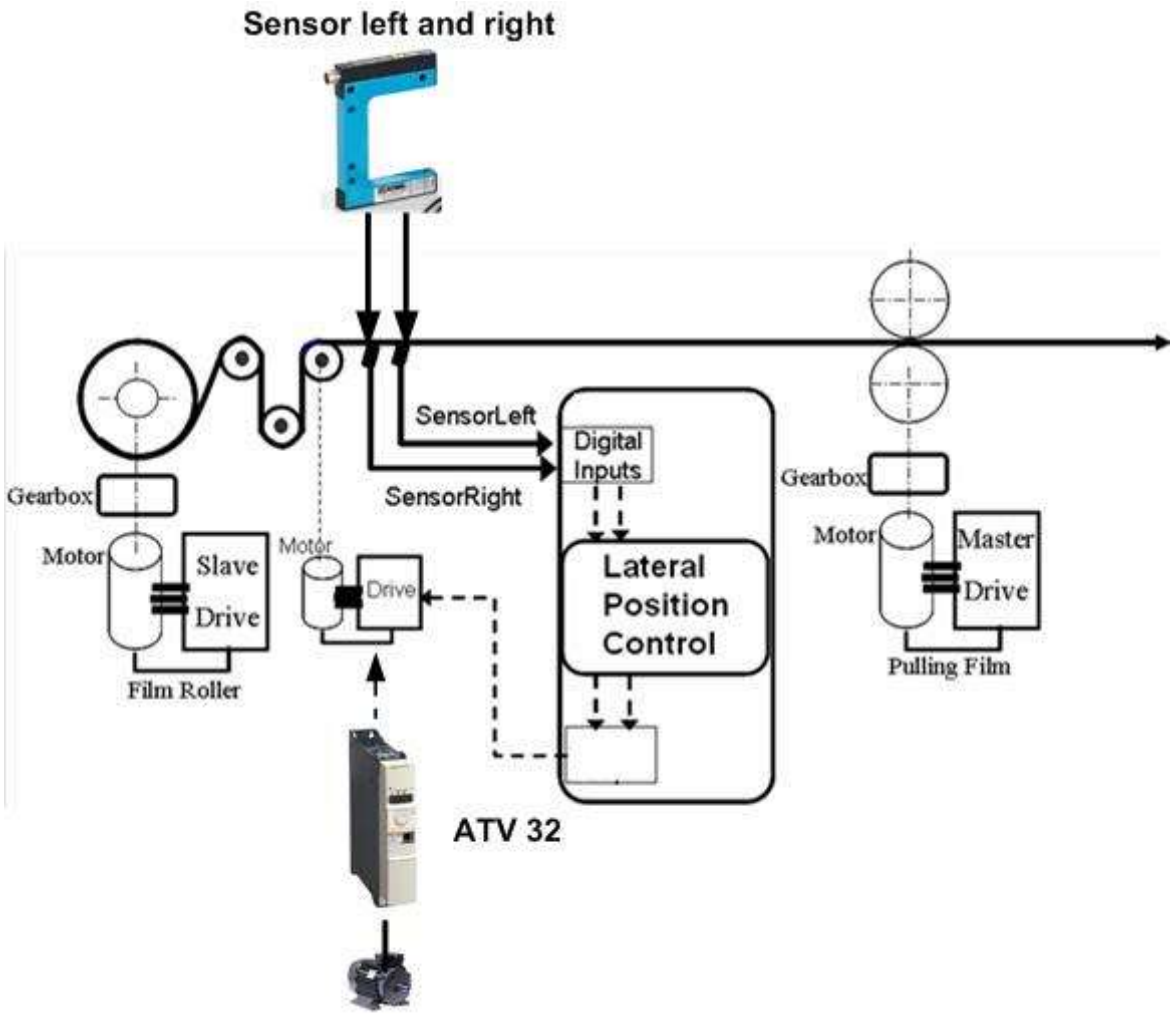
FB LateralPositionControl



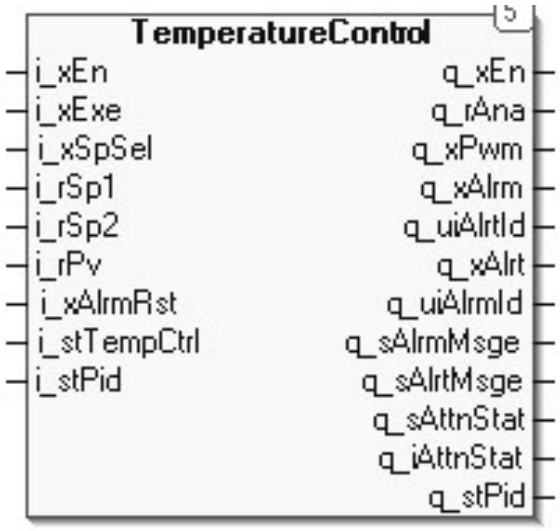
This block controls and helps to correct the lateral positioning of a film while it is unwinding from a reel.
This function helps the “cutting device” to cut film at the correct position.
The correction is based on fixing the edges of the film between two digital sensors. If the lateral film position is in good (e.g. between SensorLeft and SensorRight), the path is not corrected. If, however, depending on sensor configuration, the film position is incorrect, it must be corrected. One can select between digital or analog output mode.

In this architecture digital output is used.

LateralPositionControl setup



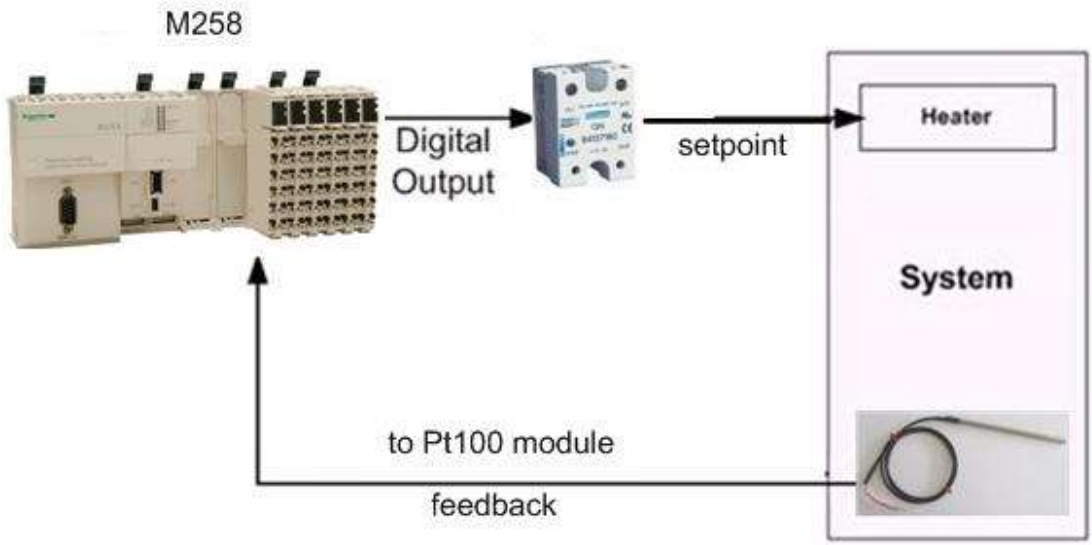
FB TemperatureControl



The function block TemperatureControl is designed for monitoring and controlling a wide variety of temperature-dependent processes.
Main characteristics

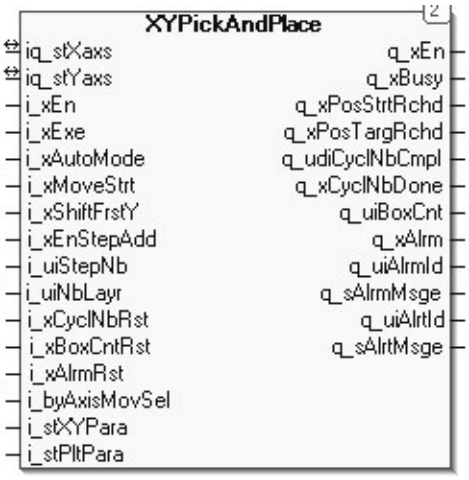
- Auto-Tuning or Self-Tuning based on inflectional tangential method
- Pulse width modulation output for controlling switching actuators
- Standby function
- Filtering functions for analog sensor input
- Set point ramping function
- Tolerance band monitoring (two different tolerance bands)
- Absolute value monitoring
- Commissioning screens

TemperatureControl setup



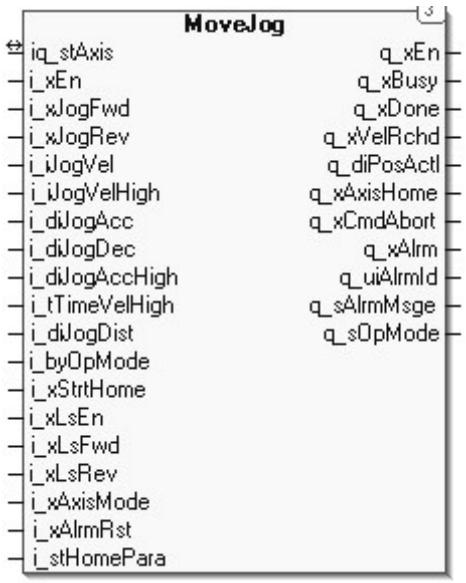
FB XYPickAndPlace

The goal of the Application Function Block is to control two linear axis which move manufactured parts from one assembly station to another station or from conveyor to pallet.

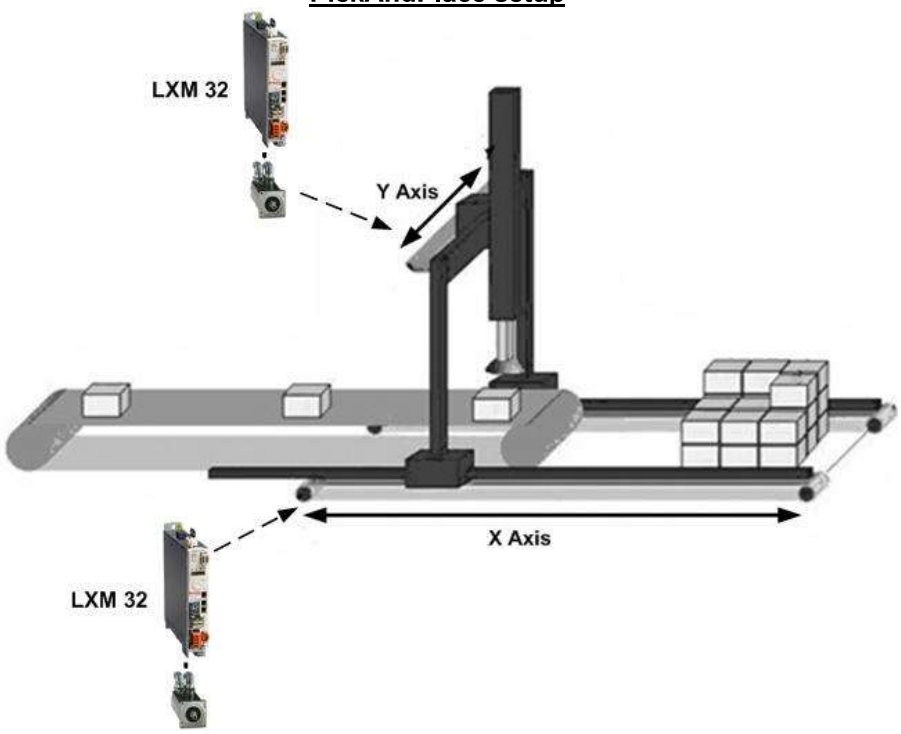


FB MoveJog

The goal of the Application Function Block is to run an axis in speed mode, position mode or to home an axis.



PickAndPlace setup



Detailed Component List

The following is a list of components for the main components of the Performance CANopen M258 architecture. A complete component list for the architecture can be found in the EPLAN file "Performance_CANopen_M258_WID.pdf"

Sarel cabinet

Hardware-Components				
Pos.	**Qty**	**Description**	**Part Number**	**Rev./ Vers.**
1.1	1	Cabinet with mounting plate 1800 x 1200 x 600 mm	NSYSF1812602DP	
1.2	1	Side wall 1800 x 800 x 600 mm	NSY2SP186	
1.3	2	Cabinet with mounting plate 600 x 600 x 400 mm	NSYS3D6640P	
1.4	1	Cabinet with mounting plate 800 x 600 x 400	NSYS3D8640P	
1.5	3	Filter fan, 85 m³/h, 230 Vac, IP54	NSYCVF85M230PF	
1.6	1	Filter fan, 165 m³/h, 230 Vac, IP54	NSYCVF165M230PF	
1.7	3	Cabinet filter 170 x 150	NSYCAG125LPF	
1.8	1	Cabinet filter 223 x 223	NSYCAG223LPF	
1.9	4	Wiring diagram pocket	NSYDPA4	
1.10	1	Cabinet light incl. socket, magnetic fixing	NSYLAM75	
1.11	4	Thermostat 1 NC, 0-60 °C	NSYCCOTHO	

Main switch

Hardware-Components				
Pos.	**Qty**	**Description**	**Part Number**	**Rev./ Vers.**
2.1	1	Main switch 3pin 36 kA	LV429003	
2.2	1	Contact block TM16D	LV429037	
2.3	1	Terminal cover	LV429515	
2.4	1	Rotary drive with door interface	LV429340	

	Hardware-Components				
	Pos.	**Qty**	**Description**	**Part Number**	**Rev./ Vers.**
Power supply and Heating relays	3.1	4	Power supply 230 Vac / 24Vdc 5 A	ABL8RPS24050	
	3.2	2	Power supply 230 Vac / 24Vdc 10 A	ABL8RPS24100	
	3.3	2	Disconnect terminal	5711016550	
	3.4	4	Solid state relay for heating	SSRPCDS10A1	
	3.5	1	Circuit Breaker C60N 1P, C, 2 A	23726	
	3.6	4	Circuit Breaker C60N 1P, C, 10 A	23734	
	3.7	4	Circuit Breaker C60N 2P, C, 2 A	23747	
	3.8	1	Circuit Breaker C60N 2P, C, 10 A	23756	
	3.9	3	Circuit Breaker C60N 3P, C, 10 A	23773	
	3.10	1	Circuit Breaker C60N 1P, B, 1 A	24045	
	3.11	3	Circuit Breaker C60N 2P, C, 2 A	24443	
	3.12	2	Circuit Breaker C60N 2P, C, 3 A	24444	
	3.13	2	Circuit Breaker C60L 1P, D, 10 A	25085	
	3.14	10	Circuit Breaker C60L 1P, C, 1 A	25392	
	3.15	2	Circuit Breaker C60L 1P, C, 2 A	25393	
	3.16	1	Circuit Breaker C60L 1P, C, 3 A	25394	
	3.17	4	Circuit Breaker C60L 1P, C, 4 A	25395	
	3.18	4	Circuit Breaker C60L 2P, C, 2 A	25419	
	3.19	2	Circuit Breaker C60L 1P, Z, 2 A	26135	
	3.20	8	Auxiliary contacts for C60N	26924	
	3.21	4	Fuse 1 A, slow-blow (third party)	Littelfuse 0218001.HXP	
	3.22	1	Fuse 2 A, slow-blow (third party)	Littelfuse 0218002.HXP	
	3.23	1	Fuse 3.15 A, slow-blow (third party)	Littelfuse 02183.15HXP	
	3.24	1	Fuse 6.3 A, slow-blow (third party)	Littelfuse 021806.3HXP	
	3.25	4	Fuse 10 A, slow-blow (third party)	Littelfuse 0218010.HXP	
	3.26	5	Terminal for Fuse with LED	AB1FUSE435U5XB	
Optional	3.27	4	Power supply 230 Vac / 24Vdc 5 A	ABL8RSM24050	
	3.28	2	Power supply 230 Vac / 24Vdc 10 A	ABL8RSM24100	

M258, TM5 and TM7

Hardware-Components				
Pos.	**Qty**	**Description**	**Part Number**	**Rev./ Vers.**
4.1	1	Modicon M258 Logic controller	TM258LF42DT4L	V2.0.2.22
4.2	1	Pt100 input module 4 IN	TM5SAI4PH	
4.3	1	Analog output module 2 OUT	TM5SAO2L	
4.4	2	Digital input module 12 IN	TM5SDI12D	
4.5	2	Digital output module 12 OUT	TM5SDO12T	
4.6	1	Power supply module 24 Vdc	TM5SPS2F	
4.7	1	Base module for power supply	TM5ACBM01R	
4.8	6	Base module for expansion slices	TM5ACBM11	
4.9	1	Locking plate right	TM5ACLPR1	
4.10	7	Terminal block, 12 pin coded	TM5ACTB12	
4.11	3	Bus base for field bus interface module and Interface Power Distribution Module (IPDM)	TM5ACBN1	
4.12	3	TM5 CANopen interface module	TM5NCO1	
4.13	3	TM5 Field bus interface 24 Vdc power supply	TM5SPS3	
4.14	1	TM7 CANopen IO Block	TM7NCOM16A	
4.15	1	Power cable for TM7, 5 m	TCSCCN1M1F2	

Drives

Hardware-Components				
Pos.	**Qty**	**Description**	**Part Number**	**Rev./ Vers.**
5.1	4	ATV32 variable speed drives 0.37 kW	ATV32H037N4	V1.3 IE04
5.2	2	ATV32 variable speed drives 0.75 kW	ATV32H075N4	V1.3 IE04
5.3	4	ATV71 variable speed drives 0.75 kW	ATV71H075N4	V3.3 IE40
5.4	4	Lexium 32A servo drives continuous output current: 6 A RMS at 6000 RPM	LXM32AD18M2	V1.06.06
5.5	4	Servo motor with brake	BSH0702P02F2A	
5.6	2	Lexium ILA integrated drives	ILA1F571PC2A	
5.7	2	Power cable for ILA, 5 m	VWL30001R50	
5.8	1	TeSysU base module reversing 12 A	LU2B12BL	
5.9	1	TeSysU coil wiring kit	LU2MB0BL	
5.10	1	TeSysU standard control unit	LUCA05BL	
5.11	1	TeSysU CANopen communication module	LULC08	
5.12	6	Magnetic circuit breaker 2.5 A	GV2L07	
5.13	4	Magnetic circuit breaker 4 A	GV2L08	
5.14	4	Magnetic circuit breaker 10 A	GV2L14	
5.15	14	Auxiliary contacts for circuit breaker 1 NO 1 NC	GVAE11	
5.16	4	Power cable for Lexium 32, 5 m	VW3M5101R50	
5.17	4	Encoder cable for Lexium 32, 5 m	VW3M8102R50	
5.18	6	Altivar 32 CANopen daisy chain option card	VW3A3608	

Sensor

Hardware-Components				
Pos.	**Qty**	**Description**	**Part Number**	**Rev./ Vers.**
6.1	1	Inductive proximity sensor pre-cabled 2 m (optional for Analog Tension Control)	XS4P12AB120	
6.2	2	Inductive proximity sensor pre-cabled 2 m (optional for Digital Tension Control)	XS612B1PAL2	
6.3	3	Fixing brackets for inductive sensor (optional packaging machine sensor)	XSZB112	
6.4	4	Inductive proximity sensor with M8 connector (optional for Pick and Place)	XS508B1PBM8	
6.5	4	Sensor cable with one side M8 and other side open end, 5m (optional for Pick and Place)	XZCP0166L5	
6.6	4	Fixing brackets for inductive sensor (optional packaging machine sensor)	XSZB108	
6.7	2	Infrared fork Photo-electric sensor with M8 connector (optional Lateral Position Control)	XUYFANEP40015	
6.8	2	Sensor cable with one side M8 and other side open end, 5m (optional Lateral Position Control)	XZCP091L5	
6.9	1	Inductive Proximity sensor with M8 connector (optional for generic purposes)	XS608B1PAM12	
6.10	1	Sensor cable with one side M12 and other side open end, 2 m (optional for Inductive Proximity sensor)	XZCP1264L2	
6.11	1	Fixing brackets for inductive sensor (optional for Inductive Proximity sensor)	XSZB108	
6.12	1	Photoelectric sensor with M12 connector (optional for generic purposes)	XUB1APANM12	
6.13	1	Sensor cable with one side M12 and other side open end, 2 m (optional for Photoelectric sensor)	XZCP1264L2	
6.14	1	Reflector 50 x 50 (optional for Photoelectric sensor)	XUZC50	
6.15	4	Pt100 sensor; -50...250 °C (third party)	PT46X150 (Labfacility)	

Encoder

Hardware-Components				
Pos.	**Qty**	**Description**	**Part Number**	**Rev./ Vers.**
7.1	1	CANopen multi-turn absolute encoder	XCC3510PS84CB	
7.2	4	Incremental encoder push pull	XCC1510PS11X	
7.3	4	Encoder cable 10 pin, 5 m	XCCPM2312L5	
7.4	4	Fixing brackets for encoder	XCCRE5SN	
7.5	4	ATV71 encoder card	VW3A3401	

HMI

Hardware-Components				
Pos.	**Qty**	**Description**	**Part Number**	**Rev./ Vers.**
8.1	1	Magelis XBTGT 10.6“ touch display	XBTGT5330	6.0.0.146

E-Stop and Door guarding

Hardware-Components				
Pos.	**Qty**	**Description**	**Part Number**	**Rev./ Vers.**
9.1	1	Emergency Stop safety module XPSAV	XPSAV31111Z002	
9.2	1	Safety extension module	XPSECP5131	
9.3	4	Door guarding module XPSAC	XPSAC5121	
9.4	1	E-Stop pushbutton for field	XALK178G	
9.5	1	Emergency Stop pushbutton mounted on the cabinet doors	XB5AS844	
9.6	1	Auxiliary contacts of Emergency Stop mounted on the cabinet doors	ZB5AZ141	
9.7	10	Illuminated pushbutton, 1 NC, blue	XB5AW36B5	
9.8	5	Assembly housing	XALD01	
9.9	4	Door guard switch	XCSPA792	
9.10	4	Actuator for door guard switch	XCSZ12	
9.11	2	Load contactors 7.5 kW	LC1D18BL	
9.12	11	Load contactors 2.4 kW	LC1D09BL	

Harmony

Hardware-Components				
Pos.	**Qty**	**Description**	**Part Number**	**Rev./ Vers.**
10.1	1	Three position switch	XB5AD33	
10.2	1	Box for 3 button	XALD03	
10.3	2	Signal lamp LED white	XB5AVB1	
10.4	5	Pushbutton with LED green	XB5AW33B5	
10.5	3	Pushbutton with LED red	XB5AW34B5	
10.6	5	Pushbutton with LED yellow	XB5AW35B5	
10.7	2	Pushbutton red	XB5AA42	
10.8	1	Connection element	XVBC21	
10.9	1	Signal element green	XVBC2B3	
10.10	1	Signal element red	XVBC2B4	
10.11	1	Signal element blue	XVBC2B6	
10.12	1	Signal element yellow	XVBC2B8	
10.13	1	Tube with connection	XVBZ02	

CANopen

Hardware-Components				
Pos.	**Qty**	**Description**	**Part Number**	**Rev./ Vers.**
11.1	5	CANopen taps with 4 x SUBD9	TSXCANTDM4	
11.2	4	CANopen cord set SUBD9 to SUBD9 1m	TSXCANCADD1	
11.3	14	CANopen cord set SUBD9 RJ45, 1 m	TCSCCN4F3M1T	
11.4	3	CANopen cord set M12, 2 m	FTXCN3220	
11.5	2	CANopen cord set M12, 3 m	FTXCN3230	
11.6	2	CANopen cord set M12, 5 m	FTXCN3250	
11.7	5	CANopen cable socket M12/open end	1525704 (Phoenix)	
11.8	3	CANopen cable pin M12/open end	1525652 (Phoenix)	
11.9	5	CANopen RJ45 connector (daisy chain)	TCSCTN023F13M03	

Software Tools

Software-Components				
Pos.	**Qty**	**Description**	**Part Number**	**Rev./ Vers.**
12.1	1	SoMachine (includes Vijeo Designer) on DVD, trial version	MSDCHNSFNV30	V3.0
12.2	1	Single user license for SoMachine	MSDCHNL•UA	
12.3	1	SoMachine (includes Vijeo Designer) with Solution Extension on DVD, single user license (instead position 12.1 and 12.2)	MSDCHLLMUV30S0	V3.0
12.4	1	Programming cable	TCSXCNAMUM3P	

Component Protection Classes

Positioning Protection Class	Component	In Field, On Site			Cabinet		
					Front		Inside
		IP54	IP65	IP67	IP55	IP65	IP20
	Main Switch, with or without undervoltage protection and integrated indicator						X
	Emergency Stop switch housing XALK		X				
	Preventa module XPS						X
	Single/Double switch housing, complete		X				
	Control switch, 3 positions					X	
	Indicator buttons, all colors		X				
	Buttons with LED + 1 switch, all colors						X
	Labels 30 x 40, all texts		X				
	TeSys contactor						X
	Phaseo Power Supply						X
	Modicon M258 Logic controller						X
	Modicon TM5 I/O island						X
	Altivar 32 and Altivar 71						X
	Lexium 32 servo drive						X
	Lexium ILA, ILE	X					
	BSH Servo motor		X shaft end IP40				
	Modicon TM7 I/O island			X			
	Magelis HMI XBTGT					X	X

Environmental Characteristics

NOTE: The equipment represented in the architecture(s) of this document has been rigorously tested to meet the individually specified environmental characteristics for operation and storage. This information is available in the product catalogs. If your application requirements are extreme or otherwise do not appear to correspond to the information, your local Schneider Electric Support will be eager to assist you in determining what is appropriate for your particular application needs.

Component Features

Components

Compact NSX main switch

Compact NSX rotary switch disconnectors from 12 to 175 A are suitable for on-load making and breaking of resistive or mixed resistive and inductive circuits where frequent operation is required. They can also be used for direct switching of motors in utilization categories AC-3 and DC-3 specific to motors.



- 3-pole rotary switch disconnectors, 12 to 175 A
- Pad lockable operating handle (padlocks not supplied)
- Degree of protection IP65



Power Supply Phaseo: ABL8RPS24050 & ABL8RPS24100



- 1 or 2 phase connection
- 100...120 Vac and 200...500 Vac input
- 24 Vdc output
- Diagnostic relay
- Protected against overload and short circuits

Altivar 32 Variable Speed Drive

The Altivar 32 drive is a frequency inverter for 3-phase squirrel cage asynchronous motors. The Altivar 32 is robust, compact, easy to use and conforms to EN 50190, IEC/EN 61800-2, IEC/EN 61800-3 standards UL/CSA certification and to CE marking.



Altivar 32 drives communicate on Modbus and CANopen industrial buses. These two protocols are integrated as standard.

Multiple units can be mounted side by side to save space.

Drives are available for motor ratings between 0.18 kW and 15 kW, with four types of power supply:

- 200 Vac to 240 Vac 1-phase, 0.18 kW to 2.2 kW
- 200 Vac to 240 Vac 3-phase, 0.18 kW to 15 kW
- 380 Vac to 500 Vac 3-phase, 0.37 kW to 15 kW
- 525 Vac to 600 Vac 3-phase, 0.75 kW to 15 kW

Altivar 71 Variable Speed Drive



- - 200 Vac to 240 Vac 1-phase, 0.37 kW to 7.5 kW
  - 200 Vac to 240 Vac 3-phase, 0.37 kW to 75 kW
  - 380 Vac to 480 Vac 3-phase, 0.75 kW to 500 kW
  - 500 Vac to 690 Vac 3-phase, 2.2 kW to 630 kW
- Integrated EMC filter
- Temperature range: -10 to +50°C
- Speed range 0 to 1000 Hz
- Graphical display for control and parameterization
- Operation via Modbus, CANopen or other buses possible
- 2 analog inputs plus 1 analog output
- Digital inputs, 2 digital status outputs
- 1 shutdown output (Power removal function)
- Option cards for communication buses, Extended I/O and encoder
- Protections of drive and motor
- Compact design, side-by-side installation possible

Lexium 32 servo drive



- Voltage range:
  1-phase 100 – 120 Vac or 200 – 240 Vac
  3-phase 200 – 240 Vac or 380 – 480 Vac
- Power: 0.4 to 6 kW
- Rated torque: 0.5 to 36 Nm
- Rated speed: 1500 to 8000 RPM
- The compact design allows for space-saving installation of the drive in control cabinets or machines.
- Features the "Power Removal" (Safe Stop) functional safety function, which prevents the motor from being started accidentally. Category 3 with machine standard EN 954-1
- Lexium 32 servo amplifiers are fitted with a brake resistor as standard (an external brake resistor is optional)
- Quick control loop scan time: 62.5 µs for current control loop, 250 µs for speed control loop and 250 µs for position control loop
- Operating modes: Point-to-point positioning (relative and absolute), electronic gears, speed profile, speed control and manual operation for straightforward setup.
- Control interfaces:
  CANopen, Modbus or Profibus DP
  Analog reference inputs with ± 10 Vdc
  Logic inputs and outputs

Modicon TM7 I/O module TM7NCOM16A



- Suitable for use in harsh environments
- Communication via: CANopen and TM7 expansion bus
- Each channel has an LED status display
- Short-circuit-proof inputs and outputs
- Temperature range: -10 to + 60°C (1)
- Degree of protection IP67
- Approval: UL

(1) For an ATEX environment the temperature range is de-rated to 0 to +60°C. For details consult the product documentation

Magelis Display Terminal: XBTGT5330



- Sensor screen (STN-Technology) with 24 Vdc power supply
- Brightness and Contrast adjustment
- Communication via Uni-Telway and Modbus. Communication via Ethernet TCP/IP is also available in specific models
- Flat Profile
- Memory expansion for application program
- Temperature range: 0 to + 50 °C
- Certificates: UL, CSA

Preventa safety module: XPSAC5121

Main technical characteristics:

For monitoring	Emergency Stop
Max. Category accord. EN 954-1	3
No. of safety circuits	3 N/O
No. of additional circuits	1 Solid-State
Indicators	2 LED
Power supply AC/DC	24 V
Response time on input opening	< 100 ms
AC-15 breaking capacity	C300
DC-13 breaking capacity	24 Vdc / 2 A - L/R 50ms
Minimum voltage and current	17 V / 10 mA
Dimensions (mm)	114 x 22.5 x 99
Connection	Captive screw-clamp terminals
Degree of protection	IP20 (terminals) IP40 (casing)



Safety modules XPS AC are used for monitoring Emergency Stop circuits conforming to standards EN ISO 13850 and EN 60204-1 and also meet the safety requirements for the electrical monitoring of switches in protection devices conforming to standard EN 1088 ISO 14119. They provide protection for both the machine operator and the machine by immediately stopping the dangerous movement on receipt of a stop instruction from the operator, or on detection of a fault in the safety circuit itself.

SoMachine OEM Machine Programming Software: MSDCHNSFNV30 or MSDCHLLMUV30S0



SoMachine is the OEM solution software for developing, configuring and commissioning the entire machine in a single software environment, including logic, motion control, HMI and related network automation functions.

SoMachine allows you to program and commission all the elements in Schneider Electric's Flexible and Scalable Control platform, the comprehensive solution-oriented offer for OEMs, which helps you achieve the most optimized control solution for each machine's requirements.

Flexible and Scalable Control platforms include:

Controllers:

HMI controllers:
- Magelis XBTGC HMI controller
- Magelis XBTGT HMI controller
- Magelis XBTGK HMI controller

Logic controllers:
- Modicon M238 Logic controller
- Modicon M258 Logic controller

Motion controller
- Modicon LMC058 Motion controller

Drive controller:
- Altivar ATV-IMC Drive controller

HMI:

HMI Magelis graphic panels:
- XBTGT, XBTGK, XBTGH
- HMISTU and HMISTO

SoMachine is a professional, efficient, and open software solution integrating Vijeo Designer.
It integrates also the configuring and commissioning tool for motion control devices.

It features all IEC 61131-3 languages, integrated field bus configurations, expert diagnostics and debugging, as well as outstanding capabilities for maintenance and visualization.

SoMachine integrates tested, validated, documented and supported expert application libraries dedicated to Packaging, Hoisting and Conveying applications.

SoMachine provides you:
- One software package
- One project file
- One cable connection
- One download operation

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Homepage	http://www.schneider-electric.com

As standards, specifications and designs change from time to time, please ask for confirmation of the information given in this publication.