Programming & Control Manual

DMR PC 6-50

V1
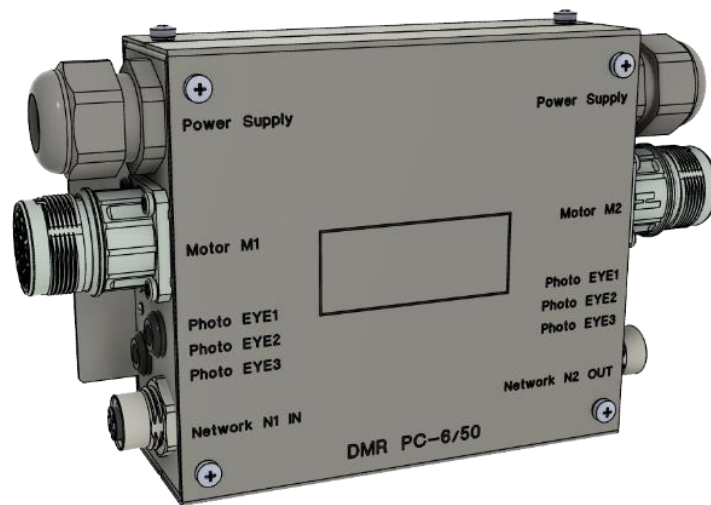
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1. Sommario

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2. General Information

Document Versioning

Version	Date	Author	Note
V1	01/03/2023	Michele Piacentini	First Release

Introduction

This document is intended to describe DMR PC commissioning with industrial Ethernet fieldbus.

For installation of the device and cabling please use INSTALLATION GUIDE at www.motorpowerco.com.

The multiprotocol device can be operated with the three industrial Ethernet protocols:

- PROFINET RT
- EthernNet/IP
- EtherCAT

Every product code has its own fixed fielbus as the following table show:

Part Number	Product code	Fieldbus Type
DMR PC-6/50 H P X	051700000004 051700000006	PROFINET RT
DMR PC-6/50 H E X	051700000005 051700000007	EtherCAT
DMR PC-6/50 H EI X	051700000009 051700000008	EtherNet/IP

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Device commissioning

the dedicated UI can be used to configure the device parameters and check the network status.

To connect with device via UI check the INSTALLATION GUIDE at www.motorpowerco.com.

A fieldbus status specific diagnostic is possible.

Also parameterization of the drive is possible.
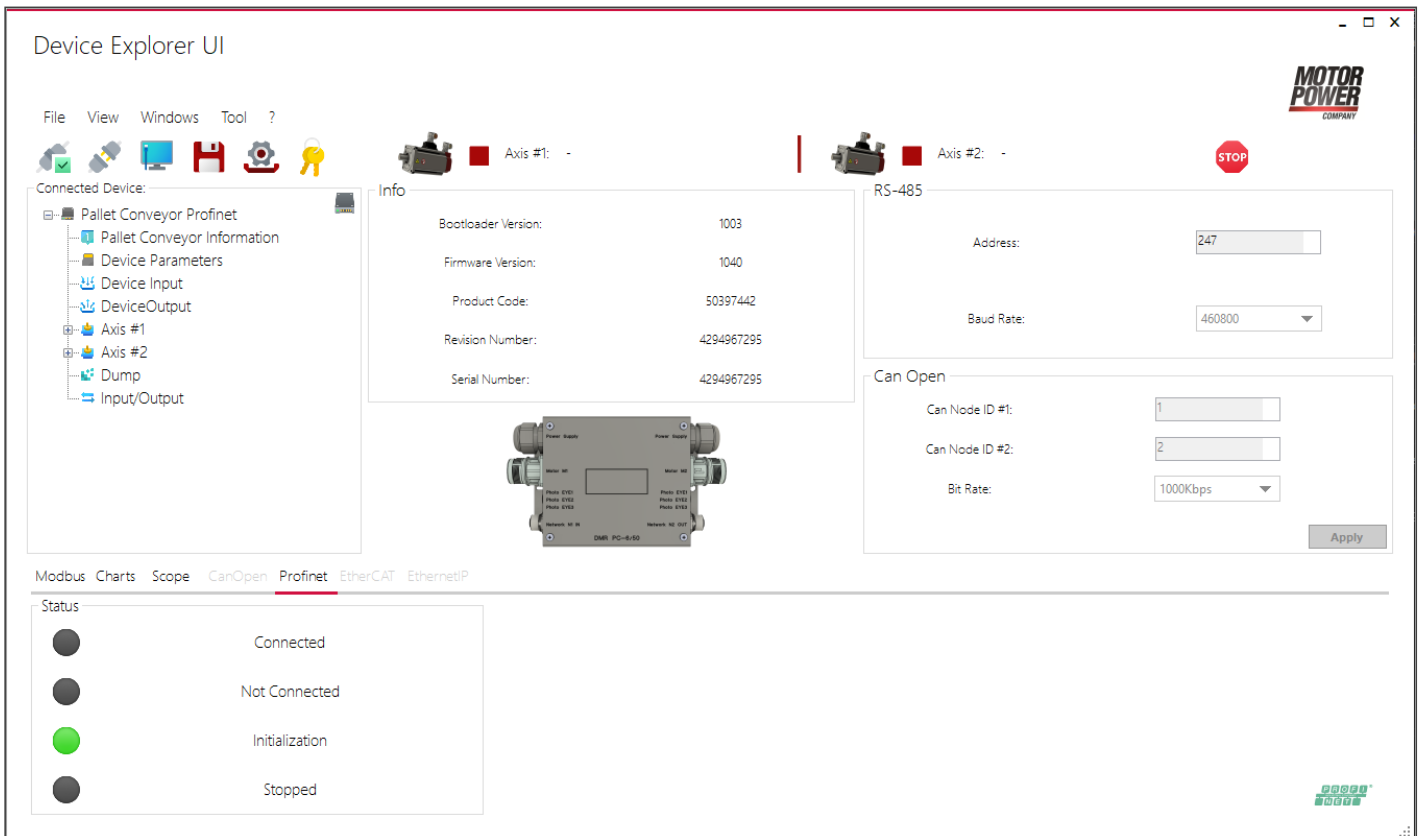
FIGURE 1

3. Commissioning the device in PROFINET

PROFINET IO features

	Description
PROFINET specification	V2.35
Conformance Class	2.35
MinCycle Time	1ms (Ios update limited to 2ms)
Topology Detection	Supported
Automatic Address Setting	Supported
Acyclic communication	Supported
MRP Client	Supported
Diagnostics	Supported
Network Load Class	3
Fast Startup	Supported

PROFINET IO device model

The technical properties of PROFINET IO devices are defined via their device description file, the GSDML file. A PROFINET IO device consists of 1…n slots, which can also contain 1…n sub slots. Sub slots are placeholders for sub modules and establish the interface to the process. Sub modules can contain parameters, data and diagnostics.

Slot 0 is always reserved as Device Access Point (DAP). The DAP contains the physical interface to the Ethernet network and represents the device. The other slots and sub slots represent the other device functions. The structure is defined by the manufacturer of field devices. It is not necessary that every slot or respectively sub slot is related to physical functions. The allocation of the slots and sub slots and thus the assignment of functions (operation mode, diagnostics, etc.) is done in the configuration software of the PROFINET controller. This device model allows manufacturers to design modular and flexible decentralized field devices. User are flexible in configuring decentralized field devices.

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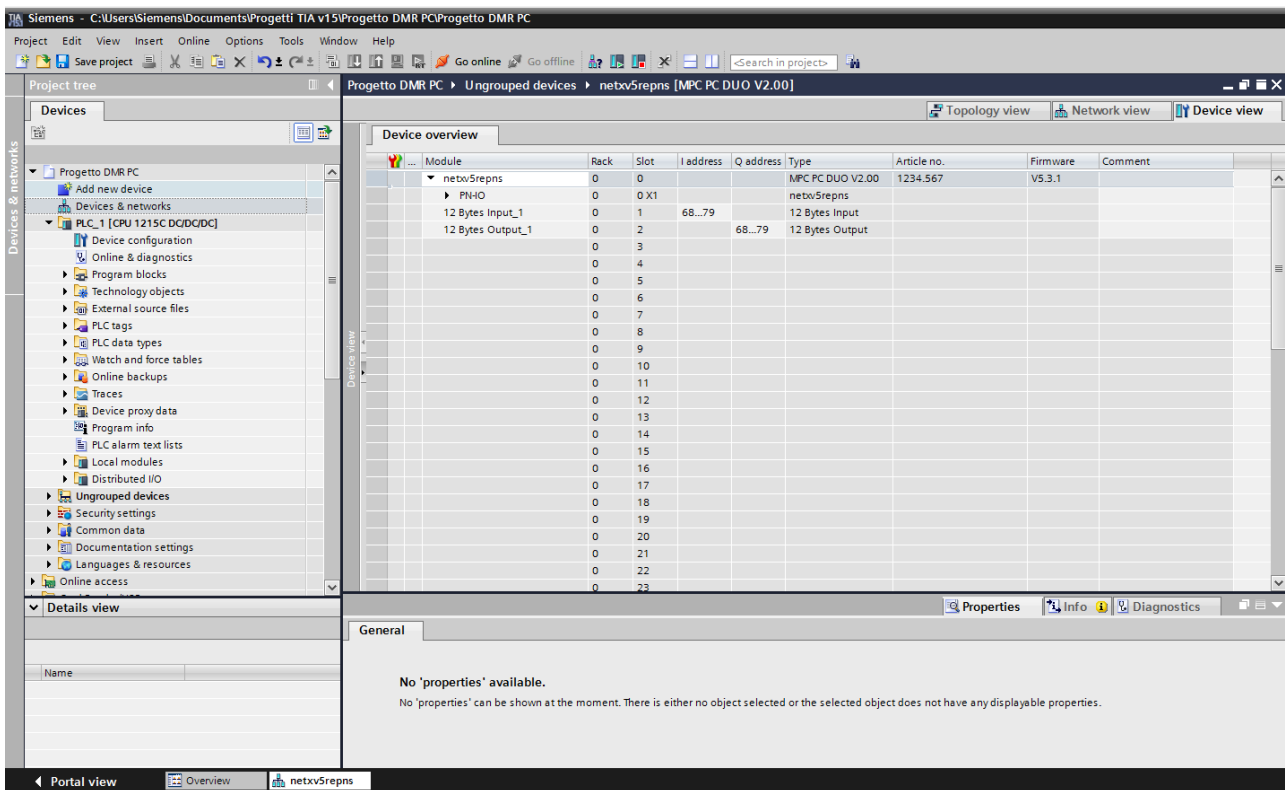
FIGURE 2 TIA PORTAL SLOT AND SUBSLOT

Besides slot 0 (DAP) all other slots of device contain only one sub slot. For this reason slots and sub slots are described as synonyms in the following.

Slot number.	Name	Description	Pluggable devices
0	MPC PC DUO	Interface of the device to PROFINET IO, Device Access Point	DeviceAccess Point Ethernet interface Ethernet port 0 Ethernet port 1
1	_12_Bytes_Input	Inputs from the drive to controller. It also addresses configuration parameters for the drive	Fixed to Standard Data Input Image
2	_12_Bytes_Output	Outputs from the PLC to drive, to control the device	Fixed to Standard Data Output Image

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_12_Bytes_Input Sub module

This sub module is fixed in slot 1 and not changeable.

Process Input Data

12 bytes are controller inputs send by drive. Drive operates in velocity mode.

Byte	Bit	Category	Designation	Type	Comments
0	.0	Sensors	Photo Eye 1 motor 1	BOOL	True = sensor active
0	.1	Sensors	Photo Eye 2 motor 1	BOOL	
0	.2	Sensors	Photo Eye 3 motor 1	BOOL	
0	.3	Sensors	Photo Eye 1 motor 2	BOOL	
0	.4	Sensors	Photo Eye 2 motor 2	BOOL	
0	.5	Sensors	Photo Eye 3 motor 2	BOOL	
0	.6	Spare		BOOL	Spare
0	.7	Spare		BOOL	
1	.0	Digital Input	Digital input 1 motor 1	BOOL	True = digital input active
1	.1	Digital Input	Digital input 2 motor 1	BOOL	
1	.2	Digital Input	Digital input 3 motor 1	BOOL	
1	.3	Digital Input	Digital input 1 motor 2	BOOL	
1	.4	Digital Input	Digital input 2 motor 2	BOOL	
1	.5	Digital Input	Digital input 3 motor 2	BOOL	
1	.6	Spare		BOOL	Spare
1	.7	Spare		BOOL	
2 – 3		Motor 1 error code	Fault Register	UINT16	Canopen drive error code as per CiA DS-402
4 - 5		Motor 2 error code	Fault Register	UINT16	Canopen drive error code as per CiA DS-402
6		Motor 1 feedback	Speed motor 1	INT8	Actual speed/position (-100..0..100 per cent of "Max Motor Velocity")
7		Motor 2 feedback	Speed motor 2	INT8	
8		Actual Torque motor 1	Actual current motor 1	INT8	Actual current in percentage of peak current(-100…100)
9		Actual Torque motor 2	Actual current motor 2	INT8	Actual current in percentage of peak current(-100…100)
10		Spare		BYTE	Spare
11		Spare		BYTE	Spare

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Fault Register Description

This pararagraph describes the fault register

The Motor 1/2 error code gives information about the fault occurred in the drives. More than one faults could be visible at the same time. In this case their values are added.

A detailed list of possible faults:

Bit number	Fault type	Description	Value (hex)
0	OVER_VOLTAGE	Power supply voltage goes above to the maximum admitted value	0x01
1	UNDER_VOLTAGE	Power supply voltage goes below to the maximum admitted value	0x02
2	PEAK_MOTOR_CURRENT	Motor peak current exceeded	0x04
3	RATED_MOTOR_CURRENT	Motor rated current exceeded	0x08
6	HALL SIGNALS	Feedback error	0x40
4	SHORT_CIRCUIT		0x10
8	POSITION_TRACKING_ERROR	Position following error exceeded	0x100
9	VELOCITY_TRACKING_ERROR	Speed following error exceeded	0x200
10	OVERVELOCITY	Maximum motor velocity exceeded	0x400
12	DRIVE_OVERTEMPERATURE	Maximum frive temp reached	0x1000
13	FIELDBUS_CYCLE_TIME	Fieldbus cyclic messages timeout	0x2000

Parameters

PNU	Name	Description	Type	Default Value
2	DC Bus Voltage Param	Bus Operating Voltage	Unsigned16	48(V)
155	Acceleration Axis 1	Ramp profile acceleration/deceleration for the motor	Unsigned32	1000 (rpm/s)
157	Deceleration Axis 1	Ramp profile acceleration/deceleration for the motor	Unsigned32	1000 (rpm/s)

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347	Acceleration Axis 2	Ramp profile acceleration/deceleration for the motor	Unsigned32	1000 (rpm/s)
349	Deceleration Axis 2	Ramp profile acceleration/deceleration for the motor	Unsigned32	1000 (rpm/s)
151	Max Motor Velocity Axis 1	Max veloxity for the motor to be used in target/feedback for process data	Unsigned32	2500 rpm
343	Max Motor Velocity Axis 2	Max veloxity for the motor to be used in target/feedback for process data	Unsigned32	2500 rpm

_12_Bytes_Output Sub module

12 bytes are controller output send by PN IO controller.

Byte	Bit	Category	Designation	Type	Comments
0	.0	Digital Output	Digital output 1 motor 1	BOOL	True = digital output active Available when digital outputs are set as "Generic output" on SW interface
0	.1	Digital Output	Digital output 2 motor 1	BOOL	
0	.2	Digital Output	Digital output 1 motor 2	BOOL	
0	.3	Digital Output	Digital output 2 motor 2	BOOL	
0	.4	Spare		BOOL	Spare
0	.5	Spare		BOOL	
0	.6	Spare		BOOL	
0	.7	Spare		BOOL	
1	.0	Enable AX 1	Digital enable motor 1	BOOL	True = motor enable
1	.1	Enable AX 2	Digital enable motor 2	BOOL	True = motor enable
1	.2	Begin AX 1	Digital begin motor 1	BOOL	True = target enable
1	.3	Begin AX 2	Digital begin motor 2	BOOL	True = target enable
1	.4	Reset Fault AX1	Reset Fault motor 1	BOOL	True on rising edge = clear fault
1	.5	Reset Fault AX2	Reset Fault motor 2	BOOL	True on rising edge = clear fault
1	.6	Reset Pos AX1	Reset Position motor 1	BOOL	True on rising edge = homing to 0 on actual position
1	.7	Reset Pos AX2	Reset Position motor 2	BOOL	True on rising edge = homing to 0 on actual position
2		Motor 1 target	Speed/Position motor 1	INT8	Target speed/position (-100..0..100 per cent of "Max Motor Velocity")
3		Motor 2 target	Speed/Position motor 2	INT8	

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4		Torque Limit AX1	Current Limitation motor 1	INT8	Max current available on motor (percentage 100% of Peak current)
5		Torque Limit AX2	Current Limitation motor 2	INT8	Max current available on motor (percentage 100% of Peak current)
6		Spare		BYTE	Spare
7		Spare		BYTE	Spare
8		Spare		BYTE	Spare
9		Spare		BYTE	Spare
10		Spare		BYTE	Spare
11		Spare		BYTE	Spare

Services for Acyclic Data (Records)

NAME	TYPE	PNU-Index	Description	R/W	UNIT	RANGE
Actual position Axis 1	int32	693	Actual incremental position	Read only	User Unit	-2147483648 … 2147483648
Actual position Axis 2	int32	743	Actual incremental position	Read only	User Unit	-2147483648 … 2147483648
Bootloader version	unit16	666	Bootloader version	Read only		0 … 65536
Serial number	unit32	648	Serial number del drive	Read only		0 … 4294967296
Firmware version	unit16	640	Firmware version del drive	Read only		0 … 65536
Fault register Axis 1	unit16	669	Fault register See Table	Read only		0 … 65536
Fault register Axis 2	unit16	719	Fault register See Table	Read only		0 … 65536
Actual DC BUS voltage	unit16	653	Actual DC BUS voltage	Read only	Volts	0 … 65536
Drive temperature	unit16	662	Actual drive temperature*100	Read only	°C*100	0 … 65536
I2T Protection Type Axis1	unit16	256	I2T type potection active in the motor	R/W		0…1
I2T Protection Type	unit16	448	I2T type	R/W		0…1

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Axis2			potection active in the motor			
Acceleration Axis 1	unit32	155	Profile Velocity Acceleration Axis 1	R/W	User Unit (rpm/s Default)	0 … 4294967296
Acceleration Axis 2	unit32	347	Profile Velocity Acceleration Axis 2	R/W	User Unit (rpm/s Default)	0 … 4294967296
Deceleration Axis 1	unit32	157	Profile Velocity Deceleration Axis 1	R/W	User Unit (rpm/s Default)	0 … 4294967296
Deceleration Axis 2	unit32	349	Profile Velocity Deceleration Axis 2	R/W	User Unit (rpm/s Default)	0 … 4294967296
Max Motor Velocity Axis 1	unit32	151	Max Motor Velocity Axis 1	R/W	User Unit (rpm Default)	0 … 4294967296
Max Motor Velocity Axis 2	unit32	343	Max Motor Velocity Axis 2	R/W	User Unit (rpm Default)	0 … 4294967296
Overvelocity Axis 1	unit32	169	Velocity Admissible Limit For Motor	R/W	User Unit (rpm Default)	0 … 4294967296
Overvelocity Axis 2	unit32	361	Velocity Admissible Limit For Motor	R/W	User Unit (rpm Default)	0 … 4294967296
Velocity Following Error Window Axis 1	unit32	167	Velocity Following Error Window in Velocity Mode	R/W	User Unit (rpm Default)	0 … 4294967296
Velocity Following Error Window Axis 2	unit32	359	Velocity Following Error Window in Velocity Mode	R/W	User Unit (rpm Default)	0 … 4294967296
Nominal current Axis 1	unit16	142	Motor nominal current Axis 1	R / W	Arms	0 … 65536
Peak current Axis 1	unit16	143	Motor peak current Axis 1	R / W	Arms	0 … 65536
Nominal current Axis 2	unit16	334	Motor nominal current Axis 2	R / W	Arms	0 … 65536
Peak current Axis 2	unit16	335	Motor peak current Axis 2	R / W	Arms	0 … 65536

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Clear Fault Ax1	unit16	548	Clear Axis 1 Fault on 0->1 edge	R / W		0...1
Clear Fault Ax2	unit16	598	Clear Axis 2 Fault on 0->1 edge	R / W		0...1
Save to EEPROM	unit16	514	Store actual parameters in NVM	Write only		0...1
Actual torque Ax1	Int16	674	Actual torque in Iq active on axis	Read only	Milliamps peak	-32.768...32.7677
Actual torque Ax2	Int16	724	Actual torque in Iq active on axis	Read only	Milliamps peak	-32.768...32.7677
Analog In Ax1	Int16	674	Analog input value for Axis1	Read only	mV	-32.768...32.7677
Analog In Ax1	Int16	724	Analog input value for Axis1	Read only	mV	

MRP (Media Redundancy Protocol)

The device supports MRP.

MRP is a standardized protocol according to IEC 62439. It describes a mechanism for media redundancy in ring topologies. With MRP, a defective ring topology with up to 50 nodes is detected and reconfigured in the event of an error. With MRP a trouble-free switch-over is not possible.

A Media Redundancy Manager (MRM) checks the ring topology of a PROFINET network defined by the network configuration for functionality. All other network nodes are Media Redundancy Clients (MRC). In the error-free state, the MRM blocks normal network traffic on one of its ring ports, with the exception of the test telegrams. The physical ring structure thus becomes a line structure again at the logical level for normal network traffic. If a test telegram fails to appear, a network error has occurred. In this case, the MRM opens its blocked port and establishes a new functioning connection between all remaining devices in the form of a linear network topology.

The time between ring interruption and recovery of a redundant path is called reconfiguration time. For MRP, this is a maximum of 200 ms. Therefore, an application must be able to compensate for the 200 ms interruption. The reconfiguration time always depends on the Media Redundancy Manager (e.g. the PROFINET PLC) and the I/O cycle and watchdog times set here. For PROFINET, the response monitoring time must be selected accordingly > 200 ms.

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It is not possible to use Fast Start-Up in an MRP network.

MRDP is not supported

Address setting in PROFINET

In IP-based communication, the field devices are addressed by means of an IP address. PROFINET uses the Discovery and Configuration Protocol (DCP) for IP assignment.

When delivered, each field device has, among other things, a MAC address. This information is sufficient to give the respective field device a unique name.

The address is assigned in two steps:

- Assignment of a unique plant specific name to the respective field device.
- Assignment of the IP address from the IO-Controller before the system start-up based on the plant-specific (unique) name.

PROFINET naming convention

The names are assigned via DCP. The device name is checked for correct spelling during input. The following rules apply for the use of the device name according to PROFINET specification V2.3.

- All device names must be unique.
- Maximum name size: 240 characters Allowed:
    o Lower case letters a…z
    o Numbers 0…9
    o Hyphen and dot
- The name may consist of several components separated by a period. A name component, i.e. a string between two dots, may be a maximum of 63 characters long.
- The device name must not start or end with a hyphen.
- The device name must not start with "port-xyz" (y…z = 0…9).
- The name must not have the form of an IP address (n.n.n, n = 0…999).
- Do not use special characters.
- Do not use capital letters.

Connecting the device to a Siemens PLC via PROFINET

This section provides an overview of the necessary steps for the parameterisation and configuration of the master. The following procedure is recommended:

- Add the GSDML file
- Add servo drive to PROFINET network
- Specify the device name

On the controller side, the servo drive must be integrated into the PROFINET network. The following section describes this, based on an example using integration under SIEMENS SIMATIC S7.

Add the GSDML file

If the servo drive is not included in the device or hardware catalogue, the GSDML file must be installed first. The GSDML file can be found in the software folder in the specific download area at www.motorpowerco.com. To install it go to "*Options>Manage general station description files*".
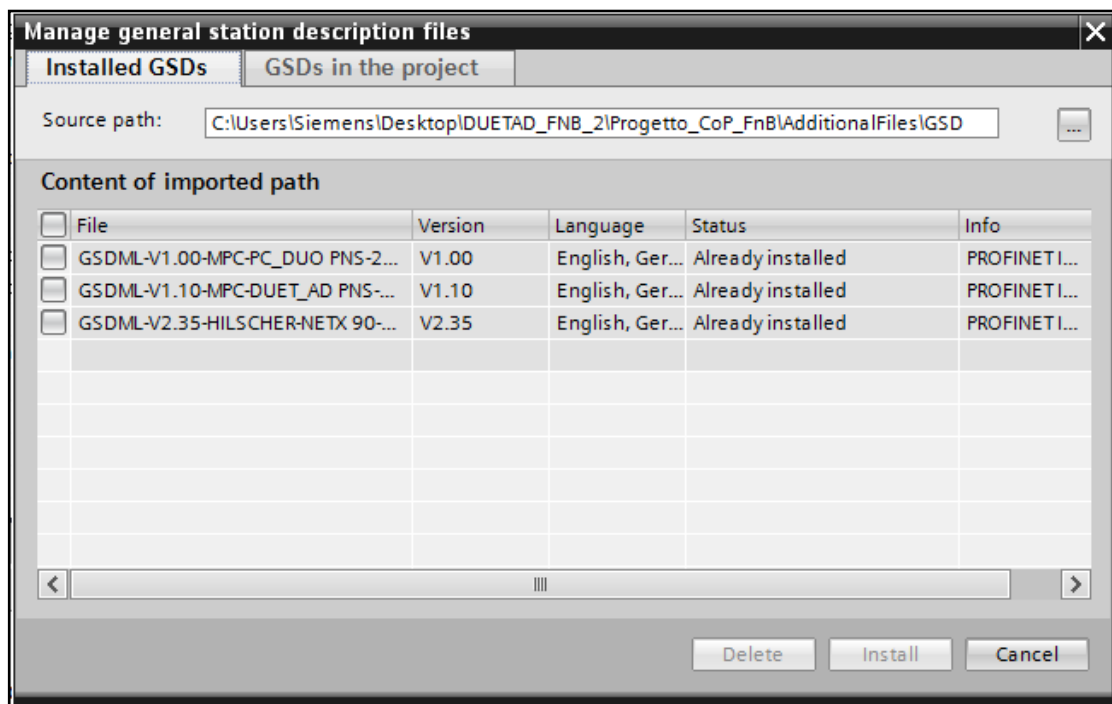

FIGURE 3 - MANAGE GENERAL STATION DESCRIPTION FILES

> ⚠️ **NOTE**: GSDML file is available at
> www.motorpowerco.com

Add servo drive to PROFINET network

To integrate the servo drive into the PROFINET network, the servo drive must be selected in the hardware catalog. The Pallet Conveyor drive device can be found in "*Other field devices > PROFINET IO > I/O > Hilscher Gesellschaft fur Systemautomation mbH > PNS*"
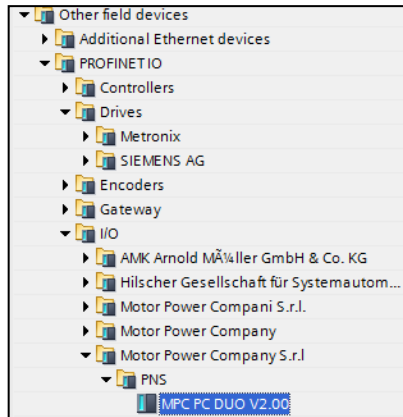

FIGURE 4 PROFINET DEVICE SELECTION IN HARDWARE CATALOG

The Drive head module must be dragged and dropped into the topology view of the device configuration. After the selection of the network view, the servo drive must be assigned to an I/O controller via the link "Not assigned".
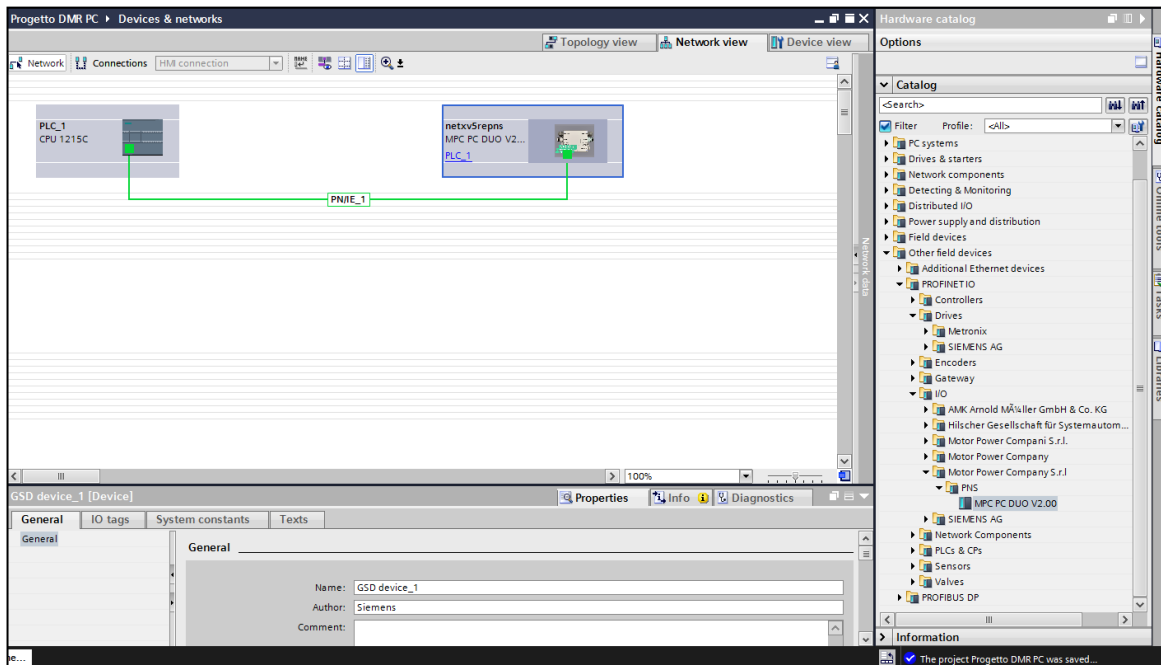

FIGURE 5 ADDING GSDML FILE IN TIA PORTAL

Connecting the devices to the PLC

- Select the device from the Hardware catalog and drag it into the **Device & networks** editor.
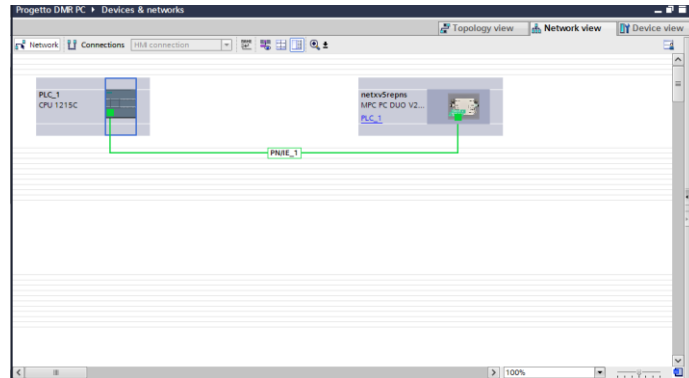- Connect the devices to the PLC in the **Devices & networks** editor.

FIGURE 6-CONNECTING DEVICE TO THE PLC

Assigning the PROFINET device name

- Select Online access → Online & diagnostics.
- Functions → Assign PROFINET device name.
- Assign the desired PROFINET device name with Assign name.
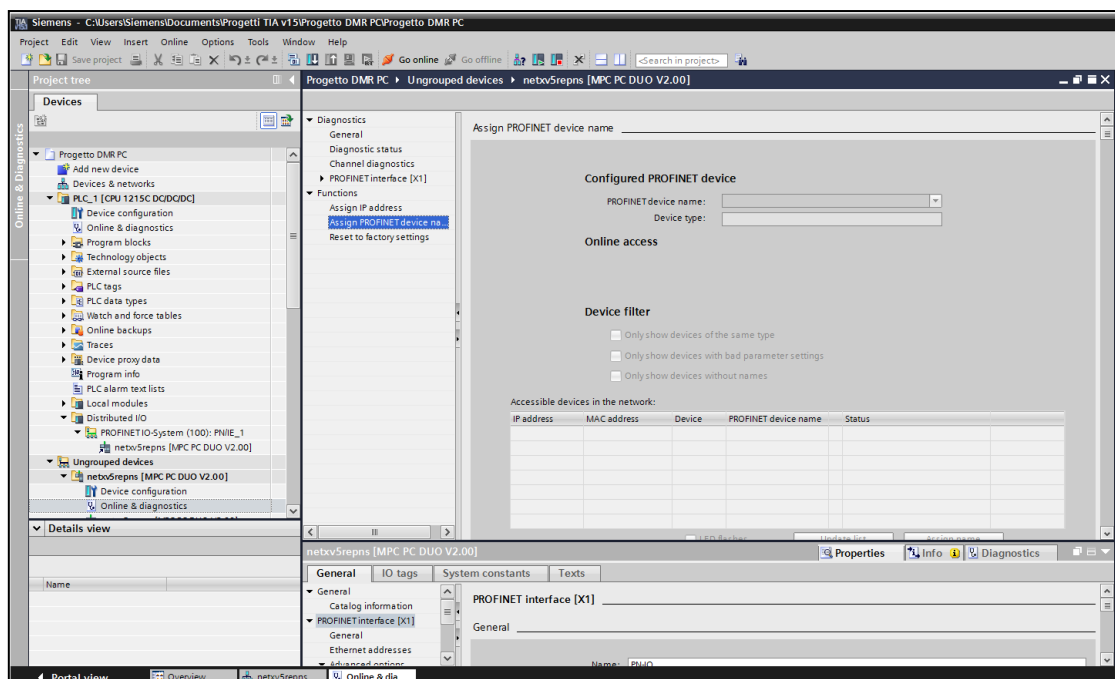
FIGURE 7- TIA-PORTAL – ASSIGNING THE PROFINET DEVICE NAME

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Setting the IP address in TIA Portal

- Select Device → Properties tab → Ethernet addresses.
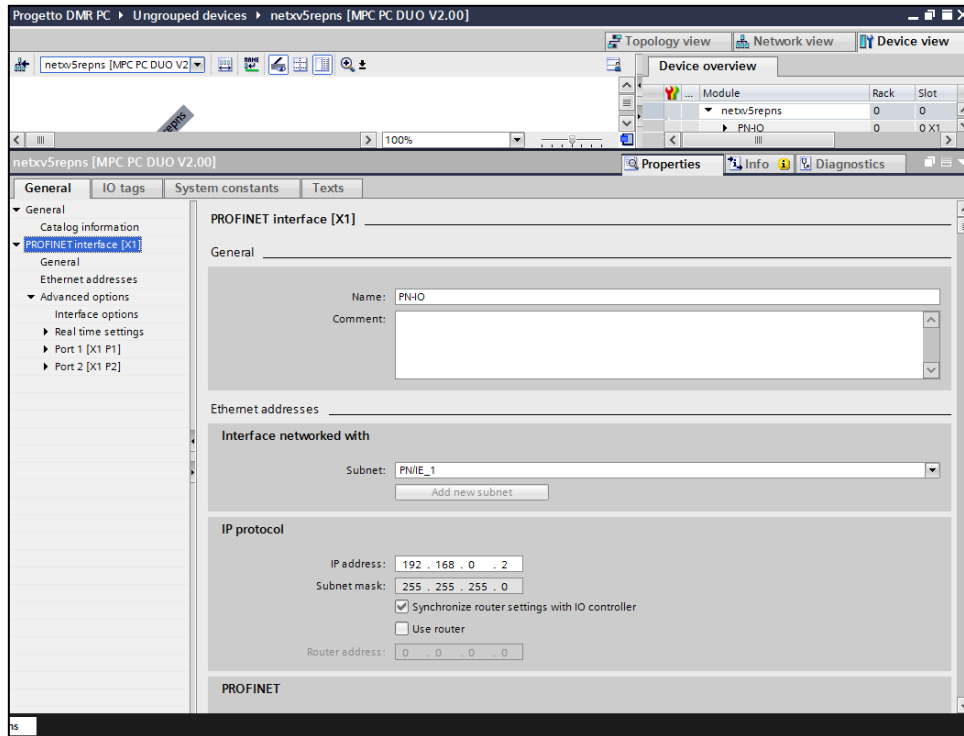- Assign the desired IP address.

FIGURE 8 ASSIGNING THE IP ADDRESS

Connecting the device online with the controller
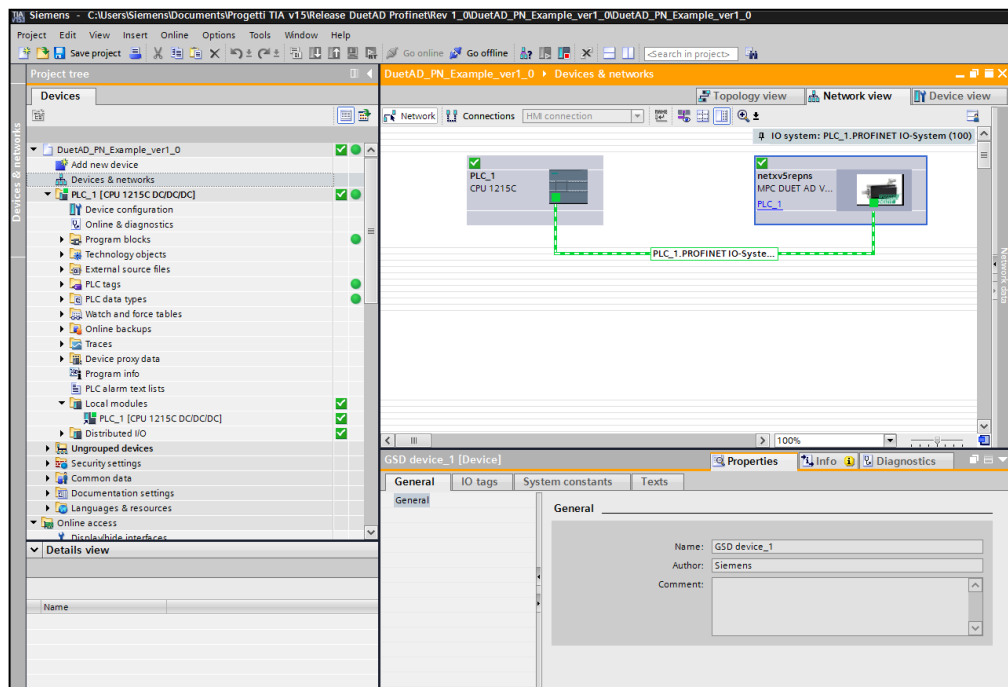
▶ Start the online mode (Go online).

FIGURE 9 TIA-PORTAL – ONLINE MODE

Acyclic Write/Read Parameters Objects

How to read/write parameters records

Acyclic data exchange using the "Record Data CR" can be used for parameter assignment or configuration of IO devices or reading out status information. This is accomplished with the read/write frames using standard IT services via TCP/IP1,in which the different data records are distinguished by their index. Data records are freely definable by device manufacturers.

The controller can send read/write record to the device. Each record is composed by 16 or 32 bits.

Parameters are based on 16bit register regardless on their type. 32bit parameters uses 2 16bit register.

For instance a given parameter whose type is Int8 (1 byte) will need anyway to use 16bit (2 byte has to be exchange) memory via records exchange in PROFINET, whereas an Uint32 (4 byte) will use 2 16 bit register and then 4 bytes of data exchange.

FUNCTION BLOCK FOR R/W PARAMETERS

You can use the RDREC (Read data record) and WRREC (Write data record) instructions with PROFINET.
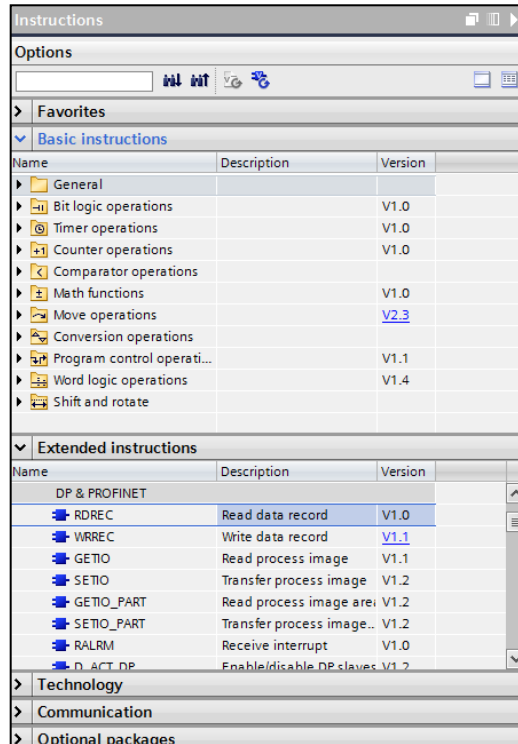
FIGURE 10-RDREC&WRREC FB IN TiAPortal

FB WRREC

Use the WRREC instruction to transfer a data RECORD with the record number INDEX to a DP slave/PROFINET IO device component addressed by ID, such as a module in the central rack or a distributed component (PROFINET IO).Assign the byte length of the data record to be transmitted. The selected length of the source area RECORD should, therefore, have at least the length of LEN bytes.

Select	Meaning
IN	
REQ	REQ = 1, starts data transmission
ID	Hardware identifier of the channel
INDEX	Number of the data set to be written (index)
MLEN	Maximum length of the data to be written

OUT	
VALID	New data set written and complete
BUSY	BUSY = 1: Write operation not yet completed
ERROR	ERROR = 1: Error while writing
STATUS	Error code of the function block
LEN	Length of the written data
IN/OUT	
RECORD	Destination memory area for the written data

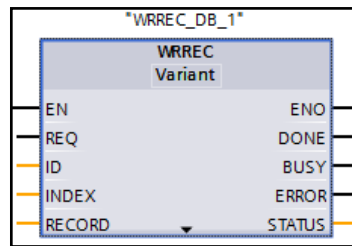*FIGURE 11-WRREC FB*

FB RDREC

Use the RDREC instruction to read a data record with the number INDEX from the component addressed by the ID, such as a central rack or a distributed component(PROFINET IO).Assign the maximum number of bytes to read in MLEN. The selected length of the target area RECORD should have at least the length of MLEN bytes.

| Select	Meaning
IN	
REQ	REQ = 1, starts data transmission
ID	Hardware identifier of the channel
INDEX	Number of the data set to be read (index)
MLEN	Maximum length of the data to be read
OUT	
VALID	New data set read and complete
BUSY	BUSY = 1: Read operation not yet completed
ERROR	ERROR = 1: Error while reading
STATUS	Error code of the function block
LEN	Length of the read data
IN/OUT	
RECORD	Destination memory area for the read data (here in the example DB10)

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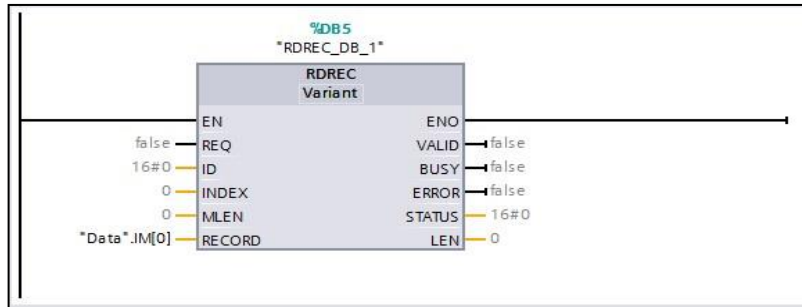
FIGURE 12 -RDREC FB

Selecting the HW ID fot RDREC/WRREC

The Hardware Identifier of the channel can be chosen independently among the modules of the station in question.

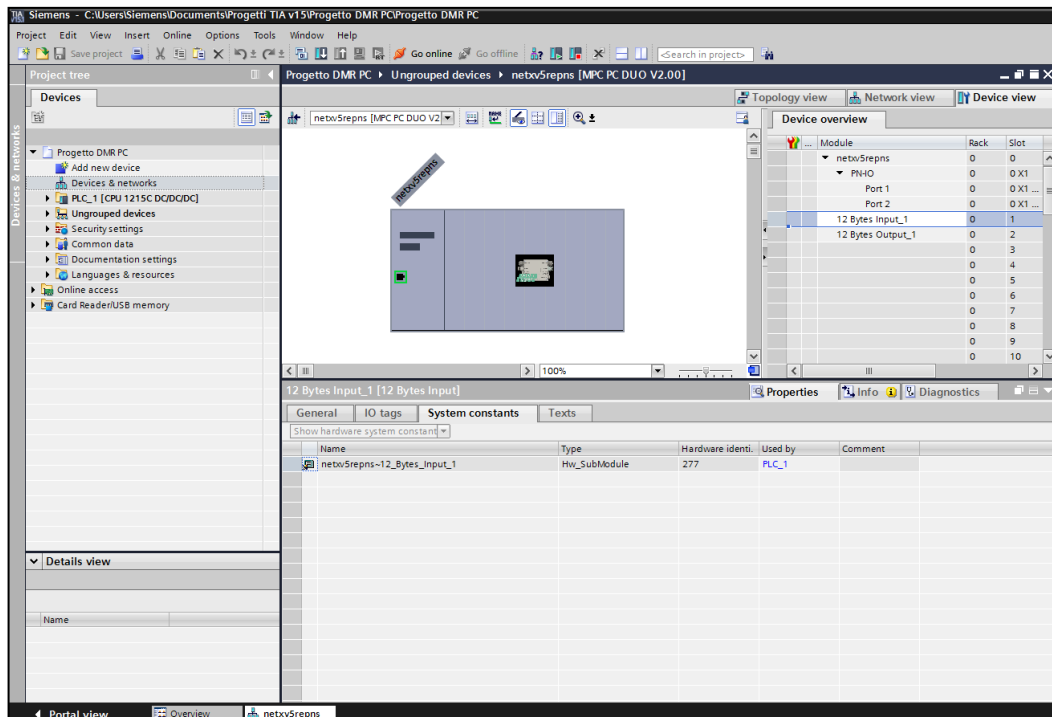Use ID of **_12_Bytes_Output** or **_12_Bytes_Input** independently.

FIGURE 13 - HARDWARE IDENTIFIER OF THE CHANNEL

12 Bytes Inputs_1 Module Parameters

Some motion parameters can be configured directly in TIA Portal. Their value is written to the drive each time the station is initialized.

NAME	Module	TYPE	Description	R/W	UNIT	RANGE
DC BUS voltage	12 Bytes Input_1	unit16	DC Bus working voltage	Read only	Volts	0 … 65536
I2T Protection Type Axis2	12 Bytes Input_1	unit16	I2T type potection active in the motor	R/W		0…1
Acceleration Axis 1	12 Bytes Input_1	unit32	Profile Velocity Acceleration Axis 1	R/W	User Unit (rpm/s Default)	0 … 4294967296
Acceleration Axis 2	12 Bytes Input_1	unit32	Profile Velocity Acceleration Axis 2	R/W	User Unit (rpm/s Default)	0 … 4294967296
Deceleration Axis 1	12 Bytes Input_1	unit32	Profile Velocity Deceleration Axis 1	R/W	User Unit (rpm/s Default)	0 … 4294967296
Deceleration Axis 2	12 Bytes Input_1	unit32	Profile Velocity Deceleration Axis 2	R/W	User Unit (rpm/s Default)	0 … 4294967296
Max Motor Velocity Axis 1	12 Bytes Input_1	unit32	Max Motor Velocity Axis 1	R/W	User Unit (rpm Default)	0 … 4294967296
Max Motor Velocity Axis 2	12 Bytes Input_1	unit32	Max Motor Velocity Axis 2	R/W	User Unit (rpm Default)	0 … 4294967296

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4. Commissioning the device in EtherNet/IP

Common EtherNet/IP features

Features	Description
Address Assingment	DHCP/BOOTP supported
DLR	Supported
Quick Connect	Supported
ACP	Supported
UCMM	Supported
Explicit Messages	Connected (class 3) and unconnected
Number of TCP connections	3
Number of CIP connections	10
Input assembly instance	100
Output assembly instance	101
Configuration assembly Instance	102

EtherNet/IP classes

Assembly Object (0x04)

The Assembly Object combines attributes of several objects and allows data to be sent from one object to another or to receive data in a targeted manner

The following description of the Ethernet Link Object is taken from the CIP specification, Vol. 2, Rev. 2.1 by ODVA & ControlNet International Ltd.

Instance attributes

Attr. no.	Attribute Name	Get/Set	Type	Value
0x03	Data	S	ARRAY OF BYTE	Identifies a special product in a device type.
0x04	Size	G	UINT	Number of bytes in attribute 3: 256 or variable 12 default

Common Services

Service	Class	Instance	Service name

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code			
14	Yes	Yes	Get_Attribute_Single Returns the content of a specified attribute.

Consuming Assembly Instance (Instance 100)

These are the input data for the device and are used for controlling the device

Byte	Bit	Category	Designation	Type	Comments
0	.0	Digital Output	Digital output 1 motor 1	BOOL	True = digital output active Available when digital outputs are set as "Generic output" on SW interface
0	.1	Digital Output	Digital output 2 motor 1	BOOL	
0	.2	Digital Output	Digital output 1 motor 2	BOOL	
0	.3	Digital Output	Digital output 2 motor 2	BOOL	
0	.4	Spare		BOOL	Spare
0	.5	Spare		BOOL	
0	.6	Spare		BOOL	
0	.7	Spare		BOOL	
1	.0	Enable AX 1	Digital enable motor 1	BOOL	True = motor enable
1	.1	Enable AX 2	Digital enable motor 2	BOOL	True = motor enable
1	.2	Begin AX 1	Digital begin motor 1	BOOL	True = target enable
1	.3	Begin AX 2	Digital begin motor 2	BOOL	True = target enable
1	.4	Reset Fault AX1	Reset Fault motor 1	BOOL	True on rising edge = clear fault
1	.5	Reset Fault AX2	Reset Fault motor 2	BOOL	True on rising edge = clear fault
1	.6	Reset Pos AX1	Reset Position motor 1	BOOL	True on rising edge = homing to 0 on actual position
1	.7	Reset Pos AX2	Reset Position motor 2	BOOL	True on rising edge = homing to 0 on actual position
2		Motor 1 target	Speed/Position motor 1	INT8	Target speed/position (-100..0..100 per cent of "Max Motor Velocity")
3		Motor 2 target	Speed/Position motor 2	INT8	
4		Torque Limit AX1	Current Limitation motor 1	INT8	Max current available on motor (percentage 100% of Peak current)
5		Torque Limit AX2	Current Limitation motor 2	INT8	Max current available on motor (percentage 100% of Peak current)
6		Spare		BYTE	Spare

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7	Spare		BYTE	Spare
8	Spare		BYTE	Spare
9	Spare		BYTE	Spare
10	Spare		BYTE	Spare
11	Spare		BYTE	Spare

Fault Register Description

This pararagraph describes the fault register

The Motor 1/2 error code gives information about the fault occurred in the drives. More than one faults could be visible at the same time. In this case their values are added.

A detailed list of possible faults:

Bit number	Fault type	Description	Value (hex)
0	OVER_VOLTAGE	Power supply voltage goes above to the maximum admitted value	0x01
1	UNDER_VOLTAGE	Power supply voltage goes below to the maximum admitted value	0x02
2	PEAK_MOTOR_CURRENT	Motor peak current exceeded	0x04
3	RATED_MOTOR_CURRENT	Motor rated current exceeded	0x08
6	HALL SIGNALS	Feedback error	0x40
4	SHORT_CIRCUIT		0x10
8	POSITION_TRACKING_ERROR	Position following error exceeded	0x100
9	VELOCITY_TRACKING_ERROR	Speed following error exceeded	0x200
10	OVERVELOCITY	Maximum motor velocity exceeded	0x400
12	DRIVE_OVERTEMPERATURE	Maximum frive temp reached	0x1000
13	FIELDBUS_CYCLE_TIME	Fieldbus cyclic messages timeout	0x2000

Producing Assembly Instance (Instance 101)

Byte	Bit	Category	Designation	Type	Comments
0	.0	Sensors	Photo Eye 1 motor 1	BOOL	True = sensor active
0	.1	Sensors	Photo Eye 2 motor 1	BOOL	
0	.2	Sensors	Photo Eye 3 motor 1	BOOL	
0	.3	Sensors	Photo Eye 1 motor 2	BOOL	
0	.4	Sensors	Photo Eye 2 motor 2	BOOL	
0	.5	Sensors	Photo Eye 3 motor 2	BOOL	
0	.6	Spare		BOOL	Spare

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0	.7	Spare		BOOL	
1	.0	Digital Input	Digital input 1 motor 1	BOOL	True = digital input active
1	.1	Digital Input	Digital input 2 motor 1	BOOL	
1	.2	Digital Input	Digital input 3 motor 1	BOOL	
1	.3	Digital Input	Digital input 1 motor 2	BOOL	
1	.4	Digital Input	Digital input 2 motor 2	BOOL	
1	.5	Digital Input	Digital input 3 motor 2	BOOL	
1	.6	Spare		BOOL	Spare
1	.7	Spare		BOOL	
2 – 3		Motor 1 error code	Fault Register	UINT16	Canopen drive error code as per CiA DS-402
4 - 5		Motor 2 error code	Fault Register	UINT16	Canopen drive error code as per CiA DS-402
6		Motor 1 feedback	Speed motor 1	INT8	Actual speed/position (-100..0..100 per cent of "Max Motor Velocity")
7		Motor 2 feedback	Speed motor 2	INT8	
8		Actual Torque motor 1	Actual current motor 1	INT8	Actual current in percentage of peak current(-100…100)
9		Actual Torque motor 2	Actual current motor 2	INT8	Actual current in percentage of peak current(-100…100)
10		Spare		BYTE	Spare
11		Spare		BYTE	Spare

Identity Object (0x01)

The following description of the Ethernet Link Object is taken from the CIP specification, Vol. 2, Rev. 2.1 by ODVA & ControlNet International Ltd.

Instance Attribute

Attr. no.	Attribute name	Get/set	Type	Value
1	Vendor	G	UINT	Contains the manufacturer ID. 0x11C
2	Product type	G	UINT	Shows the general product type. Communications Adapter 12dez = 0x0C
3	Product code	G	UINT	Identifies a special product in a device type. default: 771

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4	Revision n Major n Minor	G	STRUCT OF: n USINT n USINT	Revision of the device which is represented by the Indentity Object. n 0x01 n 0x01
5	Device status	G	WORD	WORD
6	Serial number	G	UDINT	Contains the last 3 bytes of the MAC ID
7	Product name	G	STRUCT OF: USINT STRING [13]	i.e.: MPC_PC_V1_EIP
8	State	G	UINT8	Present State of the Device

Device Status

Bit	Name	Definition
0…1	Reserved	default = 0
2	Configured	TRUE = 1: The application in the device has been configured (default setting).
3	Reserved	Default = 0
4…7	Extended Device Status	0011 = no I/O connection established 0110 = at least one I/O connection is in RUN mode 0111 = at least one I/O connection established, all in IDLE mode All other settings = reserved
8	Minor recoverable fault	Recoverable fault, e.g.: n Undervoltage n Force-Mode in DTM active n Diagnostic active at I/O channel
9…10	Reserved	
11	Diag	Common error bit
12…15	Reserved	Default = 0

Common services

Service Code	Class	Instance	Service Name

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1	Yes	Yes	Get_Attribute_All Returns a predefined list of object attributes
5	No	Yes	Reset Starts the reset service for the device
14	Yes	Yes	Get_Attribute_Single Returns the content of a specified attribute.
16	No	No	Set_Attribute_Single Modifies a single attribute

TCP/IP Interface Object (0xF5)

The following description of the Ethernet Link Object is taken from the CIP specification, Vol. 2, Rev. 1.1 by ODVA & ControlNet International Ltd.

Class attributes

Attr. no.	Designation	Get/set	Type	Value
1	Revision	G	UINT	1
2	Max. object instance	G	UINT	1
3	Number of instances	G	UINT	1
6	Max. class identifier	G	UINT	7
7	Max. instance attribute	G	UINT	6

Instance attributes

Attr. no.	Designation	Get/set	Type	Value
1	Status	G	DWORD	Interface status
2	Configuration capability	G	DWORD	Interface capability flag
3	Configuration control	G/S	DWORD	Interface control flag
4	Physical link object	G	STRUCT	
	Path size		UINT	Number of 16 bit words: 0x02
	Path		Padded EPATH	0x20, 0xF6, 0x24, 0x01
5	Interface configuration	G	Structure of:	TCP/IP network interface configuration
	IP address	G	UDINT	Actual IP address

	Network mask	G	UDINT	Actual network mask
	Gateway addr.	G	UDINT	Actual default gateway
	Name server	G	UDINT	0 = no server address configured
	Name server 2	G	UDINT	0 = no secondary server address configured
	Domain name	G	UDINT	0 = no Domain Name configured
6	Host name	G	STRING	0 = no host name configured
7	Safety Network	G	UDINT	
8	TTL Value	G/S		
9	Master Config	G	UDINT	
10	Select Acd	G		
11	Last Conflict Detected	G/S	UDINT	
12	QuickConnect	G/S	BOOL	= deactivate = activate
13	Encap. Inactivity Timeout	G/S	UDINT	

Common Services

Service code.	Class	Instance	Meaning
1	Yes	Yes	Get_Attribute_All
2	No	No	Set_Attribute_All
14	Yes	Yes	Get_Attribute_Single
16	No	Yes	Set_Attribute_Single

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Interface Status

The Status attribute indicates the status of the TCP/IP network interface.

Bit	Designation	Meaning
0…3	Interface configuration status	Indicates the status of the Interface Configuration attribute: • 0 = The Interface Configuration attribute has not beenconfigured • 1 = The Interface Configuration attribute contains validconfiguration. 2…15 = reserved
4…31	Reserved	

Configuration Capability

The Configuration Capability indicates the device's support for optional network configuration capability.

Bit	Designation	Meaning	Value
0	BOOTP client	The device is capable of obtaining its network configuration via BOOTP.	1
1	DNS client	The device is capable of resolving host names by querying a DNS server.	0
2	DHCP client	The device is capable of obtaining its network configuration via DHCP.	1

Configuration control

The Configuration Control attribute is used to control network configuration options.

Bit	Designation	Meaning
0…3	Startup configuration	Determines how the device shall obtain its initial configuration. 0 = The device shall use the interface configuration values previously stored (for example, in non-volatile memory or via hardware switches, etc). 1…3 = reserved
4	DNS Enable	Always 0
5…31	Reserved	Set to 0

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Interface Configuration

This attribute contains the configuration parameters required to operate a TCP/IP device.

To change this attribute, proceed as follows:

- Read out the attribute.
- Change the parameters.
- Set the attribute.

The TCP/IP Interface Object appese the new configuration upon completion of the Set service. If the value of the Startup Configuration bits (Configuration Control attribute) is 0, the new configuration is stored in non-volatile memory.

The device does not reply to the set service until the values are safely stored to non-volatile memory.

An attempt to set any of the components of the Interface Configuration attribute to invalid values results in an error (status code 0x09) returned from the Set service. If initial configuration is obtained via BOOTP or DHCP, the Interface Configuration attribute components are all 0 until the BOOTP or DHCP reply is received. Upon receipt of the BOOTP or DHCP reply, the Interface Configuration attribute shows the configuration obtained via BOOTP/DHCP.

Host name

This attribute contains the device's host name. The host name attribute is used when the device supports the DHCP-DNS Update capability and has been configured to use DHCP upon start up. The mechanism allows the DHCP client to transmit its host name to the DHCP server. The DHCP server then updates the DNS records on behalf of the client

VSC Vendor Specific Class

It is possible to write/read some specific parameters as user parameters to PC drive adapter.

Instance ID is always 0x01.

Init Parameters Class (101)

ATTR No.	Designation	Def value	ACCESS	type	Meaning
100	ACC_AX1	2000	G/S	UDINT	Profile acceleration of Ax1 in user units
101	ACC_AX2	2000	G/S	UDINT	Profile acceleration of Ax2 in user units
102	DEC_AX1	2000	G/S	UDINT	Profile deceleration of Ax1 in user units
103	DEC_AX2	2000	G/S	UDINT	Profile deceleration

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					of Ax2 in user units
104	MAX MOTOR VEL AX1	0x10	G/S	UDINT	Max motor velocity for profile in Ax1 (user units)
105	MAX MOTOR VEL AX2	0x100	G/S	UDINT	Max motor velocity for profile in Ax2 (user units)
106	DC BUS VOLTAGE IN USE	48	G/S	UINT	Speed following error exceeded
107	ACTUAL POS AX1		G	DINT	Actual position for Ax1 (High speed shaft) in user unit
108	ACTUAL POS AX2		G	DINT	Actual position for Ax2 (High speed shaft) in user unit
109	ACTUAL TORQUE AX1		G	INT	Actual torque in milliamps for Ax1
110	ACTUAL TORQUE AX2		G	INT	Actual torque in milliamps for Ax2

Common Services

Service code.	Class	Instance	Meaning
14	Yes	Yes	Get_Attribute_Single
16	No	Yes	Set_Attribute_Single

Parameter Gateway Class (100)

Expert users are allowed to read/write all the parameters of the device via Explicit messages.

Parameters are divided into 16bit parameters and 32 bits parameters.

An offset off 0x900 (2304) in the attribute ID is applied to reach the desired parameters index of the PC servo drive.

Instance ID is always 0x01.

For instance if it is needed to access parameter index 2 of the device, proper attribute ID has to be 0x902.

Here is a list of parameters that can be configured to the device:

Attribute No	Designation	Meaning	Get/ Set	TYPE	UNIT	Value

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693 + 2304	Actual position Axis 1	Actual incremental position	D	DINT	User Unit	-2147483648 … 2147483648
743 + 2304	Actual position Axis 2	Actual incremental position	G	DINT	User Unit	-2147483648 … 2147483648
666 + 2304	Bootloader version	Bootloader version	G	UINT		0 … 65536
648 + 2304	Serial number	Serial number del drive	G	UDINT		0 … 4294967296
640 + 2304	Firmware version	Firmware version del drive	G	UINT		0 … 65536
669 + 2304	Fault register Axis 1	Fault register See Table	G	UINT		0 … 65536
719 + 2304	Fault register Axis 2	Fault register See Table	G	UINT		0 … 65536
653 + 2304	Actual DC BUS voltage	Actual DC BUS voltage	G	UINT	Volts	0 … 65536
662 + 2304	Drive temperature	Actual drive temperature*100	G	UINT	°C*100	0 … 65536
256 + 2304	I2T Protection Type Axis1	I2T type potection active in the motor	G/S	UINT		0…1
448 + 2304	I2T Protection Type Axis2	I2T type potection active in the motor	G/S	UINT		0…1
155 + 2304	Acceleration Axis 1	Profile Velocity Acceleration Axis 1	G/S	UDINT	User Unit (rpm/s Default)	0 … 4294967296
347 + 2304	Acceleration Axis 2	Profile Velocity Acceleration Axis 2	G/S	UDINT	User Unit (rpm/s Default)	0 … 4294967296
157 + 2304	Deceleration Axis 1	Profile Velocity Deceleration Axis 1	G/S	UDINT	User Unit (rpm/s Default)	0 … 4294967296
349 + 2304	Deceleration Axis 2	Profile Velocity Deceleration Axis 2	G/S	UDINT	User Unit (rpm/s Default)	0 … 4294967296
151 + 2304	Max Motor Velocity Axis 1	Max Motor Velocity Axis 1	G/S	UDINT	User Unit (rpm Default)	0 … 4294967296

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343 + 2304	Max Motor Velocity Axis 2	Max Motor Velocity Axis 2	G/S	UDINT	User Unit (rpm Default)	0 … 4294967296
169 + 2304	Overvelocity Axis 1	Velocity Admissible Limit For Motor	G/S	UDINT	User Unit (rpm Default)	0 … 4294967296
361 + 2304	Overvelocity Axis 2	Velocity Admissible Limit For Motor	G/S	UDINT	User Unit (rpm Default)	0 … 4294967296
167 + 2304	Velocity Following Error Window Axis 1	Velocity Following Error Window in Velocity Mode	G/S	UDINT	User Unit (rpm Default)	0 … 4294967296
359 + 2304	Velocity Following Error Window Axis 2	Velocity Following Error Window in Velocity Mode	G/S	UDINT	User Unit (rpm Default)	0 … 4294967296
142 + 2304	Nominal current Axis 1	Motor nominal current Axis 1	G/S	UINT	Arms	0 … 65536
143 + 2304	Peak current Axis 1	Motor peak current Axis 1	G/S	UINT	Arms	0 … 65536
334 + 2304	Nominal current Axis 2	Motor nominal current Axis 2	G/S	UINT	Arms	0 … 65536
335 + 2304	Peak current Axis 2	Motor peak current Axis 2	G/S	UINT	Arms	0 … 65536
548 + 2304	Clear Fault Ax1	Clear Axis 1 Fault on 0->1 edge	G/S	UINT		0...1
598 + 2304	Clear Fault Ax2	Clear Axis 2 Fault on 0->1 edge	G/S	UINT		0...1
514 + 2304	Save to EEPROM	Store actual parameters in NVM	S	UINT		0...1
674 + 2304	Actual torque Ax1	Actual torque in Iq active on axis	Read G	INT	Milliamps peak	-32.768...32.7677
724 + 2304	Actual torque Ax2	Actual torque in Iq active on axis	G	INT	Milliamps peak	-32.768...32.7677
674 + 2304	Analog In Ax1	Analog input value for Axis1	G	INT	mV	-32.768...32.76

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							77
724 + 2304	Analog In Ax1	Analog input value for Axis1	G	INT	mV		

Common Services

Service code.	Class	Instance	Meaning
14	Yes	Yes	Get_Attribute_Single
16	No	Yes	Set_Attribute_Single

Connecting the devices to a Rockwell PLC with EtherNet/IP

Installing the EDS file

- Open the EDS Wizard via Tools → Hardware Installation Tool.
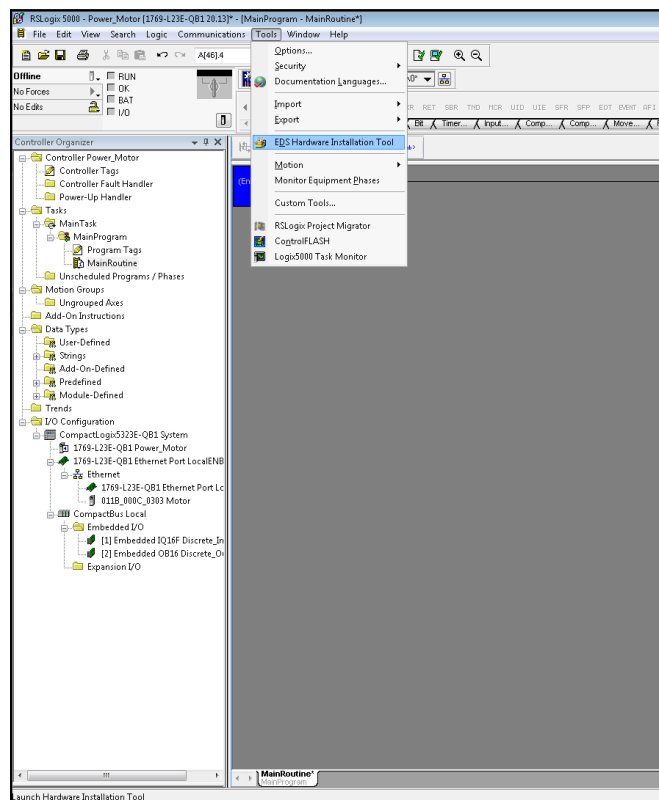
FIGURE 14 STUDIO 5000 – OPENING THE HARDWARE INSTALLATION TOOL

- Follow the instructions in the wizard to install the EDS file.
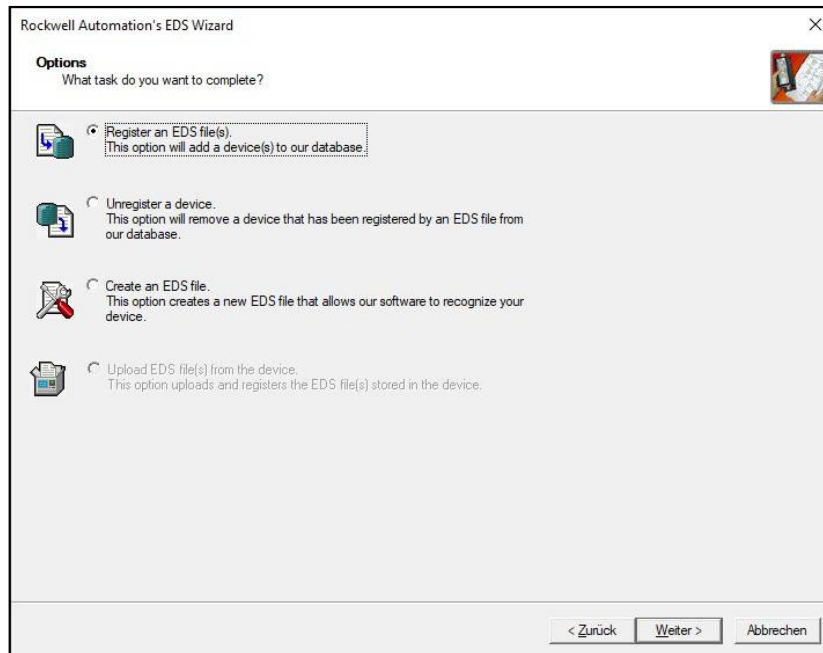
FIGURE 15 STUDIO 5000 – EDS WIZARD

- device is registered as a Communications Adapter and can be added to the project later as a slave.

Adding the device to the project

- In the project tree open the context menu by right-clicking on the entry of the scanner and click New Module.

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info@motorpowerco.it - motorpowerco.com
Cap. Soc. 250.000,00€ i.v. - R.E.A. di RE 175521
Iscr.Reg.Impr. di RE n.01308390358 - N. Mecc. RE 010210
C.F. e P.IVA IT 01308390358
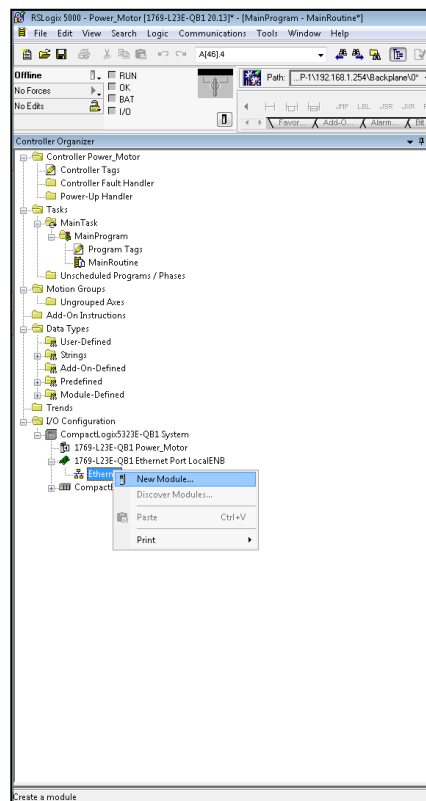
FIGURE 16- STUDIO 5000 – ADDING THE DEVICE TO THE PROJECT

- Select MPC PC EIP and add it to the project.
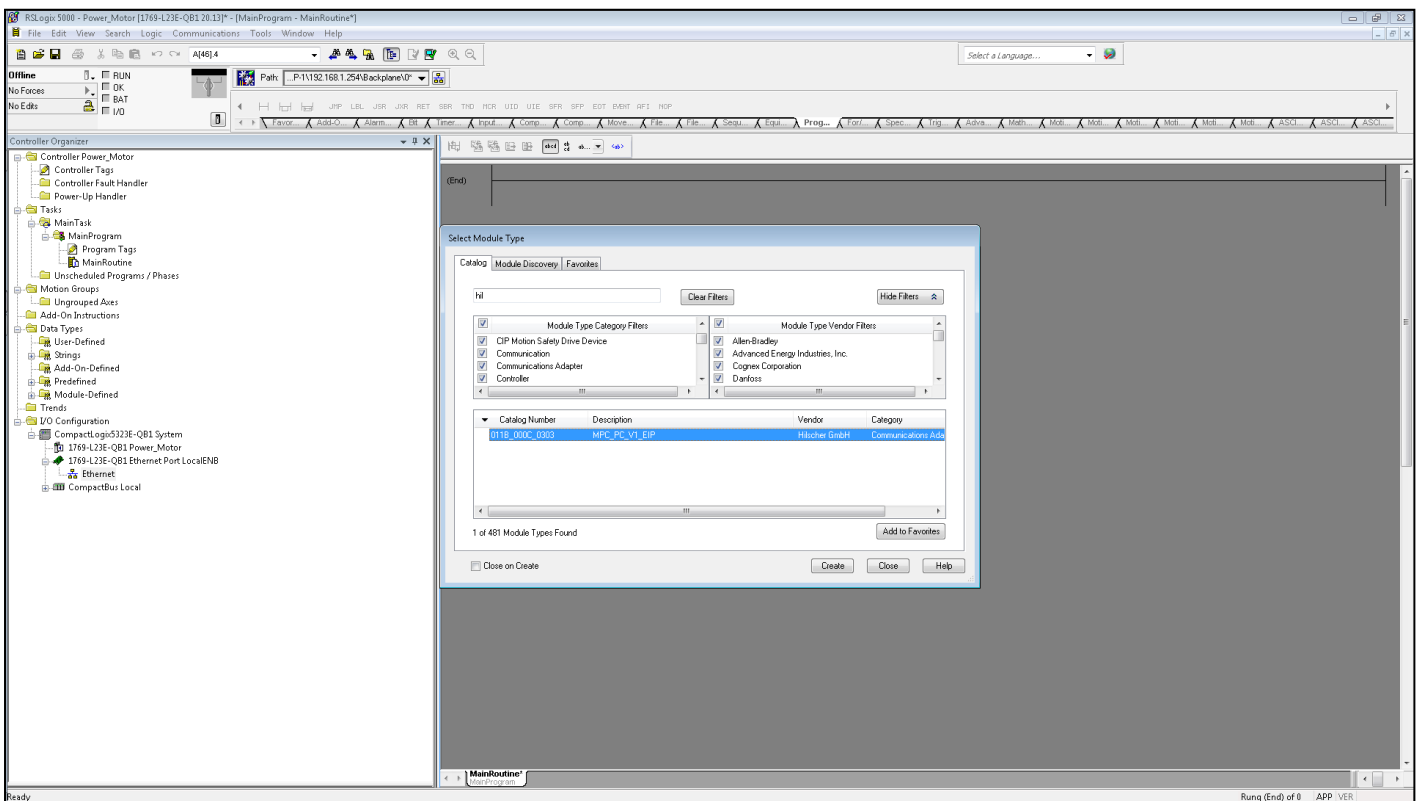
FIGURE 17-SELECTING THE DEVICE

- In the window **New Module** → **General** enter the device name and IP address of the device.
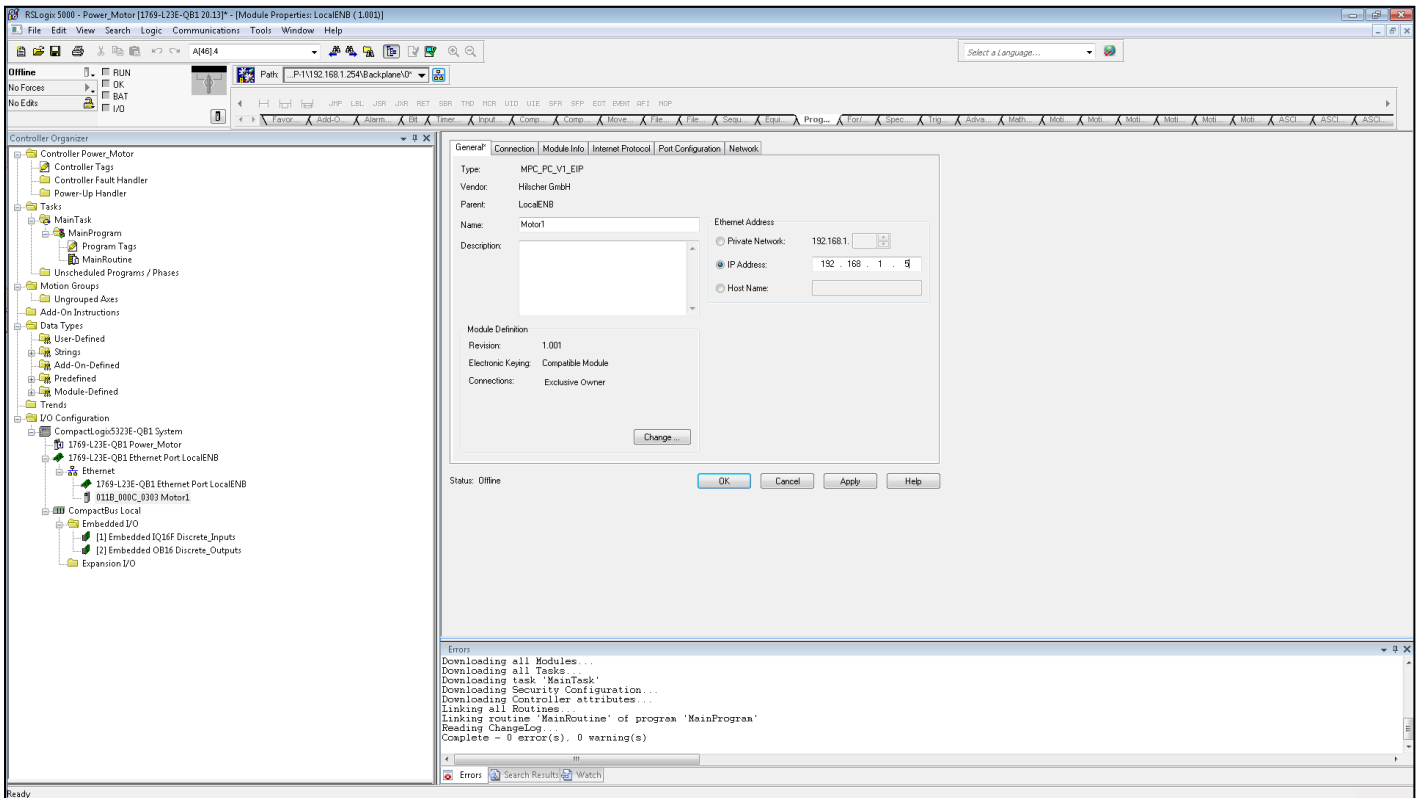
FIGURE 18 NEW MODULE, SETTING NAME AND IP ADDRESS
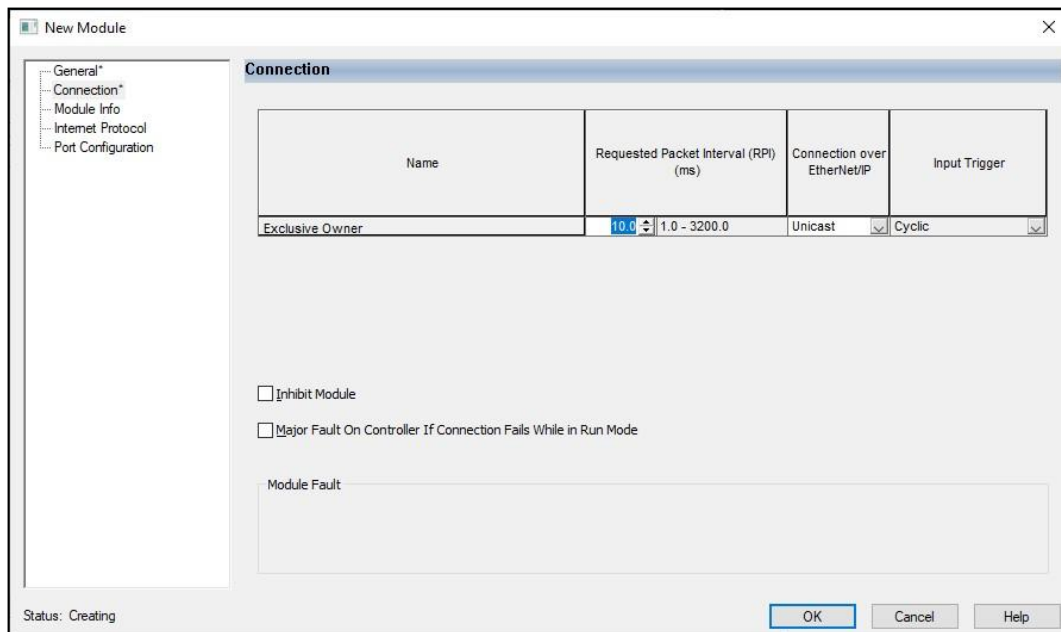
FIGURE 19-OPTIONAL-SET CONNECTION PARAMETERS

- The device appears as Ethernet slave in the project tree.
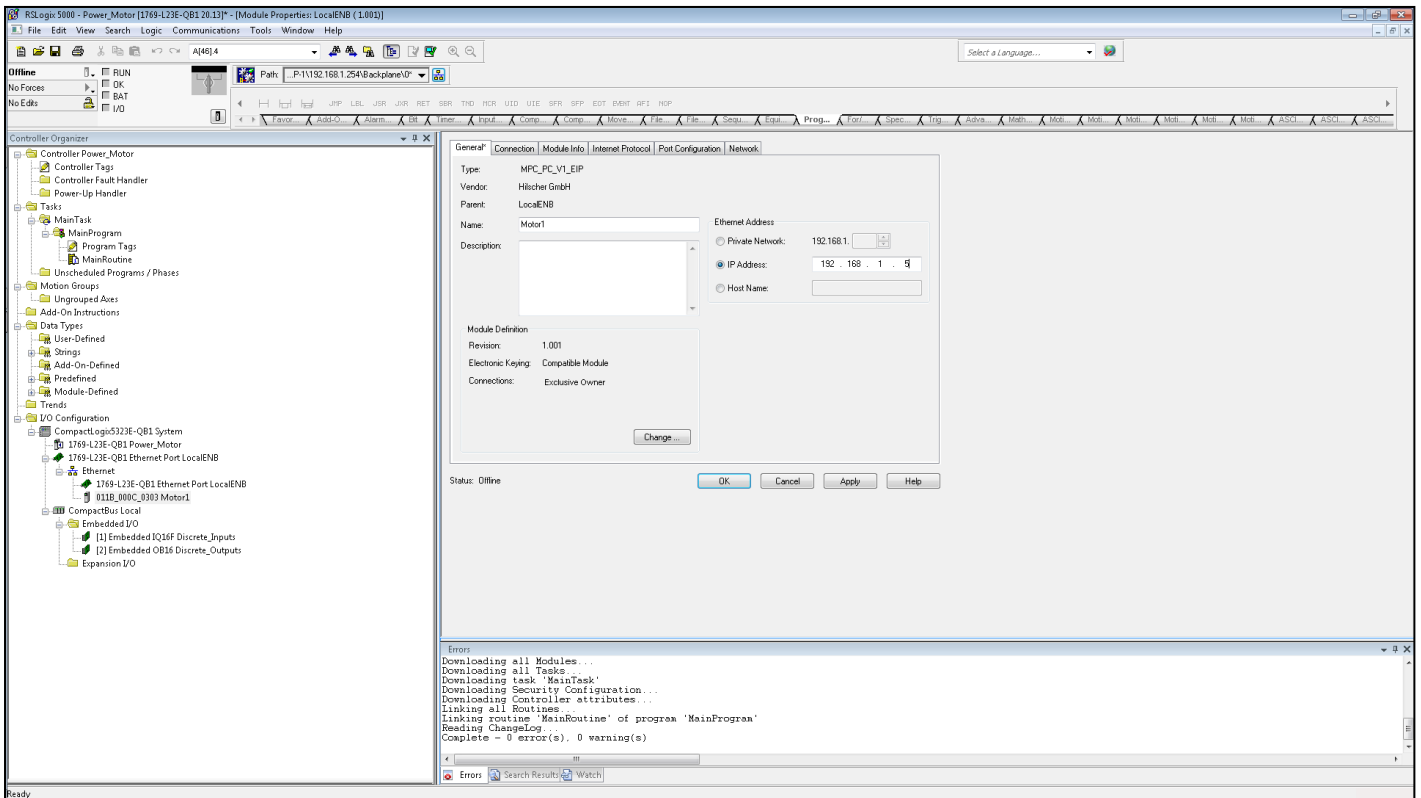
FIGURE 20 STUDIO 5000 – DEVICE IN THE PROJECT TREE

Setting initialization Parmeters

Going online with the PLC

- Search the network via the **Who Active** button.
- Select the PLC.
- Set the communication path via **Set Project Path**.
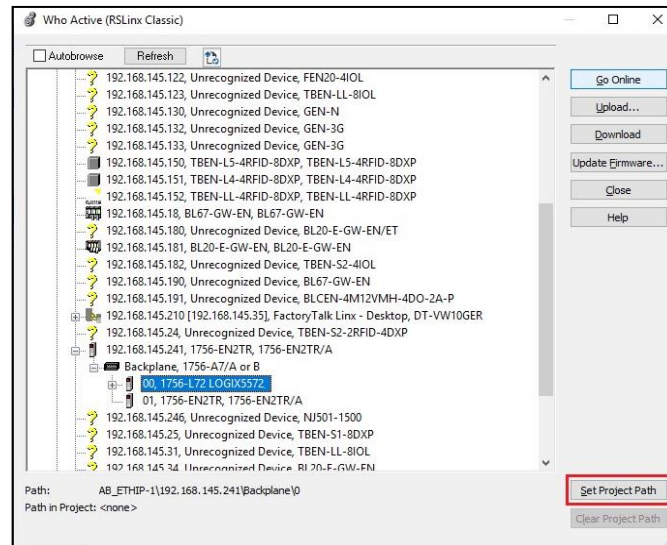
FIGURE 21 STUDIO 5000 – SETTING THE COMMUNICATION PATH

- Select the PLC.
- Click **Go online**.
- Click **Download** In the following dialog (Connect To Go Online)

5. Commissioning the device in EtherCAT

EtherCAT uses an implicit addressing of the network nodes. The EtherCAT master automatically addresses all connected slaves. A manual addressing or identification is only required for applications such as for toolchange applications (Hot Connect).

EtherCAT features

- CoE   (CAN over EtherCAT)
- FoE   (File over EtherCAT)
- SDO
- 1 TPDO/RPDO no mapping available.
- Free Run mode, maximum data update 2ms.

Process Data Objects

Inputs- Controller data Inputs

Inputs are organized as the list below. No mapping is available.

PDO in length is 28 bytes

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Byte	Bit	Category	Designation	Type	Comments
0	.0	Sensors	Photo sensor 1 motor 1	BOOL	
0	.1	Sensors	Photo sensor 2 motor 1	BOOL	
0	.2	Sensors	Photo sensor 3 motor 1	BOOL	True = sensor active
0	.3	Sensors	Photo sensor 1 motor 2	BOOL	
0	.4	Sensors	Photo sensor 2 motor 2	BOOL	
0	.5	Sensors	Photo sensor 3 motor 2	BOOL	
0	.6	Spare		BOOL	Spare
0	.7	Spare		BOOL	
1	.0	Digital Input	Digital input 1 motor 1	BOOL	
1	.1	Digital Input	Digital input 2 motor 1	BOOL	
1	.2	Digital Input	Digital input 3 motor 1	BOOL	
1	.3	Digital Input	Digital input 1 motor 2	BOOL	True = digital input active
1	.4	Digital Input	Digital input 2 motor 2	BOOL	
1	.5	Digital Input	Digital input 3 motor 2	BOOL	
1	.6	Spare		BOOL	Spare
1	.7	Spare		BOOL	
2		CanOpen	Mode of operation display motor 1	INT8	Canopen mode of operation code as per CiA DS-402
3		CanOpen	Mode of operation display motor 2	INT8	Canopen mode of operation code as per CiA DS-402
4-5		CanOpen	Status Word motor 1	UINT16	Canopen Status Word as per CiA DS-402
6-7		CanOpen	Status Word motor 2	UINT16	Canopen Status Word as per CiA DS-402
8-11		CanOpen	Actual Velocity motor 1	INT32	Canopen Actual Velocity as per CiA DS-402
12-15		CanOpen	Actual Velocity motor 2	INT32	Canopen Actual Velocity as per CiA DS-402
16-19		CanOpen	Actual Position motor 1	INT32	Canopen Actual Position as per CiA DS-402
20-23		CanOpen	Actual Position motor 2	INT32	Canopen Actual Position as per CiA DS-402
24-25		CanOpen	Actual Torque motor 1	INT16	Canopen Actual Torque as per CiA DS-402
26-27		CanOpen	Actual Torque motor 2	INT16	Canopen Actual Torque as per CiA DS-402

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FIGURE 22-TwinCAT RPDO

Outputs- Controller data ouputs

Outputs are organized as the list below. No mapping is available.

PDO in length is 28 bytes

Byte	Bit	Category	Designation	Type	Comments
0	.0	Digital Output	Digital output 1 motor 1	BOOL	True = digital output active Available when digital outputs are set as "Generic output" on SW interface
0	.1	Digital Output	Digital output 2 motor 1	BOOL	
0	.2	Digital Output	Digital output 1 motor 2	BOOL	
0	.3	Digital Output	Digital output 2 motor 2	BOOL	
0	.4	Spare		BOOL	Spare
0	.5	Spare		BOOL	
0	.6	Spare		BOOL	
0	.7	Spare		BOOL	
1		CanOpen	Mode of Operation motor 1	INT8	Canopen mode of operation as per CiA DS-402

2		CanOpen	Mode of Operation motor 2	INT8	Canopen mode of operation as per CiA DS-402
3-4		CanOpen	Control Word motor 1	UINT16	Canopen Control Word as per CiA DS-402
5-6		CanOpen	Control Word motor 2	UINT16	Canopen Control Word as per CiA DS-402
7-10		CanOpen	Target Velocity motor 1	INT32	Canopen Target Velocity as per CiA DS-402
11-14		CanOpen	Target Velocity motor 2	INT32	Canopen Target Velocity as per CiA DS-402
15-18		CanOpen	Target Position motor 1	INT32	Canopen Target Position as per CiA DS-402
19-22		CanOpen	Target Position motor 2	INT32	Canopen Target Position as per CiA DS-402
23-24			Max Current motor 1	UINT16	Current torque limits in In/1000. If 0 the limit is not active.
25-26			Max Current motor 2	UINT16	Current torque limits in In/1000. If 0 the limit is not active.
27			Spare	BYTE	Spare

Name	[X]	Online	Type	Size	>Addr...	In/Out	Linked to
Digital IO Out		0x00	BYTE	1.0	39.0	Output	
Spare		0x00	BYTE	1.0	40.0	Output	
Mode of Operati...		0	SINT	1.0	41.0	Output	
Mode of Operati...		0	SINT	1.0	42.0	Output	
Control Word 1		0	UINT	2.0	43.0	Output	
Control Word 2		0	UINT	2.0	45.0	Output	
Target Velocity 1		0	DINT	4.0	47.0	Output	
Target Velocity 2		0	DINT	4.0	51.0	Output	
Target Position 1		0	DINT	4.0	55.0	Output	
Target Position 2		0	DINT	4.0	59.0	Output	
Max Current 1		0	UINT	2.0	63.0	Output	
Max Current 2		0	UINT	2.0	65.0	Output	

FIGURE 23-TWINCAT TPDO

Service Data Object

Only the manufacturer specific index range of the object dictionary is listed

FIGURE 24-SDO LIST

Object Dictionary

0x2001: EtherCat FW Application Version

Object description:	
Index	0x2001
Description	EtherCat FW Application Version
Object Code	Variable
Data Type	UINT32
Category	Optional

Entry description:	
Access	R
PDO mapping	No
Default Value	0
Range	0… 4294967295
Units	

0x2020: Diagnosis Information

Object description:	
Index	0x2020
Description	*Diagnostic elements*
Object Code	Array
Data Type	UINT32
Category	Optional

Entry description:	
Sub-Index	00
Description	Number of entries
Object Code	Variable
Data Type	Uint8
Category	Optional
Access	R
PDO mapping	NO
Default Value	2
Range	2
Units	

Sub-Index	01
Description	Actual DC bus Voltage
Object Code	Variable
Data Type	Uint16
Category	Optional
Access	R
PDO mapping	NO
Default Value	0
Range	0…100
Units	Volts

Sub-Index	02
Description	Actual Drive temperature

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Object Code	Variable
Data Type	INT16
Category	Optional
Access	R
PDO mapping	NO
Default Value	0
Range	-4000..+12500
Units	°C*100

Sub-Index	**03**
Description	Motor 1 temperature
Object Code	Variable
Data Type	INT16
Category	Optional
Access	R
PDO mapping	NO
Default Value	0
Range	-4000..+12500
Units	°C*100

Sub-Index	**04**
Description	Motor 2 temperature
Object Code	Variable
Data Type	INT16
Category	Optional
Access	R
PDO mapping	NO
Default Value	0
Range	-4000..+12500
Units	°C*100

0x2100: Profile Acceleration Axis1

Object description:	
Index	0x2100
Description	*Profile Acceleration for Axis1*
Object Code	Variable
Data Type	UINT32
Category	Optional

Entry description:	
Access	R/W

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PDO mapping	*No*
Default Value	1000
Range	0… 4294967295
Units	User unit based on conversion factor

0x2101: Profile Acceleration Axis2

Object description:	
Index	0x2101
Description	*Profile Acceleration for Axis2*
Object Code	Variable
Data Type	UINT32
Category	Optional

Entry description:	
Access	R/W
PDO mapping	*No*
Default Value	1000
Range	0… 4294967295
Units	User unit based on conversion factor

0x2102: Profile Deceleration Axis1

Object description:	
Index	0x2102
Description	*Profile Deceleration for Axis1*
Object Code	Variable
Data Type	UINT32
Category	Optional

Entry description:	
Access	R/W
PDO mapping	*No*
Default Value	1000
Range	0… 4294967295
Units	User unit based on conversion factor

0x2103: Profile Deceleration Axis2

Object description:	
Index	0x2103
Description	*Profile Decleration for Axis2*

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Object Code	Variable
Data Type	UINT32
Category	Optional

Entry description:	
Access	R/W
PDO mapping	*No*
Default Value	1000
Range	0… 4294967295
Units	User unit based on conversion factor

0x2104: Max Motor Velocity Axis1

Object description:	
Index	0x2104
Description	*Max motor velocity Axis1*
Object Code	Variable
Data Type	UINT32
Category	Optional

Entry description:	
Access	R/W
PDO mapping	*No*
Default Value	3000
Range	0… 4294967295
Units	User unit based on conversion factor

0x2105: Max Motor Velocity Axis2

Object description:	
Index	0x2105
Description	*Max motor velocity Axis2*
Object Code	Variable
Data Type	UINT32
Category	Optional

Entry description:	
Access	R/W
PDO mapping	*No*
Default Value	3000
Range	0… 4294967295

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Units	User unit based on conversion factor

0x2106: Quick Stop Deceleration Axis1

Object description:	
Index	0x2106
Description	*Stop Deceleration Axis1 for emergency stop*
Object Code	Variable
Data Type	UINT32
Category	Optional

Entry description:	
Access	R/W
PDO mapping	*No*
Default Value	1000
Range	0… 4294967295
Units	User unit based on conversion factor

0x2107: Quick Stop Deceleration Axis2

Object description:	
Index	0x2107
Description	*Stop Deceleration Axis2 for emergency stop*
Object Code	Variable
Data Type	UINT32
Category	Optional

Entry description:	
Access	R/W
PDO mapping	*No*
Default Value	1000
Range	0… 4294967295
Units	User unit based on conversion factor

0x2108: Fault Register Axis1

Object description:	
Index	0x2108
Description	*Fault register Axis1 DS401*
Object Code	Variable
Data Type	UINT16
Category	Optional

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Entry description:	
Access	R
PDO mapping	*No*
Default Value	1000
Range	0… 65535
Units	

Fault register description

Bit number	Fault type	Description	Value (hex)
0	OVER_VOLTAGE	Power supply voltage goes above to the maximum admitted value	0x01
1	UNDER_VOLTAGE	Power supply voltage goes below to the maximum admitted value	0x02
2	PEAK_MOTOR_CURRENT	Motor peak current exceeded	0x04
3	RATED_MOTOR_CURRENT	Motor rated current exceeded	0x08
4	SHORT_CIRCUIT		0x10
8	POSITION_TRACKING_ERROR	Position following error exceeded	0x100
9	VELOCITY_TRACKING_ERROR	Speed following error exceeded	0x200
10	OVERVELOCITY	Maximum motor velocity exceeded	0x400
11	DRIVE_OVERTEMPERATURE	Maximum motor velocity reached	0x800
13	FIELDBUS_CYCLE_TIME	Profinet cyclic messages timeout	0x2000

0x2109: Fault Register Axis2

Object description:	
Index	0x2109
Description	*Fault register Axis2 DS401*
Object Code	Variable
Data Type	UINT16
Category	Optional

Entry description:	
Access	R
PDO mapping	No
Default Value	0

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Range	0… 65535
Units	

0x210A: Profile Velocity Axis1

Object description:	
Index	0x210A
Description	*Profile Velocity in Profile Position Mode Axis1*
Object Code	Variable
Data Type	UINT32
Category	Optional

Entry description:	
Access	R/W
PDO mapping	No
Default Value	0
Range	0… 4294967295
Units	

0x210B: Profile Velocity Axis2

Object description:	
Index	0x210B
Description	*Profile Velocity in Profile Position Mode Axis2*
Object Code	Variable
Data Type	UINT32
Category	Optional

Entry description:	
Access	R/W
PDO mapping	No
Default Value	0
Range	0… 4294967295
Units	

0x210C: Load Inertia Axis1

Object description:	
Index	0x210C
Description	*Load Inertia Axis1*
Object Code	Variable
Data Type	UINT16
Category	Optional

Entry description:	
Access	R/W
PDO mapping	No
Default Value	0
Range	0… 65535
Units	Kg/cm^2

0x210D: Load Inertia Axis2

Object description:	
Index	0x210D
Description	*Load Inertia Axis2*
Object Code	Variable
Data Type	UINT16
Category	Optional

Entry description:	
Access	R/W
PDO mapping	No
Default Value	0
Range	0… 65535

Installing ESI files

The device is connected to the Beckhoff controller with an xml file, the EtherCAT Slave Information (ESI). The device description file must be saved in TwinCAT Studio V3 for the connection. The ESI file for the device is available free of charge for download from www.motorpowerco.it

Storing an xml file in the installation directory: **TwinCAT → 3.1 →Config → Io → EtherCAT**.

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Updating the device catalog: **TwinCAT** → **EtherCAT Devices** → **Reload Device Descriptions**.
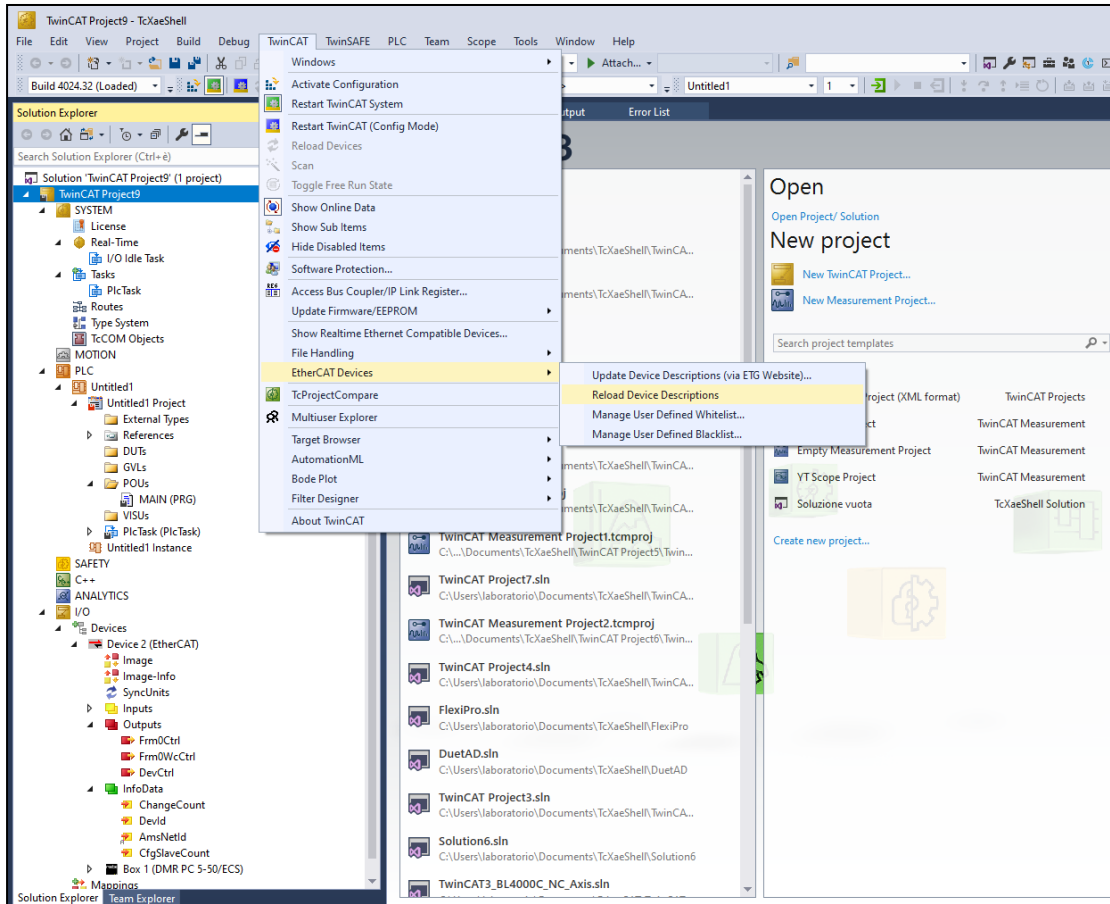
FIGURE 25 TWINCAT-UPDATING THE DEVICE CATALOG

The device description is loaded.

Connecting the device with the controller

Select used EtherCAT master as target system.

Scan the network for EtherCAT stations: Right-click **I/O → Devices. ▶ Click Scan**.
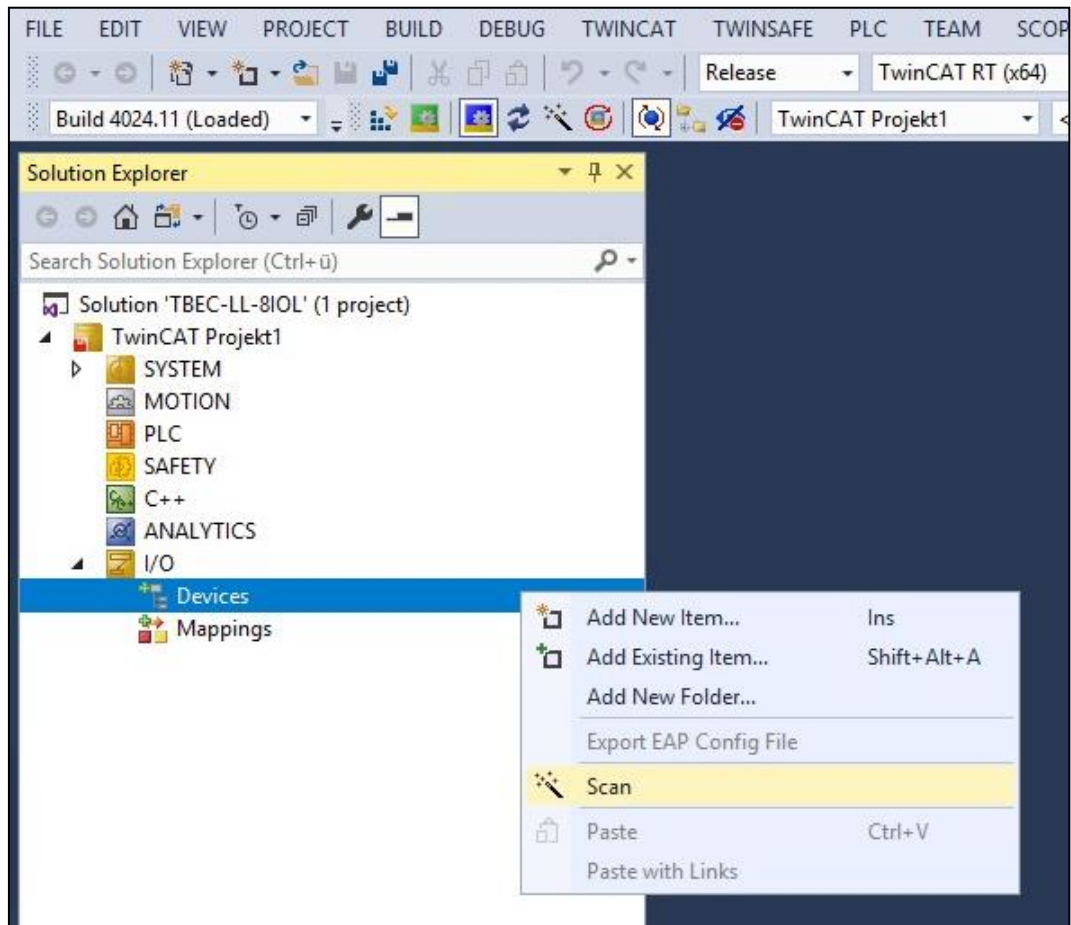
FIGURE 26-SCAN FOR NEW DEVICES

The EtherCAT stations are read in and automatically added to the I/O configuration. The module appears in the Solution Explorer as **Box n.**
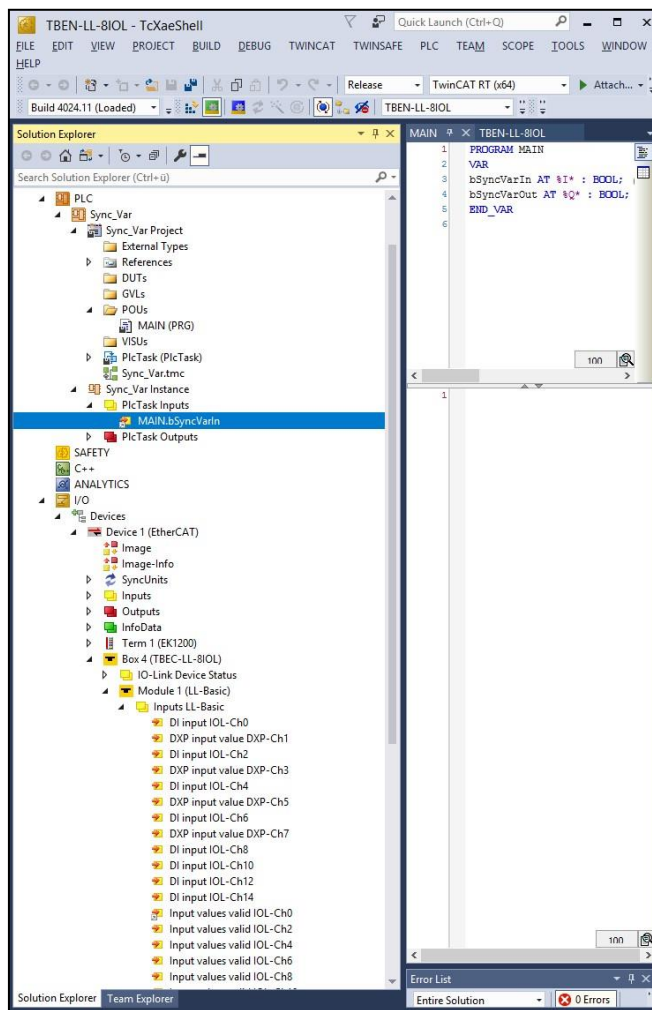
FIGURE 27-DEVICE AS BOX 2 IN THE SOLUTION EXPLORER

NOTE: it is needed to link a variable to the device before activate the configuration.
Click the **Activate configuration** button.

FIGURE 28 ACTIVATING THE CONFIGURATION

The device configuration is activated.

Click the **Run mode** button.

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C.F. e P.IVA IT 01308390358
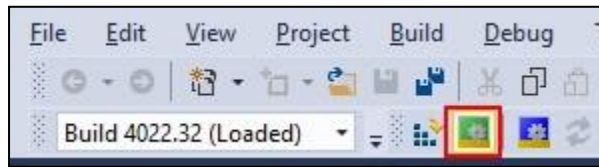
FIGURE 29 RUN MODE

The device is connected online with the EtherCAT master.

Double-click **Box 2** (DMR PC 6/50).

The current status (here: **OP**) as well as the data points and the link are shown on the **Online** tab.

FIGURE 30 DEVICE – ONLINE TAB: STATUS DISPLAY (HERE: OPERATIONAL), DATA POINTS, LINK

Setting startup parameters

Device parameters which should be permanently written at startup are set in the **Startup** tab.
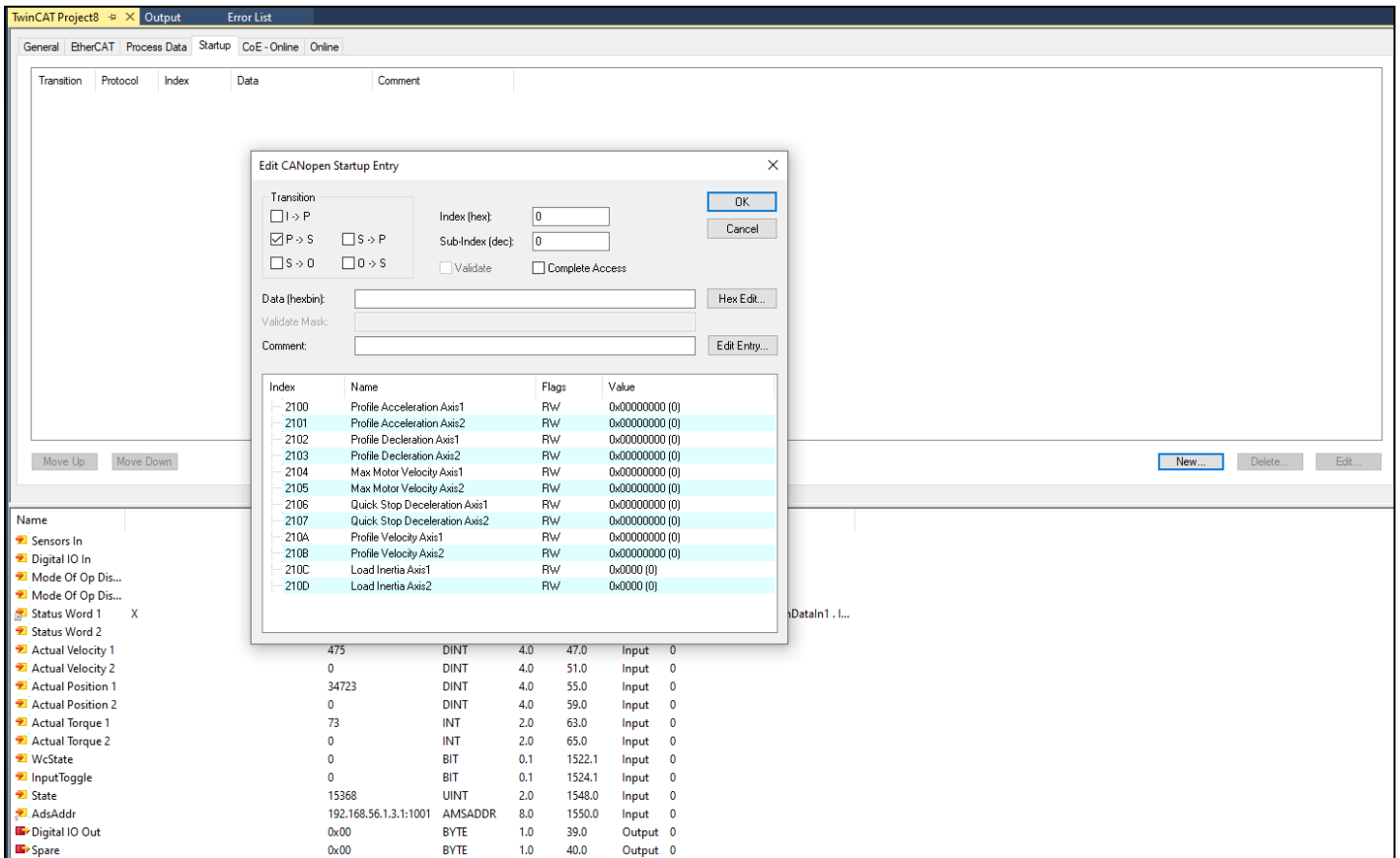
FIGURE 31 PARAMETERS TO BE SET AT STARTUP TABLE

Firmware upgrade over FoE with EtherCAT

FoE (File Access Over EtherCAT) is a simple protocol similar to TFTP (Trivial File Transfer Protocol) enables file access in a device and a uniform firmware upload to devices across a network. The protocol has been deliberately specified in a lean manner, so that it can be supported by boot loader programs – a TCP/IP stack isn't required.

DMR supports FoE for upload firmwares in an easy and fast way. Two types of files are supported:

- *FWUPDATE.ZIP* is a specific compressed set of files given by Motor Power Company for update the EtherCAT stack firmware
- *FW_DuetDownload.bin* is a binary file that contains the drive section of the DMR

EtherCAT Stack FW Update

1. Start TwinCat. Change the device state to PREOP and select "Download...":
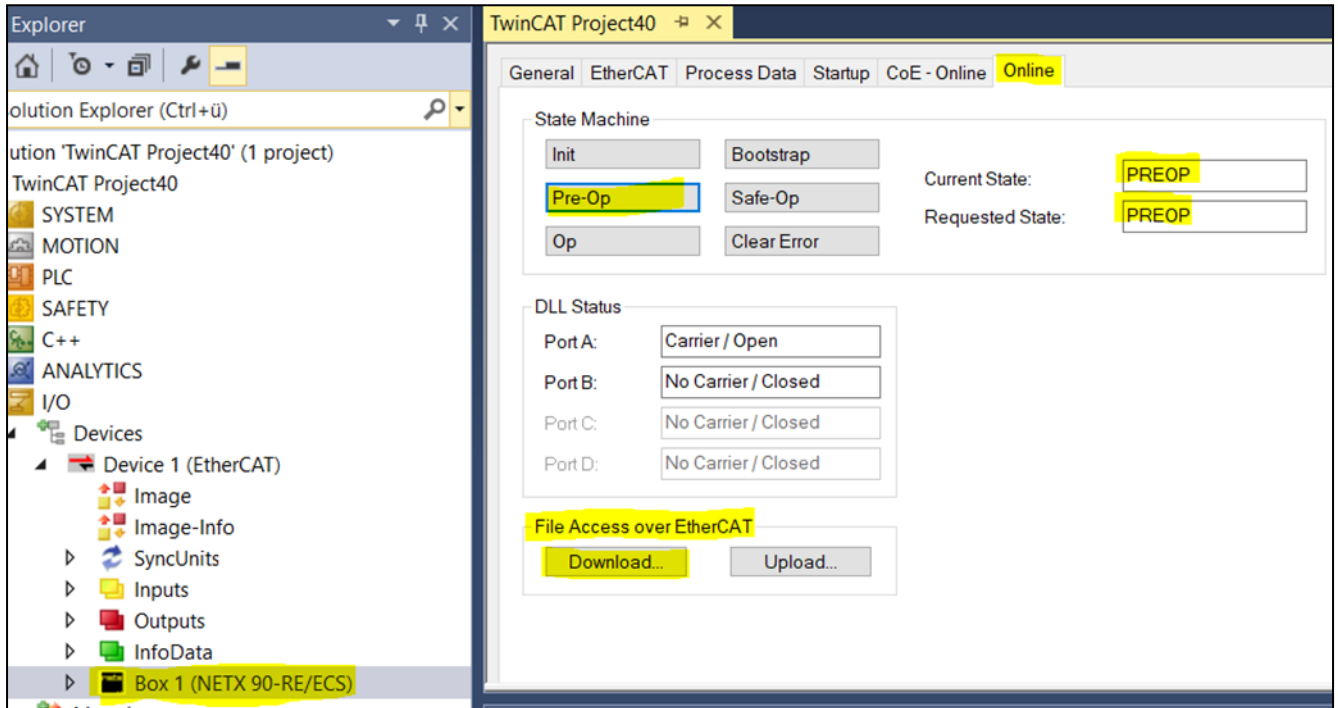
FIGURA 1

2. Select the zip folder given by Motor Power Company. The name must be FWUPDATE.ZIP. Do not forget to add .ZIP:
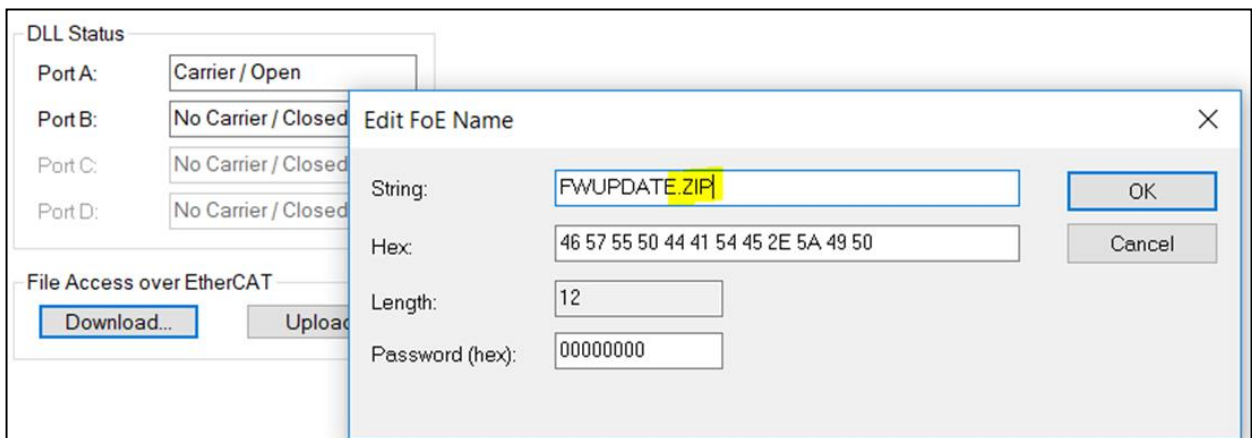
FIGURA 2

3. Click OK and wait for download process to be finished. You can see the progress status at the right bottom of Twincat. It can takes several seconds to finish.

FIGURE 3

4 After the download finished successfully, go to CoE-Online. Try to write TRUE to object 2FF0, the update reset command will be trigged.

FIGURA 4

5   Wait untill the procedure will end. If procedure was successful the node will restart automatically.

Drive FW Update via FoE

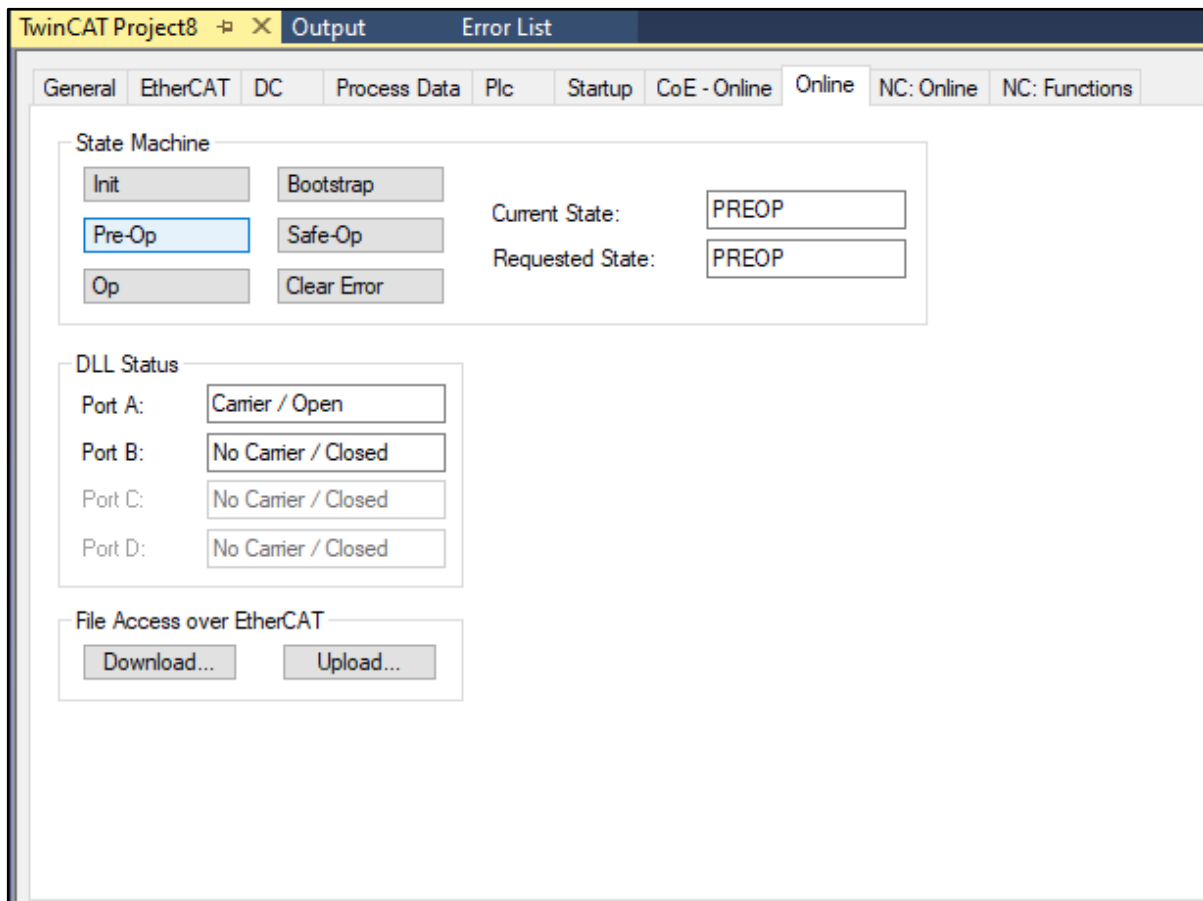1   Start TwinCat. Change the device state to PREOP:

FIGURA 5

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2   Now the Drive FW part has to be put in set in Bootloader Mode. This will be done by putting TRUE to object 0x2FF1. Wait at least 3 seconds for the following steps. Ignore node errors if they occurs in this part.
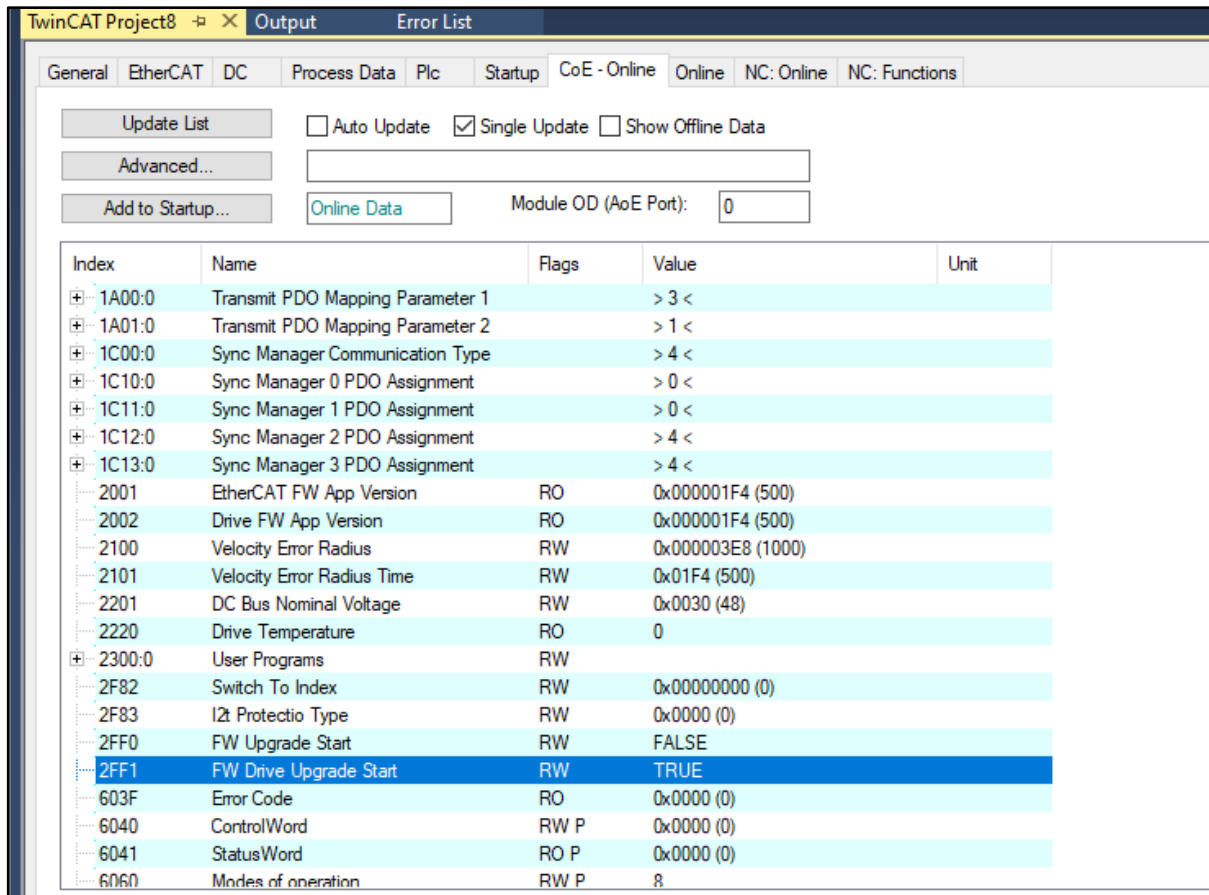

FIGURA 6

3   Now select the bin file given by Motor Power Company. The name must be FW_DuetDownload.bin. Then download it. Do not forget to add .bin
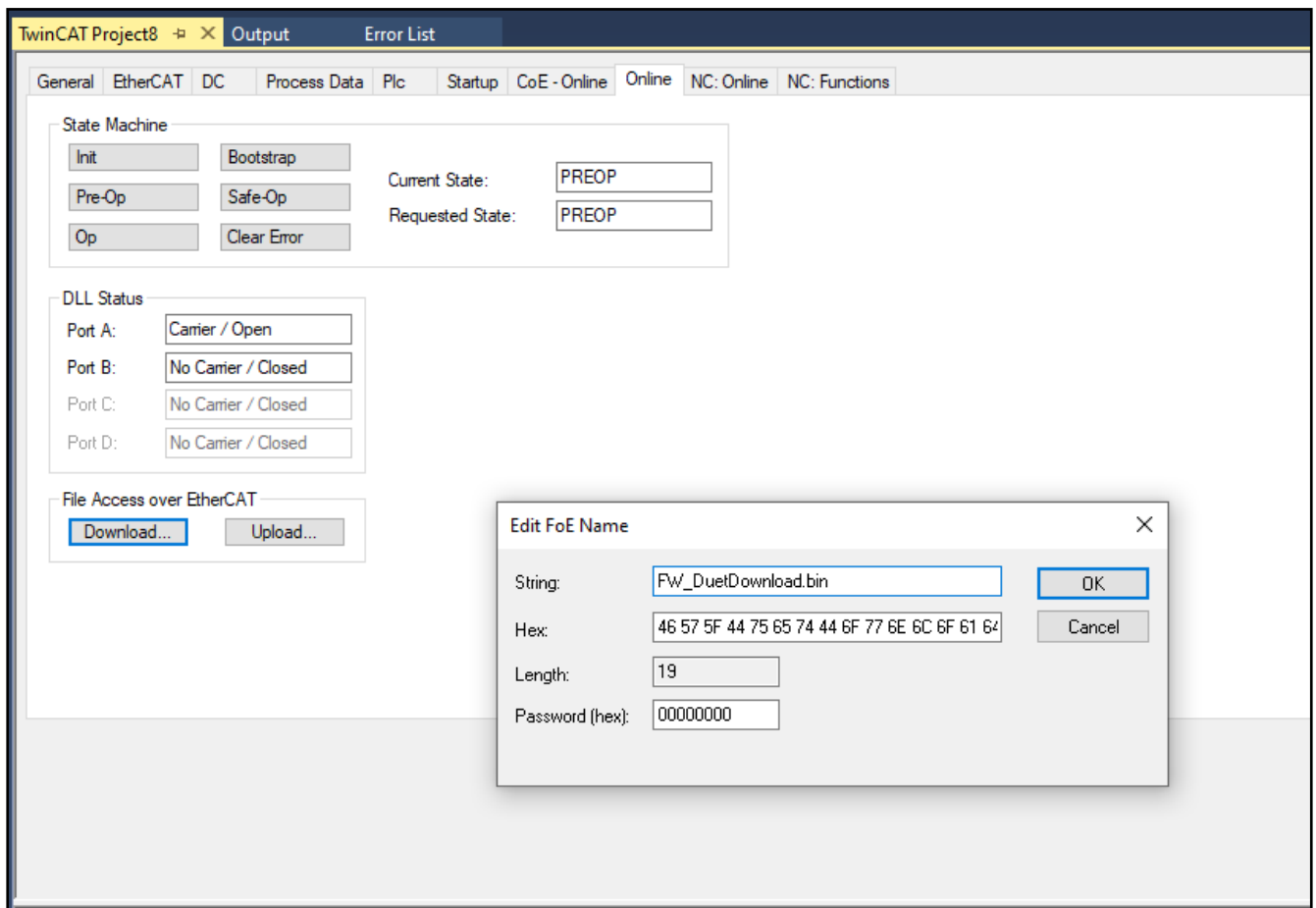
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FIGURA 7

4   Click OK and wait for download process to be finished. You can see the progress status at the right bottom of Twincat. It can takes several seconds to finish.

FIGURA 8

5   Wait untill the procedure will end. If procedure was successful the node will restart automatically.