ASCET RP(Rapid Prototyping)

Using ES910 & ES930

Version 1.1

Index

Overview

Rapid Prototyping Devices

ES910 (ES920, ES922), ES930

Rapid Prototyping Devices

ES910

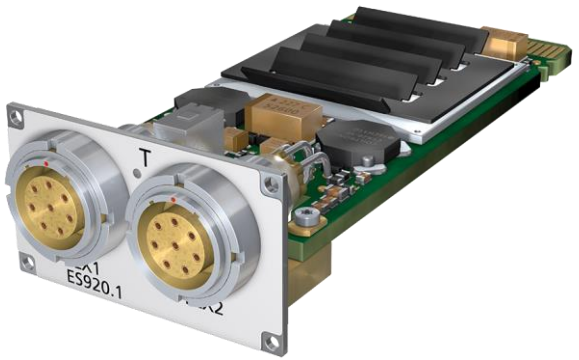
ES910

Rapid prototyping can be executed with the compact module ES910.3-A.

The ES910.3-A has a simulation controller and the ECU interfaces CAN, LIN, ETK and XETK and also one interface for Daisy Chain modules (ES4xx/ES63x/ES93x modules).

Rapid Prototyping Devices

ES920, ES922 Modules



ES920 – FlexRay Module

The ES920 FlexRay Module adds a FlexRay bus interface to the compact ES910 Prototyping and Interface Module. It is plugged into the extension slot of the ES910 module.

ES922 – CAN FD Module

The ES922 CAN FD module provides two additional CAN FD interfaces for the compact ES910 Prototyping and Interface Module. It is plugged into the extension slot of the ES910.3 module.

Rapid Prototyping Devices

ES930

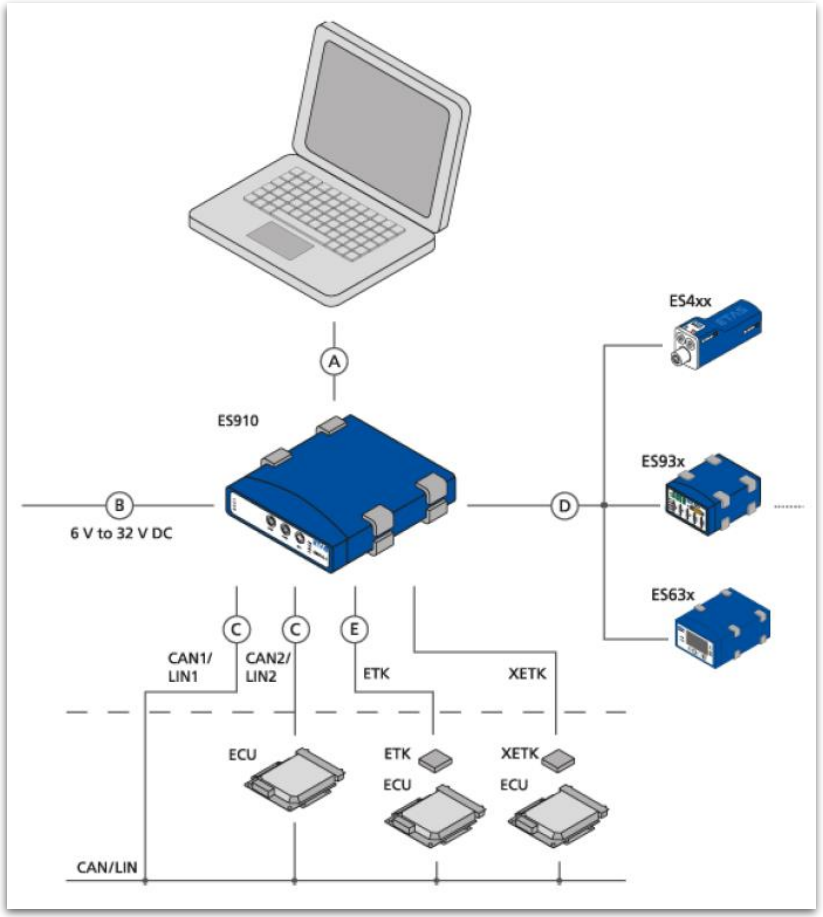
ES930

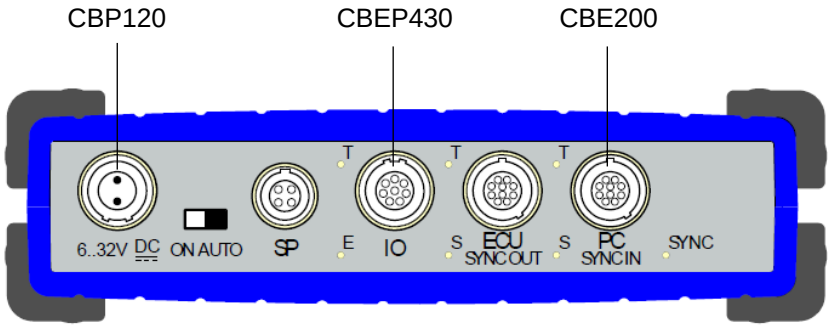
The ES930.1 Multi-I/O Module is a compact, robust and powerful metrology module with numerous input and output channels.

The module can be used for a variety of measuring tasks or for the control of additional hardware in the development, application and validation of electronic vehicle systems in the vehicle or the lab.

Rapid Prototyping Devices

ES910 with Daisy Chain Modules

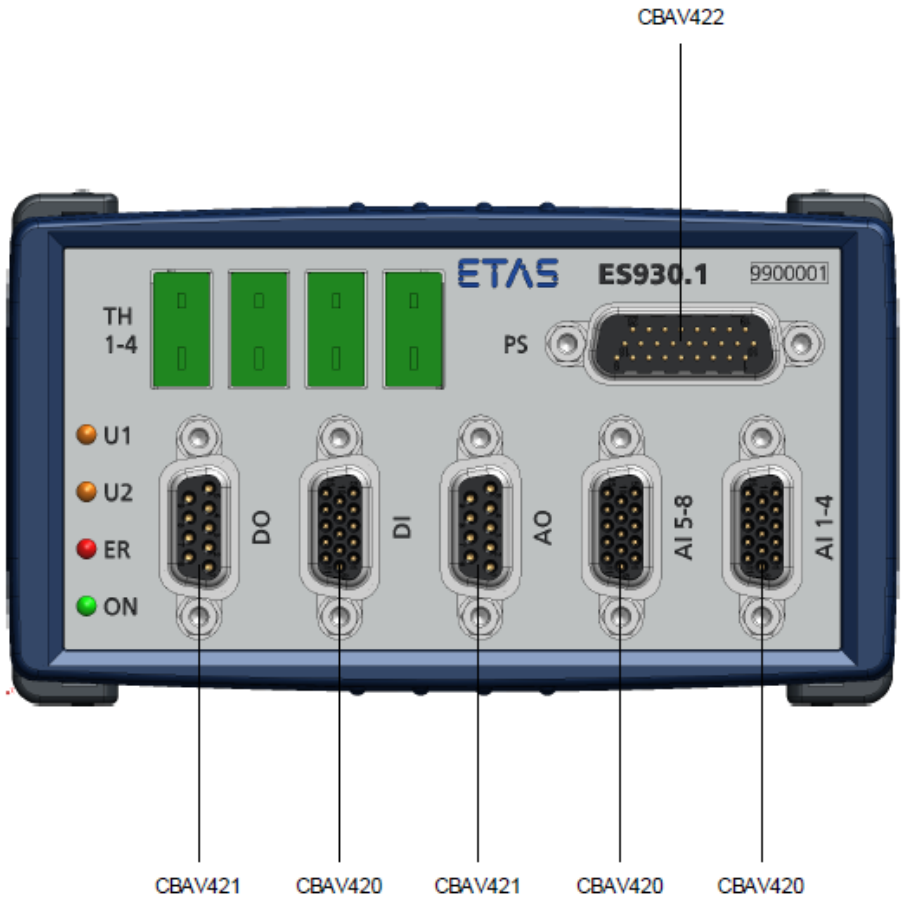




Cables in Fig. 10-7	Function	Short name
A	PC connection cable	CBE200
B	Power supply cable	CBP120
C	CAN/ LIN/ FlexRay connection cable	CBCFI100
D	Combined power supply and Ethernet cable	CBEP430
E	ETK connection cable	CBM150

Rapid Prototyping Devices

Front side of ES930

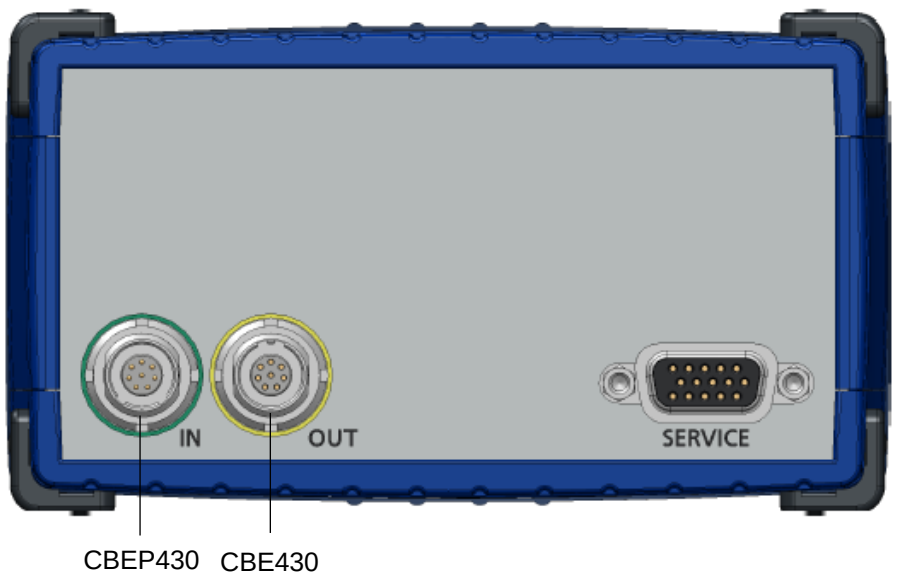


Name	Connection	Meaning
TH1-4	Thermo channel	Thermo measurement (channel 1 to channel 4)
PS	Power stages	Power stages (6 half bridges with current measurement) and external supply
DO	Digital outputs	Digital output channels (channel 1 to channel 6)
DI	Digital inputs	Digital input channels (channel 1 to channel 4)
AO	Analog outputs	Analog output channels (channel 1 to channel 4)
AI 5-8	Analog inputs	Analog input channels (channel 5 to channel 8); sensor supply channels (channel 3 and channel 4)
AI 1-4	Analog inputs	Analog input channels (channel 1 to channel 4); sensor supply channels (channel 1 and channel 2)

LED ER	LED ON	Operating state	Comment
Off	Off	Module off	No power supply, power supply defective
Off	Green	Normal	Module on, no error
Red	Off	Hardware error	Internal error
Red	Green	LED test	Briefly during initialization of the module
Red	Green	Internal error	Module features no valid calibration. Measurements are possible in principle. The measuring accuracy is out of specification. Send the module to ETAS for calibration/ repair.
Red, flashing	Green	Update process	Update of firmware

Rapid Prototyping Devices

Rear side of ES930



Name	Connection	Meaning
IN	Daisy chain In	Input; Ethernet connection to the previous module or the PC, power supply of the module
OUT	Daisy chain Out	Output; Ethernet connection and power supply of the succeeding module
SERVICE	Service	Reserved; for ETAS-internal application only; no provision of functions for the customer

Rapid Prototyping Devices

ES930 - "DO" connection (CBAV421)

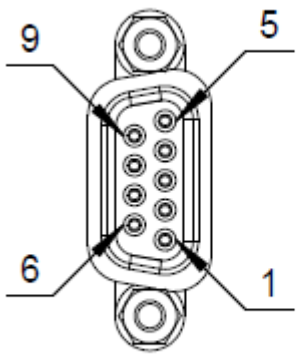


Fig. 13-1 "DO" connection

ES930.1 "DO" connection		Meaning
Pin	Signal	
1	DO_CH1	Digital output channel 1
2	DO_CH2	Digital output channel 2
3	DO_CH3	Digital output channel 3
4	DO_CH4	Digital output channel 4
5	DO_CH5	Digital output channel 5
6	DO_CH6	Digital output channel 6
7	DO_GND	Digital output channel, ground *)
8	DO_GND	Digital output channel, ground *)
9	DO_GND	Digital output channel, ground *)

*) : common ground

Rapid Prototyping Devices

ES930 - "DI" connection (CBAV420)

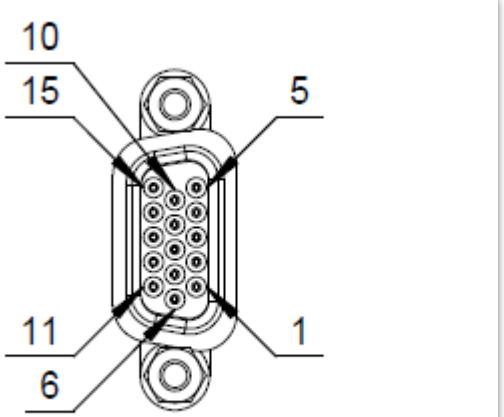


Fig. 13-2 "DI" connection

ES930.1 "DI" connection		Meaning
Pin	Signal	
1	DI_CH1	Digital input channel 1
2	DI_CH2	Digital input channel 2
3	DI_CH3	Digital input channel 3
4	DI_CH4	Digital input channel 4
6	DI_CH1_GND	Digital input channel 1, ground *)
7	DI_CH2_GND	Digital input channel 2, ground *)
8	DI_CH3_GND	Digital input channel 3, ground *)
9	DI_CH4_GND	Digital input channel 4, ground *)
5, 10, 11, 12, 13, 14, 15	N.C.	Not connected

*) : common ground

Rapid Prototyping Devices

ES930 - “AO" connection (CBAV421)

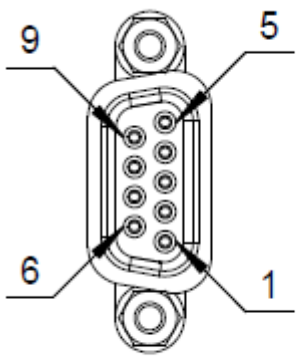


Fig. 13-3 "AO" connection

ES930.1 "AO" connection		Meaning
Pin	Signal	
1	AO_CH1	Digital output channel 1
2	AO_CH2	Digital output channel 2
3	AO_CH3	Analog output channel 3
4	AO_CH4	Analog output channel 4
5	N.C.	Not connected
6	N.C.	Not connected
7	AO_GND	Analog output channel, ground *)
8	AO_GND	Analog output channel, ground *)
9	AO_GND	Analog output channel, ground *)

*) : common ground

Rapid Prototyping Devices

ES930 - “AI" connection (1-4) (CBAV420)

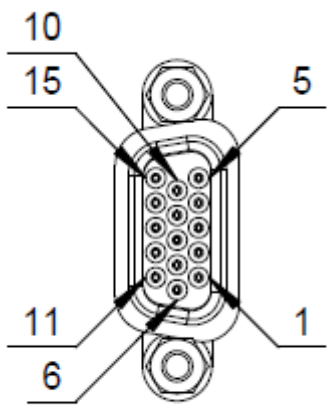


Fig. 13-5 "AI 1-4" connection

ES930.1 "AI 1-4" connection		Meaning
Pin	Signal	
1	AI_CH1	Analog input channel 1
2	AI_CH2	Analog input channel 2
3	AI_CH3	Analog input channel 3
4	AI_CH4	Analog input channel 4
5	N.C.	Not connected
6	AI_CH1_GND	Analog input channel 1, ground
7	AI_CH2_GND	Analog input channel 2, ground
8	AI_CH3_GND	Analog input channel 3, ground
9	AI_CH4_GND	Analog input channel 4, ground
10	N.C.	Not connected
11	SensorSupply_CH1	Sensor power supply, channel 1
12	SensorSupply_CH1_GND	Sensor power supply, channel 1, ground
13	SensorSupply_CH2	Sensor power supply, channel 2
14	SensorSupply_CH2_GND	Sensor power supply, channel 2, ground
15	N.C.	Not connected

Rapid Prototyping Devices

ES930 - “AI" connection (5-8) (CBAV420)

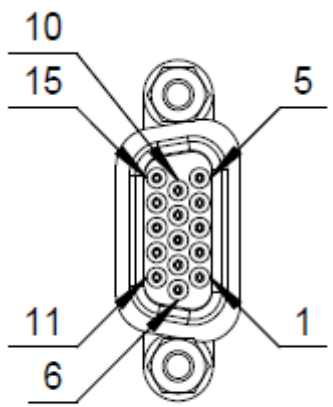


Fig. 13-4 "AI 5-8" connection

ES930.1 "AI 5-8" connection		Meaning
Pin	Signal	
1	AI_CH5	Analog output channel 5
2	AI_CH6	Analog output channel 6
3	AI_CH7	Analog input channel 7
4	AI_CH8	Analog input channel 8
5	N.C.	Not connected
6	AI_CH5_GND	Analog input channel 5, ground
7	AI_CH6_GND	Analog input channel 6, ground
8	AI_CH7_GND	Analog input channel 7, ground
9	AI_CH8_GND	Analog input channel 8, ground
10	N.C.	Not connected
11	SensorSupply_CH3	Sensor power supply, channel 3
12	SensorSupply_CH3_GND	Sensor power supply, channel 3, ground
13	SensorSupply_CH4	Sensor power supply, channel 4
14	SensorSupply_CH4_GND	Sensor power supply, channel 4, ground
15	N.C.	Not connected

Rapid Prototyping Devices

ES930 - “PS" connection (CBAV422)

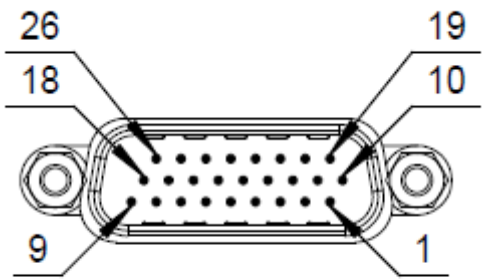


Fig. 13-6 "PS" connection

ES930.1 "PS" connection		Meaning
Pin	**Signal**	
1, 10	PS_CH1	Power stage, channel 1
2, 11	PS_CH2	Power stage, channel 2
3, 12	PS_CH3	Power stage, channel 3
4, 13	PS_CH4	Power stage, channel 4
5, 14	PS_CH5	Power stage, channel 5
6, 15	PS_CH6	Power stage, channel 6
7, 8, 9, 16, 17, 18, 26	PS_GND	Power stage, external power supply ground
19, 20, 21, 22, 23, 24, 25	PS_UBAT	Power stage, external power supply

Rapid Prototyping Devices

ES930 - “TH1-4" connection

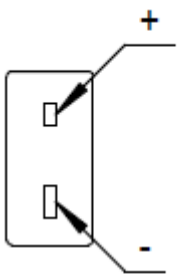


Fig. 13-7 "TH1-4" connection

ES930.1 "TH1-4" connection		Meaning
Pin	Signal	
+	In+	Input (+)
-	In-	Input (-)

Rapid Prototyping Devices

CBAV420.1 cable for use at the connections "DI", "AI 5-8" and "AI 1-4“

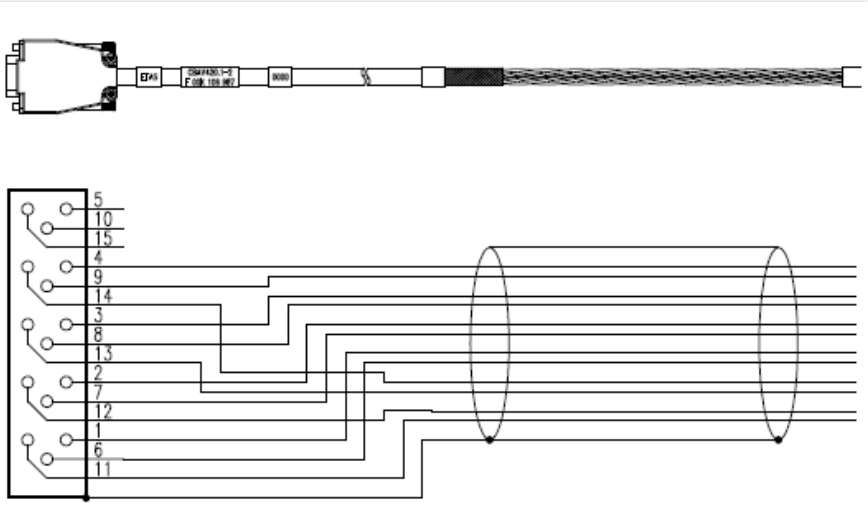


Fig. 13-11 CBAV420.1 cable with wiring plan

Product	Length	Order number
CBAV420.1-2	2 m / 6.5 ft	F 00K 106 987

"DI" / "AI 1-4" / "AI 5-8"	"DI" connection	"AI 5-8" connection	"AI 1-4" connection	CBAV420.1: Open cable end	
Pin	Signal	Signal	Signal	Pair	Color
4	DI_CH4	AI_CH8	AI_CH4	1	white
9	DI_GND	AI_CH8_GND	AI_CH4_GND	1	brown
3	DI_CH3	AI_CH7	AI_CH3	2	green
8	DI_GND	AI_CH7_GND	AI_CH3_GND	2	yellow
2	DI_CH2	AI_CH6	AI_CH2	3	gray
7	DI_GND	AI_CH6_GND	AI_CH2_GND	3	pink
1	DI_CH1	AI_CH5	AI_CH1	4	blue
6	DI_GND	AI_CH5_GND	AI_CH1_GND	4	red
14	N.C.	SensorSupply_CH4_GND	SensorSupply_CH2_GND	5	black
13	N.C.	SensorSupply_CH4	SensorSupply_CH2	5	violet
12	N.C.	SensorSupply_CH3_GND	SensorSupply_CH1_GND	6	gray/pink
11	N.C.	SensorSupply_CH3	SensorSupply_CH1	6	red/blue
5, 10, 15	N.C.	N.C.	N.C.		
Housing				Shield	

Rapid Prototyping Devices

CBAV421.1 cable for use at the connections "DO" and "AO"

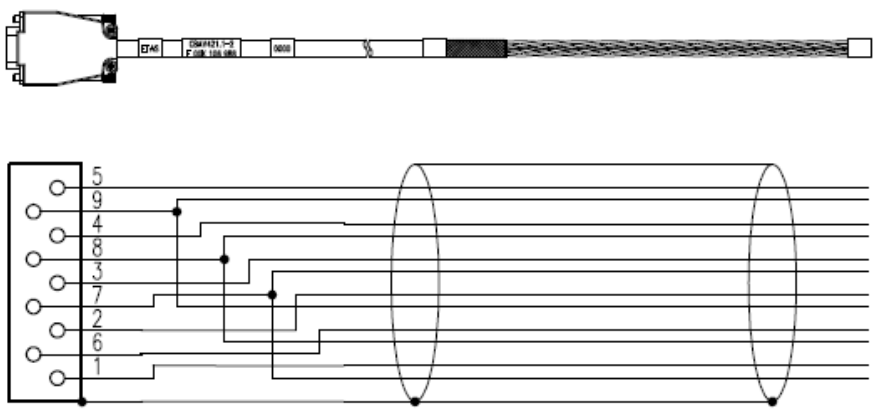


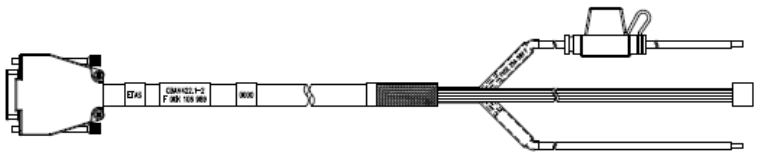
Fig. 13-12 CBAV421.1 cable with wiring plan

Product	Length	Order number
CBAV421.1-2	2 m / 6.5 ft	F 00K 106 988

DO / AO	DO connection	AO connection	CBAV421.1: Open cable end	
Pin	Signal	Signal	Pair	Color
5	DO_CH5	N.C.	1	white
9	DO_GND	AO_GND	1	brown
4	DO_CH4	AO_CH4	2	green
8	DO_GND	AO_GND	2	yellow
3	DO_CH3	AO_CH3	3	gray
7	DO_GND	AO_GND	3	pink
2	DO_CH2	AO_CH2	4	blue
9	DO_GND	AO_GND	4	red
6	DO_CH6	N.C.	5	black
8	DO_GND	N.C.	5	violet
1	DO_CH1	AO_CH1	6	gray/pink
7	DO_GND	AO_GND	6	red/blue
Housing				

Rapid Prototyping Devices

CBAV422.1 cable



Page A

Page B
Page C
Page D

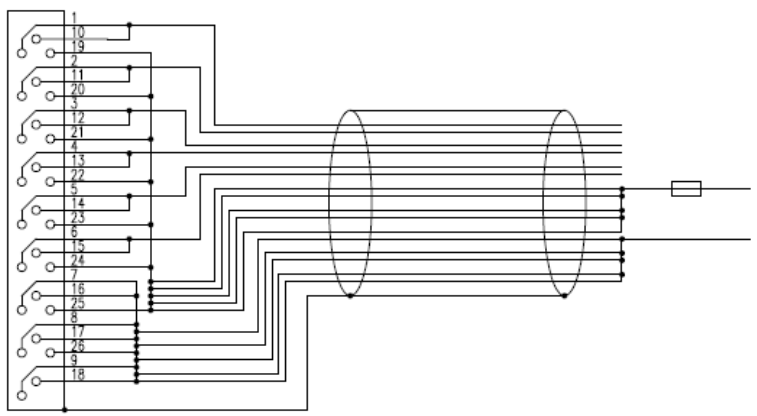


Fig. 13-13 CBAV422.1 cable with wiring plan

Product	Length	Order number
CBAV422.1-2	2 m / 6.5 ft	F 00K 106 989

HD-SUBD Pin	Signal	Open cable end Color	
1, 10	PS_CH1	white	Page C
2, 11	PS_CH2	brown	
3, 12	PS_CH3	green	
4, 13	PS_CH4	yellow	
5, 14	PS_CH5	gray	
6, 15	PS_CH6	pink	
19, 20, 21, 22, 23, 24, 25	PS_UBAT	blue	Page B
	PS_UBAT	red	
	PS_UBAT	black	
	PS_UBAT	violet	
	PS_UBAT	gray/pink	
7, 8, 9, 16, 17, 18, 26	PS_GND	red/blue	Page D
	PS_GND	white/green	
	PS_GND	brown/green	
	PS_GND	white/yellow	
	PS_GND	yellow/brown	
Housing		Shield	

Daisy Chain

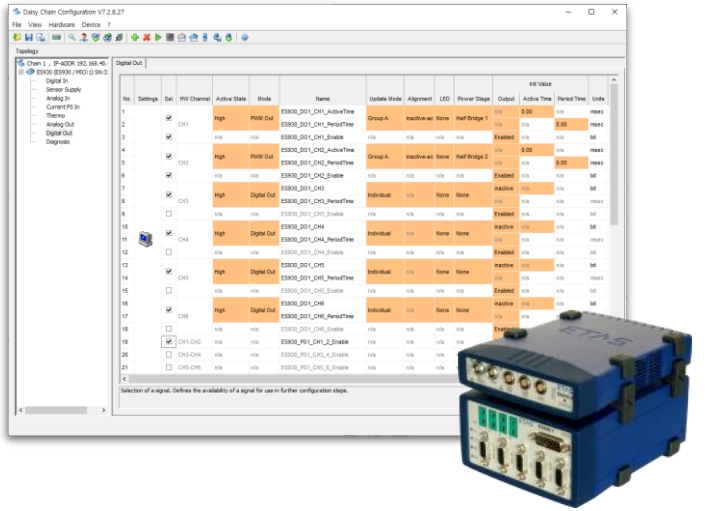
ES930 Multi-IO Module

Daisy Chain

Installation

Daisy Chain Configuration Program

The Daisy Chain configuration program, which is either integrated into INCA or provided as a standalone tool, enables you to configure the modules of the **ES4xx**, **ES63x** and **ES93x** product families on your PC.



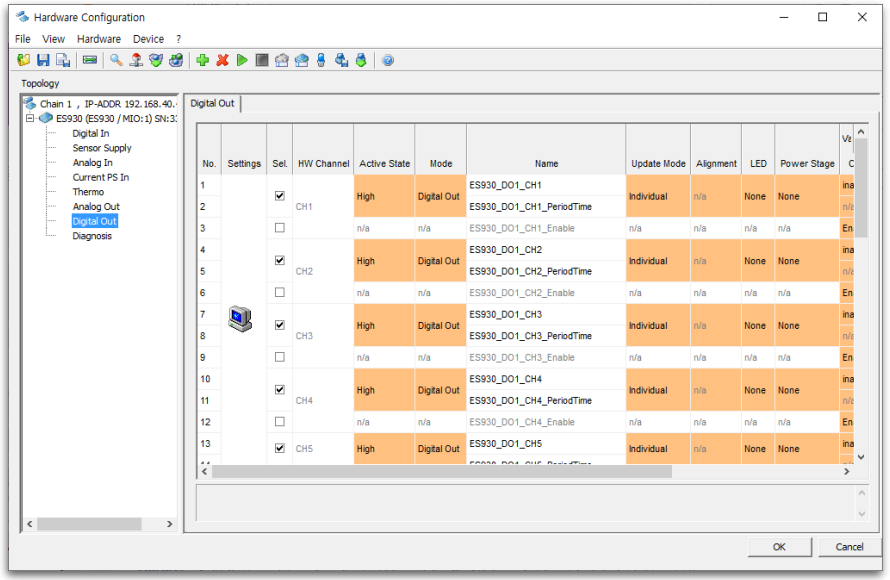
Daisy Chain installation

- Download : [Daisy Chain Configuration Tool - 다운로드센터 - ETAS]

Daisy Chain

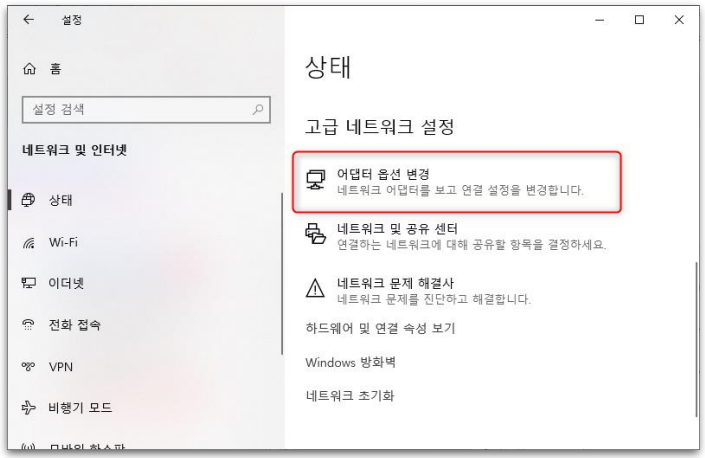
ES930 Multi-IO Module

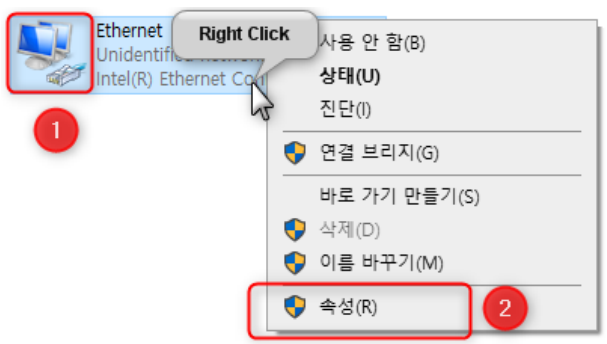
The ES930 Multi-I/O module functions as a very compact measuring module. It can, however, with its outputs also be used to control additional hardware in the vehicle or on the test bench. The module also extends the functionality of the ES910 Rapid Prototyping and Interface Module, which makes it suitable for controlling and analyzing sensors and actuators directly from within a given function model (Simulink ®, ASCET-RP, C-Code). Interconnecting the ES910 Rapid Prototyping Module and ES920 FlexRay Module with the ES930 Multi-I/O Module opens up a broad spectrum of options for systems requiring access to **ETK**, **XETK**, **FlexRay**, **CAN**, and **LIN**, along with concurrent access to all **current analog** and **digital systems**.

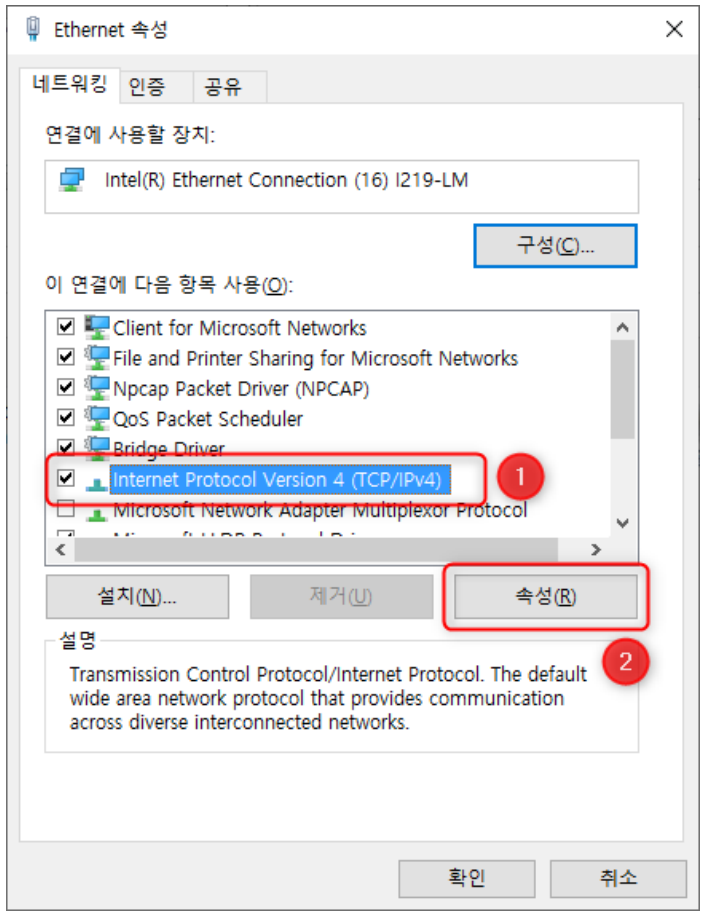


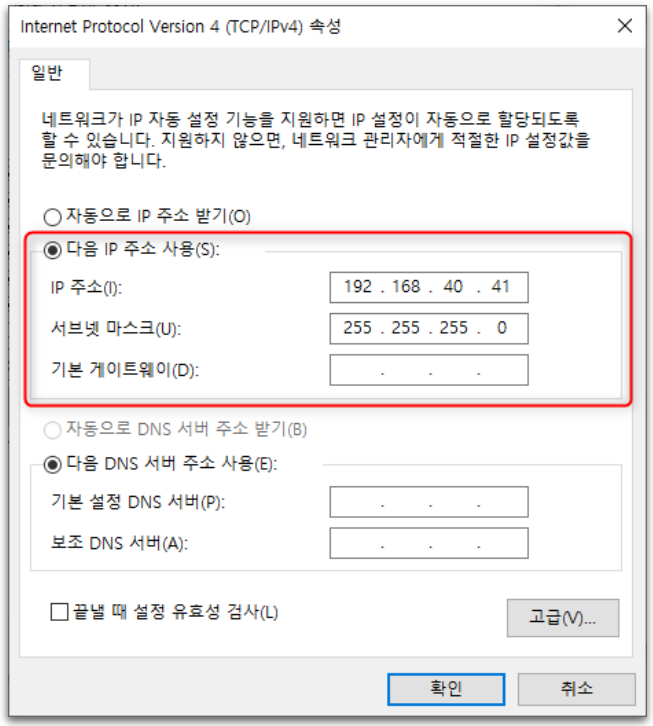
Daisy Chain

PC Network Setting





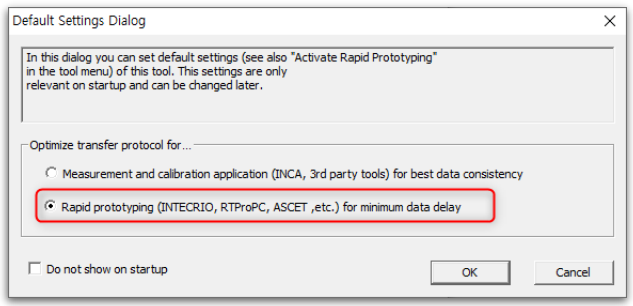


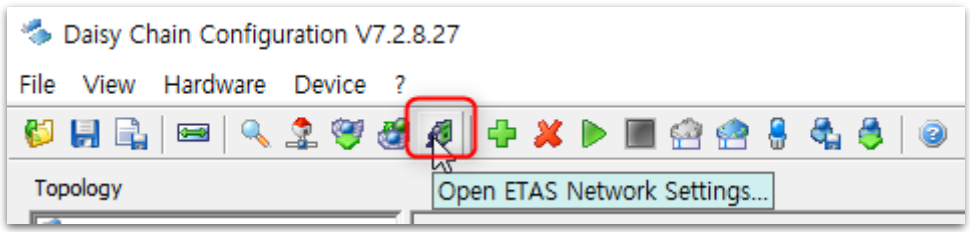


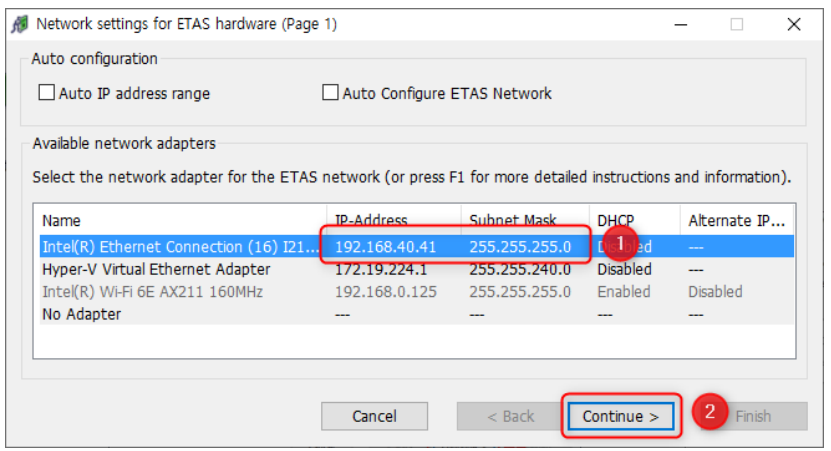
IP address	192.168.40.XX (10 ~ 227)
Subnet mask	Mask255.255.255.0

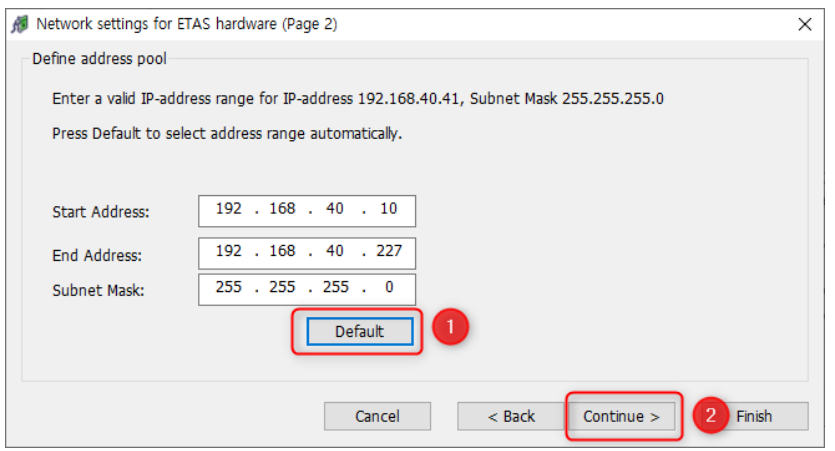
Daisy Chain

ETAS Network settings



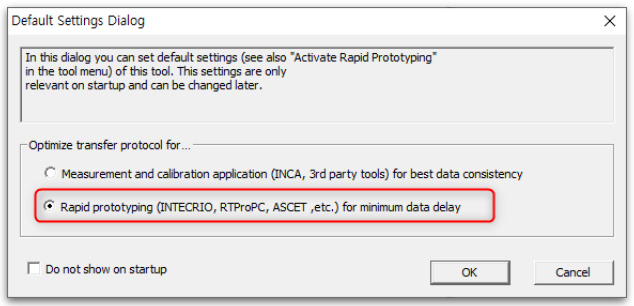


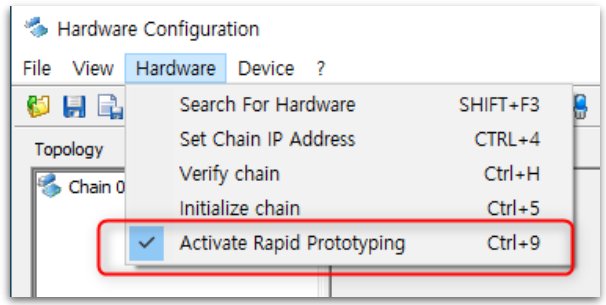


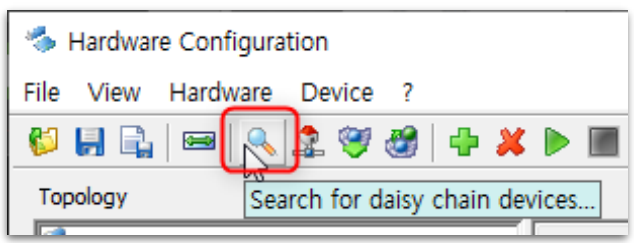


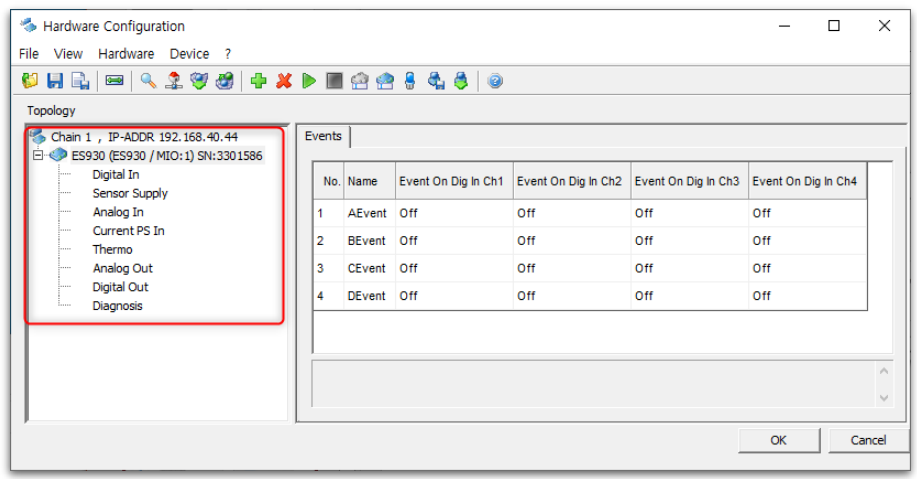
Daisy Chain

Hardware Configuration





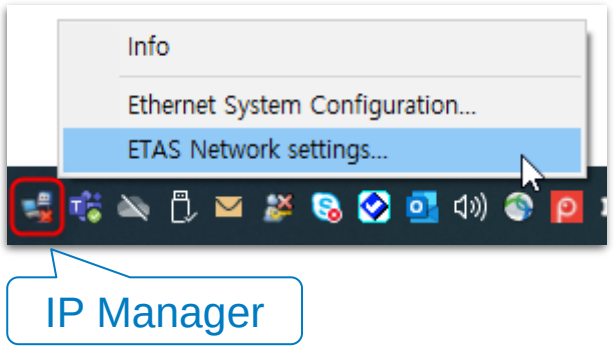


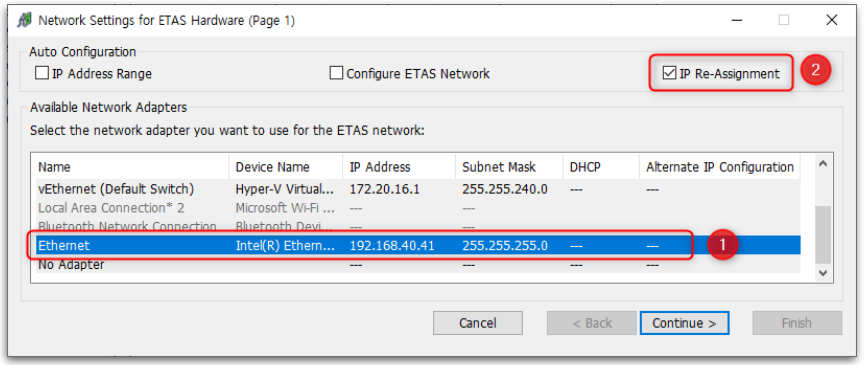


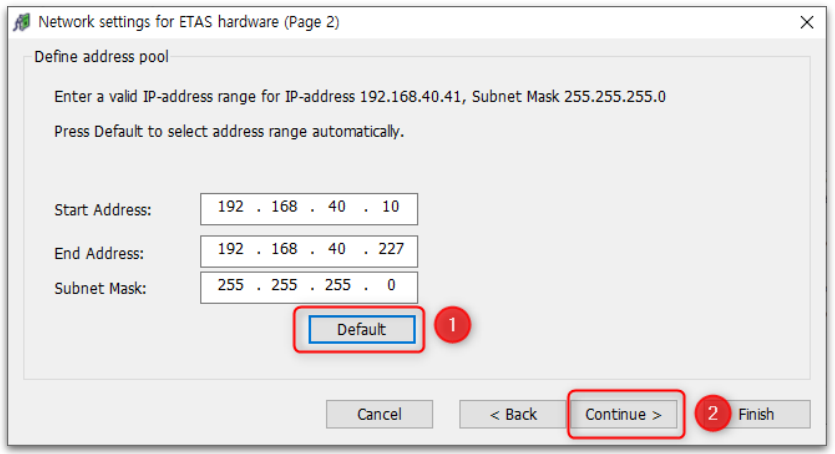
Daisy Chain

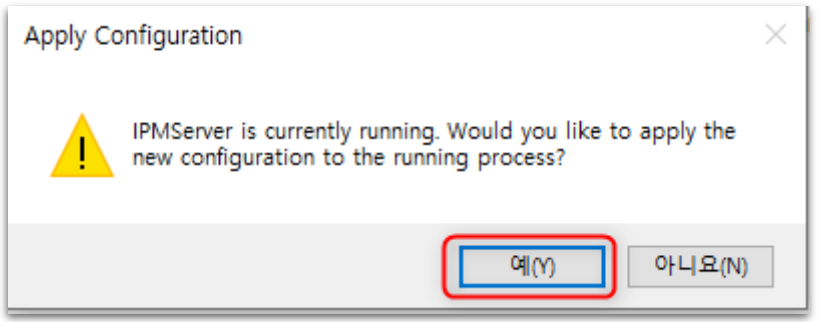
ETAS Network settings

If the connected device is not found







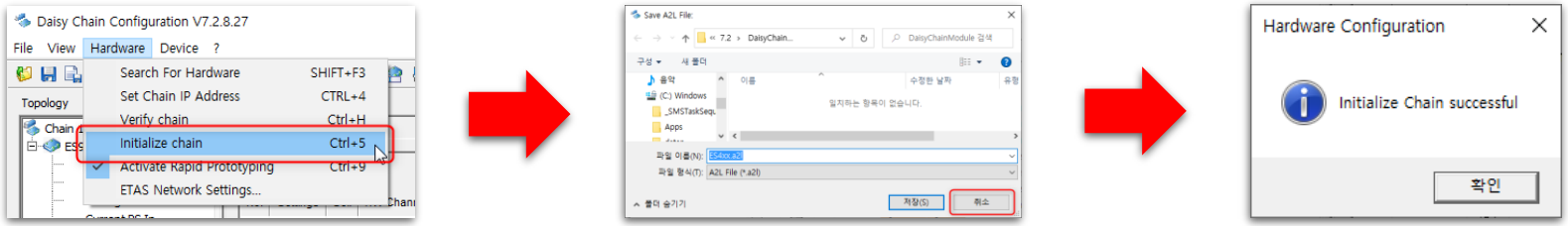


Daisy Chain

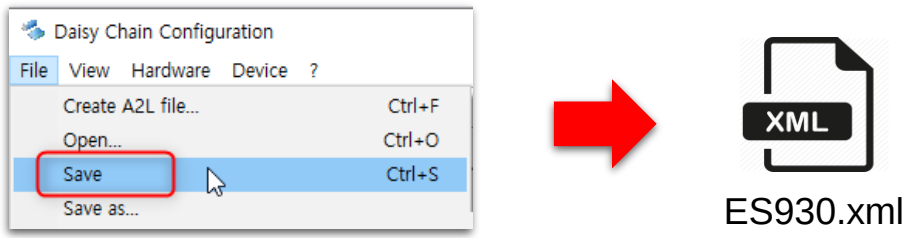
ES930 Configuration

1. Configure each input/output item as needed
   - Refer to the example pages (p.26, p.27)

2. Initialize chain (**Important ! :** It must be executed whenever the configuration of the daisy chain changes.)
   - Hardware > Initialize chain



3. save it as a data model (*.xml)
   - File > Save

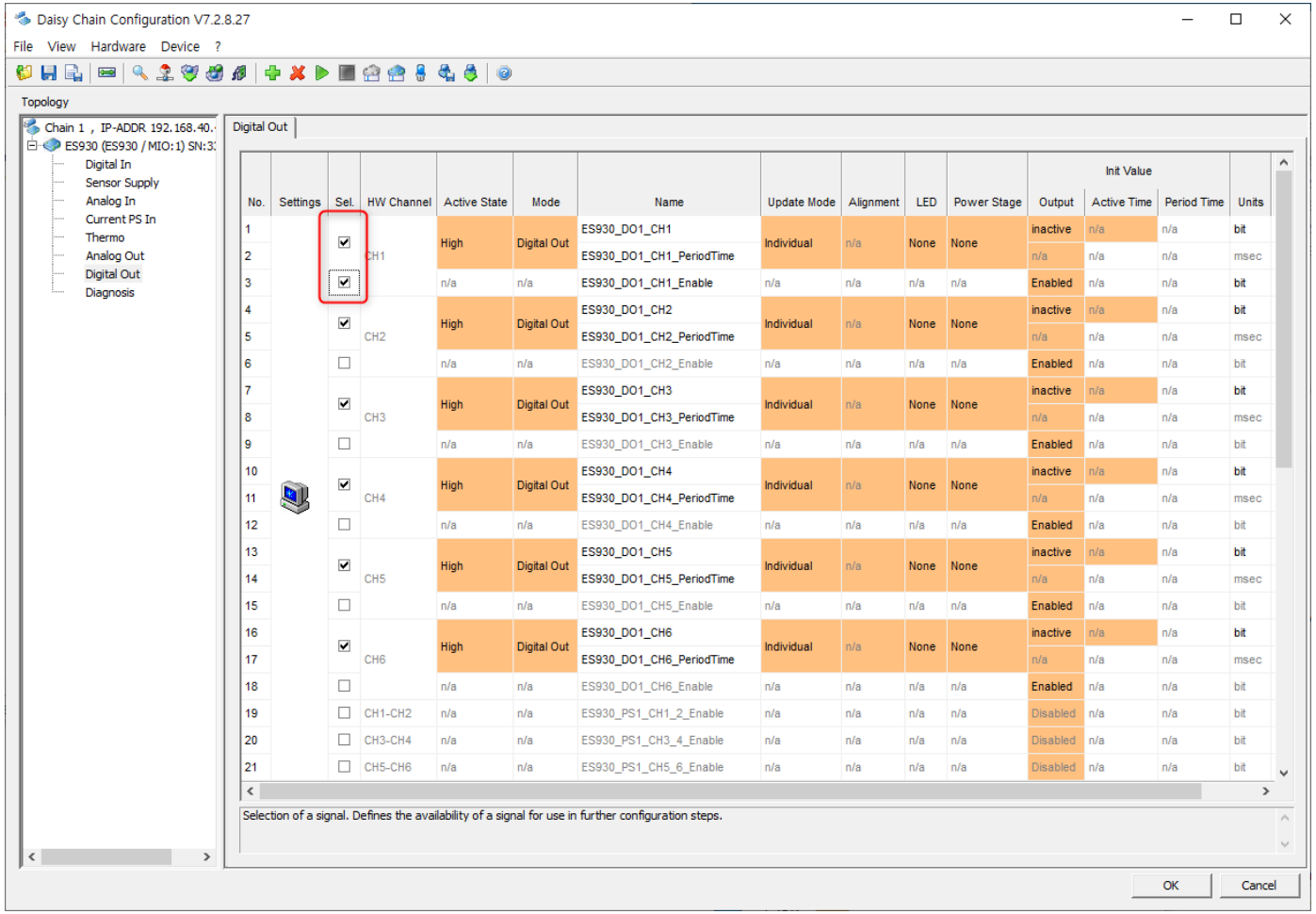


Daisy Chain

ES930 Configuration - example

Digital Out

- Mode : Digital Out

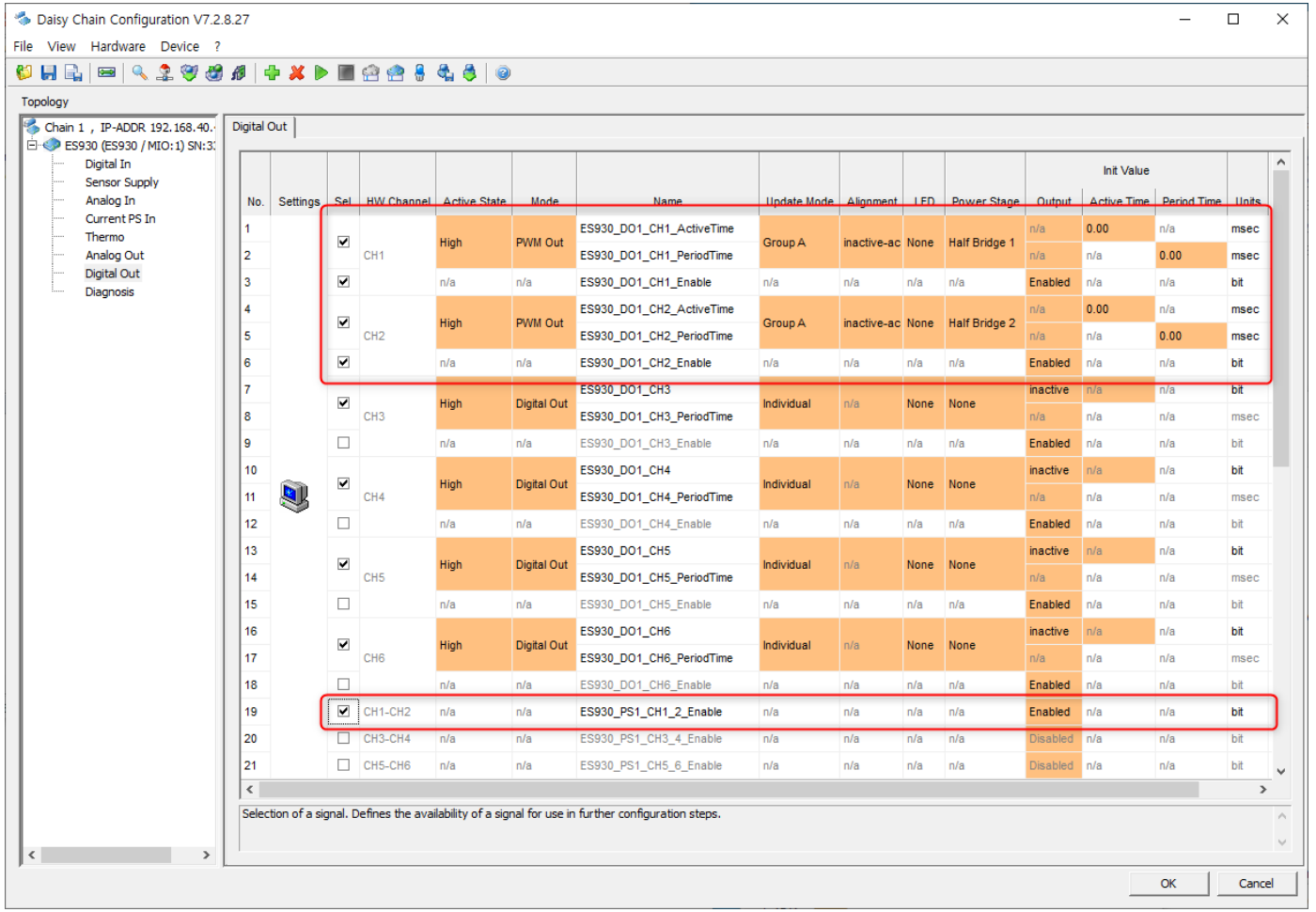


Daisy Chain

ES930 Configuration - example

Digital Out

- Mode : PWM Out



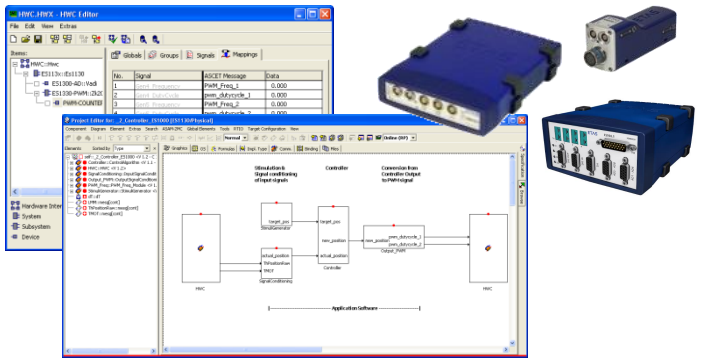
ASCET RP

ASCET RP

Installation

ASCET RP

The execution of real-time software requires experimenting hardware that is capable of real-time processing. **ASCET-RP** is used to integrate the **ES900** experimental target (E-Target) in ASCET. Together with I/O periphery, powerful development systems can be built on the basis of these experimental targets.



ASCET installation

- Download : ASCET V6.4.7
- Required installation software : ASCET, ASCET-MD, ASCET-RP

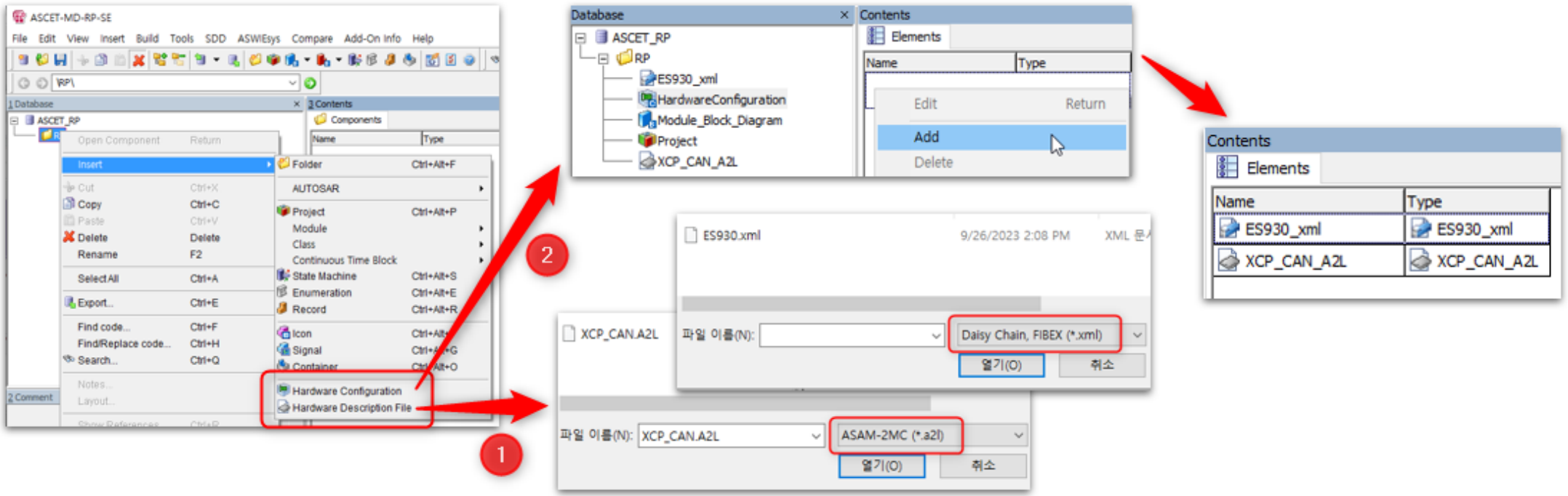
ASCET RP

Hardware Configuration

Create “**Hardware Description File**” and “**Hardware Configuration**”

① Hardware Description File > *.xml (Daisy Chain) or *.A2L

② Hardware Configuration > Add > Hardware Description File element(*.xml or *.A2L)

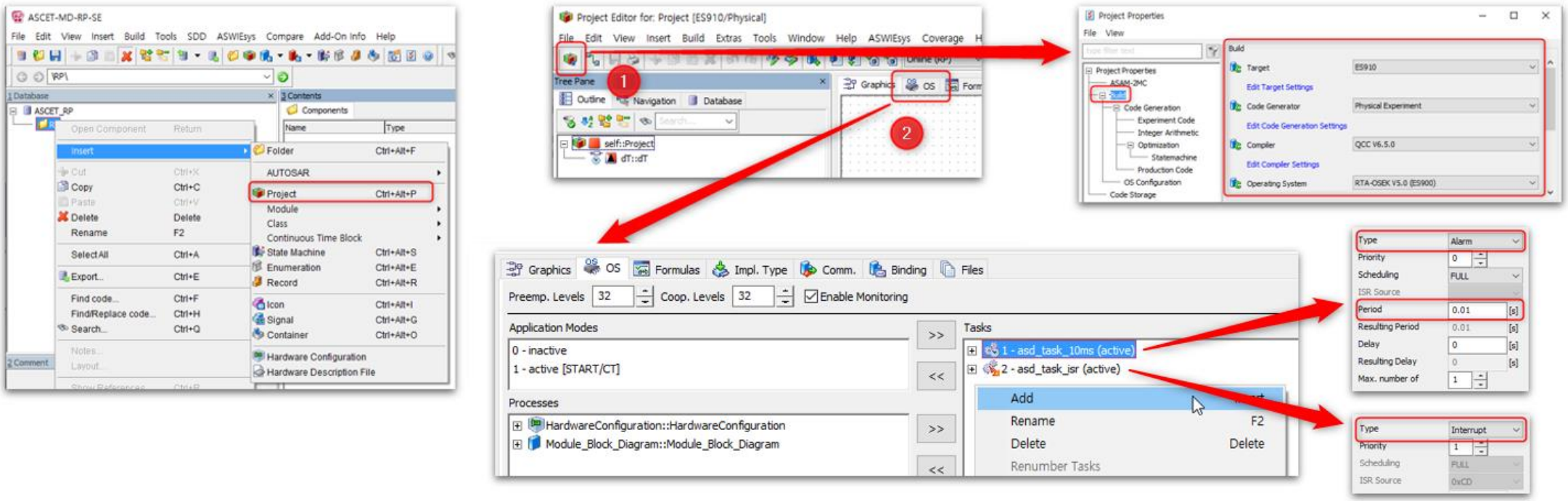


Project

Create a “Project” component : Code generation & Experiment

① Project : Project Properties > Build > Target > **ES910**

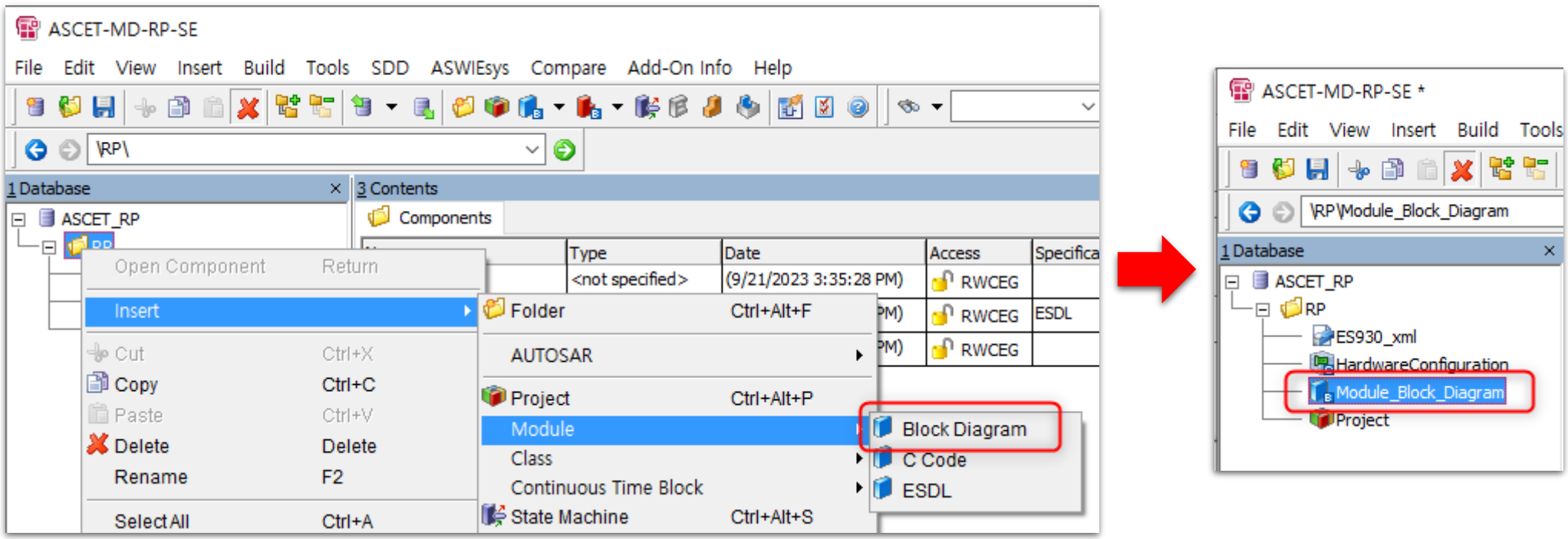
② Project : “OS” tab > “Tasks” > Add > Create tasks as much as needed (At least one ‘alarm’ type and one ‘interrupt’ type)



ASCET RP

Module

Create a “Module” component : Modeling & Algorithm

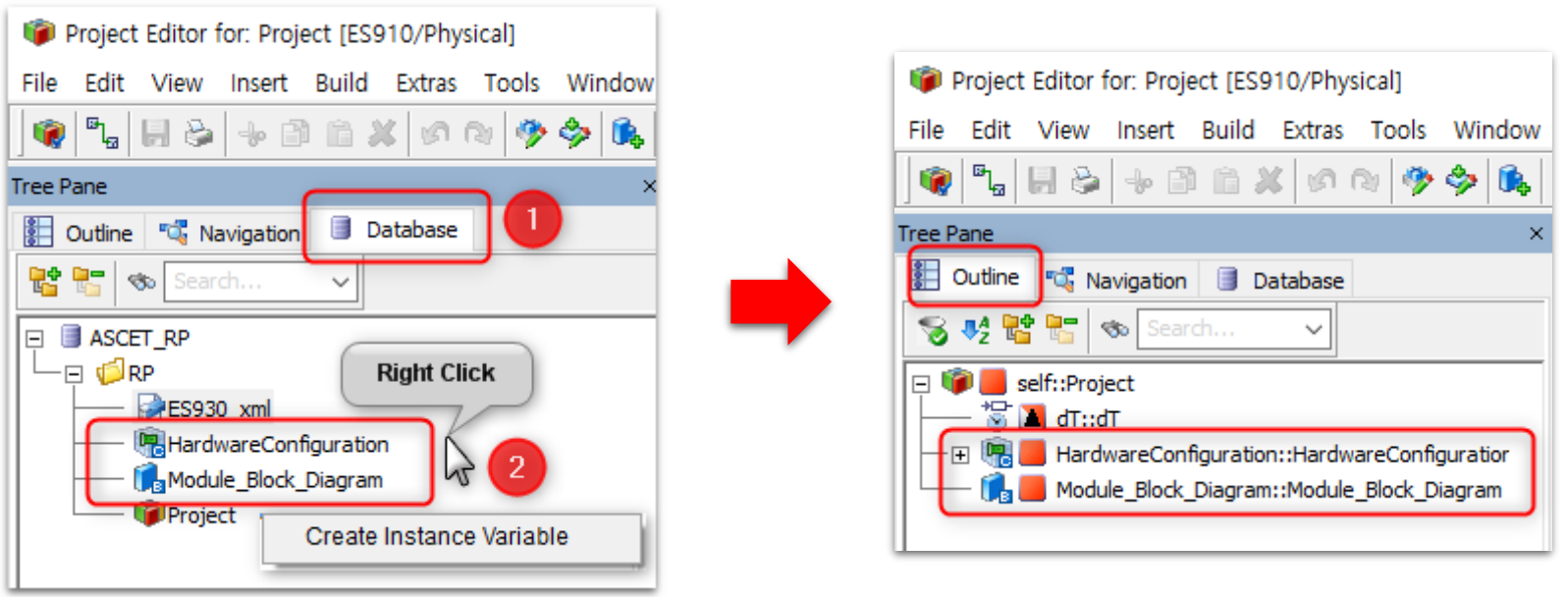


ASCET RP

Instances

Create instances of “Hardware Configuration” and “Module”

- Project Open > “Database” tab > “Hardware Configuration” and “Module” > “Create Instance Variable”



ASCET RP

Module (or Class)

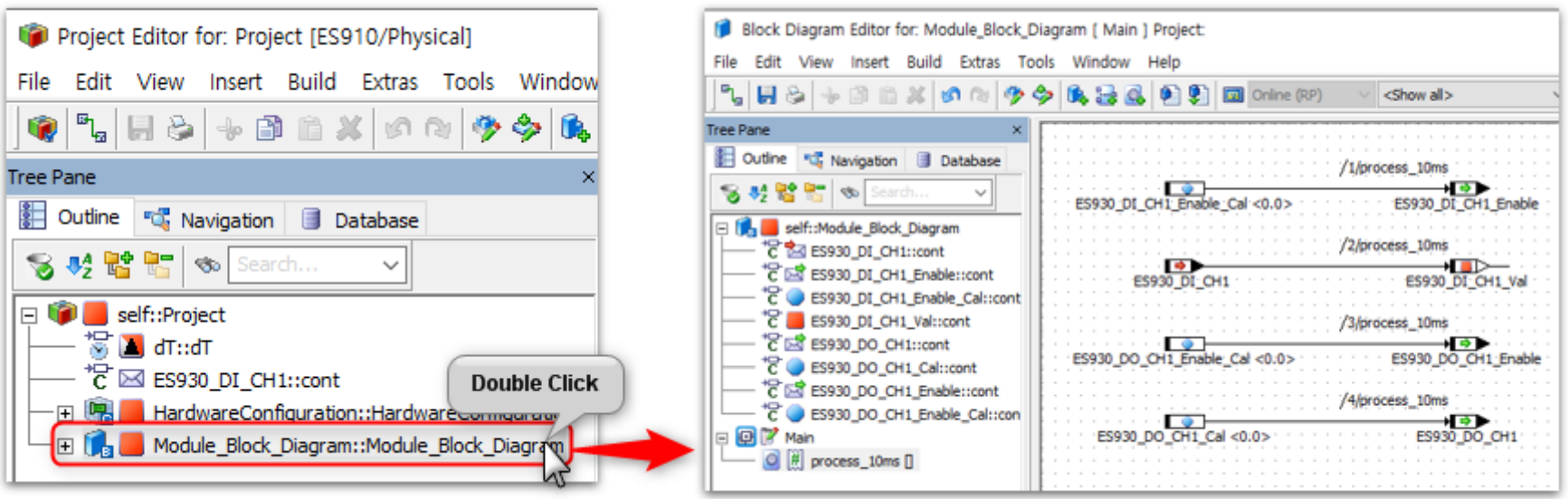
Create “Messages”, “Parameters” and “Processes"

- Messages : Elements for matching signals of daisy chain

  Ex) ES930_DO_CH1_Enable, ES930_DO_CH1, ES930_DI_CH1
- Parameters & Variables : Elements for getting or setting the value of the messages

  Ex) ES930_DO_CH1_Enable_Cal, ES930_DO_CH1_Cal, ES930_DI_CH1_Val
- Processes : Process for matching task

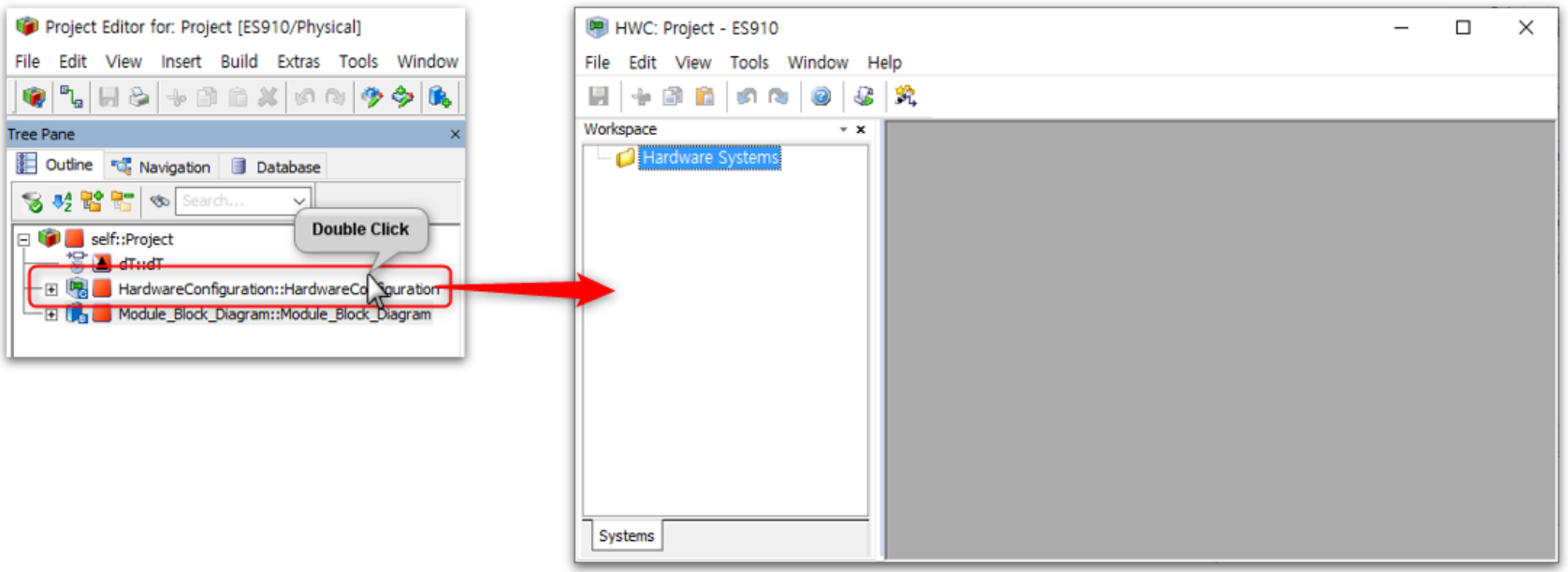
  Ex) process_10ms



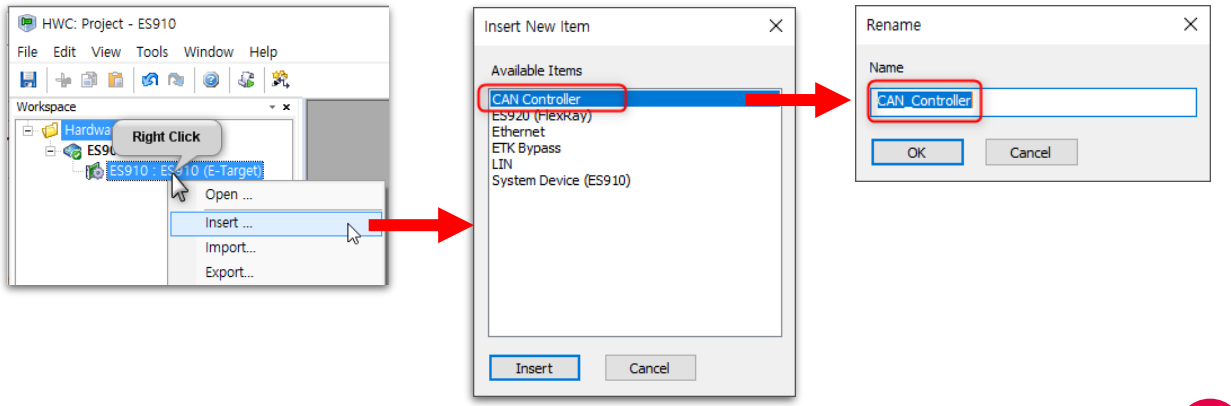
ASCET RP

Open Hardware Configuration

Configuration to match daisy chain **signals** and ASCET **messages**

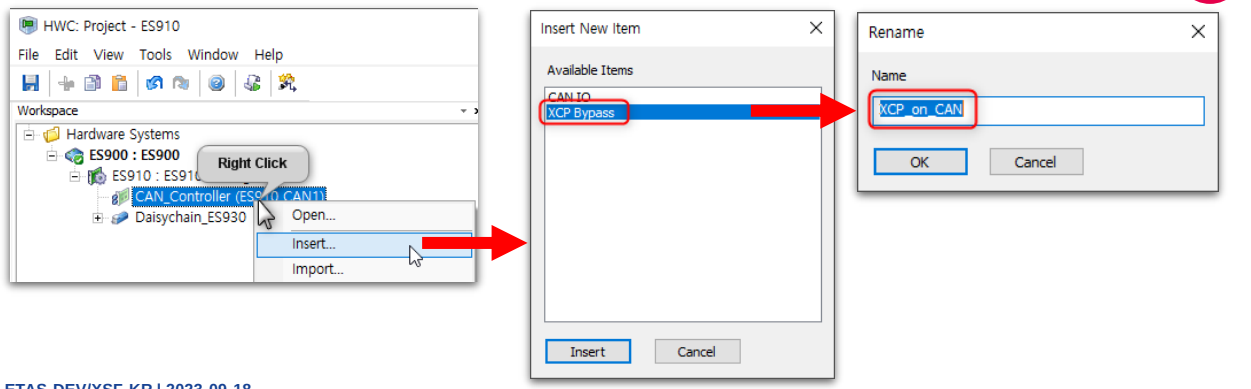


Hardware Configuration – XCP on CAN Configuration



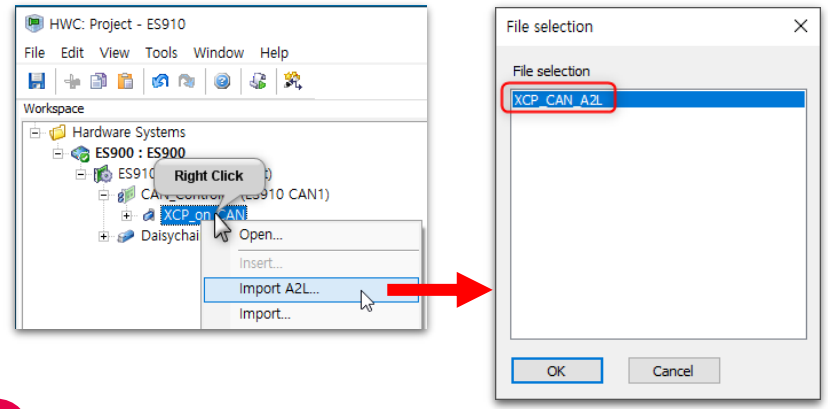
ES910 : ES910 (E-Target) > Insert… > CAN Controller > CAN_Controller

1



CAN_Controller (ES910 CAN1) > Insert… > XCP Bypass > XCP_on_CAN

2



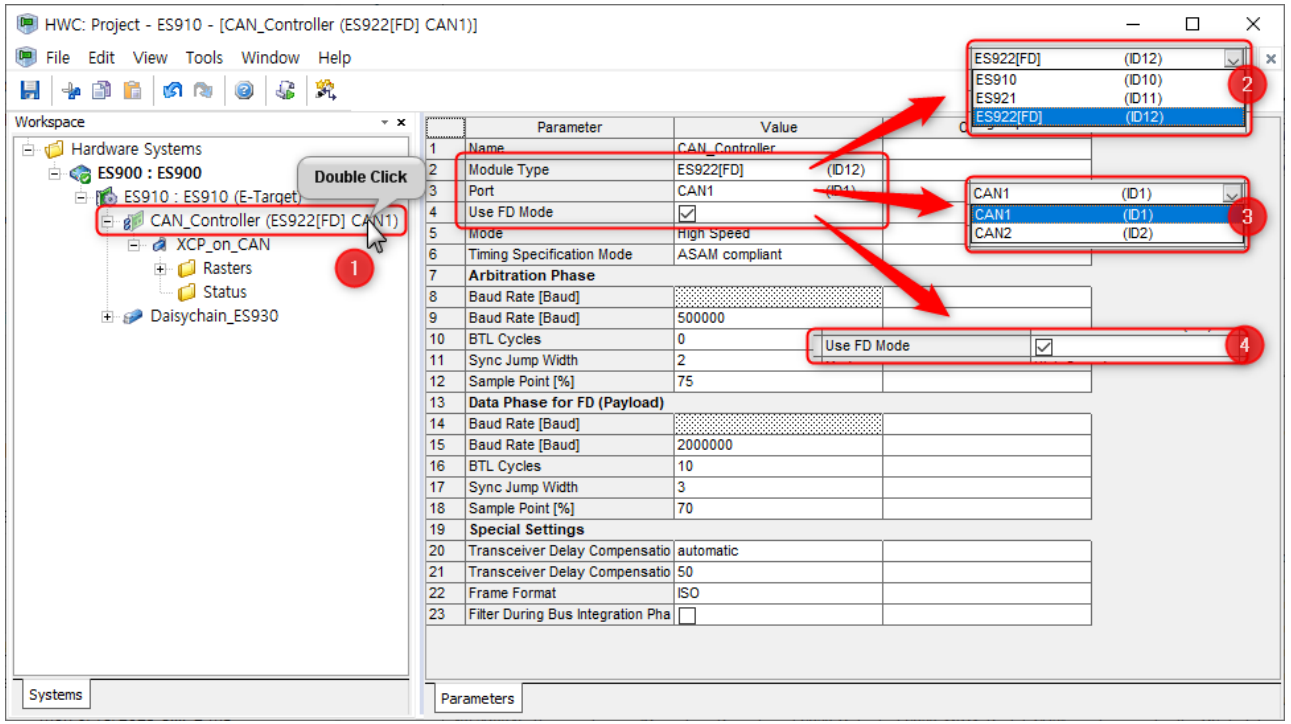
3

XCP_on_CAN > Import A2L… > XCP_CAN_A2L

ASCET RP

Hardware Configuration – Parameters

① Double click “CAN_Controller(ESXXX CANX)”
② Select “Module Type” : ES910, ES921, ES922(CANFD)
③ Select “Port” : CAN1, CAN2
④ Check “Use FD Mode” : Check this option if you need to use CANFD

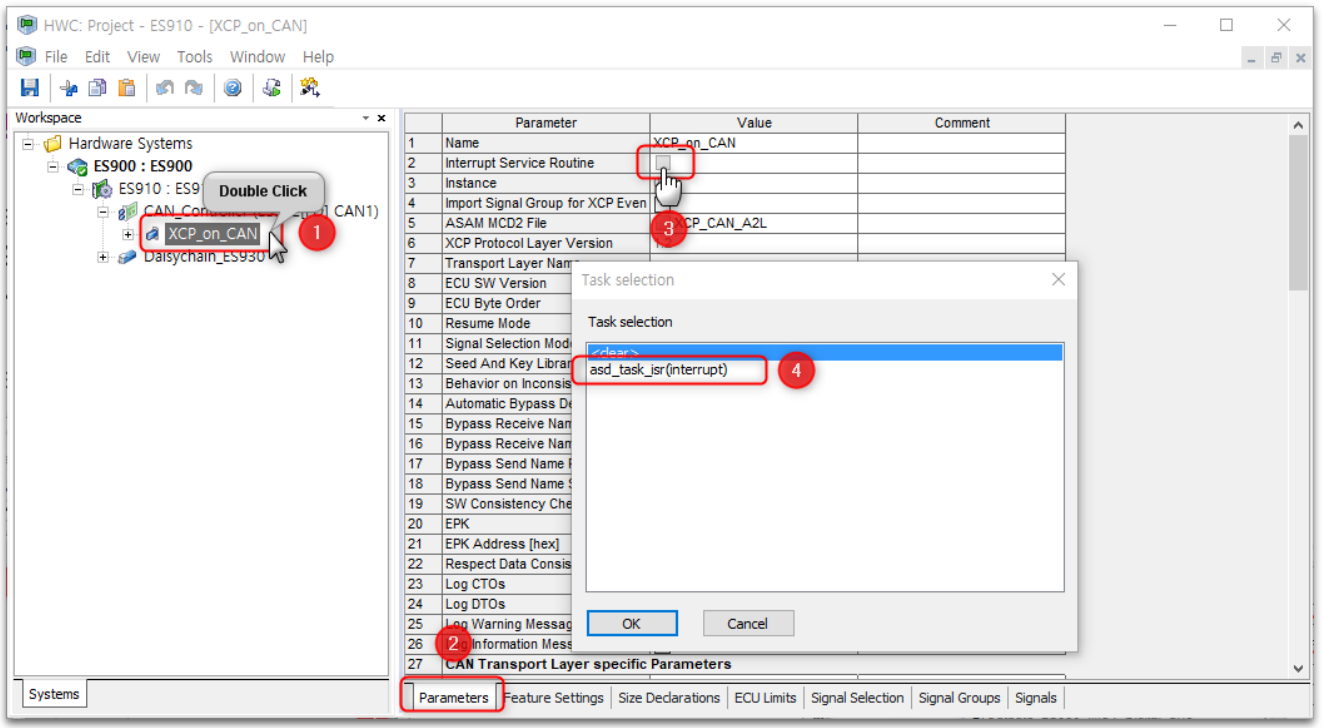


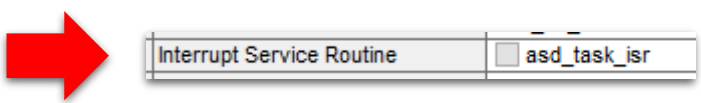
	Parameter	Value
1	Name	CAN_Controller
2	Module Type	ES922[FD] (ID12)
3	Port	CAN1 (ID1)
4	Use FD Mode	☑
5	Mode	High Speed
6	Timing Specification Mode	ASAM compliant
7	**Arbitration Phase**	
8	Baud Rate [Baud]	
9	Baud Rate [Baud]	500000
10	BTL Cycles	0
11	Sync Jump Width	2
12	Sample Point [%]	75
13	**Data Phase for FD (Payload)**	
14	Baud Rate [Baud]	
15	Baud Rate [Baud]	2000000
16	BTL Cycles	10
17	Sync Jump Width	3
18	Sample Point [%]	70
19	**Special Settings**	
20	Transceiver Delay Compensatio	automatic
21	Transceiver Delay Compensatio	50
22	Frame Format	ISO
23	Filter During Bus Integration Pha	☐

ASCET RP

Hardware Configuration – Parameters

① Double click “XCP_on_CAN”
② Select “Parameters” tab
③ Select the checkbox in the “Value” field of the Interrupt Service Routine to assign to task
④ Select an interrupt task to assign

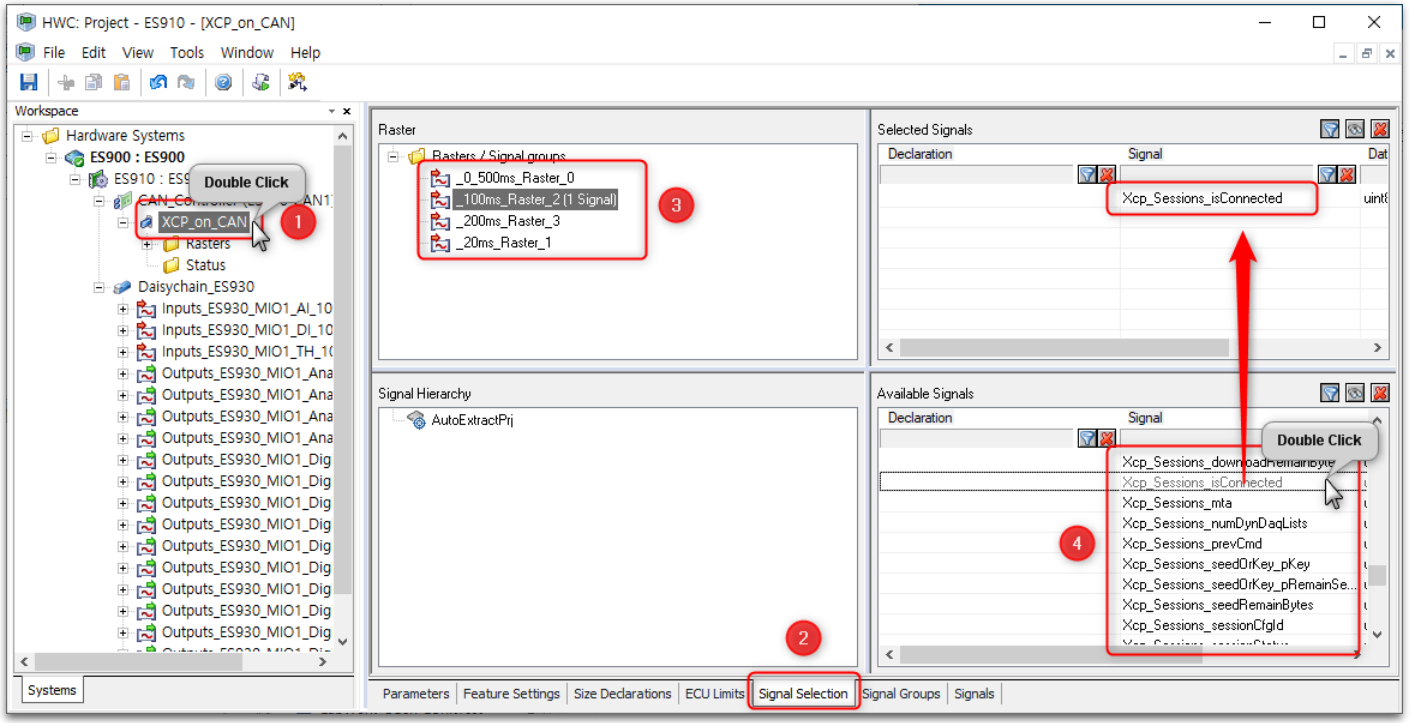




ASCET RP

Hardware Configuration – Signal Selection

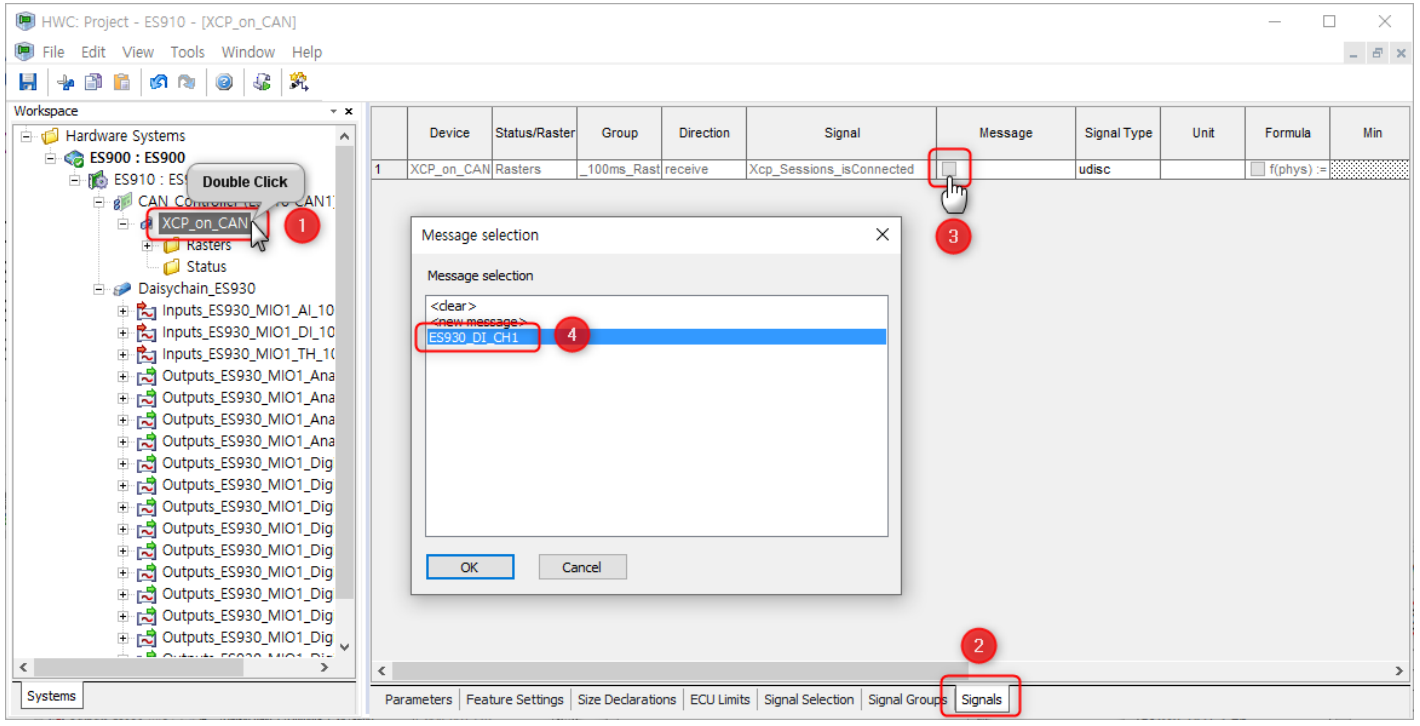
① Double click “XCP_on_CAN”
② Select “Signal Selection” tab
③ Select the one of rasters or signal groups
④ Double click the one of signals



ASCET RP

Hardware Configuration – Signals

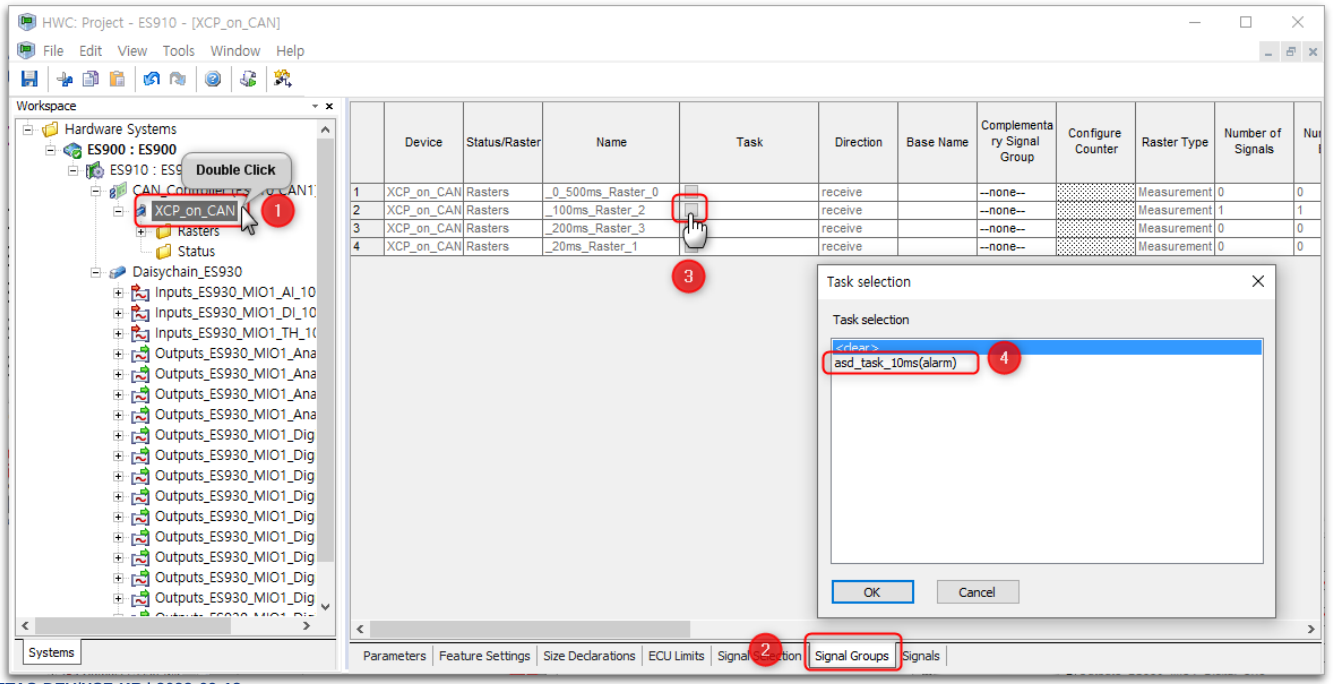
① Double click “XCP_on_CAN”
② Select “Signals” tab
③ Select the checkbox in the “Message” field of the signal to match
④ Select a message to match

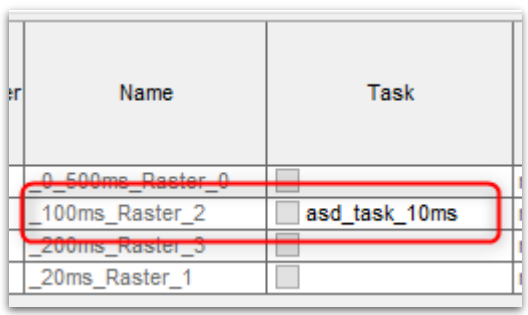


ASCET RP

Hardware Configuration – Signal Groups

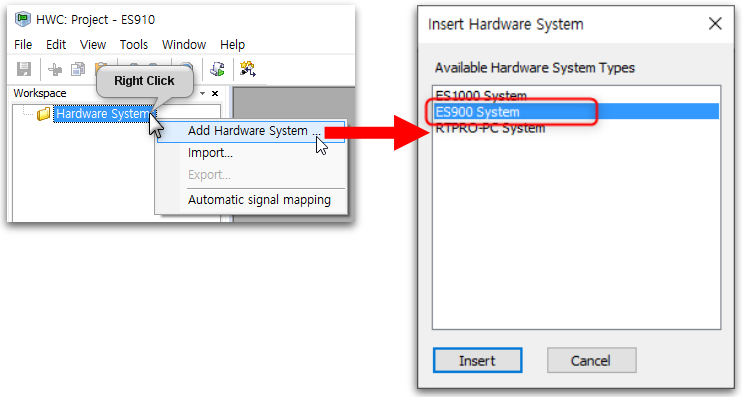
① Double click “XCP_on_CAN”
② Select “Signal Groups” tab
③ Select the checkbox in the “Task” field of the signal to assign to task
④ Select a task to assign
⑤ Save workspace





ASCET RP

Hardware Configuration – ES930 Configuratiopn

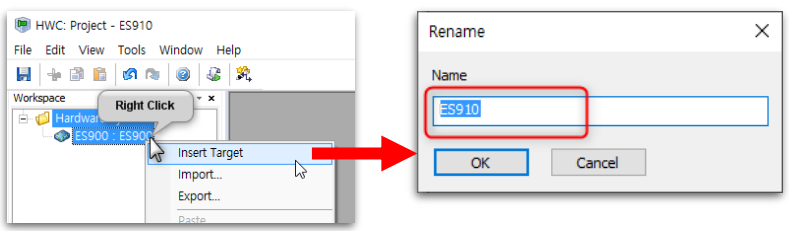


Hardware System > Add Hardware System… > ES900 System

1

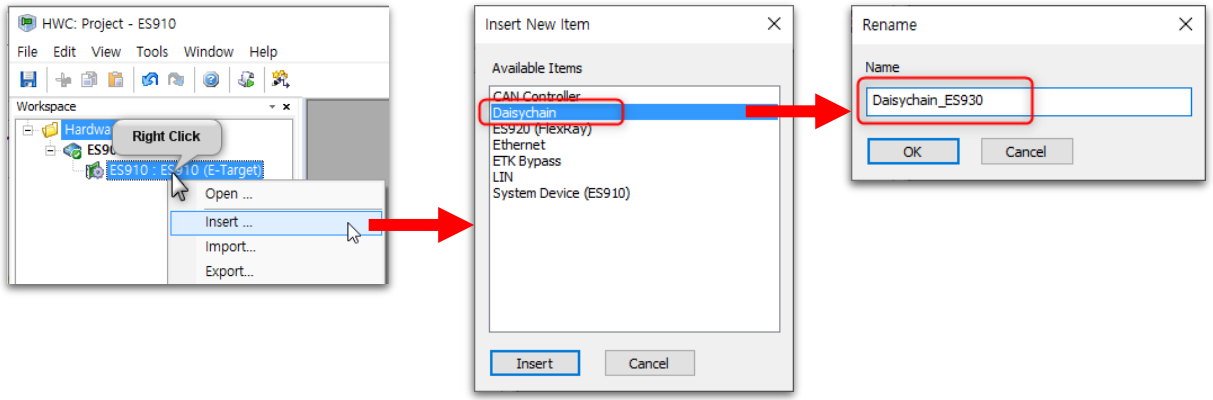
ES900 : ES900 > Insert Target > ES910

2



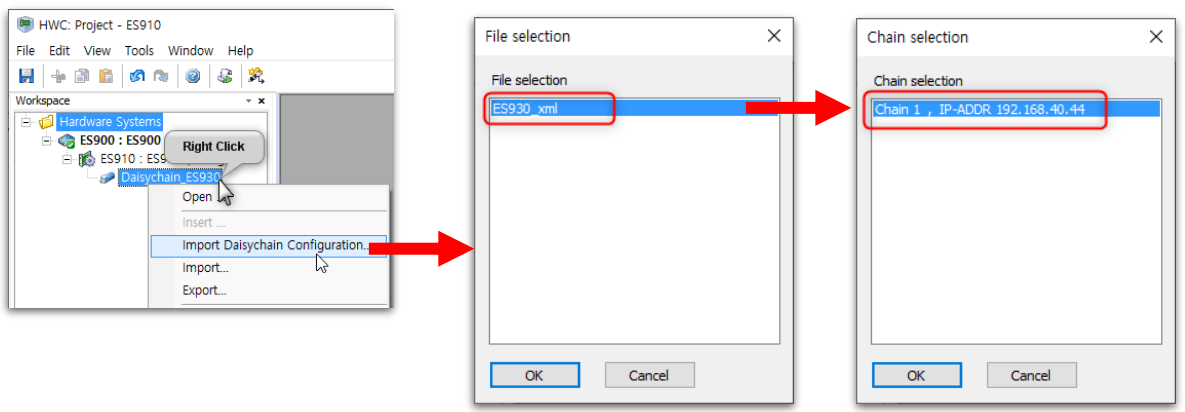
3

ES910 : ES910 (E-Target) > Insert… > Daisychain > Daisychain_ES930



4

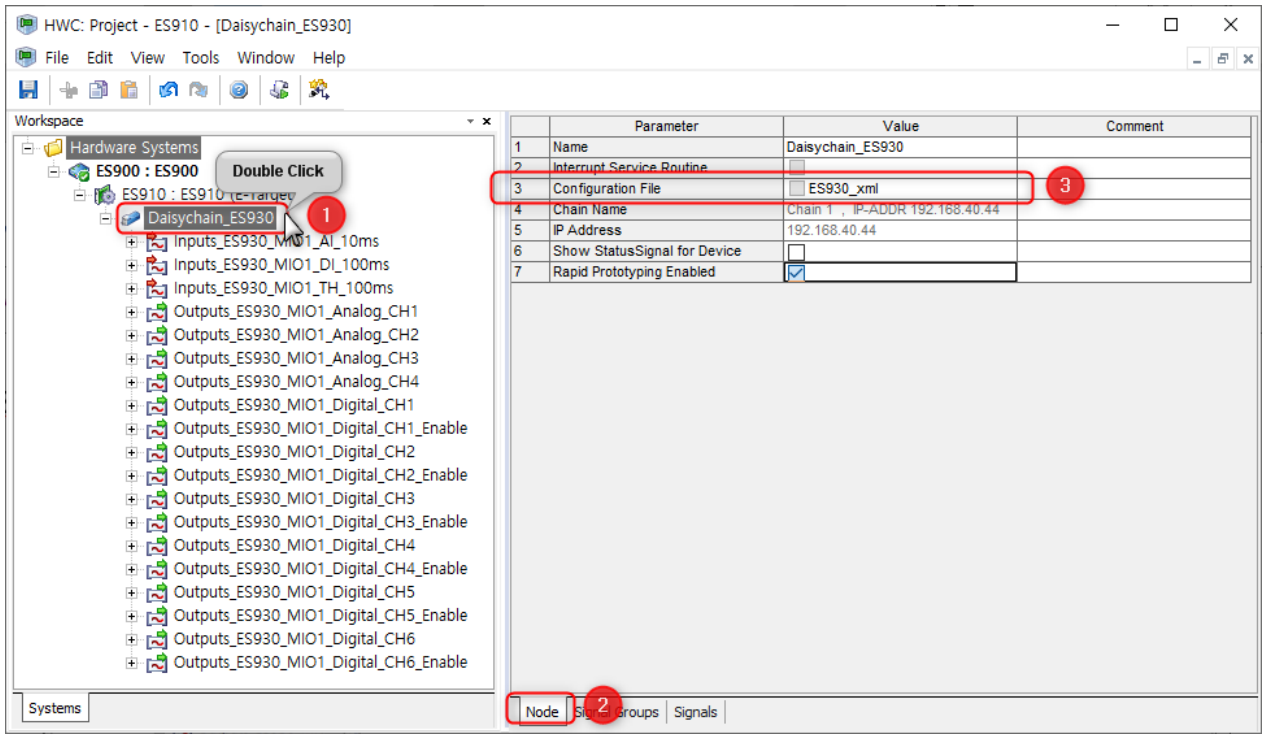
Daisychain_ES930 > import Daisychain Configuration… > ES930.xml > Chain 1, IP-ADDR 192.168.xx.xx



ASCET RP

Hardware Configuration – Node

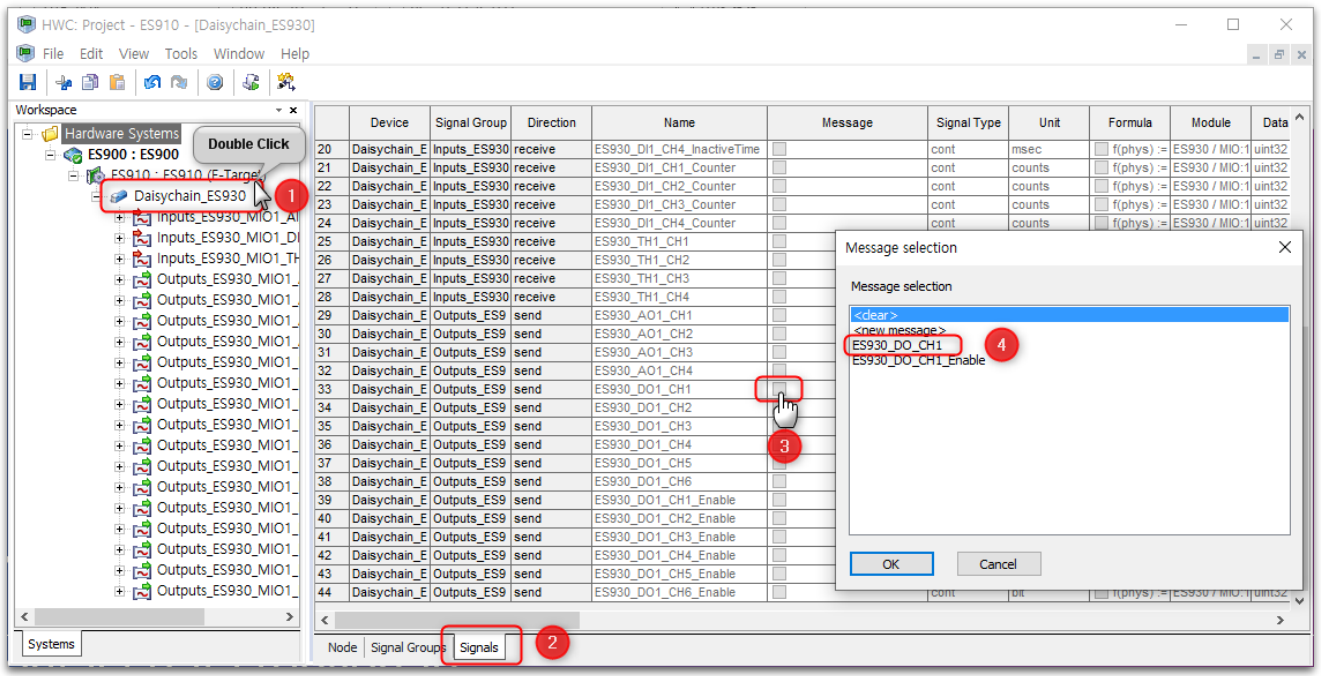
① Double click “Daisychain_ES930”
② Select “Node” tab
③ Check the selected xml file in the "Configuration File" field

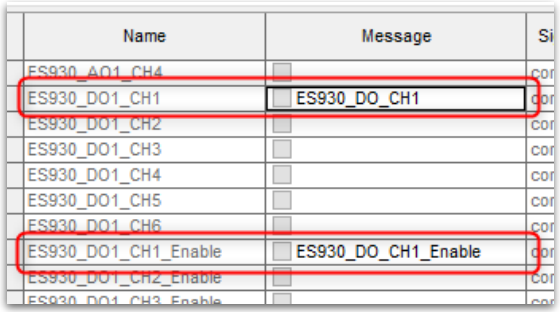


ASCET RP

Hardware Configuration – Signals

① Double click “Daisychain_ES930”
② Select “Signals” tab
③ Select the checkbox in the “Message” field of the signal to match
④ Select a message to match

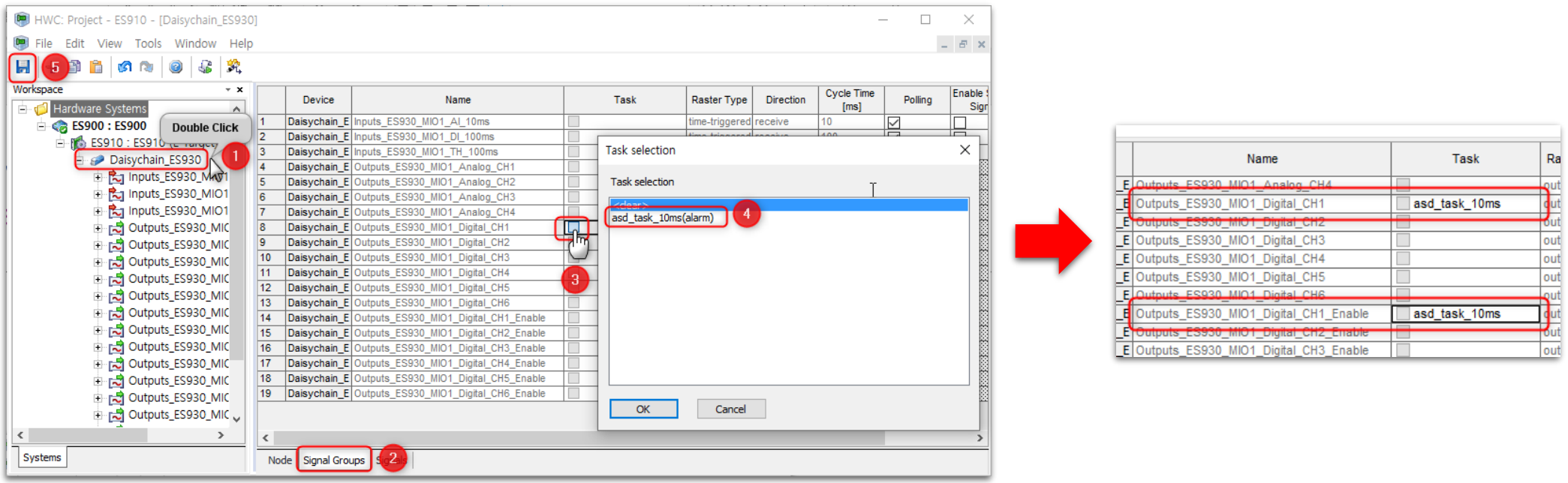




ASCET RP

Hardware Configuration – Signal Groups

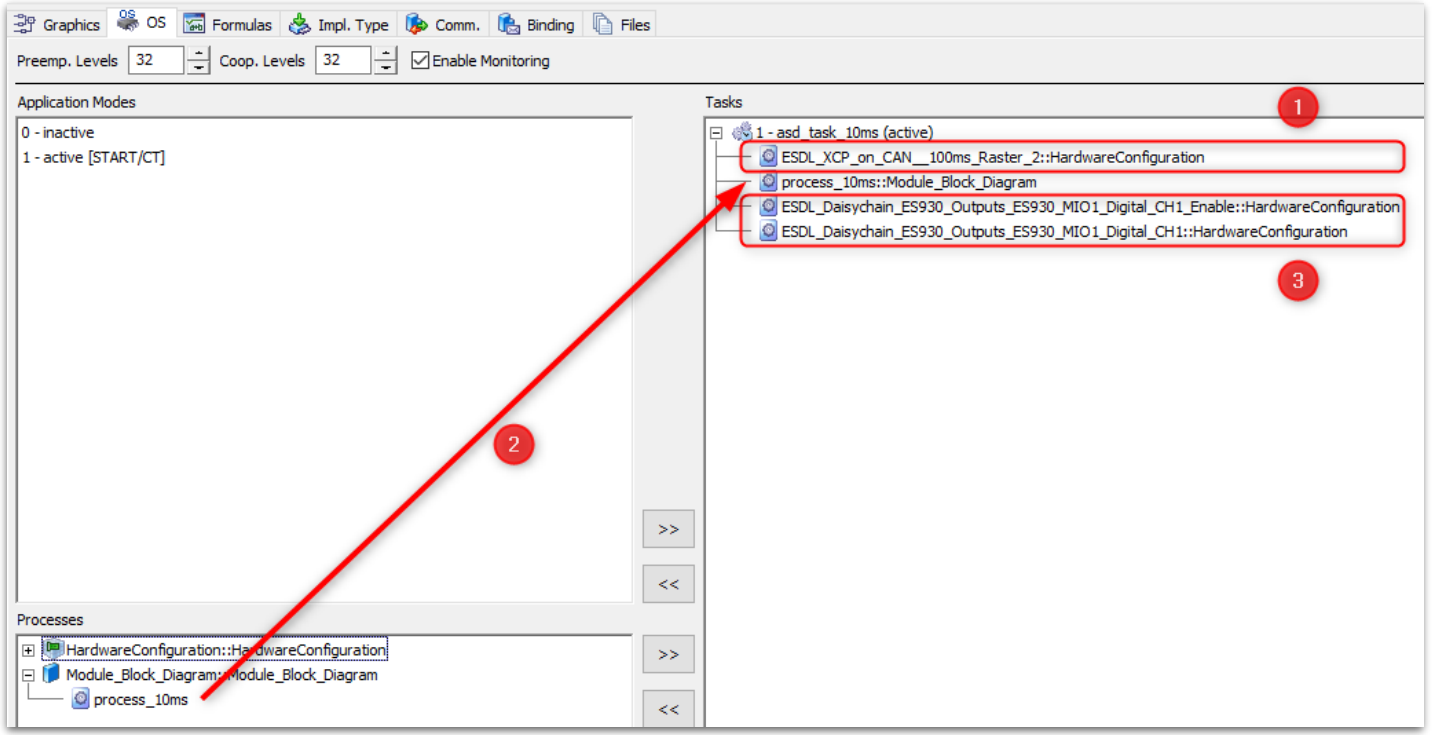
① Double click “Daisychain_ES930”
② Select “Signal Groups” tab
③ Select the checkbox in the “Task” field of the signal to assign to task
④ Select a task to assign
⑤ Save workspace



ASCET RP

Project - OS

① Check processes assigned to tasks in Hardware Configuration(HWC) : Receive messages
② Assign the module's process to the appropriate location of the task
③ Check processes assigned to tasks in Hardware Configuration(HWC) : Send messages

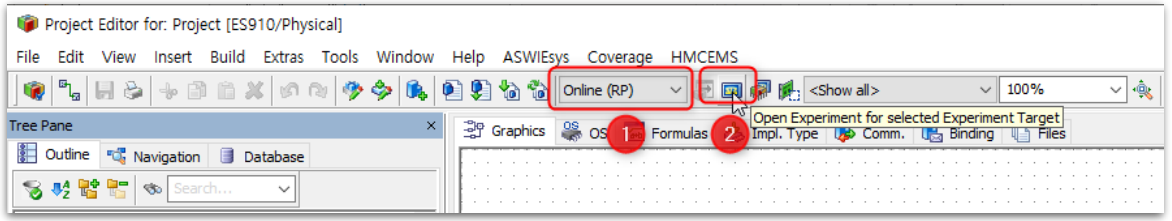


ASCET RP

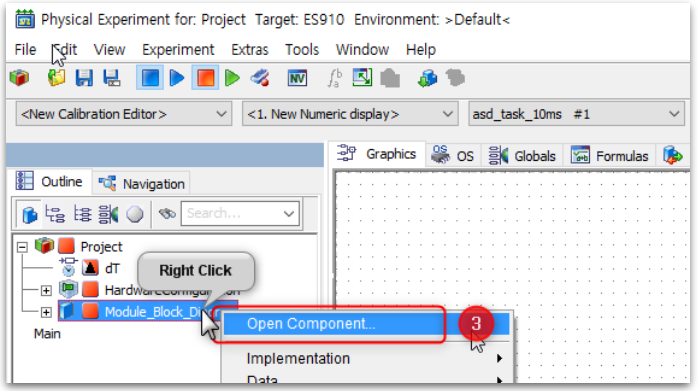
Project - Experiment

① Check Experiment Target : Online(RP)

② Open Experiment for selected Experiment Target

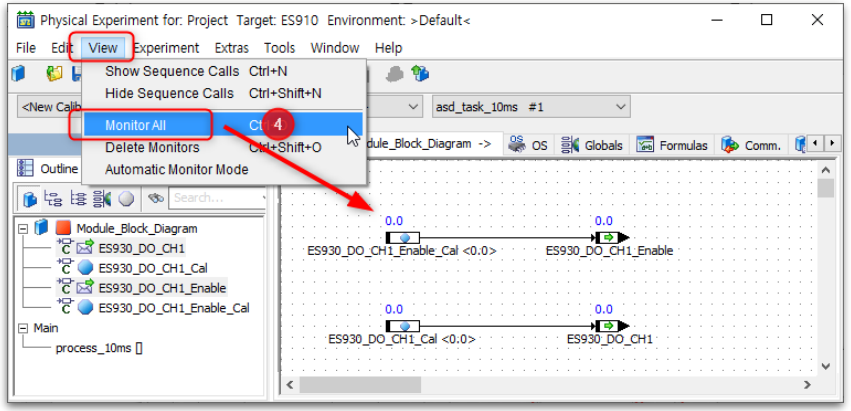


③ Open Component …



④ Monitor

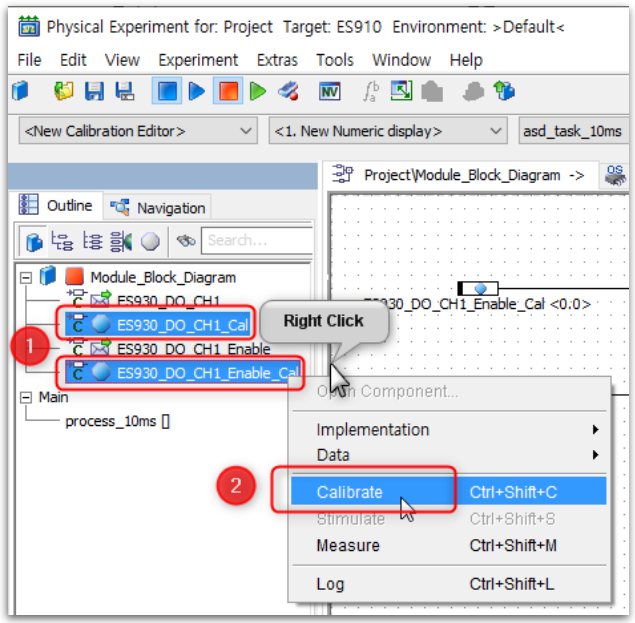
- View > Monitor All

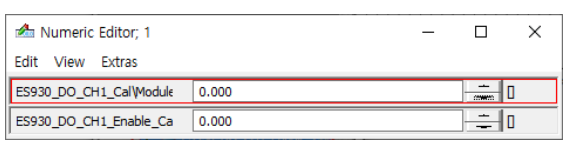


ASCET RP

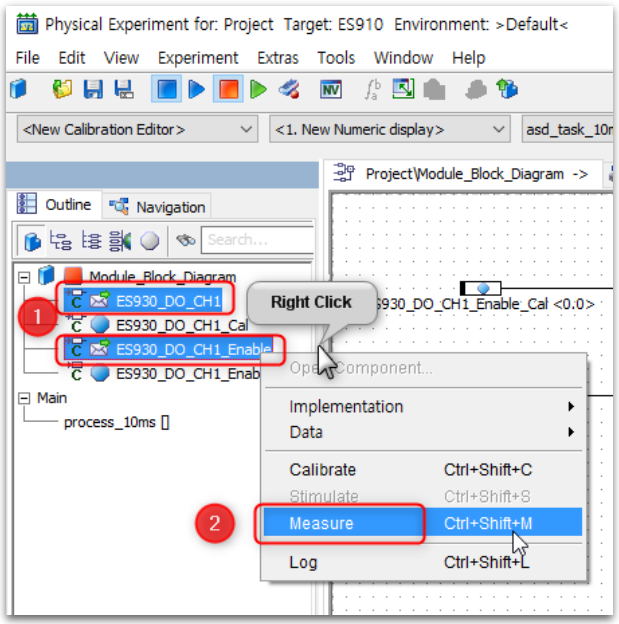
Calibration & Measurement

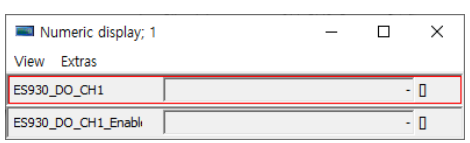
① Select parameters
② Calibrate





① Select messages
② Measure

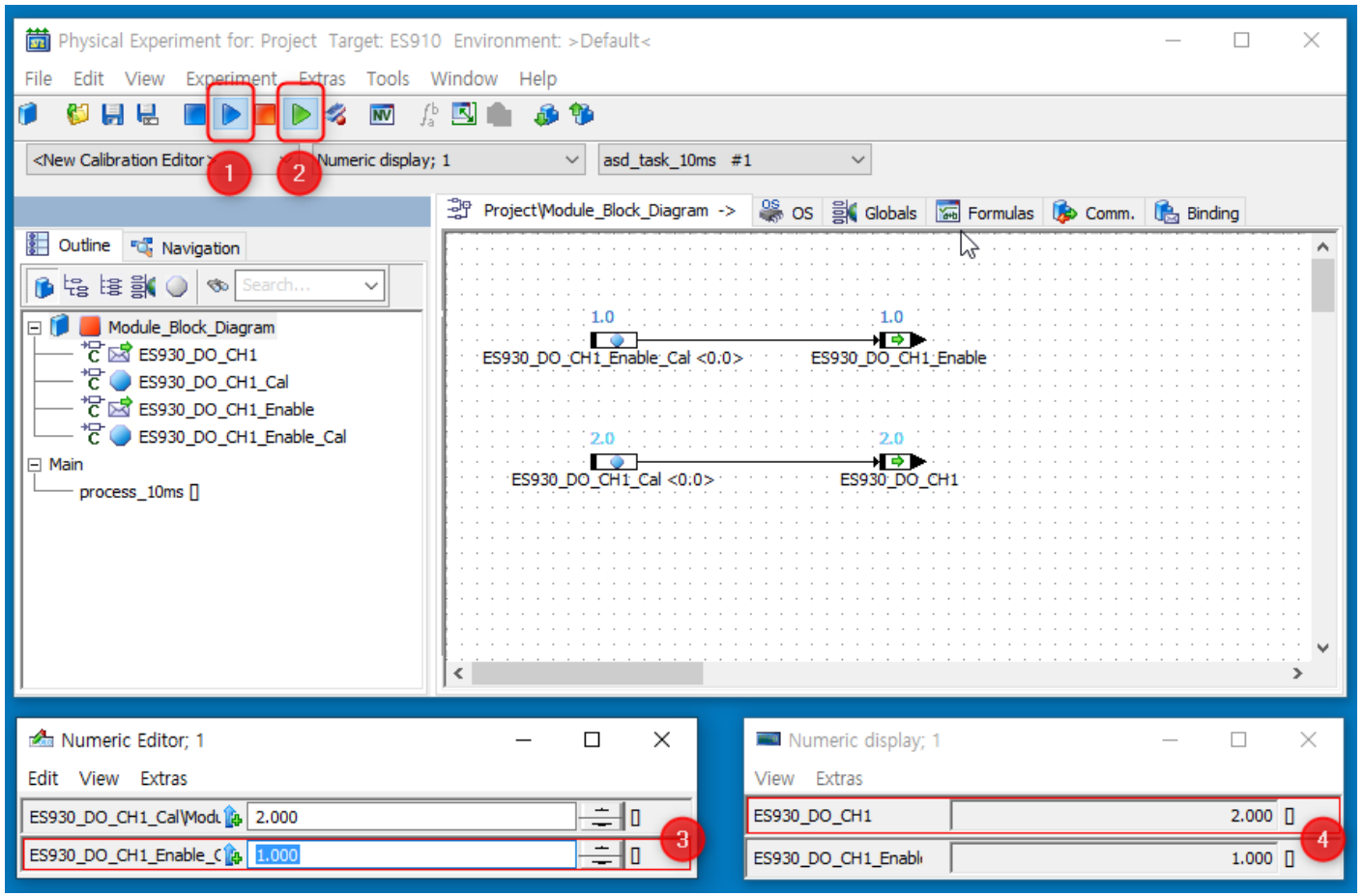




ASCET RP

Experiment with ES910 – ES930

① Start OS
② Start Measurement
③ Calibrate parameters
④ Measure variables



Thank you!