Application Note

FESTO

Commissioning CANopen device CMMP-AS with Schneider Electric PLC M340

This document describes exemplarily how to set the parameters in the Schneider Electric PLC M340 with CANopen-Master to establish the CANopen-communication with a servo motor controller of type CMMP-AS-M3, without much details.

CMMP-AS-...-M3
CMMP-AS-...-M0

100020

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Table of contents

1   Components/Software used

| Type/Name	Version Software/Firmware	Date of manufacture
CMMP-AS-C2-3A-M3	4.0.1501.2.1	HW 4.7
FCT …Festo Configuration Tool	PlugIn CMMP-AS V2.4.1.4	---
Schneider PLC Modicon M340 CPU 340-20 Ethernet CANopen2	2.50	---
Unity Pro XL V7.0	V7.0 120823C	---

Table 1.1: 1   Components/Software used

1.1   Introduction

This document describes exemplarily how to set the parameters in the Schneider Electric PLC M340 with CANopen-Master to establish the CANopen-communication with a servo motor controller of type CMMP-AS-M3. It is a step-by-step instruction without much detail. It is as well possible, that not every step is mentioned and described. Just to have a quick information source to get run the fieldbus communication. For more information you can consult the online help of the programming software Unity Pro XL from Schneider Electric.

PLC with CANopen-Master from Schneider Electric of type Medicon M340

(CPU 340-20, Ethernet TCPIP, CANopen master)
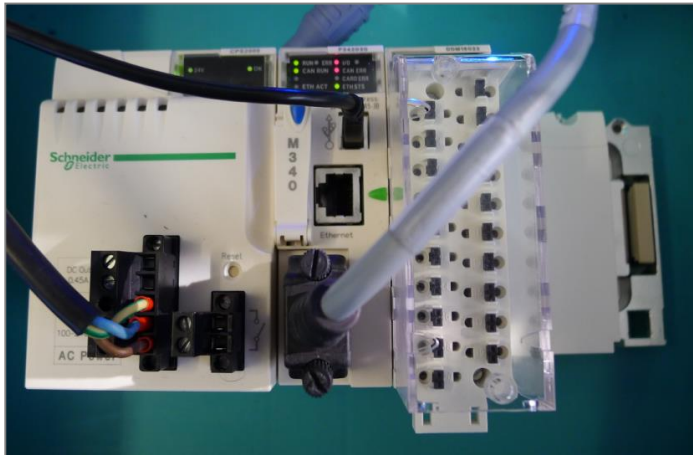
The programming software is Unity Pro XL V7.0 from Schneider Electric:
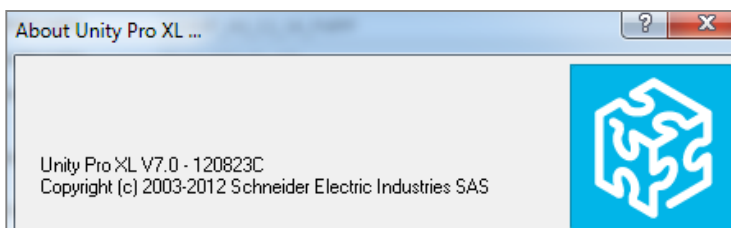
2 Instruction

2.1 Download CANopen EDS

Download the relevant CANopen EDS-files (Device Description files) for the CANopen device 'motor controller' from the Support Portal on the Festo internet homepage. Please select the belonging file to your motor controller (type) and the used communication protocol FHPP or CiA402.

2.2 Install the EDS-File in the programming software Unity Pro XL V7.0

1. Start the Hardware Catalog Manager
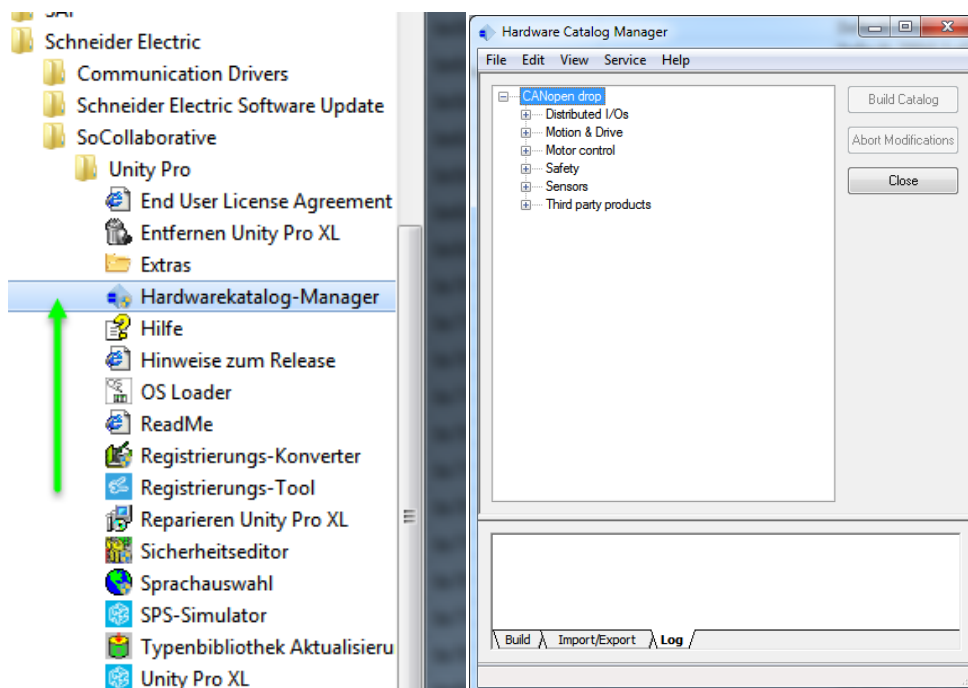
2. Add an new device by clicking right mouse button into the chapter 'Third party products'.

   Select your relevant EDS-File from the previous downloaded and stored place on your computer drive.

   Click 'Build Catalog' and then the process is starting to import the EDS-file. The imported EDS-file (e.g. CMMP_AS_C2_3A_M3_FHPP) is now available in the programming software Unity Pro XL V7.0
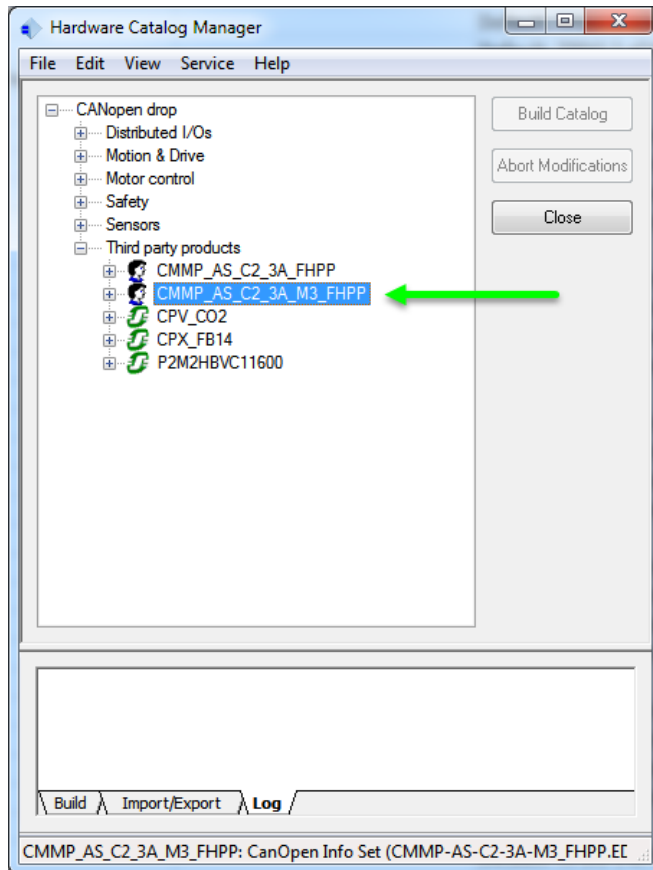
3. Close the Hardware Catalog Manager.

2.3 Implementing of the CANopen-Device "motor controller" CMMP-AS

1. Click double onto the CANopen-Master in the project tree:
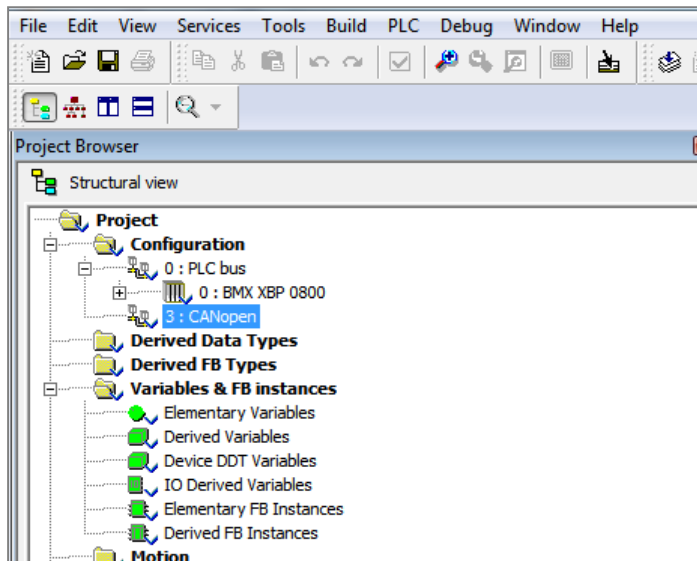
2. Click double into the empty rectangle:
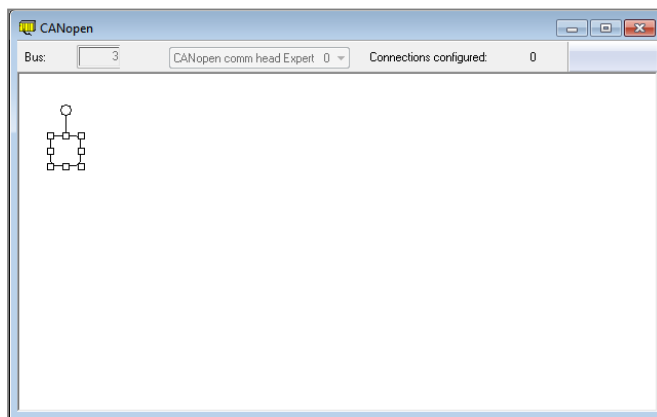
3. Select your CANopen-device in the chapter 'Third party products' and set the needed node ID in the field 'Topological Address [1..62]':
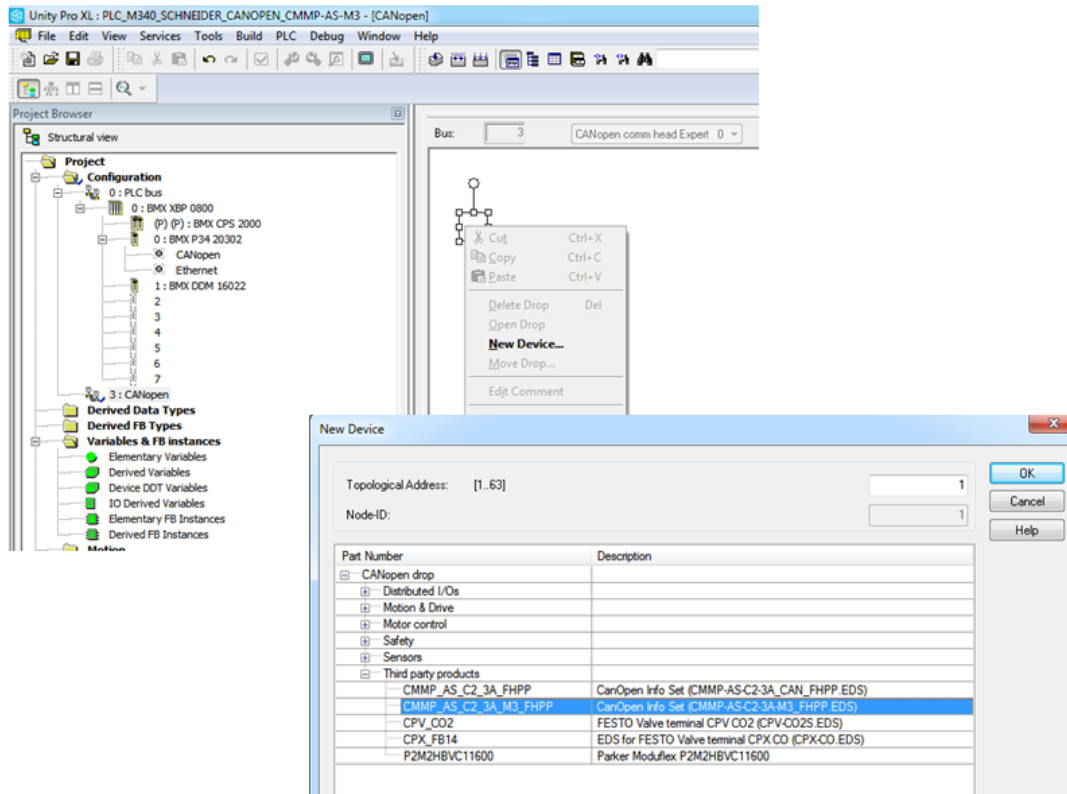
4. Finally the CANopen-Device is implemented:
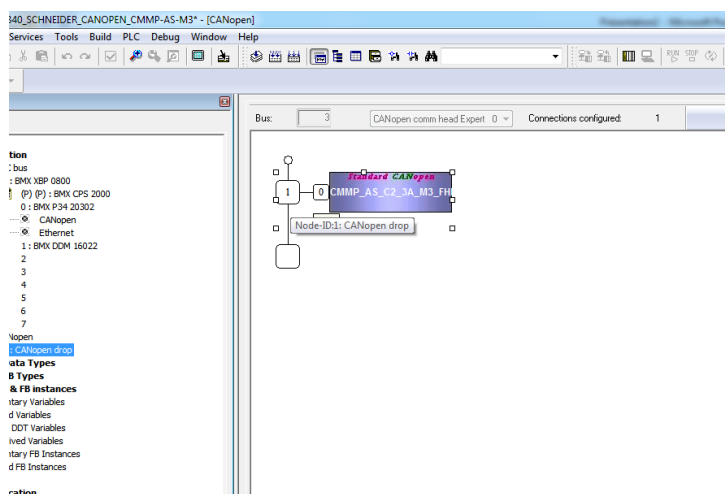
2.4   Setting CAN-parameters for the CANopen device CMMP-AS

1. Click double into the CANopen device in the project tree (1: CANopen drop) or in the graphical symbol. Then you open the needed place for parameterizing the CAN-settings for the CANopen device (CANopen node):
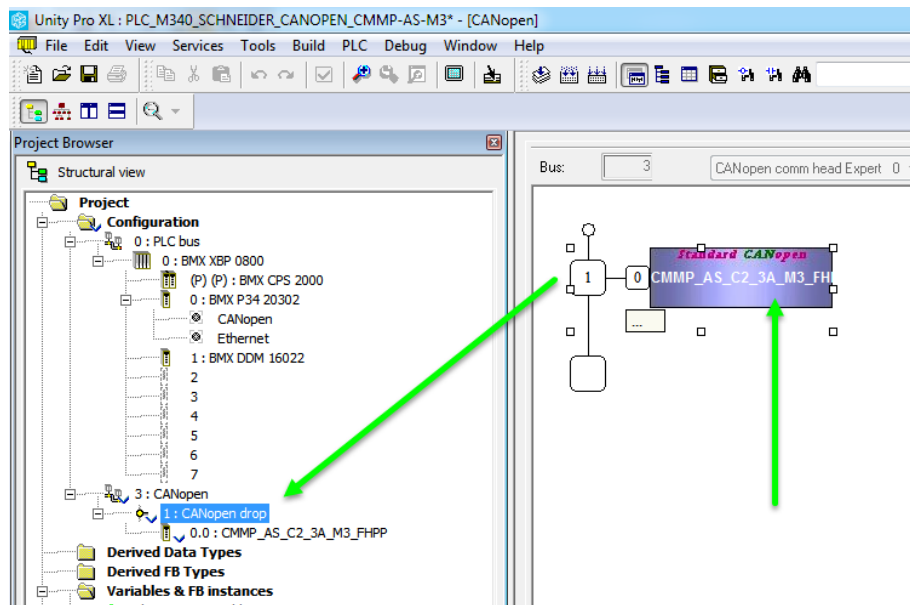
- Please set the number of PDO's for 'receive' and 'transmit'. Depending on your settings in FCT (FCT…Festo Configuration Tool) you need different numbers of PDO's (FHPP, FHPP and FPC, FHPP and FPC and FHPP+). In the following example we are using FHPP and FPC, which means 16 Byte IO resulting into two TxPDO and two RxPDO.

Please untick in the tab 'PDO' the PDO's 3 and 4 for Transmit and Receive:

2.5 Setting the communication parameters for PDO 1 and 2 (transmit and receive)

For motion applications we recommend to change the PDO transmission type no. 255_asynchronous (application event is defined in the device profile) to type no. 1-240[1]_cyclic_synchonous ([1] the type indicates the number of SYNC objects between two PDO transmissions).

• Click double on each Tr-Type...Transmission Type for changing it to 'Synchronous cyclic (1).

The Inhibit Time for transmit PDO

- Display only active PDO's to see the result

2.6   Error control tab: Monitoring of network participants

The Heartbeat mechanism consists of sending cyclical presence messages generated by a Heartbeat Producer. A Heartbeat transmitter (producer) sends messages recurringly. The sending time is configured with the Node Heartbeat Procucer Time Value. One or several elements connected to the network receive this message. The Heartbeat consumer surveys the Heartbeat message reception. The default value of consumer time is set to (1.5 * Producer Heartbeat Time). If its duration exceeds the Heartbeat Consumer Time (1.5 * Producer Heartbeat Time), an Hearbeat event is created and the device is in default.

The Error control tab for CANopen slave modules allows you to configure the monitoring.
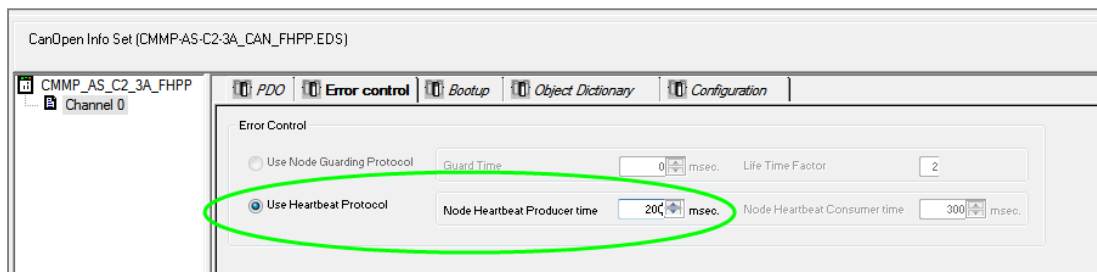
The Festo motor controller CMMP-AS supports the mechanism Node Guarding Protocol and Heartbeat Protocol.

➜   **Note**

For devices which support Heartbeat and Node Guarding, the only choice in Unity Pro is the Heartbeat mechanism.

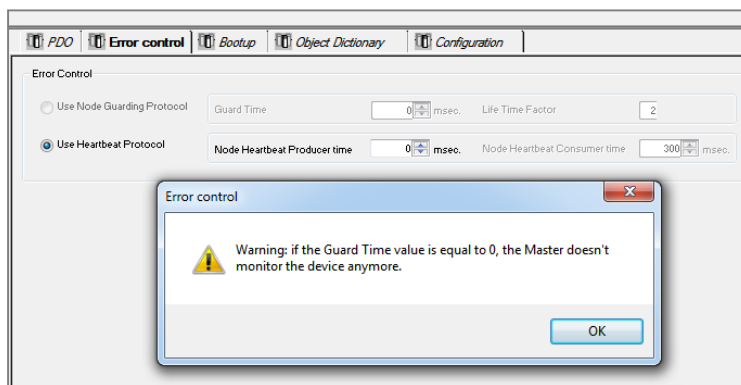• In case of using Heartbeat, please set the producer time.

- CAN-Trace with 200 ms Heartbeat from motor controller CMMP-AS (COB-ID 0x701)

    The Master (COB-ID 0x77F) can send Heartbeat messages to the slaves. The Master Heartbeat producer time is set at 200 ms and is not modifiable.

Time	Cnt	ID	Msg Type	Node	Details	Raw Message
00000199,748	87	0x77F	Node Guarding/Heartbeat	[0x7F (127)] PLC	Operational	05
00000200,473	86	0x701	Node Guarding/Heartbeat	[0x01 (1)] CMMP-AS	Operational	05
00000009,983	1736	0x301	Default: PDO		Default: RPDO 2 of Node [0x01 (1)] CMMP-AS	00 00 00 00 00 00 00 00
00000010,025	1736	0x281	Default: PDO		Default: TPDO 2 of Node [0x01 (1)] CMMP-AS	00 00 00 00 00 00 00 00
00000009,983	1736	0x201	Default: PDO		Default: RPDO 1 of Node [0x01 (1)] CMMP-AS	00 00 00 00 00 00 00 00
00000009,983	1736	0x181	Default: PDO		Default: TPDO 1 of Node [0x01 (1)] CMMP-AS	10 00 00 00 F8 FF FF FF
00000009,983	1736	0x080	SYNC Sync			

- You can switch off the Heartbeat mechanism when you set the node heartbeat producer time to 0.

    1. CAN-Trace with 0 ms Heartbeat: Hearbeat of motor controller CMMP-AS is switched off

Time	Cnt	ID	Msg Type	Node	Details	Raw Message
00000199,923	77	0x77F	Node Guarding/Heartbeat	[0x7F (127)] PLC	Operational	05
00000009,983	1544	0x301	Default: PDO		Default: RPDO 2 of Node [0x01 (1)] CMMP-AS	00 00 00 00 00 00 00 00
00000009,983	1544	0x281	Default: PDO		Default: TPDO 2 of Node [0x01 (1)] CMMP-AS	00 00 00 00 00 00 00 00
00000009,983	1544	0x201	Default: PDO		Default: RPDO 1 of Node [0x01 (1)] CMMP-AS	00 00 00 00 00 00 00 00
00000009,983	1544	0x181	Default: PDO		Default: TPDO 1 of Node [0x01 (1)] CMMP-AS	10 00 00 00 F8 FF FF FF
00000009,984	1544	0x080	SYNC Sync			

2.7 Bootup procedure configuration

The Bootup tab allows you to configure the Bootup procedure.

Please follow the needed settings:
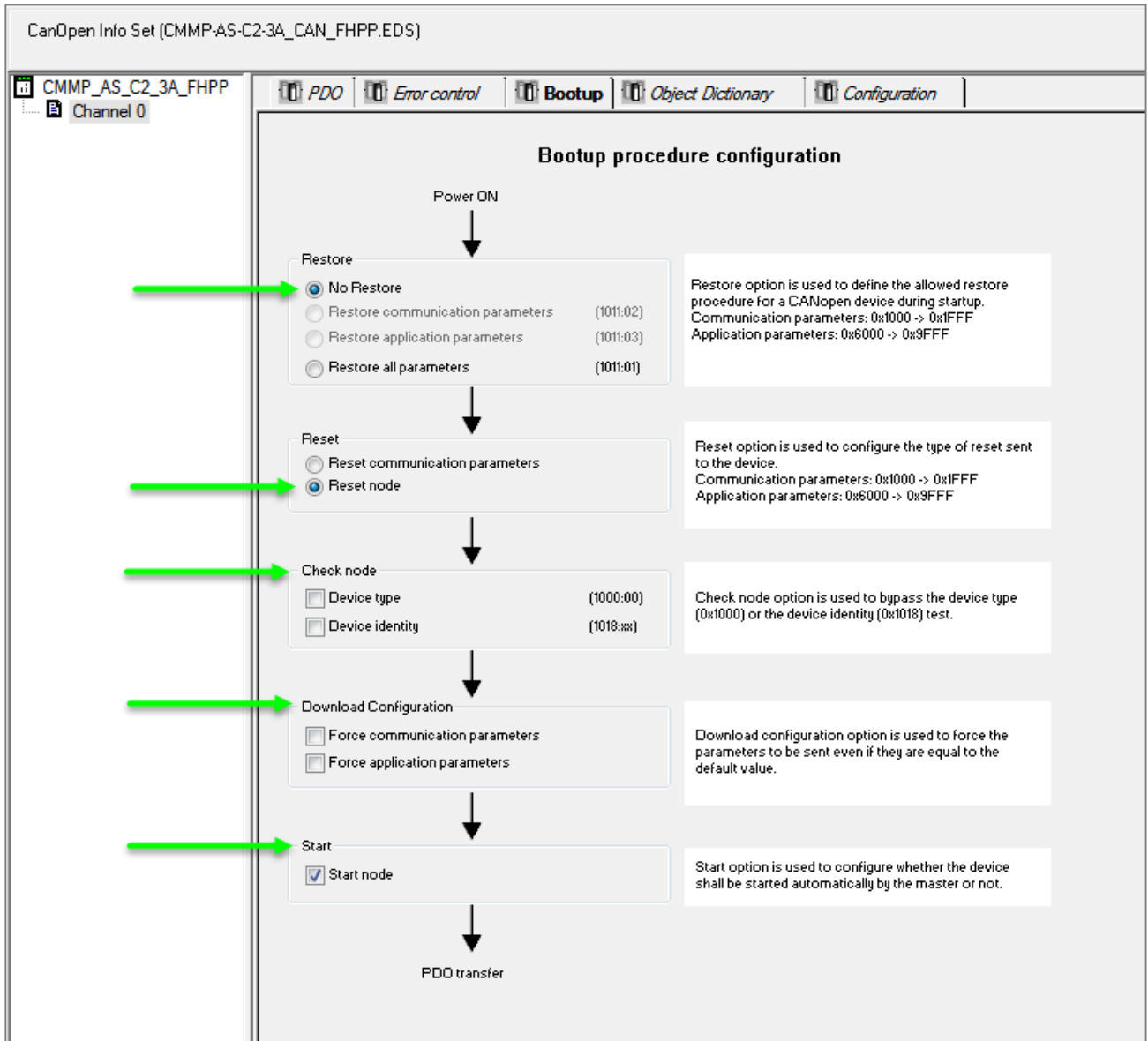
The type of restore:	Please keep the default option 'No Restore' enabled
The type of reset:	You can use the default setting 'Reset node'. 'Reset communication parameters' is as well possible
Check node:	Both settings are possible. When checked, then content of 0x1000 and 0x1018:xx in the motor controller must be equal to EDS-file. For more details, please see appendix

Download Configuration: Unchecked

Start:	Please keep option checked (default value), the CANopen master starts automatically the device after the bootup procedure.

2.8   Object Dictionary tab

Area Filter: 0x1000…0x11FF (communication profile area)

Status Filter: Configured

Uncheck the consumer heartbeat time:

⚠ Caution

If not, then the boot-up-sequence (initializing) is in an endless-loop. The CANopen-Master is getting a SDO Abort by trying to write of CANopen object 0x1016:01 and finally the CANopen-Master is sending an NMT Master Request 'Reset Node' (CS 81h).

Area Filter: All

Status Filter: Configured

Uncheck the communication and mapping parameter of PDO 3 and 4, receive and transmit:

Instruction

Result:

2.9 Parameterizing the CANopen-Master (Master Configuration)

Inputs and Outputs Configuration

To configure the inputs of the bus slaves, it is necessary to indicate the memory areas to which they will be periodically recopied. To configure the outputs, it is necessary to indicate, as for the inputs, the word and bits tables that will contain the values of the bus slave outputs.

2.10 Bus Parameters

The figure below illustrates the bus parameters configuration area:

- the transmission speed: 250kBauds default, example project 1000 kBaud
- the COB-ID of the synchronization message: 128 default, => 80h
- the synchronization message period: 100ms default, example project 10ms
- the NMT inhibit time: 5ms default. During Bootup, the CANopen Master implements a delay between each NMT messages to avoid slave overload. The value must be given in multiple of 100 μ s. The value 0 disables the inhibit time.
- the Device Bootup Time Out: 50ms default. The global SDO timeout for the master is related to the scanning of the network. During this time, the master reads the object 1000 of each slave to analyse the CANopen bus configuration.

Instruction

2.11   EMCY_Emergency Message

Example: EMCY-Producer servo controller CMMP-AS

E08-6: Faulty angle encoder communication:
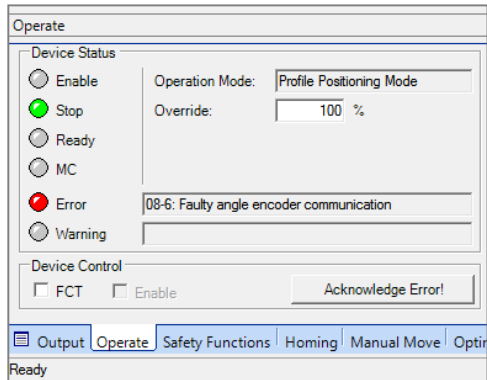
FCT_Online to servo controller:
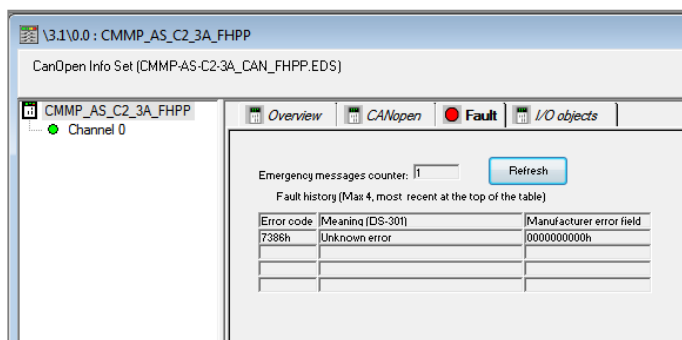
2.12 Checklist

This is just a kind of conclusion regarding important settings:

Bootup: sequence has to be modified in Unity Pro XL

- No Restore
- Reset communication parameters or reset node
- Start node

Object Dictionary: uncheck some CAN-objects:

- Uncheck object 0x1016:01 consumer heartbeat time
- Uncheck object 0x1402, 0x1403, 0x1602, 0x1603, 0x1802, 0x1803, 0x1a02 and 0x1A03 (Mapping and communication parameters of transmit and receice PDO 3 and 4. In case of FHPP+ you keep checked it

PDO transmission mode:

- Using transmission mode cyclic synchronous '1' instead of asynchronous '255' for all PDO's receive and transmit.
- Check as well if the SYNC signal with COB-ID 128=80h is activated by the sync period time with e.g. 10 ms

General:

Check all relevant settings in FCT and Unity Pro XL:

- Baud rate
- Node-ID
- Communication profile FHPP or DS402

3   Appendix

The following sections are excerpted from the:

CiA 302 Draft Standard Proposal

Additional application layer functions Part 2: Network Management / Version 4.1.0 / 02 February 2009

3.1   6.6 Object 1F84h – Device type identification

This object is used for verification of the device type of the CANopen devices in the network.

The **device type** (object 1000h – *see /CiA301/*) of the CANopen device in the network shall be matched against the value of this object in case the value is unequal 0. An error event shall be generated if the values mismatch. In case the value of this object is 0 the device type of

the CANopen device in the network may not verified. Table 34 and Table 35 define the object description and the entry description.

The following sections are related to **Device Identity (object 1018 sub-Index 1-4)**

3.2   6.7 Object 1F85h – Vendor identification

The vendor-ID (object 1018h sub-index 01h – see /CiA301/) of the CANopen device in the network shall be matched against the value of this object in case the value is unequal 0.

An error event shall be generated if the values mismatch. In case the value of this object is 0 the vendor-ID of the CANopen device in the network may not verified. Table 36 and Table 37 define the object description and the entry description.

3.3   6.8 Object 1F86h – Product code

This object shall be used for verification of the product code of the CANopen devices in the network.

The product code (object 1018h sub-index 02h – see /CiA301/) of the CANopen device in the network shall be matched against the value of this object in case the value is unequal 0.

An error event shall be generated if the values mismatch. In case the value of this object is 0 the product code of the CANopen device in the network may not verified. Table 38 and Table 39 define the object description and the entry description.

3.4   6.9 Object 1F87h – Revision number

This object shall be used for verification of the revision number of the CANopen devices in the network.

The revision number (object 1018h sub-index 03h – see /CiA301/) of the CANopen device in the network shall be matched against the value of this object in case the value is unequal 0.

An error event shall be generated if the values mismatch. A mismatch is defined as:

•   the major revision number is unequal to the expected major revision number, or

•   the minor revision number is less than the expected minor revision number,

In case the value of this object is 0 the revision number of the CANopen device in the network shall not be verified. Table 40 and Table 41 define the object description and the entry description.

3.5   6.10 Object 1F88h – Serial number

This object shall be used for verification of the serial number of the CANopen devices in the network.

The serial number (object 1018h sub-index 04h – see /CiA301/) of the CANopen device in the network shall be matched against the value of this object in case the value is unequal 0.

An error event shall be generated if the values mismatch. In case the value of this object is 0 the serial number of the CANopen device in the network may not verified. Table 42 and Table 43 define the object description and the entry description.