

Application note

easy Control EC4P-200

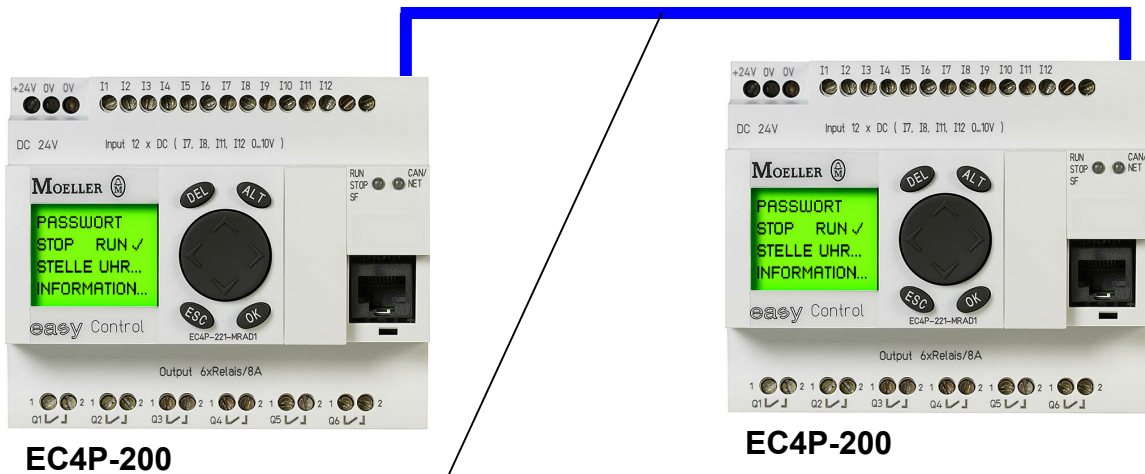
Brief description

This application note describes the communication between two EC4P-200 compact controllers of the easy Control device series. Communication is implemented with CAN network variables. In the “easy Soft CoDeSys” sample projects, 36 UINT variables each are transmitted and received in both directions. This presentation describes how the sample projects can be extended, modified and recreated.

Hardware

Schematic diagram:

CANopen



**Connect the two EC4P-200 controllers with the cable:
EASY-NT-30, EASY-NT-80 or EASY-NT-150**

easy
Relay

easy
HMI

easy
Control

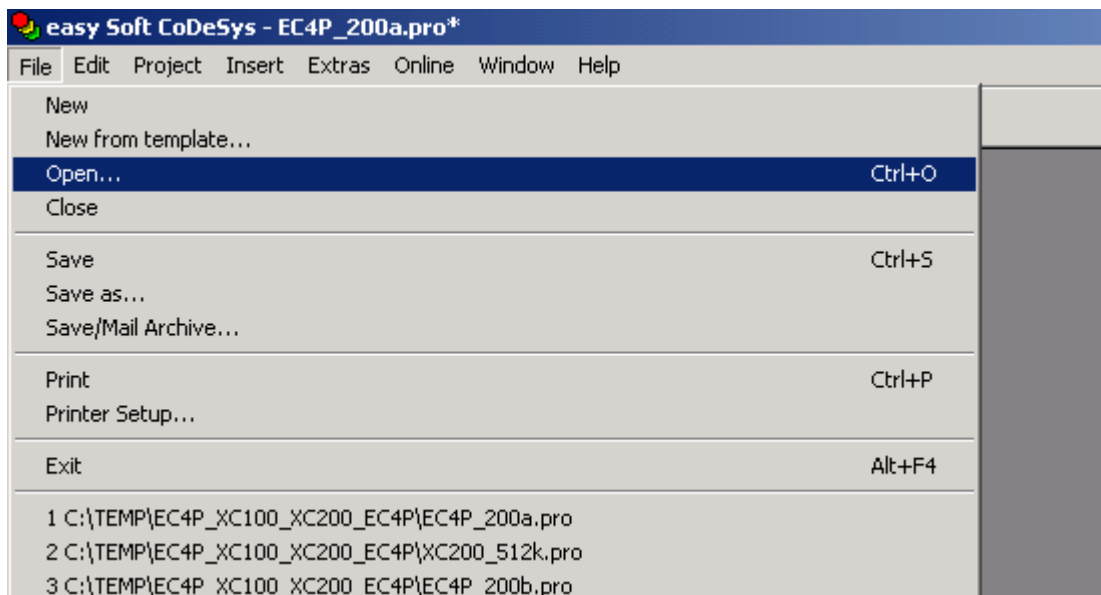
XC
100

XC
200

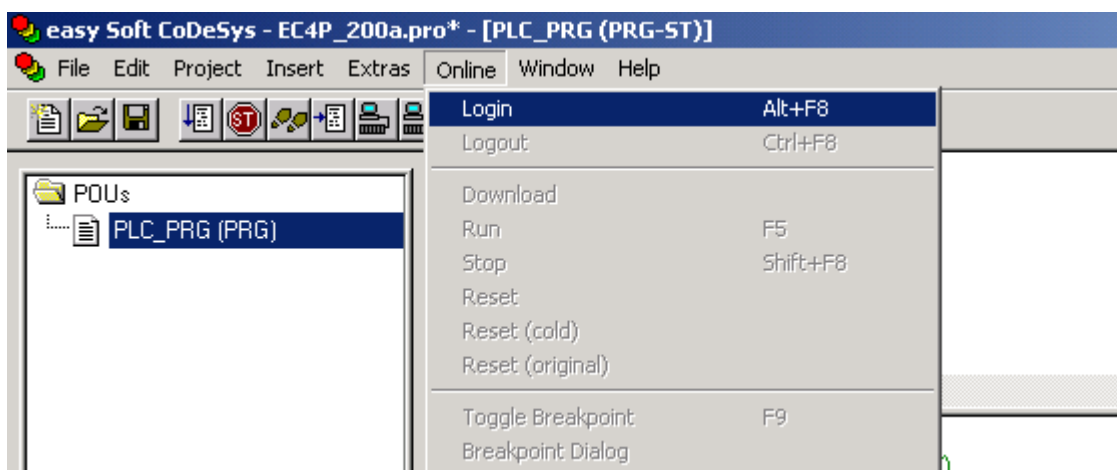
XC
121

Opening and transferring sample project “EC4P_200a.pro”

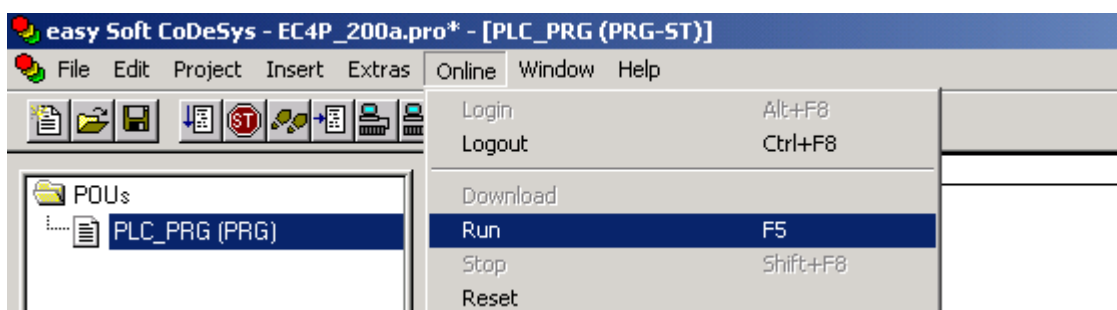
Launch the “easy Soft CoDeSys” programming software and open the sample project “EC4P_200a.pro”.



Connect PC and controller “A” with a programming cable. Choose “Online / Login”. The sample project is compiled and then transferred to the controller.

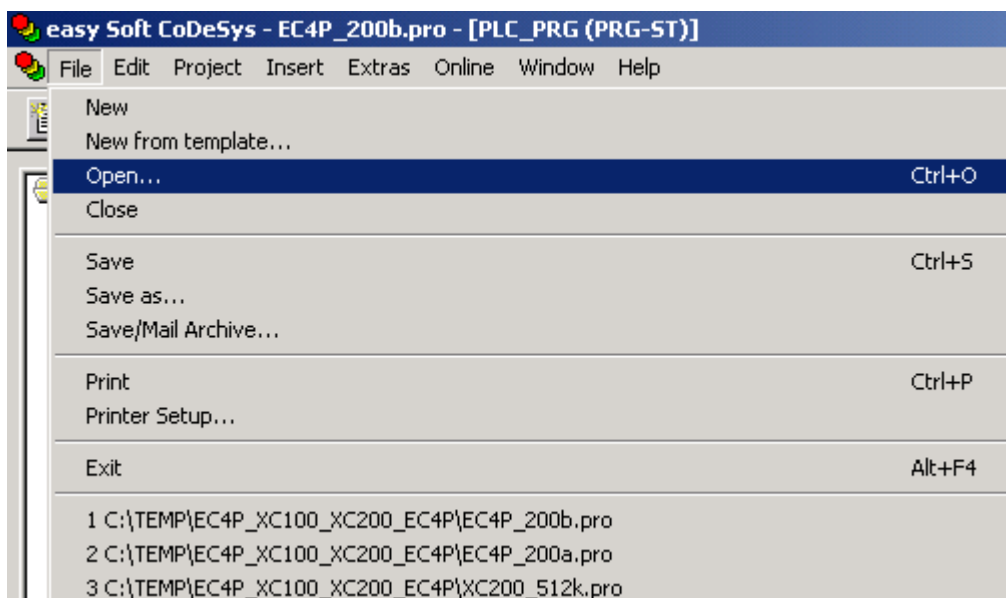


Choose “Online / Start”.

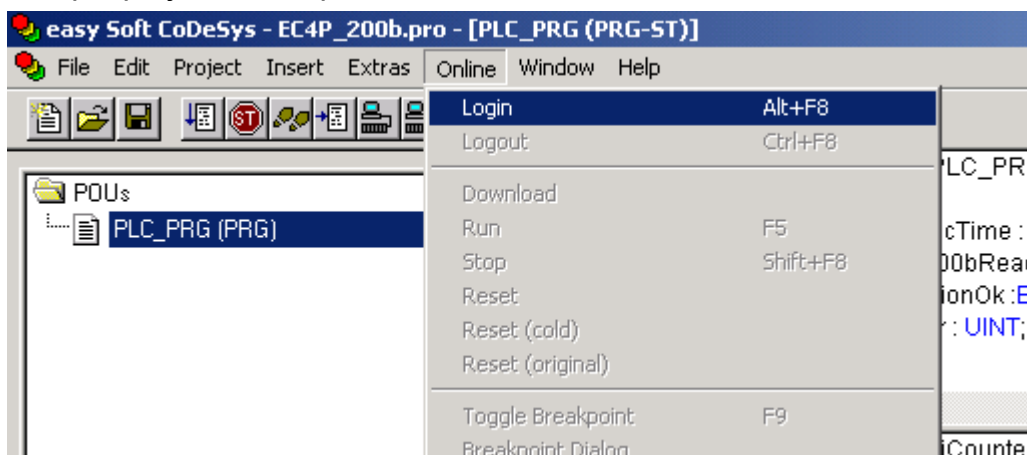


Opening and transferring sample project “EC4P_200b.pro”

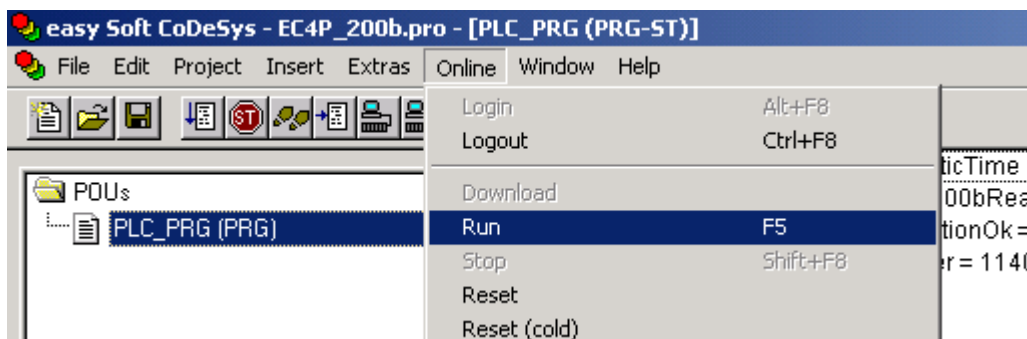
Open sample project “EC4P_200b.pro”.



Connect PC and controller “B” with a programming cable. Choose “Online / Login”. The sample project is compiled and then transferred to the controller.



Choose “Online / Start”.



Online testing of communication and diagnostics

Establish the online connection to controller “A”. Double-click on “POUs/PLC_PRG”. In the upper section of the program “PLC_PRG” 3 blocks with 12 variables each are provided for data transfer. 3 blocks with 12 variables each are provided in the middle section for data reception. The divided value of a counter is transferred to the receive variables.

For diagnostics tasks, the counter of the first receive variables is monitored for changes. This is implemented in the lower program section. The variable “xConnectionOk” indicates the current status of the communication. This is a reliable method of monitoring the connection as all possible “communication fault sources” are considered.

easy Soft CoDeSys - EC4P_200a.pro* - [PLC_PRG (PRG-ST)]

File Edit Project Insert Extras Online Window Help

POUs
PLC_PRG (PRG)

0001	uiCounter = 26305	
0002	uiRead1Old = 20000	
0003	DiagnosticTime	
0004	xConnectionOk = FALSE	
0005		
0006		
0069	uiRead18;	uiRead18 = 7810
0070	uiRead19;	uiRead19 = 6694
0071	uiRead20;	uiRead20 = 5857
0072	uiRead21;	uiRead21 = 5207
0073	uiRead22;	uiRead22 = 4686
0074	uiRead23;	uiRead23 = 4260
0075	uiRead24;	uiRead24 = 3905
0076		
0077	(*Receive from other plc every 1s*)	
0078	uiRead25;	uiRead25 = 0
0079	uiRead26;	uiRead26 = 0
0080	uiRead27;	uiRead27 = 0
0081	uiRead28;	uiRead28 = 0
0082	uiRead29;	uiRead29 = 0
0083	uiRead30;	uiRead30 = 0
0084	uiRead31;	uiRead31 = 0
0085	uiRead32;	uiRead32 = 0
0086	uiRead33;	uiRead33 = 0
0087	uiRead34;	uiRead34 = 0
0088	uiRead35;	uiRead35 = 0
0089	uiRead36;	uiRead36 = 0
0090		
0091	(*Diagnosis: Connection OK*)	
0092	DiagnosticTime(IN:=TRUE, PT:=t#200ms)	
0093	IF DiagnosticTime.Q THEN	DiagnosticTime.Q = FALSE
0094	DiagnosticTime(IN:=FALSE);	
0095	IF uiRead1Old=uiRead1 THEN	uiRead1Old = 20000
0096	xConnectionOk:=FALSE;	xConnectionOk = FALSE
0097	ELSE	
0098	xConnectionOk:=TRUE;	xConnectionOk = FALSE
0099	END_IF	
0100	uiRead1Old:=uiRead1;	uiRead1Old = 20000
0101	END_IF	

easy
Relay



easy
HMI



easy
Control



XC
100



XC
200



XC
121



Modification of global variable lists

You can modify the global variable lists of the sample project in the following way. Double-click “Resources/Global Variables/Com_Write_4” of the project “EC4P_200a.pro”. The list must not exceed 24 bytes (=12 UINT variables) for the data transfer. The variable names can be modified as required, only the order of the variables is of importance. The variable list “Com_Read_4” in the other PLC must be modified in the same way for receiving data. A total of 3 variable lists can be created for data transfer.

The other variable lists can be adapted in the same way. For example, double-click “Resources/Global Variables/Com_Read_1”. The variable list contains 12 variables for data reception. The variable names can also be modified as required. The variable list “Com_Write_1” for the data transfer from the other PLC must be modified in the same way. A total of 3 variable lists are created for data reception.

easy Soft CoDeSys - EC4P_200a.pro* - [Com_Write_4]

File Edit Project Insert Extras Online Window Help

Resources

- Global Variables
 - CanOpen implicit Variables (CONSTANT)
 - Com_Read_1
 - Com_Read_13
 - Com_Read_7
 - Com_Write_10
 - Com_Write_16
 - Com_Write_4**
 - Globale_Variablen
 - Networkmanagement implicit Variables CAN (CONSTANT)
 - Variablen_Konfiguration (VAR_CONFIG)
- library 3S_CanDrv.lib 30.9.04 15:40:14: global variables
- library 3S_CANopenManager.lib 9.8.05 19:15:36: global variable
- library 3S_CANopenMaster.lib 4.11.05 15:27:28: global variable
- library 3S_CANopenNetVar.lib 4.11.05 15:32:04: global variable
- library Standard.lib 7.6.02 11:26:00: global variables
- library SYSLIBCALLBACK.LIB 31.3.04 10:33:20: global variable
- Alarm configuration
- Library Manager
- Log
- Parameter Manager
- PLC - Browser
- PLC Configuration
- Sampling Trace
- Target Settings
- Task configuration
- Watch- and Recipe Manager

0001 VAR_GLOBAL

0002 (*Maximum 12 UINT-variables*)

0003 uiWrite1 : UINT;

0004 uiWrite2 : UINT;

0005 uiWrite3 : UINT;

0006 uiWrite4 : UINT;

0007 uiWrite5 : UINT;

0008 uiWrite6 : UINT;

0009 uiWrite7 : UINT;

0010 uiWrite8 : UINT;

0011 uiWrite9 : UINT;

0012 uiWrite10 : UINT;

0013 uiWrite11 : UINT;

0014 uiWrite12 : UINT;

0015 END_VAR

easy
Relay

easy
HMI

easy
Control

XC
100

XC
200

XC
121

Parameterisation of global variable lists

For example, right-click the global variable list “Com_Write_4” of the project “EC4P_200a.pro” and choose “Object Properties”. You will see that “Pack variables”, “Write” and “Cyclic transmission” every “50ms” are selected. A 4 is entered as the variables list ID (COB-ID). In the global variable list “Com_Read_4” of the project “EC4P_200b.pro”, a 4 is also entered as the variables list ID (COB-ID). “Read” was selected. The send and receive variables of the two variables lists are adapted to each other by the same variable list ID. The “7” was selected in the pair “Com_Read_7 / Com_Write_7” as the next higher variable list ID. The difference of “3” means that a maximum of 3 COB-IDs are possible. 8 bytes of data can be used for each COB-ID. The maximum data in the variable lists is therefore “3 x 8 bytes = 24 bytes”. For example, 12 UINT variables can be used per list.

Unlike the global variables list “Com_Write_4” transfer intervals of 2300 and 1000 ms were selected for “Com_Write_10” and “Com_Write_16”.

Properties

Global Variable List | Access rights

Name of the global variable list:

Link to file

Filename:

☒ Import before compile ☐ Export before compile

Connection 1 (CAN)

Network type:

☒ Pack variables

List identifier (COB-ID):

☐ Transmit checksum

☐ Acknowledgement

☐ Read ☐ Request on bootup

☒ Write ☐ Answer bootup requests

☒ Cyclic transmission Interval:

☐ Transmit on change Minimum gap:

☐ Transmit on event Variable:

easy
Relay

easy
HMI

easy
Control

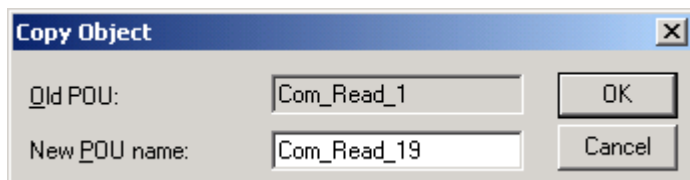
XC
100

XC
200

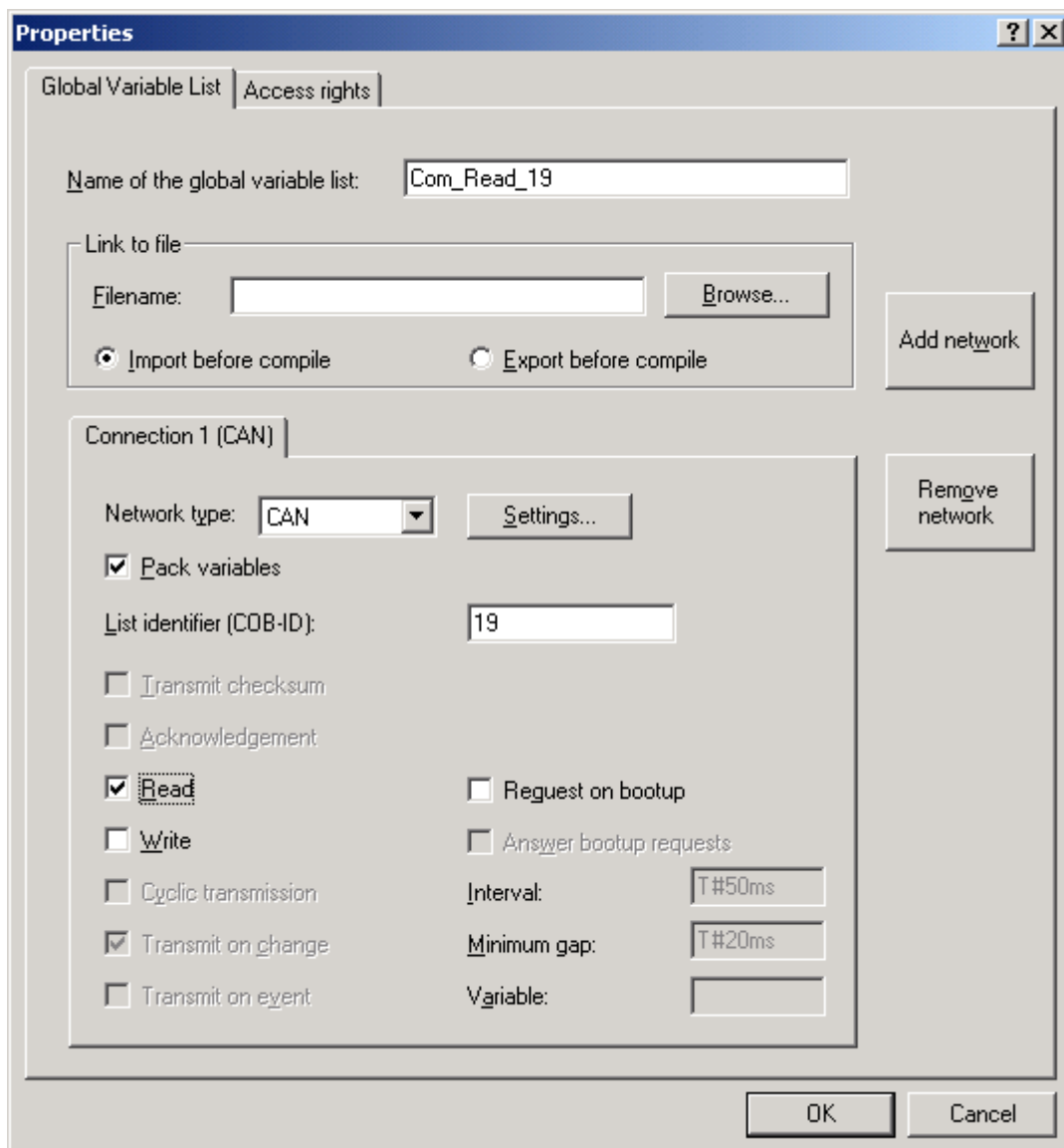
XC
121

Creating additional global variable lists

You can also create other global variable lists. For example, right-click “Resources/Global Variables/Com_Read_1”, choose Copy and rename the new global variable list something like “Com_Read_19”.



Right-click the new variable list and choose “Object Properties”. Enter a “19”, for example, as the variable list ID (COB-ID). If, for example, you wish to enter 40 bytes in the variable list, $40/8 = 5$ COB-IDs are required. The COB-IDs 19-23 should therefore be used. The highest permissible COB-ID is 127.



easy
Relay



easy
HMI



easy
Control



XC
100



XC
200



XC
121



Procedure for a new project

Choose “Support network variables”/CAN for the Target Settings

Target Settings

Configuration: **EC4P-200**

Target Platform | Memory Layout | General | **Network functionality** | Visualization

☒ Support parameter manager

Index ranges:

Index ranges for parameters:

Index ranges for variables:

16#2000-16#5fff

Index range for mappings:

☒ Support network variables

Names of supported network interfaces:

CAN

Example of a name list:
CAN;UDP;DP;DEVNET
max. 7 characters/name !

Add a CAN master as a subelement in the PLC configuration, by right-clicking the PLC type. Under “CAN Parameters” select a different Node ID for each PLC, i.e. Node ID “1” for the first PLC and Node ID “2” for the second.

easy Soft CoDeSys - EC4P_200a.pro* - [PLC Configuration]

File Edit Project Insert Extras Online Window Help

Resources

- Global Variable
 - CanOpen i
 - Com_Read
 - Com_Read
 - Com_Read
 - Com_Read
 - Com_Write
 - Com_Write
 - Com_Write
 - Globale_Va
 - Networkma
 - Variablen_1
- library 3S_CanC
- library 3S_CAN
- library 3S_CAN
- library 3S_CanC
- library Standard
- library SYSLIBO
- Alarm configura
- Library Manage
- Log
- Parameter Man
- PLC - Browser

Configuration EC

- Local I/O[SL]
- EXT Extension[E]
- CANopen CanMaster

Base parameters | **CAN parameters**

baud rate: 125000

Com. Cycle Period (µsec): 0

Sync. Window Length (µsec): 0

Sync. COB-ID: 128

Node-Id: 1

☒ Automatic startup

☒ Support DSP301,V4.01

Heartbeat Master [ms]: 0

Global variable lists for a new project

Right-click “Resources/Global Variables”, choose “Add Object” and name the variable list, e.g. “Transmit_1”. Choose “Add network connection” and, for example, “Write” with “Cyclic Transmission” and an “Interval” of 100ms. Enter a variable list ID such as “1”. A variable list with the “Read” option and identical variable list ID must be created for the other PLC. For both lists select “Pack variables”.

Properties [?] [X]

Global Variable List

Name of the global variable list:

Link to file

Filename:

☒ Import before compile ☐ Export before compile

Connection 1 (CAN)

Network type:

☒ Pack variables

List identifier (COB-ID):

☐ Transmit checksum

☐ Acknowledgement

☐ Read ☐ Request on bootup

☒ Write ☐ Answer bootup requests

☒ Cyclic transmission

Interval:

☐ Transmit on change

Minimum gap:

☐ Transmit on event

Variable:

easy
Relay

easy
HMI

easy
Control

XC
100

XC
200

XC
121

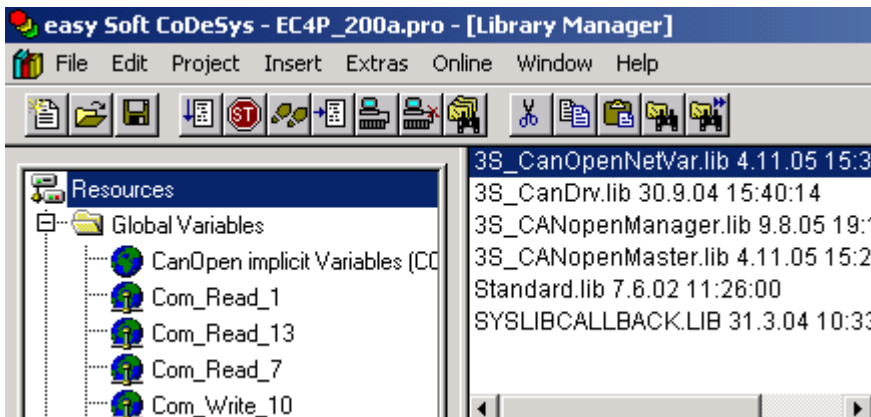
Libraries with the new project

Add the following libraries to your project with the Library Manager:

- 3S_CanOpenNetVar.lib
- 3S_CanOpenMaster.lib

The following libraries are added automatically:

- 3S_CanDrv.lib
- 3S_CanOpenManager.lib



easy
Relay

easy
HMI

easy
Control

XC
100

XC
200

XC
121