Application Note

FESTO

Commissioning between SRBG AS-i and CESA-GW-AS-CO

How to commission the SRBG using CESA-GW-AS-CO

SRBG, CESA-GW-AS-CO, AS-I, CANOPEN

100307

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1 Requirements

Here you will find the main software and hardware used for this application note.

1.1 Software

Type/Name		Version Software
CoDeSys provided by FESTO	3.5	3.5

Table 1.1: Software used

1.2 Hardware

Note
Some of products are recommendation of use.
Some items has been used as suggestion in this application description. Therefore, other parts and manufacturers whose attend the required specification can be used as well.

Doc. ID	Description/Function	Ident Code	Part Number	Manufacturer
1	AS-I Power supply [1)]	SVG-1/230VAC-ASI-5A	547869	FESTO
2	AS-I Bus Cable (YE) [1)]	KASI-1,5-Y-100	18940	FESTO
3	CANOPEN / AS-I gateway	CESA-GW-AS-CO	567033	FESTO
4	CANOPEN Master Controller [1)]	CECC-LK	574418	FESTO
5	CANOPEN Cable [1)]	3107A.001220	3107A	BELDEN
6	AS-I Sensor Box	SRBG-C1-N-1-AS-M12-M12	3567908	FESTO
7	Solenoid Valve Cable [1)]	NEBV-A1W3F-P-K-0.3-N-M12W3	3679771	FESTO
8	Activation Element for SRBG	SASF-S2-B-F-A34	4046082	FESTO
9	Solenoid Valve	VSNC-FC-M52-MD-G14-FN	577267	FESTO
10	Solenoid Coil	VACN-N-A1-1	8029144	FESTO
11	CANOPEN Connector for CECC	NECC-S1G9-C2-M	576031	FESTO
12	Ethernet Cable [1)]	VS-IP20-IP20-94B-LI/5,0	1407903	PHOENIX
13	AS-I Connector for SRBG	NEFU-X22F-M12G4	572225	FESTO
14	AS-I Round Compliant Cable [1)]	H05VV-F2x1,5	-	-

1) Recommendation

Table 1.2: Components Used

1.3 Documentation

This documentation intends to deliver supplementary information regarding the following documentations:

- CESA-GW-AS-CO-EN (749962):
  Search 749962 | Festo GB

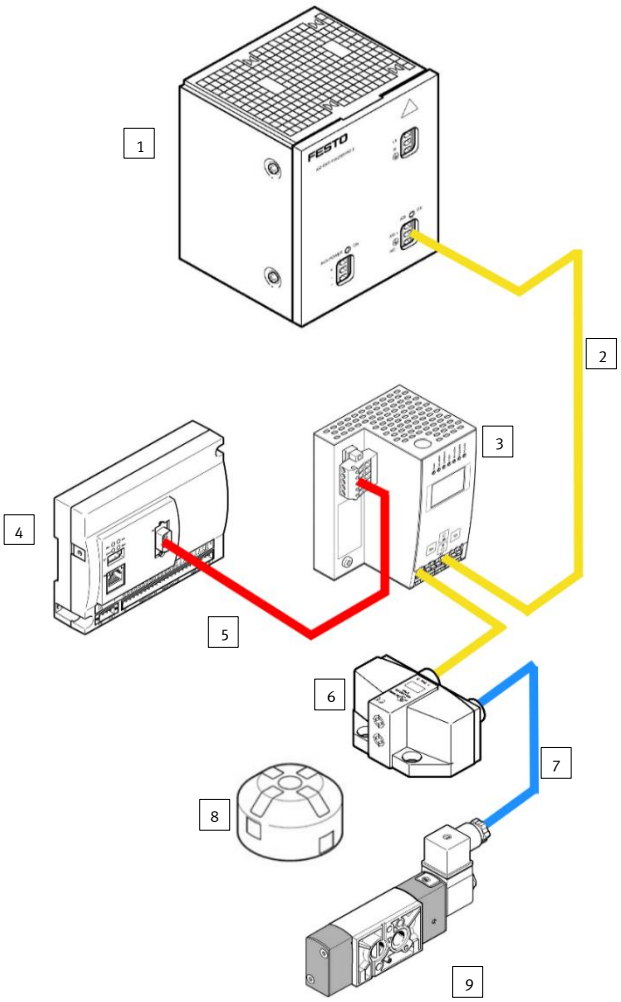
- SRBG-EN (8075401):
  Search 8075401 | Festo GB

2 Application Description

This Application note intends to show how to configure the SRBG sensorbox using our CESA-...-CO gateway for CANOPEN.
This document as well explains to how the Process Data Image from the CESA-...-CO gateway is allocated and which/how data you can access using CANOPEN with CoDeSys V3.5 controllers.
For application purposes we are using as CANOPEN master, a CECC controller.

3 Installation

3.1 Connection Overview



1 AS-i Power Supply
2 AS-i Main trunk Cable
3 CESA-...-CO Gateway
4 CECC-LK Controller
5 CANOPEN network cable
6 SRBG
7 Solenoid Cable
8 SASF Position Indicator
9 VSNC Solenoid Valve

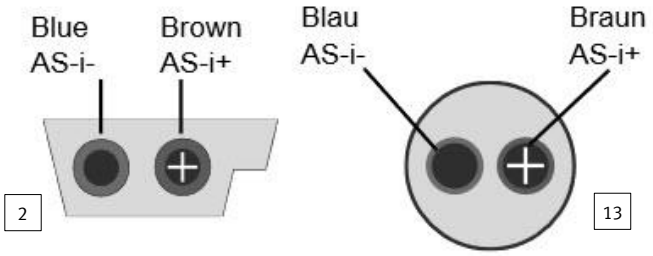
Fig. 3.1: Connection overview

Warning
This application note is entirely based in the following HW configuration as described
Any possible modification into the hardware can be consider as a possible troubleshoot step.

Info
Depending of the power demanding from you network, some additional power cable can be necessary

3.2 AS-i Cables

It is rightly recommended that you use standard AS-I cabling for this application.
The recommended cables are :



2 Flat Cable (to SRBG use with NEFU-X24F-M12G4 –)
13 2-conductor AS-i round cable (Recommended: flexible 12 power cable H05VV-F2x1,5 per DIN VDE 0281)

Fig. 3.2: AS-i Recommended Cables

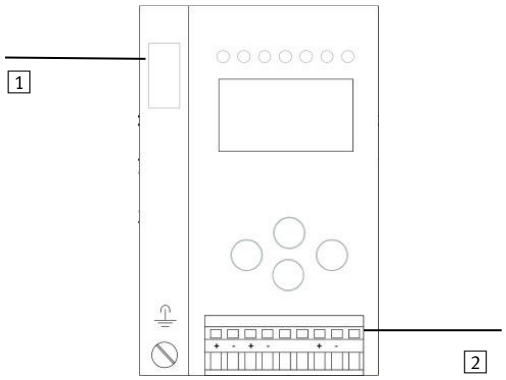
3.3 CESA-...-CO Connections

The CESA has 2 different places to connection where should have:

- AS-I Power Supply connection;
- CANOPEN Cable connection;
- AS-I Trunk Cable for the AS-I Slaves;

➔ **Check the manual from CESA-GW-AS-CO for details.**
The connections are mentioned at ➔ Cap.5 (Electrical Connection).
There you will find:

- Size of supported cables ;
- Electrical characteristics ;
- Connectors should you use.



1 Connector X1 – CANOPEN Cable
2 Connector X2 – AS-i Port Connector

Fig. 3.3: Physical connections from CESA-CO

3.4 CANOPEN cable and Connections

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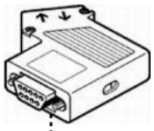
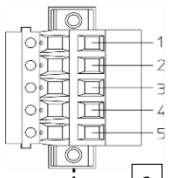
CAN bus plug	Pin	Signal	Comment
	1	n.c.	Not connected
	2	CAN_L [1]	CAN Low
	3	CAN_GND	CAN Ground
	4	n.c.	Not connected
	5	CAN_SHLD	Connection to functional earth
	6	CAN_GND	CAN Ground (optional)
	7	CAN_H [1]	CAN High
	8	n.c.	Not connected
	9	n.c.	Not connected

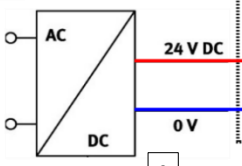
1) If the CECC is at the end of the cable:
- Connect pin 2 and pin 7 using a terminating resistor (120 ohms/0.25 W).





3

PIN	Designation
1	V+
2	CAN_H
3	SHIELD
4	CAN_L
5	V-



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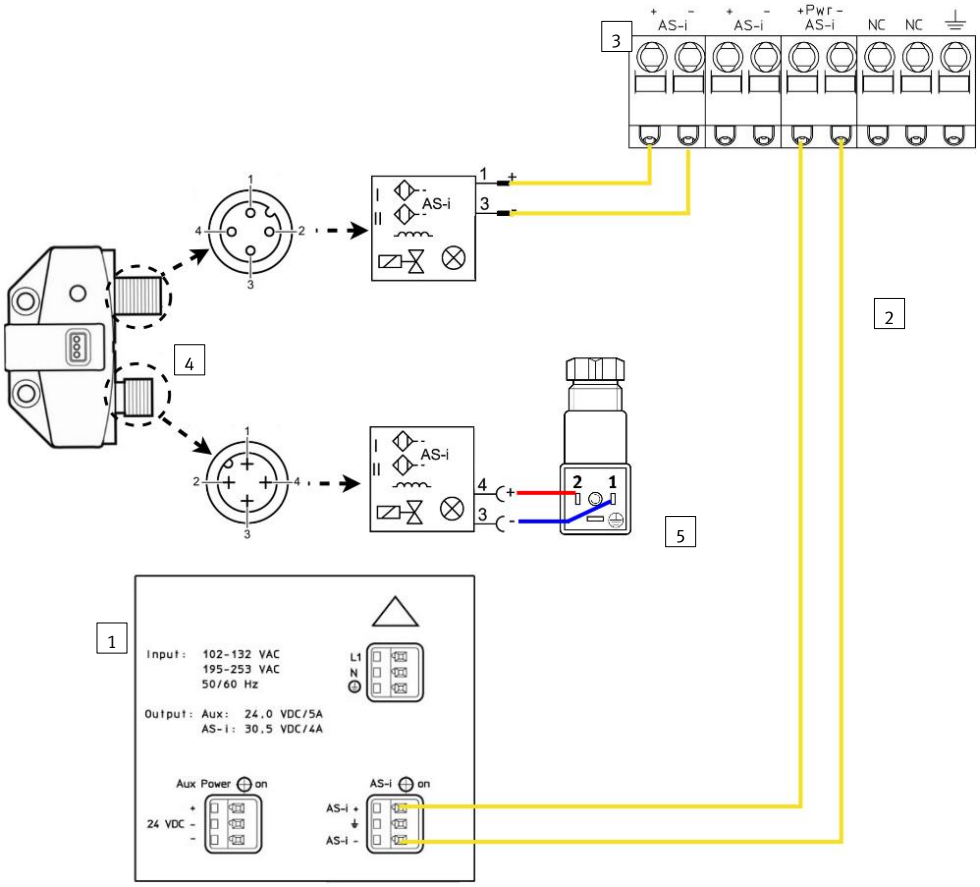
1 Power supply (use the 24 Vdc)
3 CANOPEN connection from CESA-...-CO (X1)
4 CANOPEN connection from CECC-LK
7 CANOPEN cable from connection between CESA and CECC
10 CANOPEN connector for CECC (NECC)

Fig. 3.4: Electrical Connection between CESA-..-CO and CECC-LK

Warning
The CESA needs 24VDC power between pin 1 and 5.
This makes the activation from the network, unless you don´t have it, the CESA will stay at pre-operational mode, even if you have already a CANOPEN communication.

3.5 AS-I connection between CESA and SRBG

Here you fin how to connect you AS-I system between your SRBG and CESA :



1 AS-i Power Supply
2 AS-i Main trunk Cable
3 CESA-...-CO Gateway Connector X2
4 SRBG : AS-I and Valve Connection
5 VSNC coil connector

Fig. 3.5: Electrical Connection – AS-i network with External Power Supply

4 Commissioning

4.1 CESA-...-CO configuration

This chapter brings more knowledge about the configuration that needs to be done inside of CESA in order to have the AS-I working properly.

Note
This is a complementary documentation.
For more information about the CESA-GW-AS-CO and other configurations with the advanced display mode you find at the CESA-GW-AS-CO manual ➔ Cap. 6 (Operation in Advanced display mode).

4.1.1 Using function „Quick Setup“ for AS-i Configuration

This function allows your network to be configured automatically based on the actual network state and which devices you have.
The CESA will overwrite all the addresses in order to have an optimized use form the available memory and the components that you have in the network to his internal project.

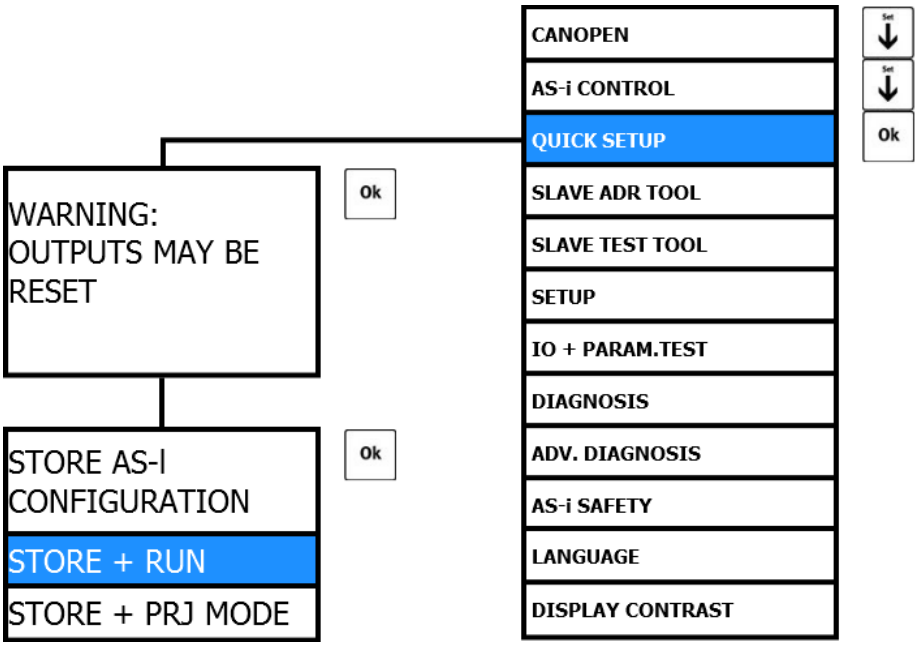


Fig. 4.1: Sequence in the “Advanced Display Mode” in CESA – Quick Setup

Warning
This procedure will overwrite all the addresses from your slaves !
If you already have an existent AS-I network and you want to add some device, be advise that using this procedure may your network experience wrong assignments for the existent devices.

4.1.2 Checking the AS-i Network

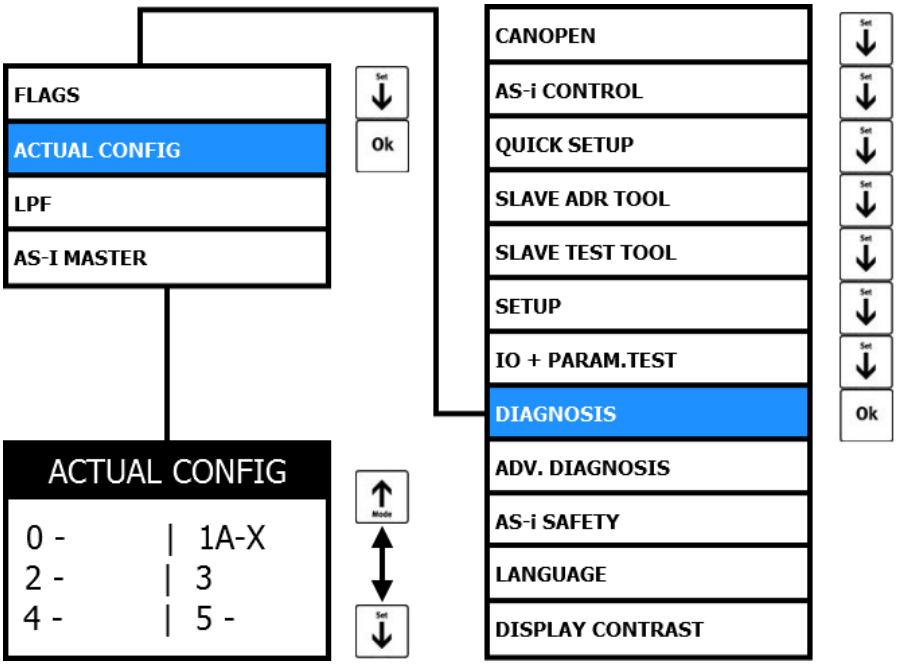


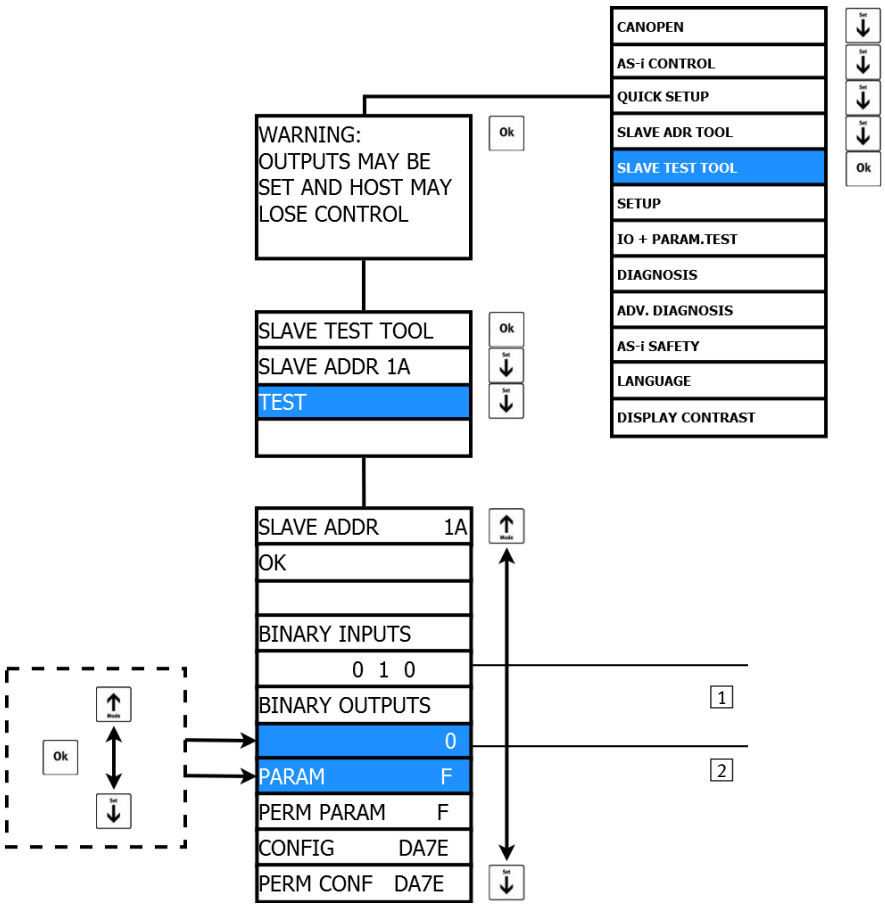
Fig. 4.2: Sequence in the "Advanced Display Mode" in CESA – Actual Configuration

In the "actual config" screen you can scroll up and down and see what are the existent configured devices and their status.

On Screen	Status	Description
X	**OK**	The configuration data for the detected AS-i slave complain with the designed configuration.
D	**Detected Only**	An AS-i slave has been detected at this address, but it was not designed in the project.
P	**Projected Only**	An AS-i Slave has been configured for this address, but it was not detected.
C	**Type Conflict**	The configuration data for the detected AS-i has no compliance with the designed configuration data. The actual existing configuration of the connected data will be shown.
F	**Peripheral Fault**	The AS-i Slave has a diagnosis .
A	**Duplicate Address**	Two or more devices have the same address.

Table 4.1: Possible Diagnosis at "Actual Configuration" in CESA

4.1.3 I/O Device Monitoring and Forcing



[1] Binary Inputs from SRBG
[2] Binary Output from SRBG

Fig. 4.3: Sequence in the “Advanced Display Mode” in CESA – Monitoring & Forcing I/O´s

4.1.4 CANOPEN node ID and baudrate

For this application, we are suing 1Mbaud and Node ID 3:

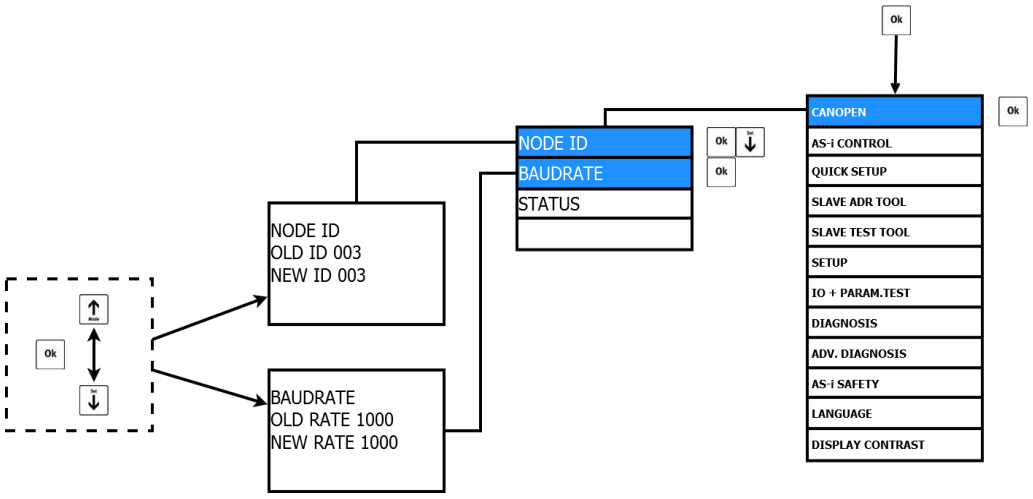


Fig. 4.4: Sequence in the “Advanced Display Mode” in CESA – CANOPEN Node ID & Baudrate

4.2 CoDeSys configuration with CECC

In this part of the application note, we will provide a basic configuration to access the variables into your CoDeSys PLC with CANOPEN master enabled.

4.2.1 Accessible variables

The variables that can be access through the process data are mentioned as follow:

Function	Access (R/W)	Description
Switch Output Sensor 1	Read	Returns the activation from the first sensor of the SRBG.
Switch Output Sensor 2	Read	Returns the activation from the second sensor of the SRBG.
Valve Error	Read	Returns if the valve has short circuit or wire break.
SRBG connected	Read	Check if the connection with the SRBG exists.
Valve Output activation	Write	Activates the output from the valve.

Table 4.2: Possible variables from the SRBG

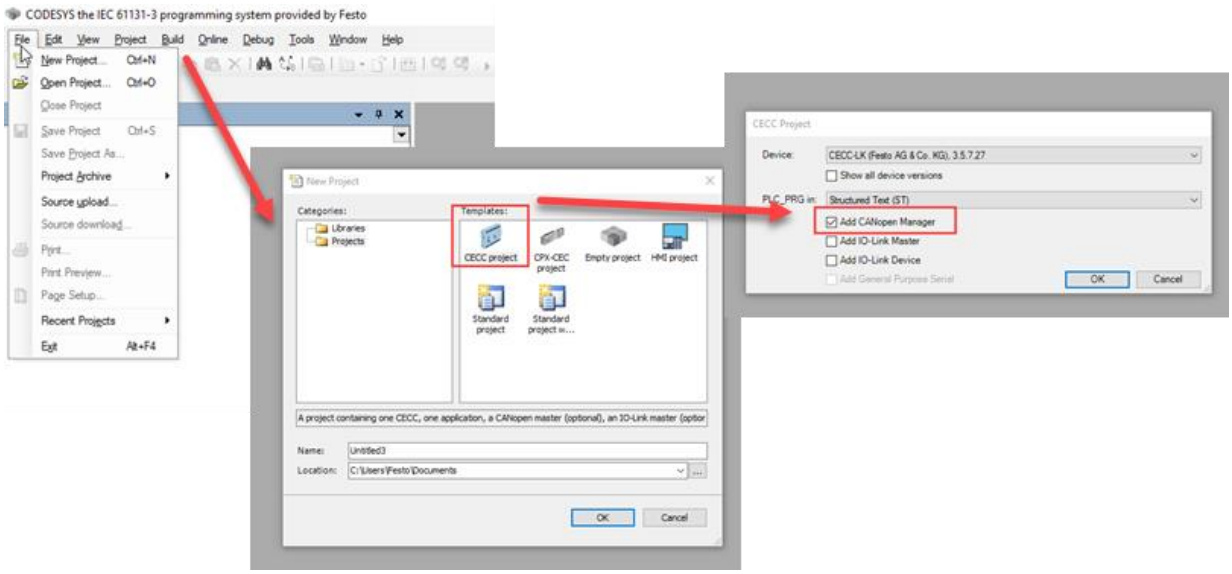
➔ **Check the manual from SRBG for details.**
The possible data mentioned is at ➔ Cap.4.2 (Electrical).
There you will find also:

- Parameters from the Identification Code;
- Parameters from switching elements and watchdog.

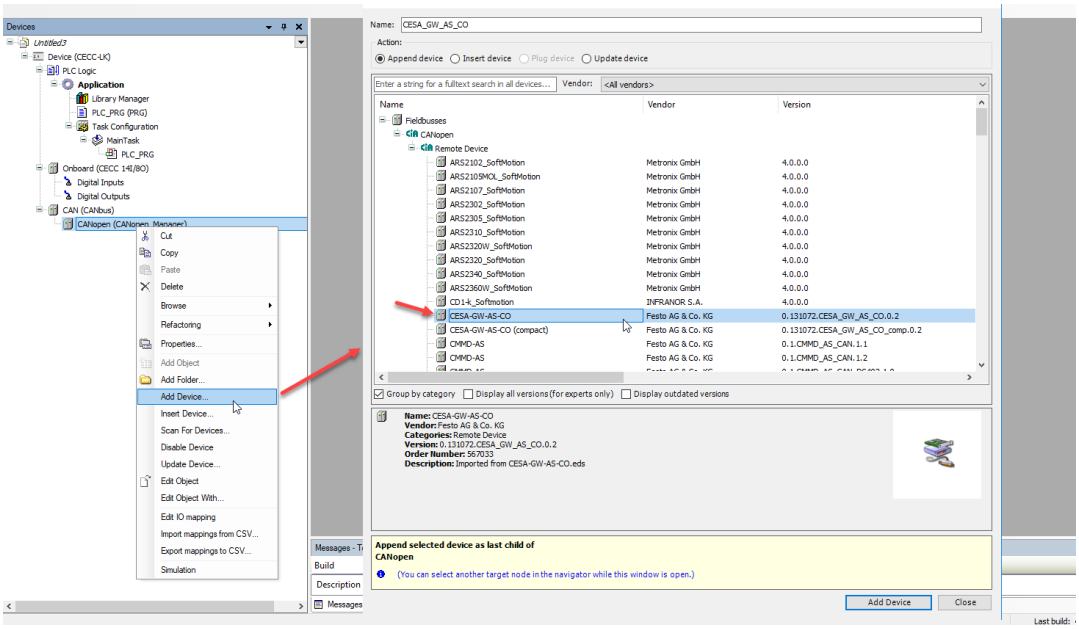
This parameters are accessible by the CESA interface.

4.2.2 Inserting new CESA-...-CO device

- Open the CoDeSys v3.5 and start a new project with a CANOpen Master Enabled PLC (Our example, CECC):

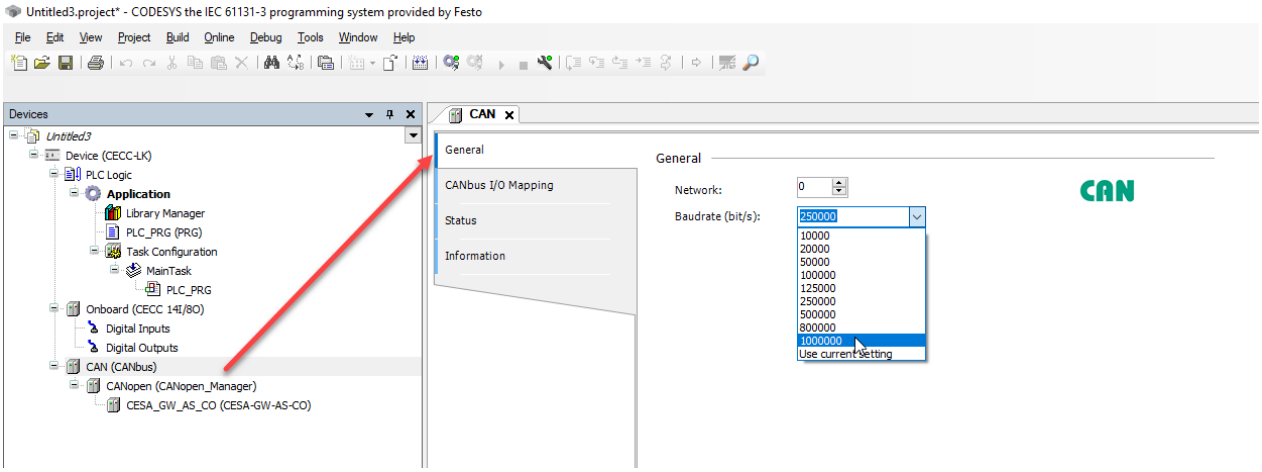


- At the project tree, select the “CanOpen Manager" in the CANBus;
- Select “Add device” and look for “CESA-GW-AS-CO”;

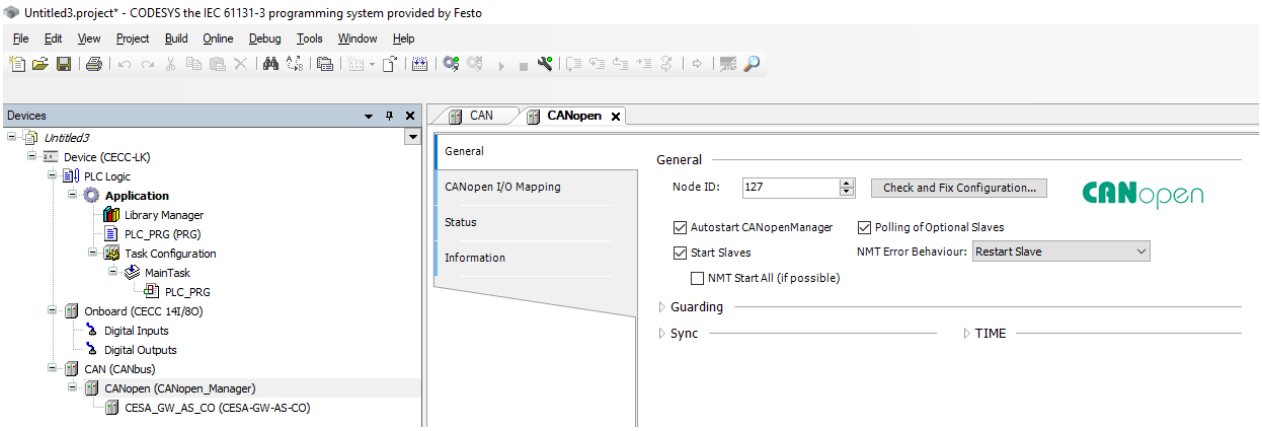


4.2.3 Configuration for CANOPEN

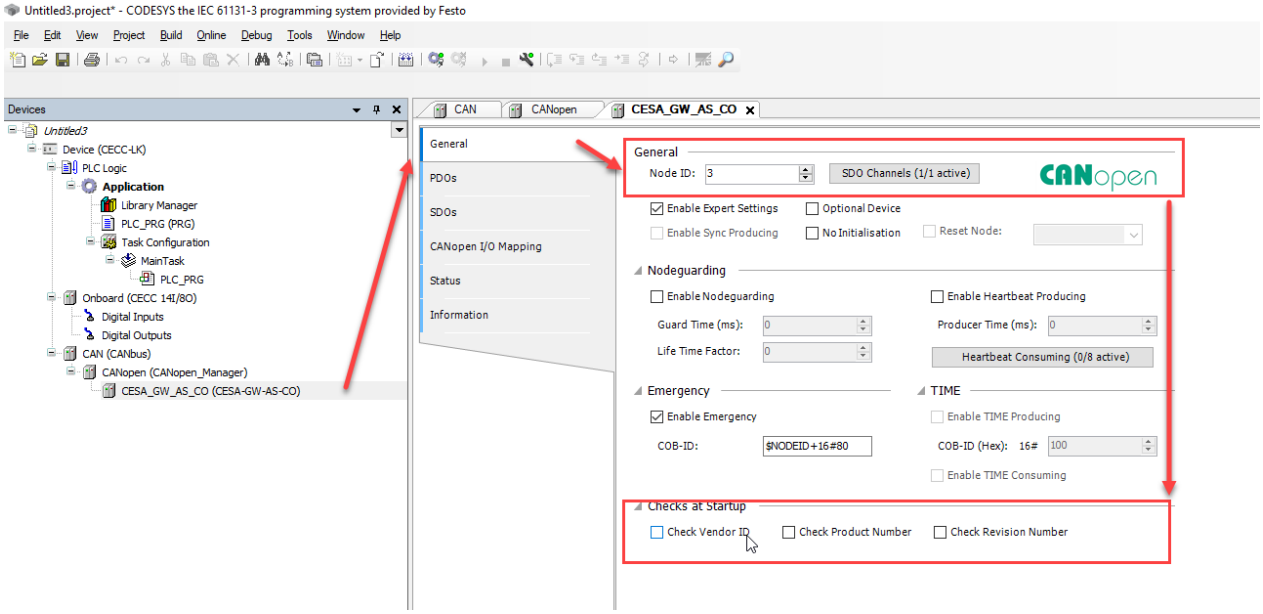
- Select “CAN (CANbus) › General › Baudrate 1000000 (bit/s);



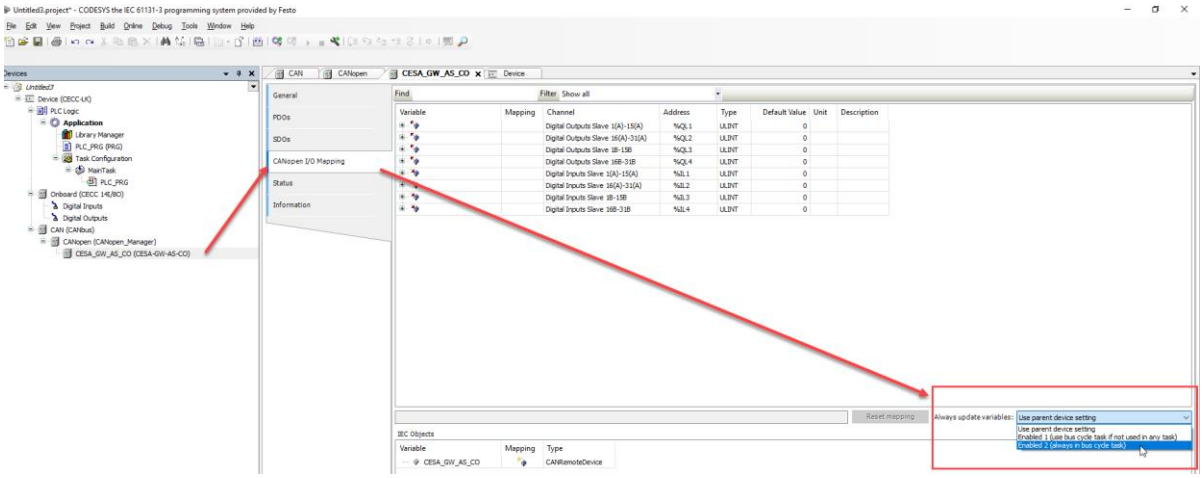
- Select “CANopen(CANopen_Manager)” and keep the following configuration , it doesn´t matter your master Node ID, just make sure that your Node ID is not matching with the CESA Node ID;



- At “CESA_GW_AS_CO” , uncheck all options bellow and make sure to have the same node ID as configured at the Advanced Display Mode:



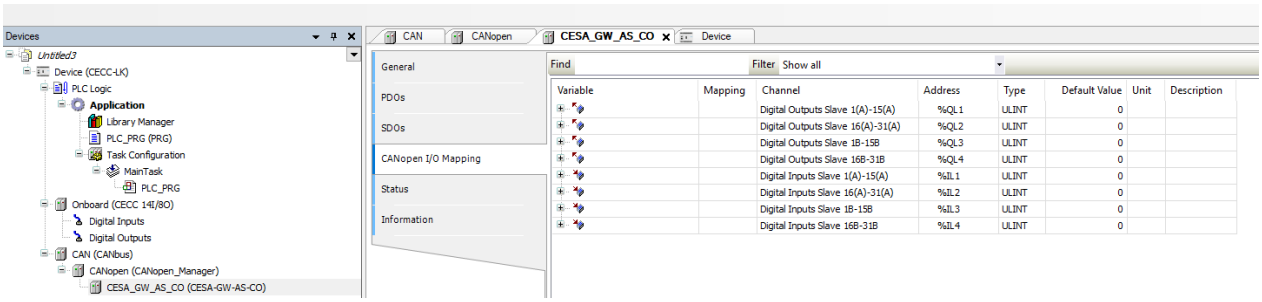
- Before download, don´t forget to change the “always update variables” field to “Enable” (1 or 2), unless you cannot see the variables changing values inside of CoDeSys.



- Compile , download, run and check online your application;

4.2.4 Process Image

This is how your CESA variables should look inside CoDeSys:



The allocation for the CESA will be as follow:

Address	Channel	Description
%QL1	Digital Output Slave 1(A)-15(A)	Devices Outputs
%QL2	Digital Output Slave 16(A)-31(A)	
%QL3	Digital Output Slave 1(B)-15(B)	Extended Addressing
%QL4	Digital Output Slave 16(B)-31(B)	Devices Outputs (AS-I 3.0)
%IL1	Digital Input Slave 1(A)-15(A)	Devices Inputs
%IL2	Digital Input Slave 16(A)-31(A)	
%IL3	Digital Input Slave 1(B)-15(B)	Extended Addressing
%IL4	Digital Input Slave 16(B)-31(B)	Devices Inputs (AS-I 3.0)

Table 4.3: Addressing at CoDeSys from CESA.

➔ **Extended Addressing is not used in this application.**
If you need a better understanding about this configuration, please check ➔ Cap. 6.8.7 (AS-I Address assistant) in the CESA Manual.

The SRBG will be mapped in the master as follow:

VARIABLE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
%IL1 (byte1)	CESA Flags for Diagnosis				Slave Address 1 Inputs			
					Switch Output Sensor 2	Switch Output Sensor 1	Valve Error	Hi-Flag from Slave[1)]
%IL1 (byte2)	Slave Address 3 Inputs				Slave Address 2 Inputs			
%QL2 (byte1)	CESA Flags for Diagnosis				Slave Address 1 Outputs			
								Valve Output
%QL2 (byte2)	Slave Address 3 Outputs				Slave Address 2 Outputs			

1) Acknowledges that the equipment is Alive (when connected, Always on):

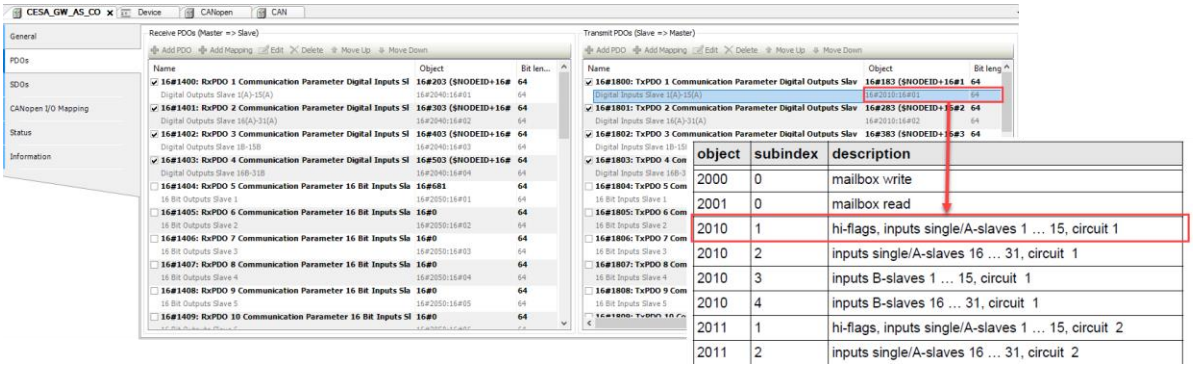


Table 4.4: SRBG Mapping

Info
The diagnosis (bit 4-7) are just in the first byte and then, for the next address , the following bytes are sequential for all the address , allocating 1 nipple (4bits) for each slave.