

Quickstart for Elines Series and the E-Suite library

Elines Series automation Solutions

Contents

1	Aim of this document	3
2	Introduction.....	3
2.1	What is E-Line?.....	3
2.2	Devices needed for the use of the getting started	3
2.3	Structure of the E-line Controller	4
2.4	Structure of programmable E-line modules (PCD1.xxxxx-C15)	5
2.5	Structure of the non-programmable Eline modules (PCD1.xxxxx-A20).....	5
2.6	System and Hardware requirements.....	6
2.7	Differences between a programmable module and a PCD	6
2.8	Topology of the demo application:.....	7
3	Basic PG5 configuration and check of the Ethernet communication	8
3.1	Target of this chapter.....	8
3.1.1	Configuration of the master	8
3.1.2	Configuration of slaves	11
3.1.3	Sbus addresses.....	11
3.1.4	Check of the Ethernet & gateway configuration of devices.....	12
4	Presentation of the corresponding libraries	14
4.1	ELine library:	14
4.2	E-suite library:	15
5	Presentation of the Eline communication	16
5.1	Presentation of the communication Fboxes:	16
5.2	Principle	17
5.3	Place Fboxes:	18
5.4	Comparison of traffic between Sbus standard communication and ComBox exchange.	20
5.5	SBus ELine Master	21
6	Example 1: E-line Rios	23
6.1	Target of this example	23
6.2	Material needed:	23
6.2.1	Goal of the program.....	23
6.3	Step by Step to do the exercise	24
6.3.1	Rio Fbox	25
6.3.2	Parameters	26
6.3.3	Manual symbols.....	26
6.3.4	Test the program.....	27
6.3.5	WebEditor.....	29
6.3.6	Diagnostic possibility	31
7	Example 2: Room controller	32
7.1	Target of this example	32
7.2	Material needed	32
7.2.1	Goal of the program.....	32

7.3	Step by Step to do the exercise	32
7.3.1	Fbox	33
7.3.2	Programmation of the room controller	33
7.3.3	Web editor	39
7.3.4	Diagnostic possibility	39
8	Example 3 light & blind	40
8.1	Target of this example	40
8.2	Material needed	40
8.2.1	Goal of the program.....	40
8.3	Step by step to do the exercise	40
8.3.1	Parameters.....	41
8.3.2	Fbox	41
8.3.3	Programmation of the light and blind module	42
8.3.4	Web editor	45
8.3.5	Diagnostic possibility	46
9	Troubleshooting.....	46
10	References.....	46

Project history

Date	Author	Modification
01.2017	TCS / SG	Edition of the documentation and the project with PG5 2.2.140

1 Aim of this document

This Quickstart guide describes how to start with our E-line family and our corresponding Fbox libraries. It is necessary to use in parallel **the official datasheets** available on our SBC Support Web Site www.sbc-support.com

This guide will show you step by step how to build a room / building automation using our E-Line family. The document includes three examples. Examples are made with a PCD1.M2220-C15 as master, and other E-line module on a slave gateway Serial network.

To be able to successfully use our E-line family, it is necessary to have a good knowledge of PG5 programming.

2 Introduction

2.1 What is E-Line?

The Saia PCD1 E-Line controller has been specially developed for building automation.

The E-Line family's highly compact housing is ideal for installation in an electrical sub-distribution board.

2.2 Devices needed for the use of the getting started

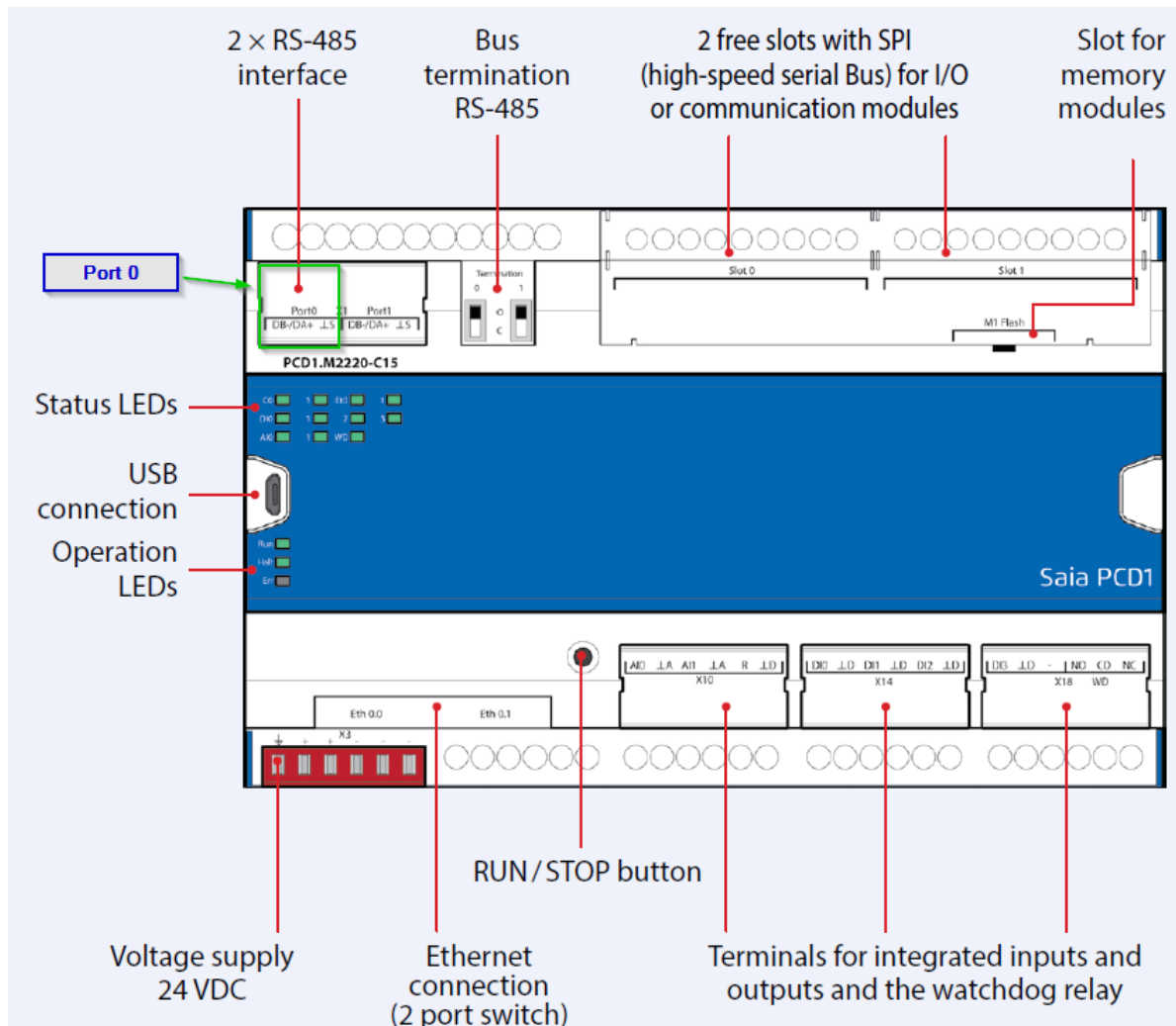
As this Getting started has been done to explain most useful function of many different modules, you will just need the module you want to test / program.

Each exercises could be done separately.

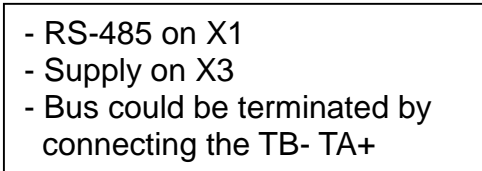
Here is the list of required material needed in order to go through all steps of the getting started:

PCD1.M2220	Master CPU:
PCD1.G3601-C15	Room controller for HVAC applications (fan coil, VAV, cooling ceiling radiators, etc.) and general applications + Aux Rs485
PCD1.G5020-A20	Rio module (non programmable)
PCD1.F2611-C15	Dali module with integrated DALI bus voltage supply + Aux Rs485
PCD1.G1100-C15	light and shade module
PCD1.W5300-C15	Analog module for VAV applications and control circuits

2.3 Structure of the E-line Controller



On all E-Line module family are the X1 connectors used as main Rs485 and the X3 connector as power supply



2.6 System and Hardware requirements

Hardware: -

Software: Minimum PG5 Version => 2.2.130 + Hotfix2

PCD1.M2220-C15 Fw 1.26.07

Minimum Fw required for E-Lines module: 1.04.24

Non Programmable

PCD1.G5020-A20

Programmable

PCD1.G3601-C15

PCD1.F2611-C15

PCD1.G1100-C15

PCD1.W5300-C15

2.7 Differences between a programmable module and a PCD

A programmable module can not replace a PCD. It's Firmware has been simplified, memory is volatile, communication as master with other Saia devices is not possible.

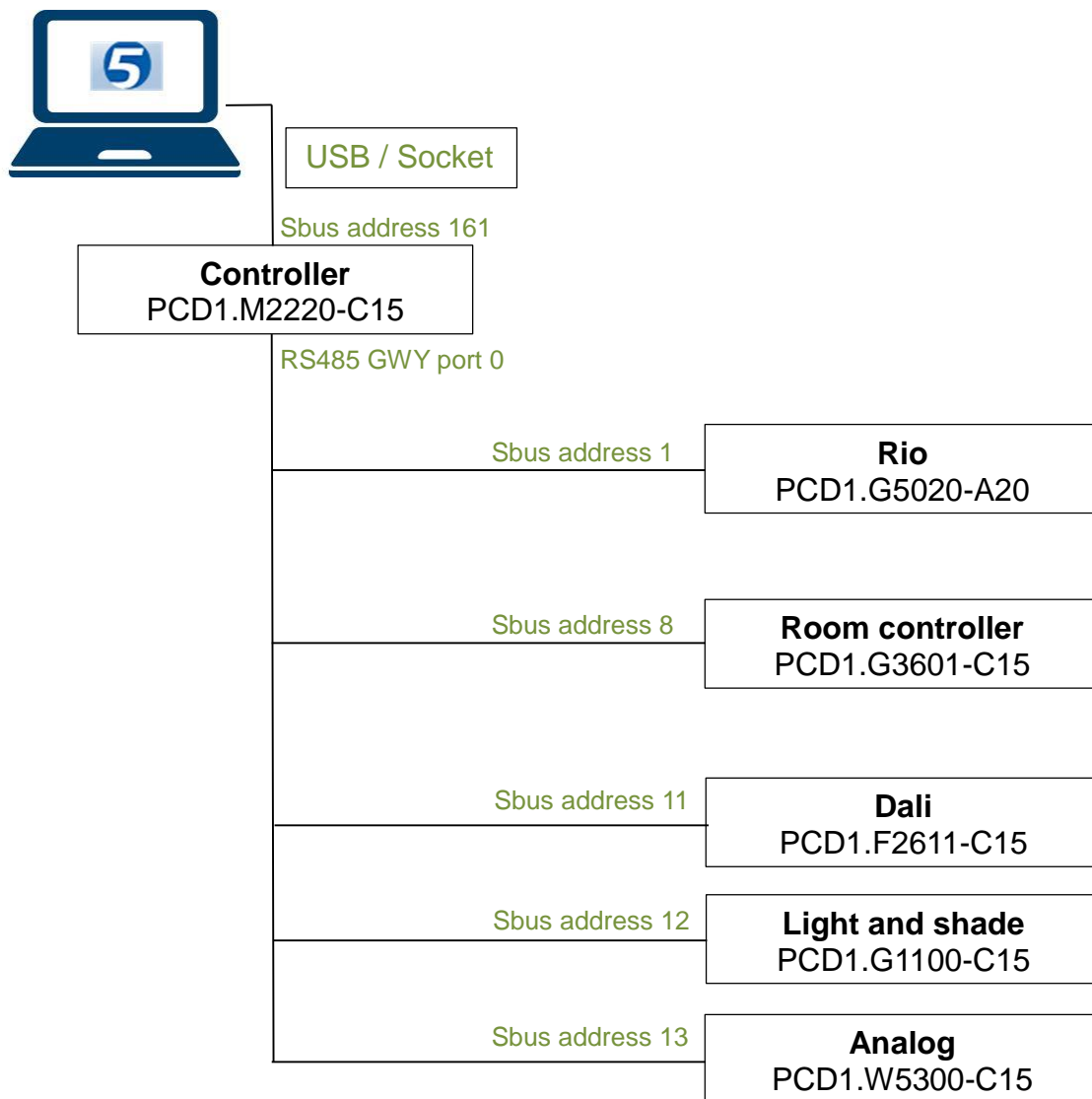
Note that not all Fbox could be used in a programmable module.

Please read our corresponding FAQ

<https://www.sbc-support.com/en/faq/101967/>

Therefore, the Esuite library has been developed.

2.8 Topology of the demo application:



Note that all modules are independent to each other. A test with the Dali module only need the Controller and the dali Eline module.

You can also choose to use programmable E-lines as standalone. When doing it so, no communication with other E-line device is possible.

3 Basic PG5 configuration and check of the Ethernet communication

3.1 Target of this chapter

- Correct hardware configuration to all devices in PG5
- Download of the configuration in devices
- Check the Ethernet / Sbus gateway communication

3.1.1 Configuration of the master

The master controller could be any kind of PCD with a RS485 Gateway function.

For this exercise, controller PCD1.M2220-C15 will be used. A connection either with USB or with Socket is possible. All exercises will be done by using Socket connection with gateway to the Port0. Configuration as follow

Properties	
Device : PCD1.M2220-C15	
Firmware	
Firmware Version	From 1.24.00 or more recent and compatible
Memory	
User Code/Text/DB Memory	512 kBytes ROM
Extension Text/DB Memory	128 kBytes RAM
User Code/Text/DB Memory Backup (Flash)	On File System
User File System Size (Flash)	128 MBytes
Program Directory	Onboard Flash
Options	
Reset Output Enable	No
Time Zone Code	
Service Key	Saia\$3280
Password	
Password Enabled	No
Password	
Inactivity Timeout [minutes]	1
S-Bus	
S-Bus Support	Yes
S-Bus Station Number	161

Configuration of the gateway on port 0

or - [00_E-Line_HeadStation]

Tools Window Help

Device

Type	Description
PCD1.M2220-C15	E-Line CPU with 512 kBytes code/text/DB flash memory and 128 kBytes extens

Memory Slots

Slot	Type	Description
M1		

Onboard Communications

Location	Type	Description
Onboard	RS-485 Port 0	RS-485 port for general-purpose communications (Terminal block).
Onboard	RS-485 Port 1	RS-485 port for general-purpose communications (Terminal block).
Onboard	USB	Universal Serial Bus port, PGU or general-purpose.
Onboard	Ethernet	Ethernet port. IP Settings, DHCP.

Ethernet Protocols

Properties

Onboard : RS-485 Port 0

Serial S-Bus

Port Number Serial S-Bus	0
Serial S-Bus Enabled	No
Full Protocol (PGU)	Yes

Serial S-Bus Master Gateway

Port Number Gateway	0
Use Serial S-Bus For Gateway	Yes
First S-Bus Station Serial S-Bus	0
Last S-Bus Station Serial S-Bus	253

Serial S-Bus Mode And Timing

S-Bus Mode	Data Mode
Baud Rate	115200 Baud
Response Timeout [ms]	0
Training Sequence Delay [ms]	0
Turnaround Delay [ms]	0

As a Web project will also be part of the Getting Started, an Ethernet address will be set

or - [00_E-Line_HeadStation]

Tools Window Help

Device

Type	Description
PCD1.M2220-C15	E-Line CPU with 512 kBytes code/text/DB flash memory and 12

Memory Slots

Slot	Type	Description
M1		

Onboard Communications

Location	Type	Description
Onboard	RS-485 Port 0	RS-485 port for general-purpose communications (T
Onboard	RS-485 Port 1	RS-485 port for general-purpose communications (T
Onboard	USB	Universal Serial Bus port, PGU or general-purpose.
Onboard	Ethernet	Ethernet port. IP Settings, DHCP.

Ethernet Protocols

Section	Description
IP Transfer Protocols	FTP, HTTP Direct Protocols, ODM.
IP Protocols	DNS, SNTP, SNMP protocols.
HTTP Portal	HTTP Portal Communication For PCD Over Private Network

Onboard Inputs/Outputs

I/O	Type	Description
I/O 0	2 Analogue Inputs	2 analogue inputs, -10..+10VDC, Pt/Ni 1000 or resistan
I/O 1	4 Digital In-/Outputs	4 digital inputs, 1 watchdog relay or relay output, conn

Onboard I/O Slots

Slot	Type	Description

Properties

Onboard : Ethernet

General

MAC Address	Not available
-------------	---------------

TCP/IP

Channel Number	9
TCP/IP Enabled	Yes
Ethernet RIO Network	None
IP Address	172.23.16.161
Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0
+ Access Control List	Hide

DHCP Client Protocol

DHCP Client Enabled	No
Automatic Gateway IP Setting	No
Automatic DNS IP Setting	No
DHCP Server IP to Reject 1	0.0.0.0
DHCP Server IP to Reject 2	0.0.0.0
Host Name	
Fully Qualified Domain Name	

Ether-S-Bus

Channel Number	9
Ether-S-Bus Enabled	Yes
IP Node	161
PGU Port	Yes
Slave	Yes
Network Groups	(Default)

Ether-S-Bus Master Gateway

Channel Number Gateway	9
Use Ether-S-Bus For Gateway	No
First S-Bus Station	0
Last S-Bus Station	253
Response Timeout [ms]	0

Note:

Set on the Web-Server section of the CPU properties set the option 'Access Checks Enabled' to 'No'

Web Server	
Default Page	start.htm
Display Root Content Enabled	Yes
Access Checks Enabled	No
Access Timeout [s]	60
Access Controls Form Page	pwdform.htm

Set on the IP Transfer Protocols, FTP, HTTP Direct Protocols, ODM section the option as shown below in order to download the Webproject.

Properties	
Ethernet Protocols : IP Transfer Protocols	
FTP Server	
FTP Server Enabled	Yes
TCP Port Number	21
User Name 1	
User Name 2	
+ Advanced Parameters	Show
Connection Timeout [s]	300
Maximum FTP Connections	3
Remove Default User	No
HTTP Direct Protocol Compatibility	
HTTP 1.0 Downgrade Enabled	No
Chunk Mode Enabled	Yes
HTTP Direct / First Listener	
HTTP TCP/IP Port Enabled	Yes
TCP Port Number	80
+ Advanced Parameters	Hide
HTTP Direct / Second Listener	
HTTP TCP/IP Port Enabled	Yes
TCP Port Number	81
+ Advanced Parameters	Hide
Open Data Mode	
Initialize Open Data Mode	Yes
Telegram Reading Timeout [ms]	1000

3.1.2 Configuration of slaves

Elines could not have the autobaud detection set per default.

At the beginning of the configuration, connect with an USB cable and make sure that:

- All modules have either the same baud rate as the master or the autobaud set to yes.
- All slaves module are set to be slaves: Onboard Rs485 properties: Serial S-Bus Enable =>Yes

Device		
Type	Description	
PCD1.G1100-C15	E-Line light and blind modu	

Onboard Communications		
Location	Type	Description
Onboard	RS-485 Slave	RS-485 port
Onboard	USB	Universal Serial
Onboard	NFC	Near Field Com

Properties	
Onboard : RS-485 Slave	
Serial S-Bus Slave	
Port Number Serial S-Bus	0
Serial S-Bus Enabled	Yes
Full Protocol (PGU)	Yes
Serial S-Bus Mode and Timing	
S-Bus Mode	Data Mode
Baud Rate	115200
Auto-detect Baud Rate	Yes
Training Sequence Delay [ms]	0
Turnaround Delay [ms]	0

Yes does set the module as a slave

As with all saia devices, the serial setting has to be set as follow:

Serial S_Bus enable = Yes	→ S-Bus is initialised as slave device
Serial S-Bus enable = No	→ S-Bus is not initialised. This could be done with Fbox in the programm

3.1.3 Sbus addresses

All devices Sbus addresses can be easily set from 0 to 98 with the two rotary switches



By choosing the address 99, -C15 devices can be addressed to the range 100 - 255

3.1.4 Check of the Ethernet & gateway configuration of devices

Connect your PC to the Ethernet Network of the PCD's and define an IP address of the PC which does fit to IP address defined on the PCD's. Open the dos command window by typing 'cmd' in window command field. On the dos command window write first the instruction "*ipconfig*" to check the configuration stored on the PC. If the Ethernet address of your PC is correct, then type the instruction "*ping ip-address*" on the command window.

The result for the ping instruction must be a "reply" shown on the window.

```
C:\Users\E856947>ping 172.23.16.161

Envoi d'une requête 'Ping' 172.23.16.161 avec 32 octets de données :
Réponse de 172.23.16.161 : octets=32 temps=5 ms TTL=64
Réponse de 172.23.16.161 : octets=32 temps=10 ms TTL=64
Réponse de 172.23.16.161 : octets=32 temps=10 ms TTL=64
Réponse de 172.23.16.161 : octets=32 temps=2 ms TTL=64

Statistiques Ping pour 172.23.16.161:
    Paquets : envoyés = 4, reçus = 4, perdus = 0 (perte 0%),
    Durée approximative des boucles en millisecondes :
        Minimum = 2ms, Maximum = 10ms, Moyenne = 6ms
```

If the devices are not reachable (means the information "*Request timed out*" is shown on the window)

```
C:\Users\E856947>ping 172.23.16.161

Envoi d'une requête 'Ping' 172.23.16.161 avec 32 octets de données :
Délai d'attente de la demande dépassé.
Délai d'attente de la demande dépassé.
Délai d'attente de la demande dépassé.
Délai d'attente de la demande dépassé.

Statistiques Ping pour 172.23.16.161:
    Paquets : envoyés = 4, reçus = 0, perdus = 4 (perte 100%)

C:\Users\E856947>
```

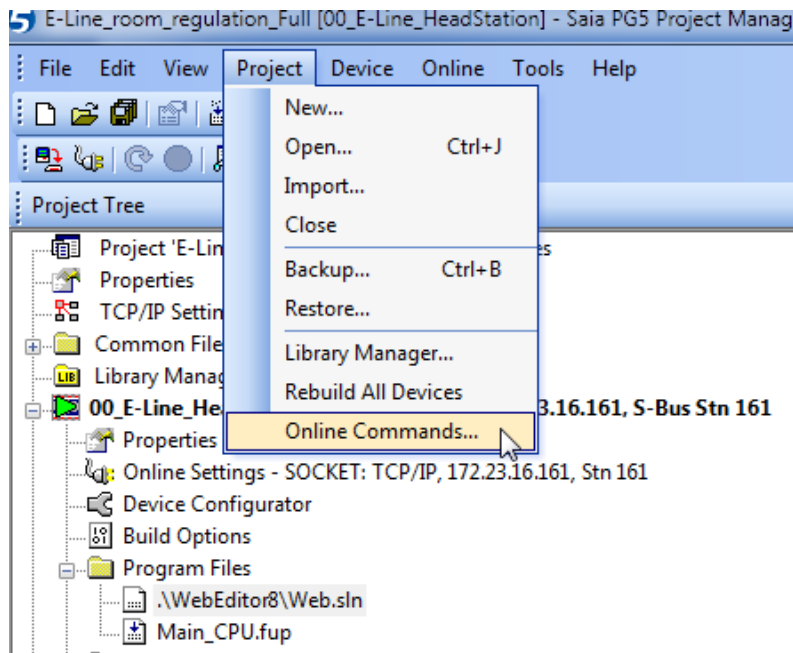
Then do verify that:

- Useful IP addresses are used and if a router is used, the default gateway address and subnet mask does fit to the configuration
- The PG5 device configuration was loaded over USB to the devices
- The devices are connected to Ethernet
- The PC is connected to Ethernet

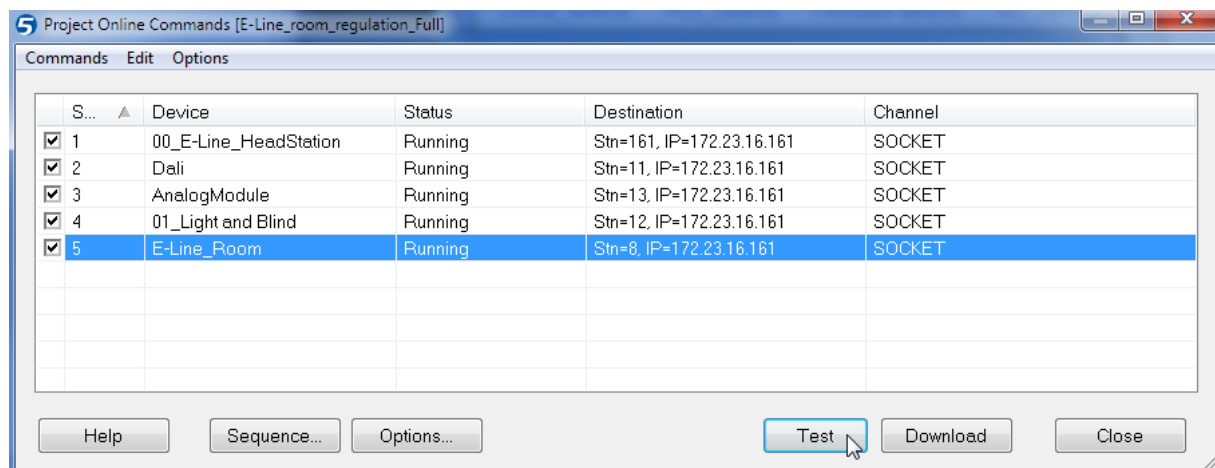
Once you are connected to the PCD, open the PG5 and adapt the online settings of each programmable device.

As E-lines modules are all connected through the gateway function, the IP address will be the Headstation IP address for all device.

Check the status and connectivity with the Online command from menu project



This menu allows to check the status and download all programs at once.



Note that all IP address are the headstation address.

Sbus Station (Stn) are the station selected on device with the rotary switch

4 Presentation of the corresponding libraries

Two new libraries have been developed for the use of the Eline family.

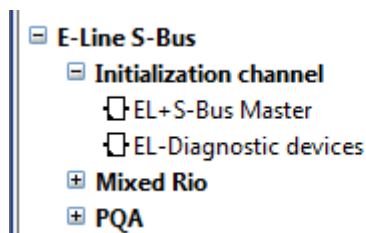
- The **Eline library** which will be used especially for non-programmable (*-a20) E-line as Rios and PQA
- The **E-suite** library which has been developed for programmable E-lines (*-c15).
Except the "ES Backup Restore Media Fbox", the E-suite library could also be used with our PCDx.M series.

4.1 ELine library:

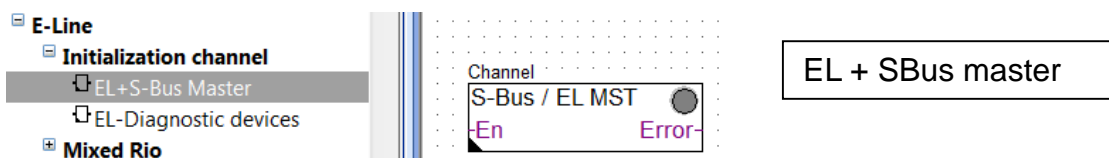
This library set up communication between our PCD and our E-lines non-programmable devices, as Rios and PQA.

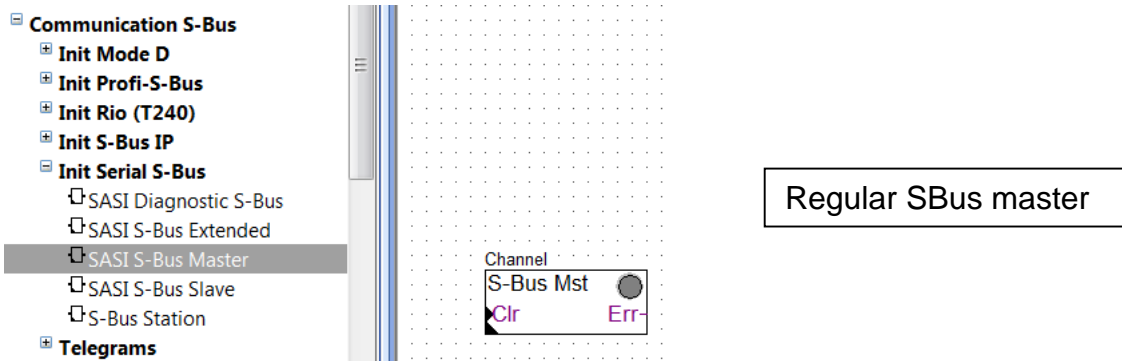
The initialization channel does include the management of Rios configuration.

- Assignment of the communication network with S-Bus and the E-Line services.
- Configuring the E-Line rio devices.
- Read/Write the I/O E-Line.
- Manual override
- Read/Write the R/F E-Line.



Note that EL + S-Bus Master is a copy of the regular S-Bus master from S-Bus communication library + the Eline Rios initialisation





4.2 E-suite library:

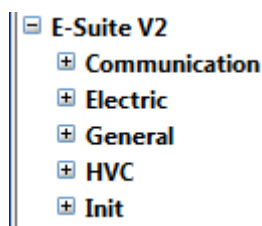
Minimum E-suite V2 V2.0.103 must be used. In case you have an older version, replace manually all Fboxes.

Beta version 1 is not compatible with v2 and should not be used anymore.

Typical applications for energy efficient Room control

- Heating, Ventilation and Cooling with Fan Coils or VAV systems
- Light control
- Shading control
- Access control
- Energy management, etc.

The library is divided into section for communication, general, HVC and Electrical applications. You will find a description of each Fbox in the help file.



5 Presentation of the Eline communication

With the introduction of the Eline, the Sbus protocol has been improved.
The main reason is to reduce the traffic on RS485 lines in order to enhance the speed of communication.

Basic comparison:

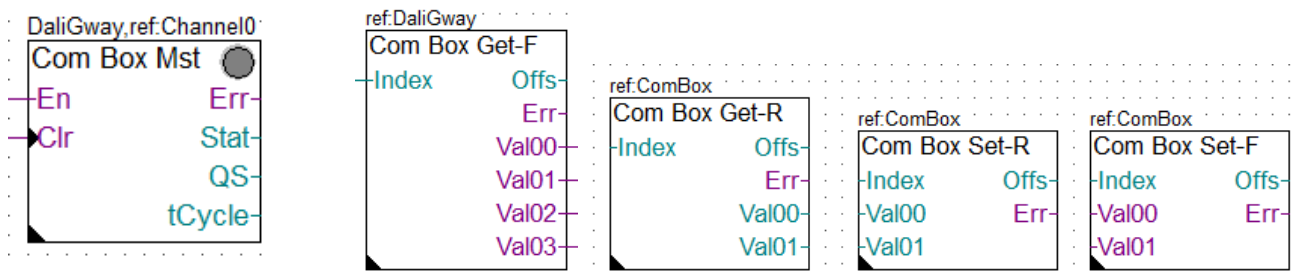
Communications steps

S-Bus		Sbus E-line	
Master	Slave	Master	Slave
Check slave		Write R & F	
	Slave acknowledge		Answer with predefined R & F
Write R0 – Rxx			
	Slave acknowledge		
Write F0 -Fxx			
	Slave acknowledge		
Read R10 – Rxx			
	Slave answer with datas		
Read F0 - Fxx			
	Slave answer with datas		

As shown on the principle, the S-bus Eline does send Registers and Flags in 1 telegram. The read Flags and registers are already defined in the slave. Instead of sending an acknowledge, the slave does send the datas directly.
The communication is done in 2 telegrams instead of 10 in that example.

5.1 Presentation of the communication Fboxes:

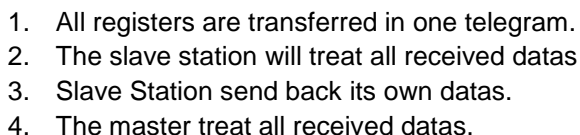
ComBox Fboxes



Optimize the communication between a master and sub-module. Flags and registers are put in arrays, and whole array is send to the slave.
When the slave receives a request, it will get all datas, and send back the defined datas. We talk about multi-media transfer

Traffic on the line will become much simplified.

All flags are copied in register: 32 flags will be transferred by 1 register.



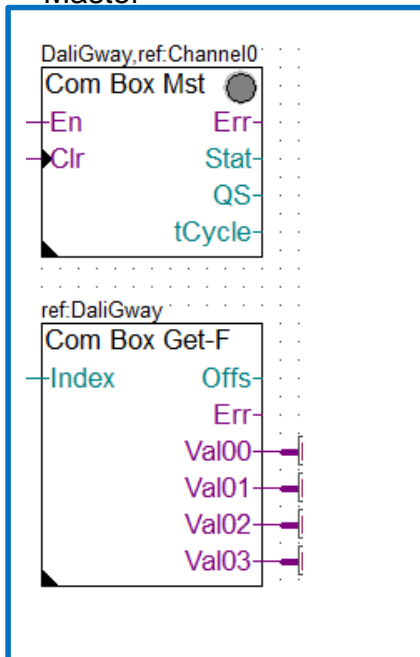
	Master	Slave station
1	send datas	
2		Get datas sent by master
3		Send datas
4	Get datas sent by slave station	

5.3 Place Fboxes:

The use of the COM BOX Fbox as follow

This shows the transfer of 4 flags from slave to master

Master



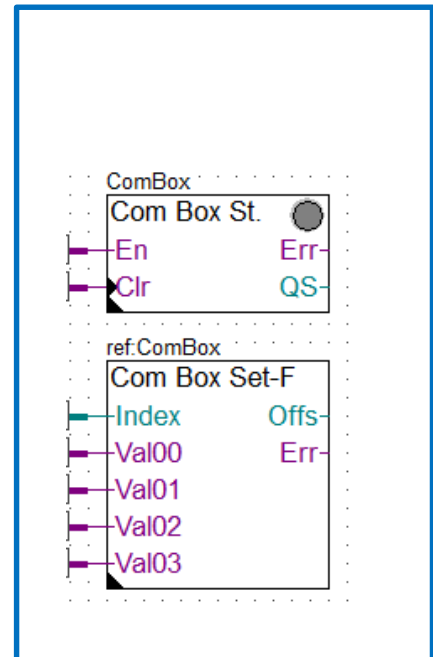
“ComBox mst” define the slaves and parameter

The program in the master has to fit with the program in slave:

Example:

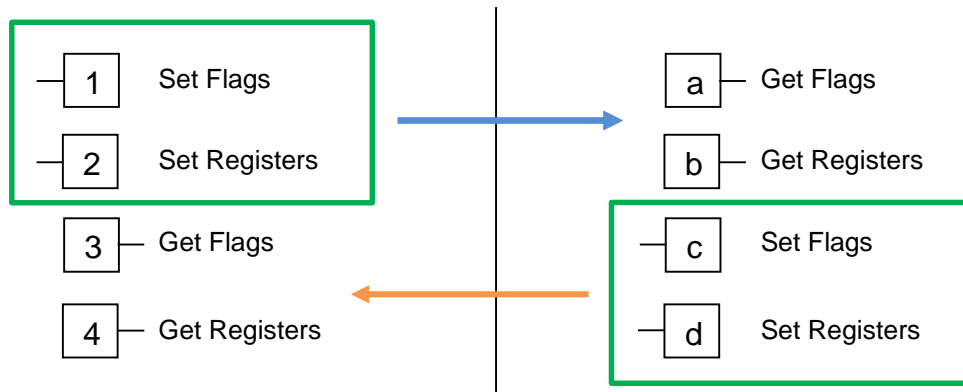
1 Get Fbox in master
→ 1 set in the slave

Slave

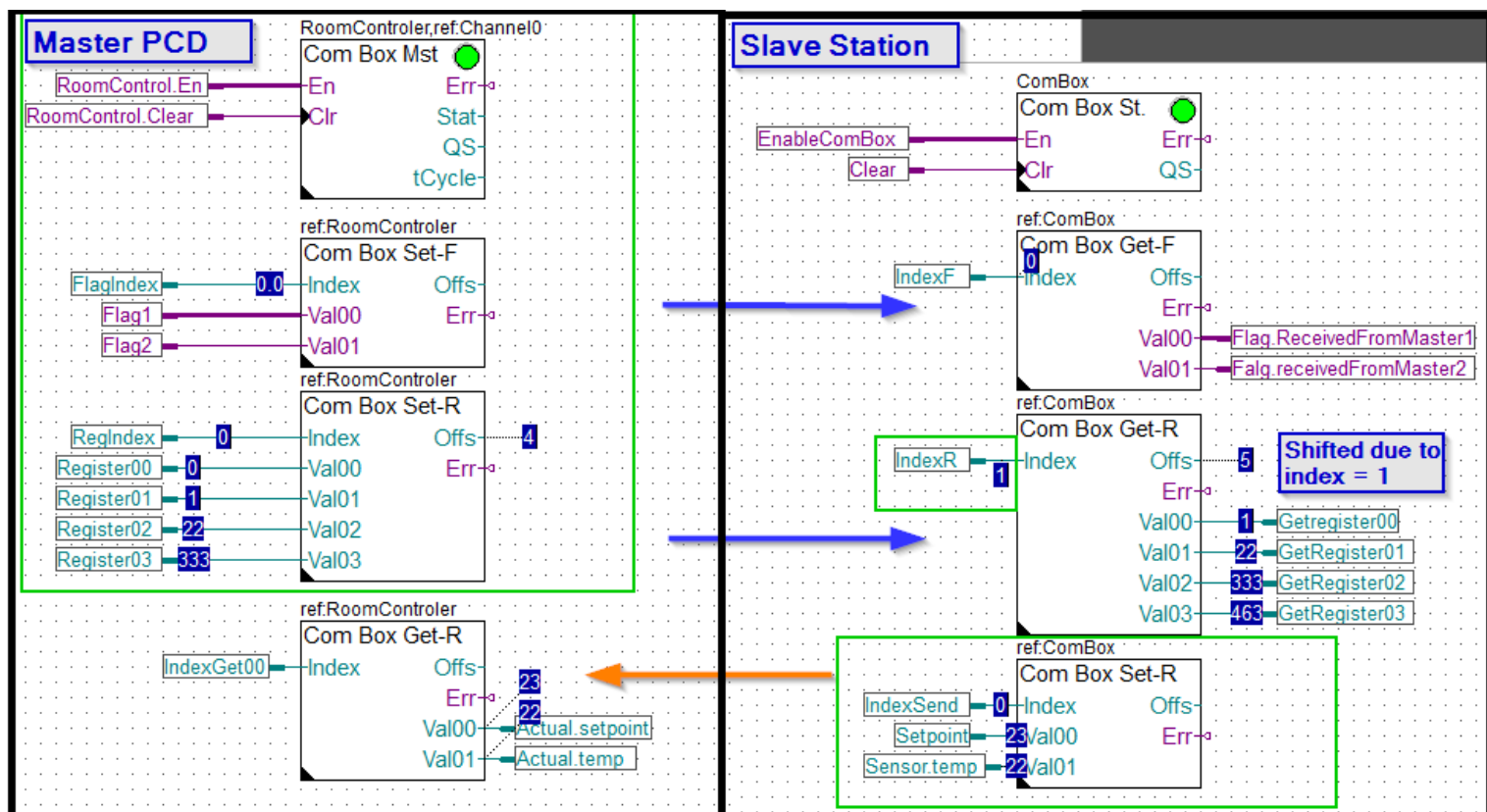


“Com Box St.” define the parameter of the slave station

It is possible to mix up all different type on master and slave



The amount of set datas is identical as the get datas
In this example the index has been set to 1 → shift the datas

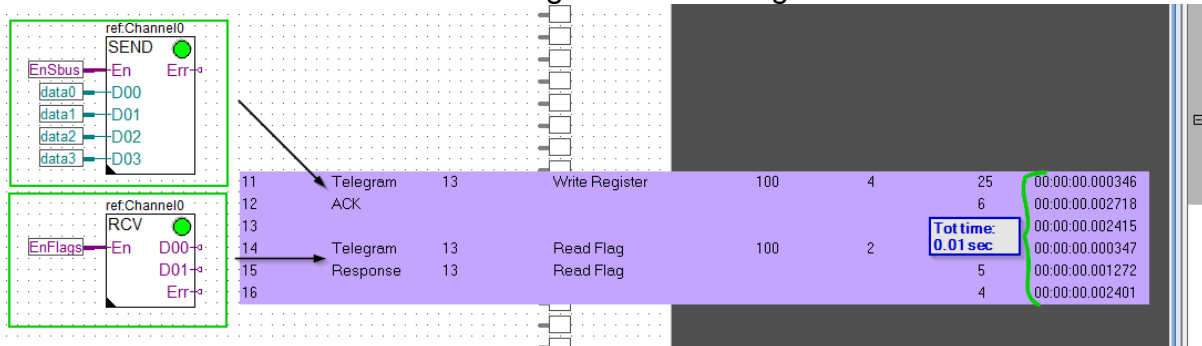


Note:

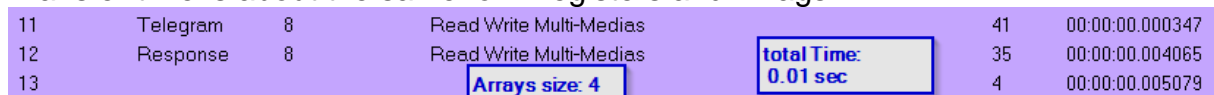
- The answer of the slave station is managed by the FW of the E-Line. The Fbox only link datas following user's settings.
- If the En input of the slave station is low, an answer will be sent but no datas will be updated in the Get-X Fbox of the slave.
- ComBox Fboxes can be used either with standard S-Bus master or S-Bus EL Master

5.4 Comparison of traffic between Sbus standard communication and ComBox exchange.

Sbus traffic: each telegram does wait for an acknowledge
Transfer time is about 0.01 sec for 4 registers and 2 flags

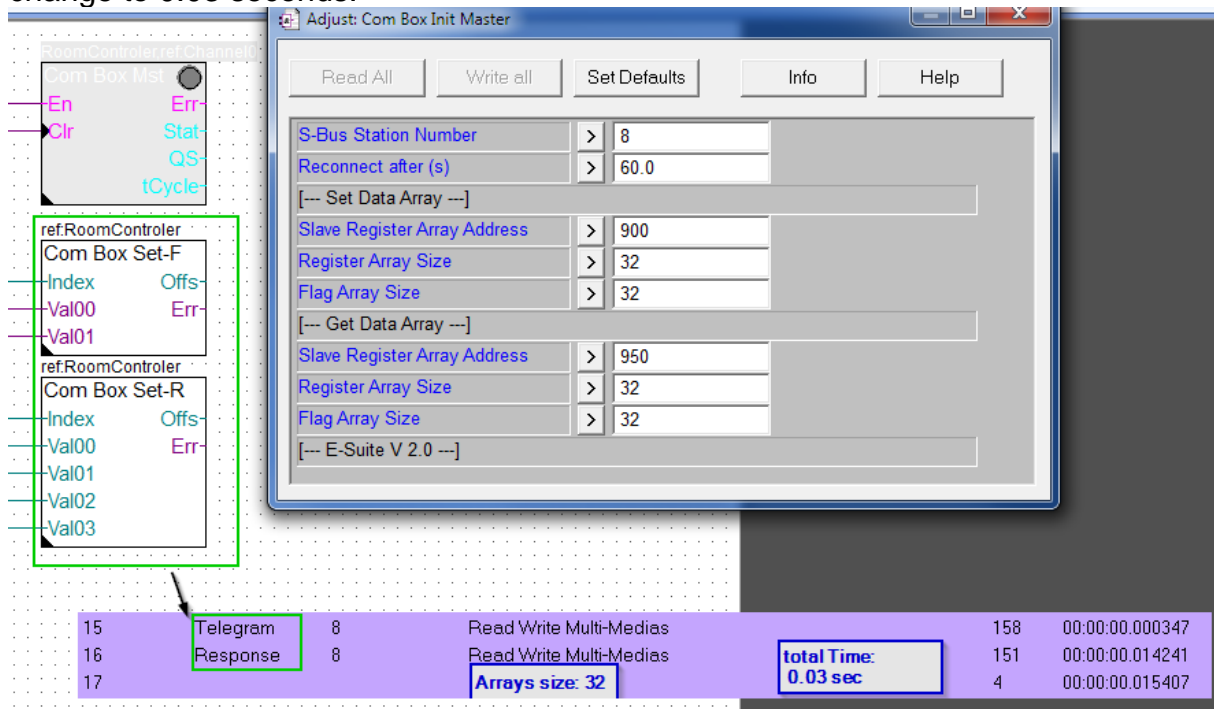


Combox communication's traffic: The multimedia is sent
Transfer time is about the same for 4 registers and 2 flags



Combox communication's traffic

By sending 32 registers and 32 flags, telegram would look the same. Timing will slightly change to 0.03 seconds.



Problems known

The use of these long telegram should be transparent for other devices.

However, it has been noticed that PCD7.L100 & PCD7.L200 does crash when such long telegrams are send on the same line. The buffer of these devices have not been designed for this kind of long telegrams

At the moment we do not have a solution to suggest. If both devices must be used, plan 2 SBUS lines

In addition, as our S-bus counter takes a long time to answer, it is not recommended to connect them in a fast SBus communication line as the counter will slow down the whole communication.

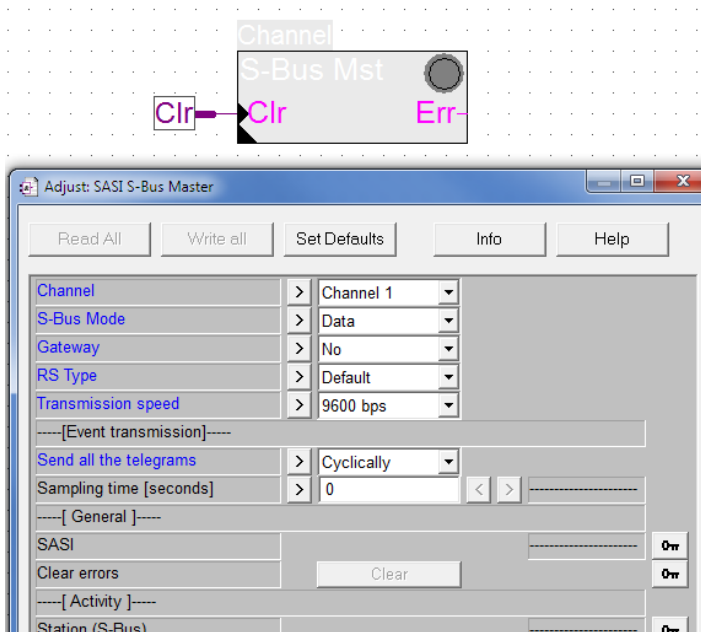
5.5 SBus ELine Master

In order to use and configure E-Lines Rios, a new Fbox must have been developed.

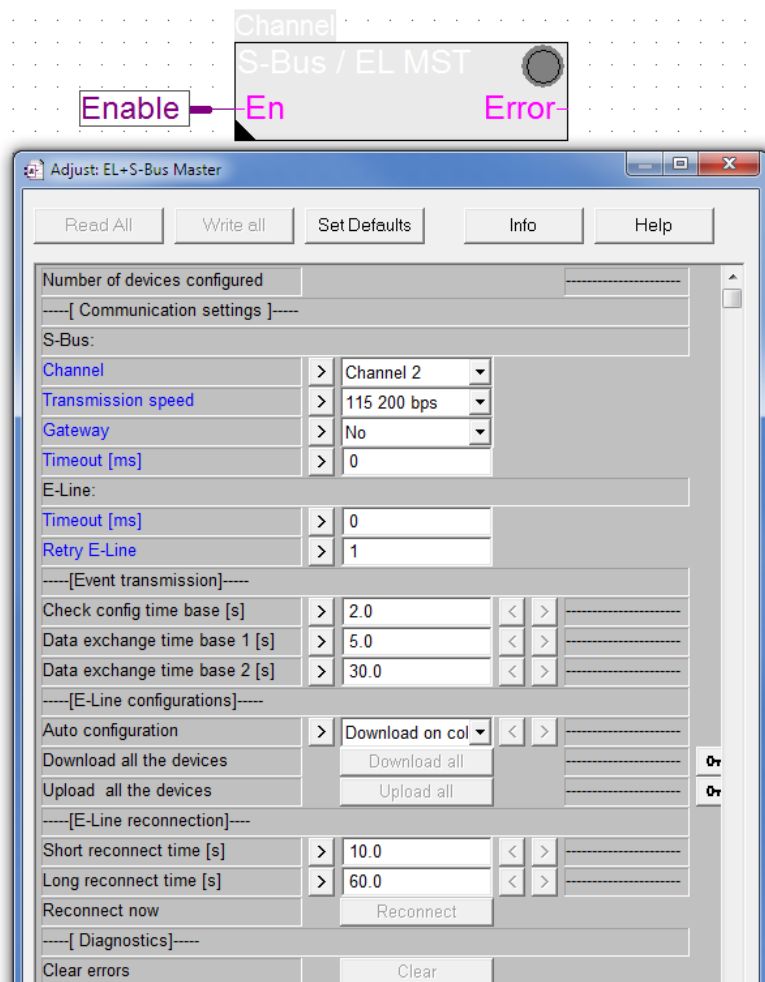
The SBus EL Master does support all commands for Elines Rios in addition to our standard SBus protocol.

SBUS master	EL master
	Manage rios
Manage SBus	
Manage Com Box	

Comparison of S-Bus master Fboxes



The regular Sbus master does only set the channel and the sampling time



The S-Bus / EL MST does set the channel and sampling time.

- It also download all rios parameters and manage the reconnection (**RIOS ONLY**).
- The reconnection management would be done with SBUS station with the regular SBus devices

6 Example 1: E-line Rios

6.1 Target of this example

Understand and use the Rios predefined symbols

Description of flags - forcing

Use of a RIO like I/Os

6.2 Material needed:

- PCD1.M2220
- PCD1.G5020 (or other Rio module. → symbol names must be adapted.)

6.2.1 Goal of the program

This program example simulate lights.

A value corresponding to a light would be increase for a defined time.

This value would then decrease for the same time

- Light would be switched on when the value is increasing.



- Light would be switched off when the value does decrease.

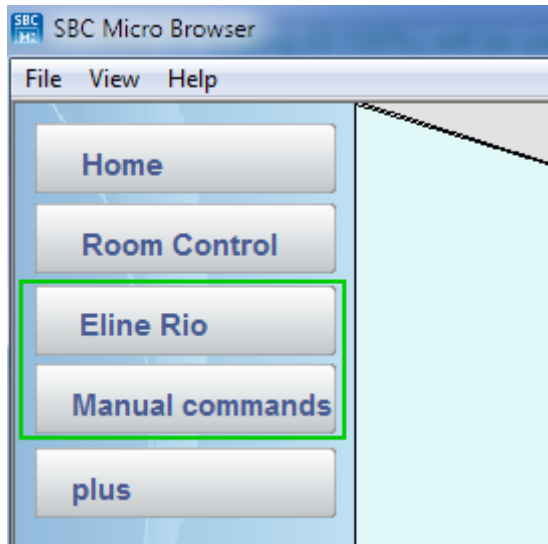


A different time is set for each of the 3 lights.

- This would create a continuous change on the output and allow to see the differences during an overwrite for example.

6.3 Step by Step to do the exercise

- The Rio module must be connected with RS485 line to port 0 of the headstation. Adapt the s-Bus address with the rotary switch → Stn 1
- Compile the device 00_E-Line_HeadStation and download it.
- Open Web Editor and download the program
- Start the uBrowser and go to the page Eline Rio or Manual command

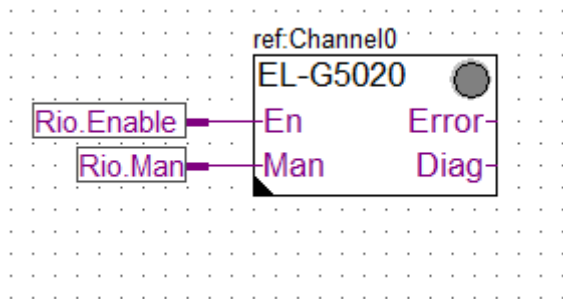


- Go to the COB1 of the Main_CPU.fup

6.3.1 Rio Fbox

The initialisation is done by the Rio Fbox

Once the Rio Fbox has been placed, the following symbols have been created under an indexed name. Be aware that all symbols used in the program will be connected to this Fbox.



EChannel	GROUP			
PCD1_G5020_0	GROUP			
Parameters	GROUP			
Manual	GROUP			
DigitalOutput3	F	(EChannel.PCD1_...	2170	Relay output 3
DigitalOutput2	F	(EChannel.PCD1_...	2169	Relay output 2
DigitalOutput1	F	(EChannel.PCD1_...	2168	Relay output 1
DigitalOutput0	F	[4]	2167	Relay output 0
DigitalInput7	F	(EChannel.PCD1_...	2253	Digital input 7
DigitalInput6	F	(EChannel.PCD1_...	2252	Digital input 6
DigitalInput5	F	(EChannel.PCD1_...	2251	Digital input 5
DigitalInput4	F	(EChannel.PCD1_...	2250	Digital input 4
DigitalInput3	F	(EChannel.PCD1_...	2249	Digital input 3
DigitalInput2	F	(EChannel.PCD1_...	2248	Digital input 2
DigitalInput1	F	(EChannel.PCD1_...	2247	Digital input 1

The first time that you place this Fbox, it will create the Group

PCD1_G5020_0

Then, the next Fbox will create

PCD1_G5020_1

And so on.

Symbol are created for each I/Os in automatic mode

For each Rio, you will find two folders and the mapping for the available IN / Outputs

- Folder Parameters: all infos about the configuration
- Folder Manual: all values related to the override
- Automatic I/Os:

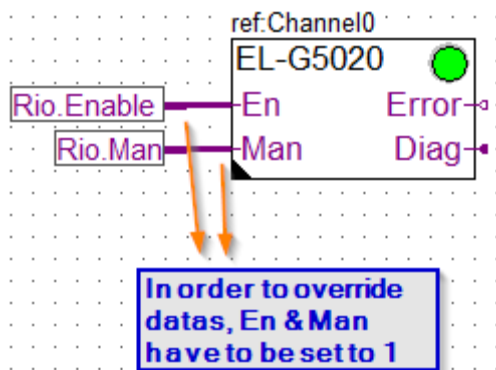
6.3.2 Parameters

Parameters		GROUP			
SR_WarnStatus	R		2273	Warning status	
SR_ExchangeDataModeMan	R		2272	Comm interval manual override	
SR_ExchangeDataModelIO	R		2271	Comm interval Inputs/outputs	
SR_ErrStatus	R		2062	Error status	
SR_Address	R		2061	S-Bus address	
SF_UploadBsy	F		2188	Upload config busy	
SF_DownloadBsy	F		2173	Download config busy	
SF_ButtonUpload	F		2172	Button: Upload	
SF_ButtonDownload	F		2171	Button: Download group	
SDB_ConfigIO	DB RAM		6600	Configurations IO (not compressed)	

Status / commands and configuration is also available directly

6.3.3 Manual symbols

Manual override could be done either directly on the Rio or remotely from a Web project for example.



When the Man Input is set active, override is possible. Symbols in the Manual folder will become actives.

Each Output could be driven / monitored with these symbols

EChannel	GROUP				
PCD1_G5020_0	GROUP				
Parameters	GROUP				
Manual	GROUP				
DigitalOutput3	GROUP				
DigitalOutput2	GROUP				
DigitalOutput1	GROUP				
DigitalOutput0	GROUP				
AnalogueOutput3	GROUP				
AnalogueOutput2	GROUP				
AnalogueOutput1	GROUP				
AnalogueOutput0	GROUP				
Value	R	[4]	2056	Output value	
ToggleManMode	F	[4]	2262	Enable/disable the manual mode	
ScaleMin	R	[4]	2050	Minimum scale	
ScaleMax	R	[4]	2038	Maximum scale	
ManModeHw	F	[4]	2258	State of the hardware manual mode	
ManMode	F	[4]	2254	State of the software manual mode	
EditManValue	R	[4]	2034	Edit the manual value	
LocalOverridePermission	R		2060	Manual override permission	

All Publics | System | Main_CPU.fup ×

Value: shows the live value of the output

ManMode: shows if the output is in automatic or forced

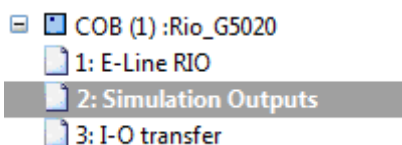
ManModeHw: shows if the forcing is done from PCD/WEB or direct on the RIO

ToggleManMode: change from forced to automatic

ToggleManValue - EditManValue: to change / edit the manual value

6.3.4 Test the program

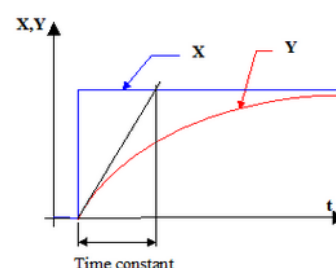
Page 2 of COB

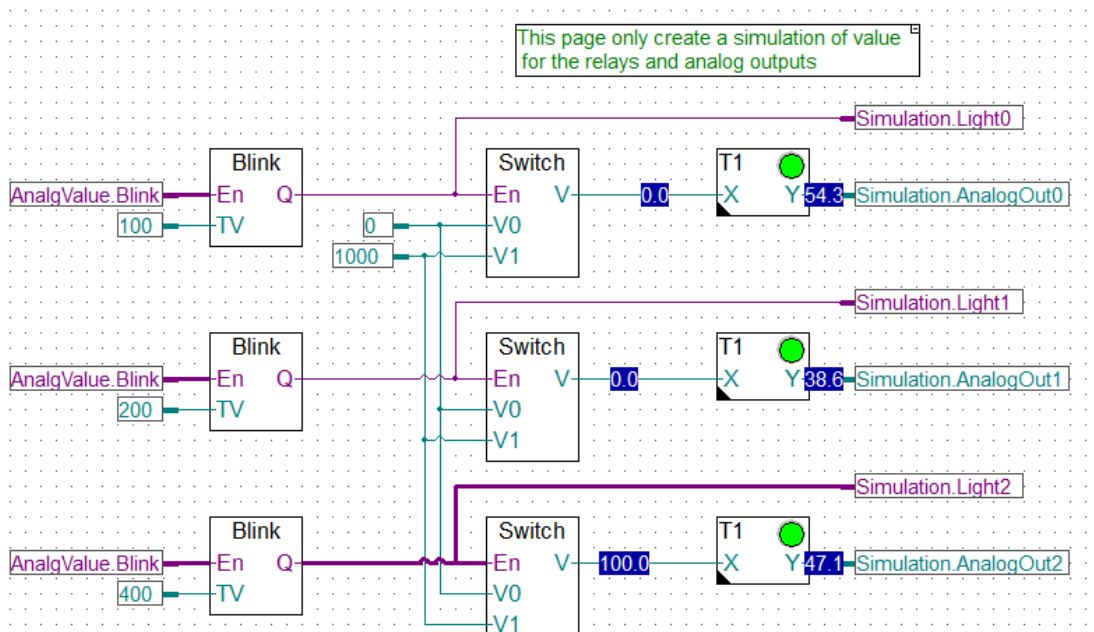


This page generate a variation from 0 to 1000 and switch flags on a different time basis: 10 seconds / 20 seconds / 40 seconds

We will then use these values to see the variation further on.

T1 Fbox (filter) has following Characteristics:

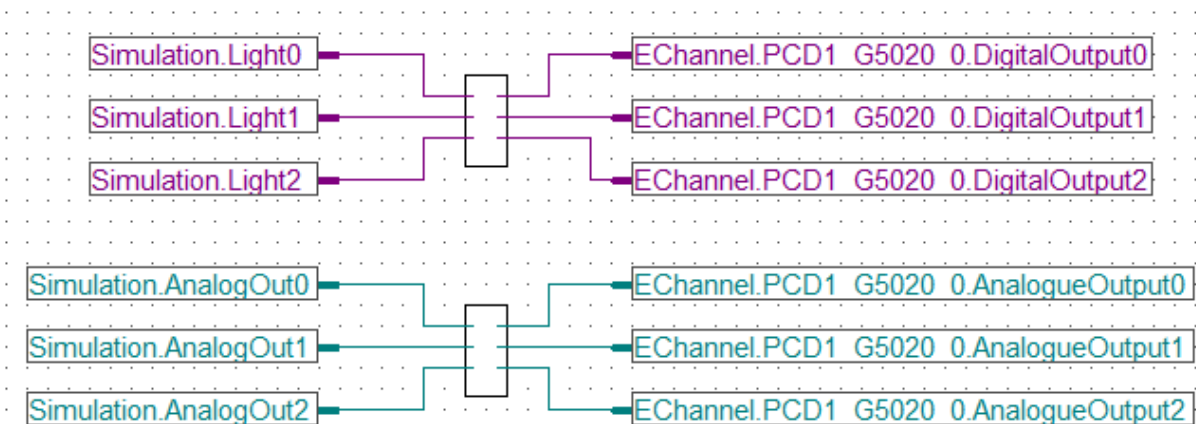


I/Os transfer

Page 3 of COB

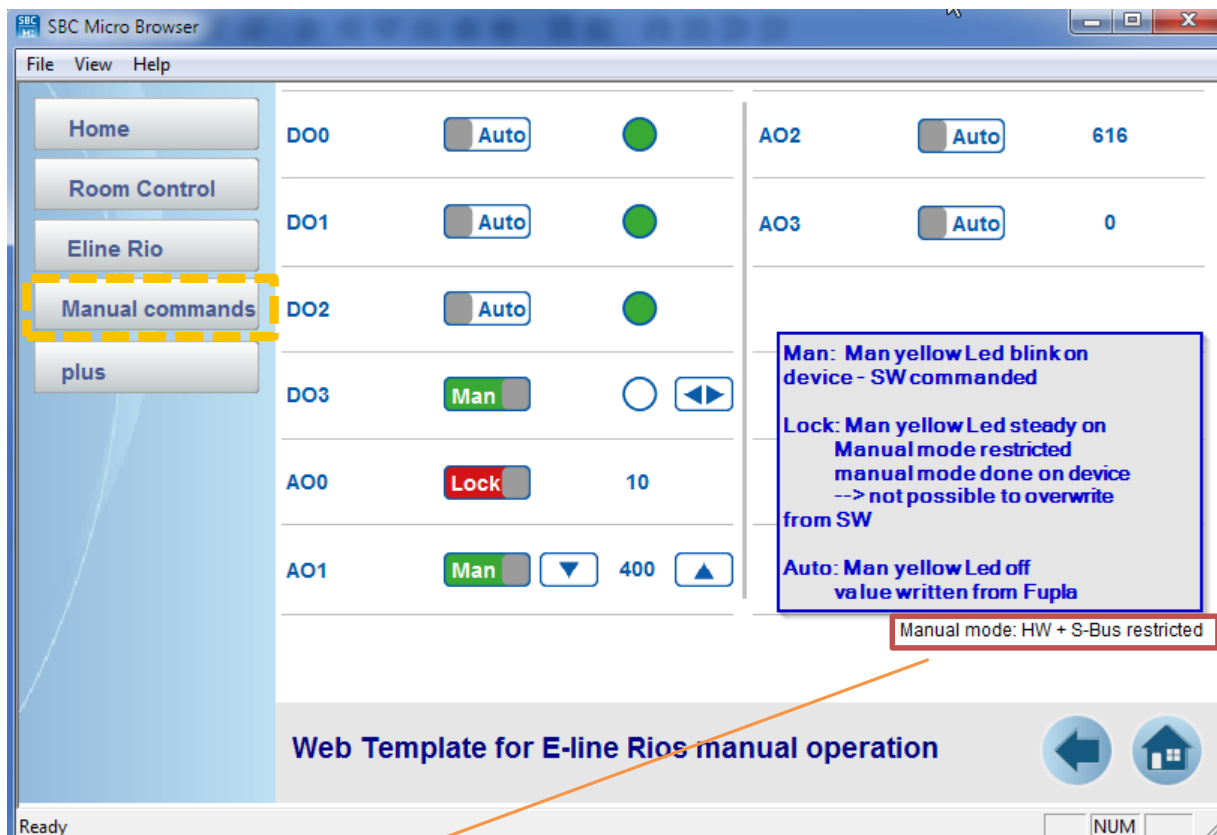
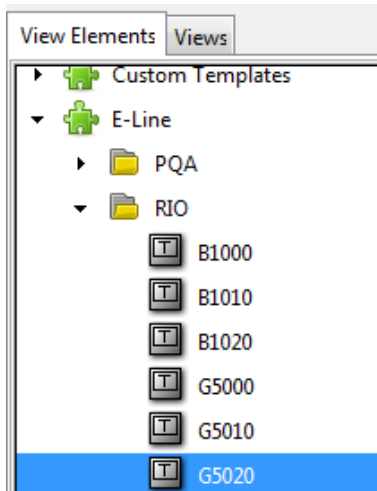
- COB (1) :Rio_G5020
 - 1: E-Line RIO
 - 2: Simulation Outputs
 - 3: I-O transfer

It is recommended to realize the I / O assignment on a separate page. This has the advantage that the program pages can be universally used again. If necessary change the I / O modules, everything will be at a glance and can be set again without long adaptation




6.3.5 WebEditor

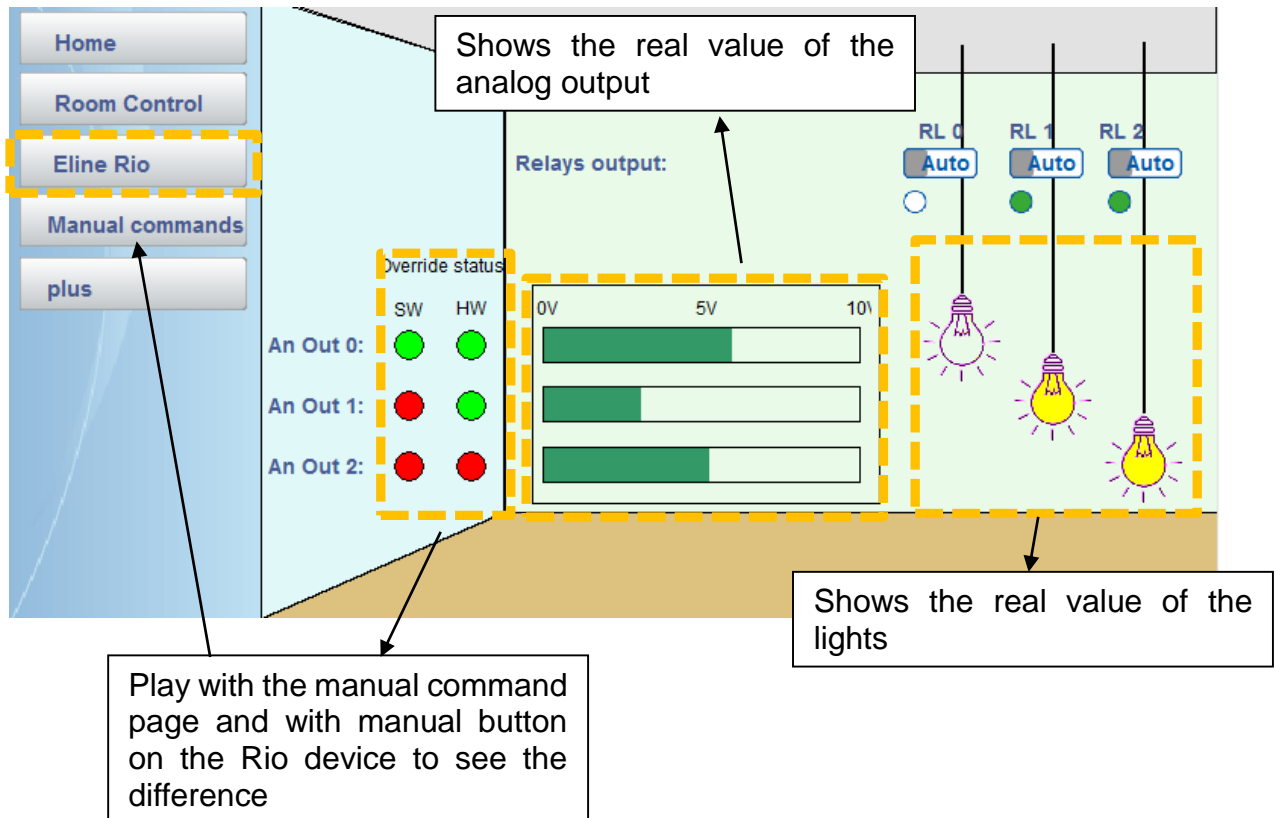
Use the macros in the WebEditor8 to Overwrite and monitor values



The manual mode is selected during initialisation in the Rio Fbox
 This mode changes the behaviour of the Rio (overwrite rights)
 For example, if the selected mode is HW + SBUS, the switch would remain Green and it would be possible to change from device and Web project.

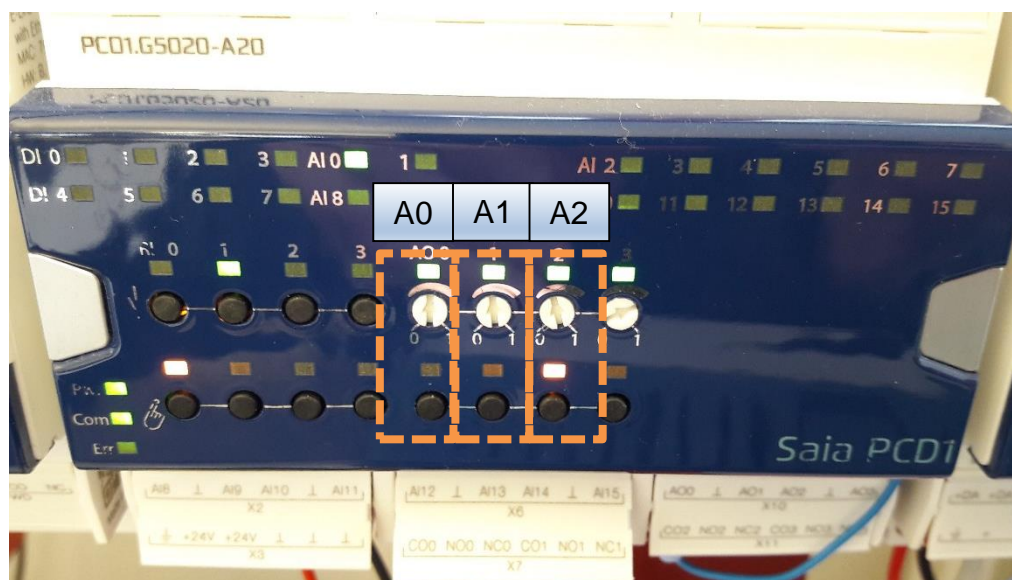
Note that this parameter is downloaded as defined in the EL + S-Bus master Fbox.

View the real value of the outputs. If both override status are green , means that the values from fupla are the shown values. Corresponding light is “on” when analog output is increasing.



Note that a manual on device forced output will set both status overwrite to 1.

- Set the manual command by pressing on the corresponding man button on the device. Change the value with a screwdriver. You will see the real value on the bargraphs.



A2
Steady On
(manual HW)

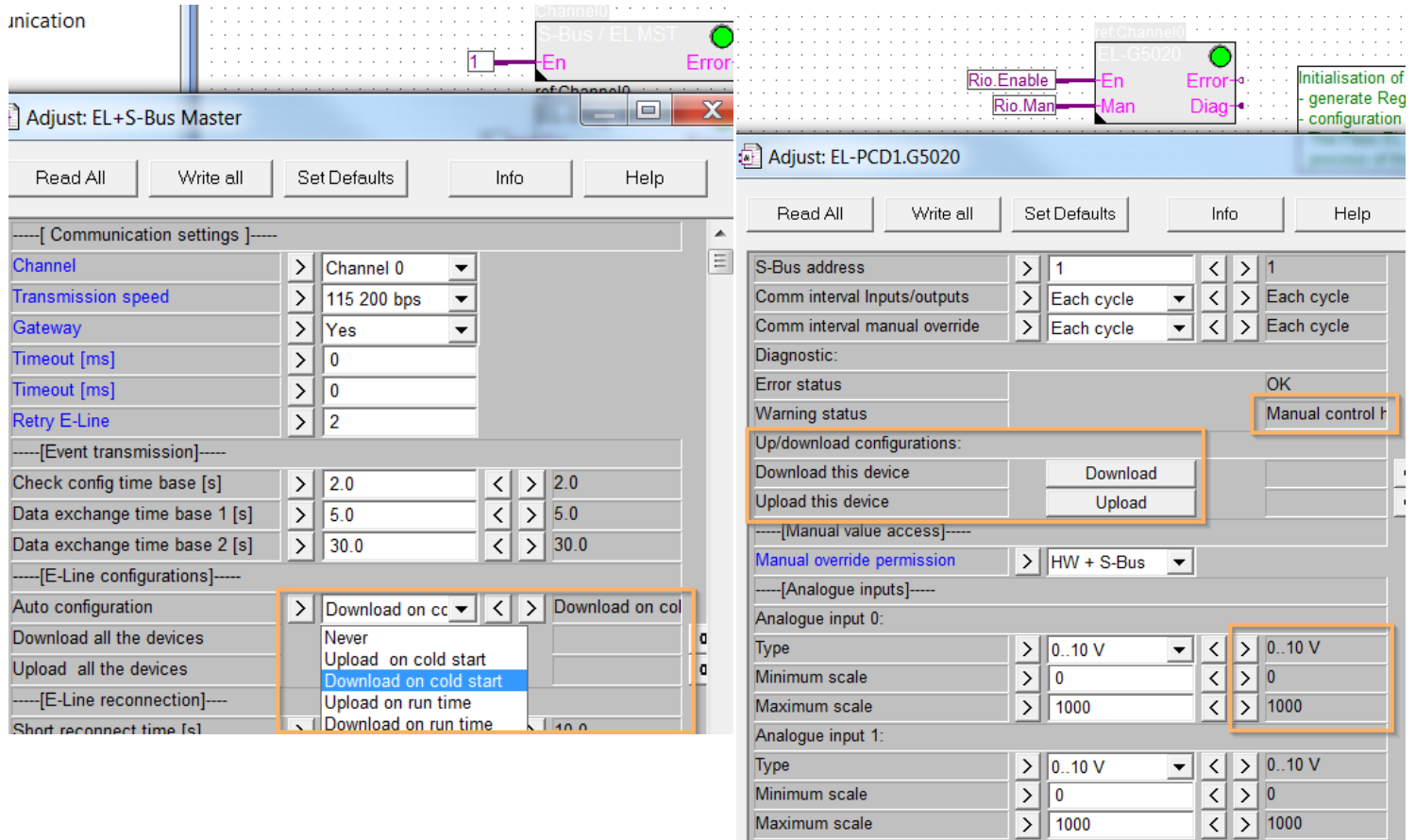
A1
Blink
(manual SW)

A0
Off
(Automatic)

6.3.6 Diagnostic possibility

Reading / writing of values does not correspond to your settings:

Check online that the configuration has been loaded correctly



Check that the downloaded configuration correspond to your expectation. You can upload the configuration to check.

Manual overwrite does not work.

Check that the Man input of the corresponding Fbox is set to 1.

7 Example 2: Room controller

7.1 Target of this example

- Use of E-suites Fboxes for room automation.
- Provide feedback and actual values to the headstation
- Possibilities to command the room directly from the Web

7.2 Material needed

- PCD1.M2220
- PCD1.G3600-C15 or G3601-C15 connected with address 8 on rotary switches
- uBrowser or Panel

7.2.1 Goal of the program

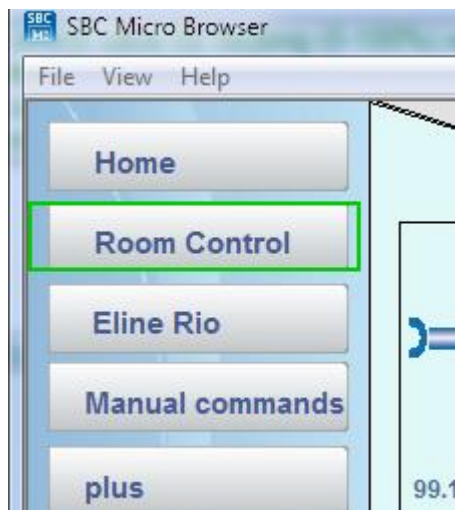
Simulation of a room control with the Webproject.:

- Open the window,
- Set sensors in the Web,
- Change setpoint and check Esuite Fboxes behavior.

7.3 Step by Step to do the exercise

Download program in the Headstation and in the room controller

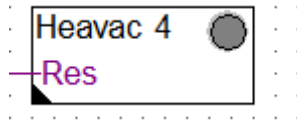
Start the uBrowser and go to the page Room Control



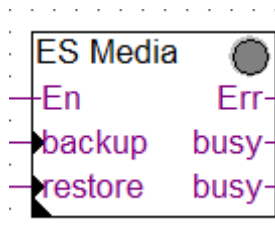
- Set the sensor to occupied / close the window
The selected mode will go to occupied (mode 4)
- Change the actual room temperature and the setpoint
- Observe the heating / cooling regulation.

7.3.1 Fbox

The E-suite library does need some initialisation from Heavac library.



The Fbox Heavac 4 must be used. Note that higher version (5-6-7-8) are not supported by E-lines modules (-C15) as the Fw does not support all coded instruction.



As E-lines does not contain battery, symbols contained in E-lines are not safe saved. Up to 500 variables in the Symbol Manager marked with the tag "S_ADJUST" will be backed-up and restored (EPROM) after a reboot by this Fbox

7.3.2 Programmation of the room controller

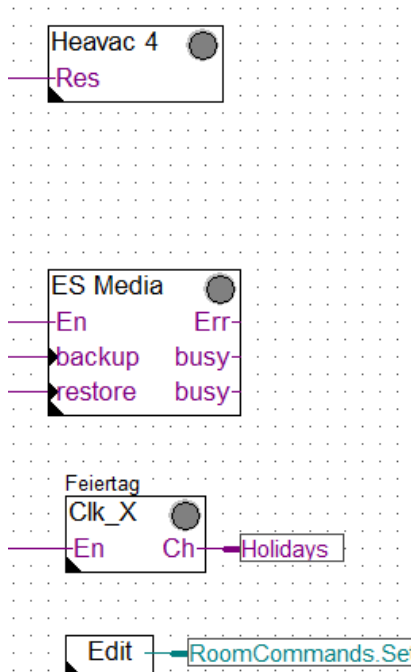
The PCD only transfer datas from Webproject to the roomcontroller

The room controller does manage datas from PCD and calculate the regulation values.

Open the Fupla file of the 01_E-Line_Room device

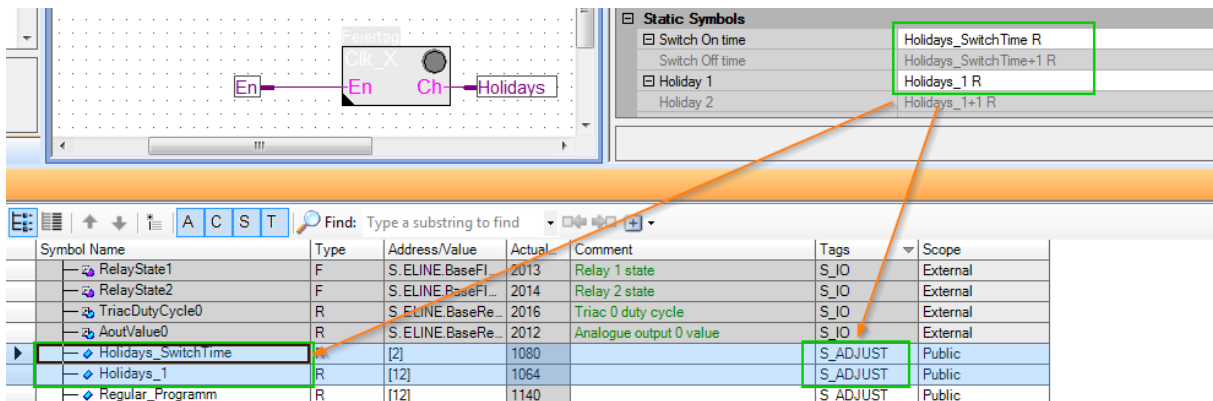
<div> <div>COB (0) : COB_0</div> <div> <div>1: Initialisation room</div> <div>2: Communication</div> <div>3: Bacnetcomm transfer</div> <div>4: Room occupation</div> <div>5: Room settings</div> <div>6: Ventilation</div> <div>7: Valves</div> <div>8: IOs transfer</div> </div> </div>	<div> <div>1: Initialisation general / backup / holidays</div> <div>2: Communication of sensors states / measures temp / setpoints / fanspeed / etc...</div> <div>3: Transfer of bacnet command (change mode)</div> <div>4: Define scenario depending of all parameter</div> <div>5: Calculation of valve opening / Effective setpoints</div> <div>6: Set up ventilation speed</div> <div>7: Simulation of specific valves</div> <div>8: Transfer of calculated value to corresponding symbols (media mapping)</div> </div>
--	---

1: Initialisation



The ES Media Fbox does save and restore all values with the Tag S_ADJUST

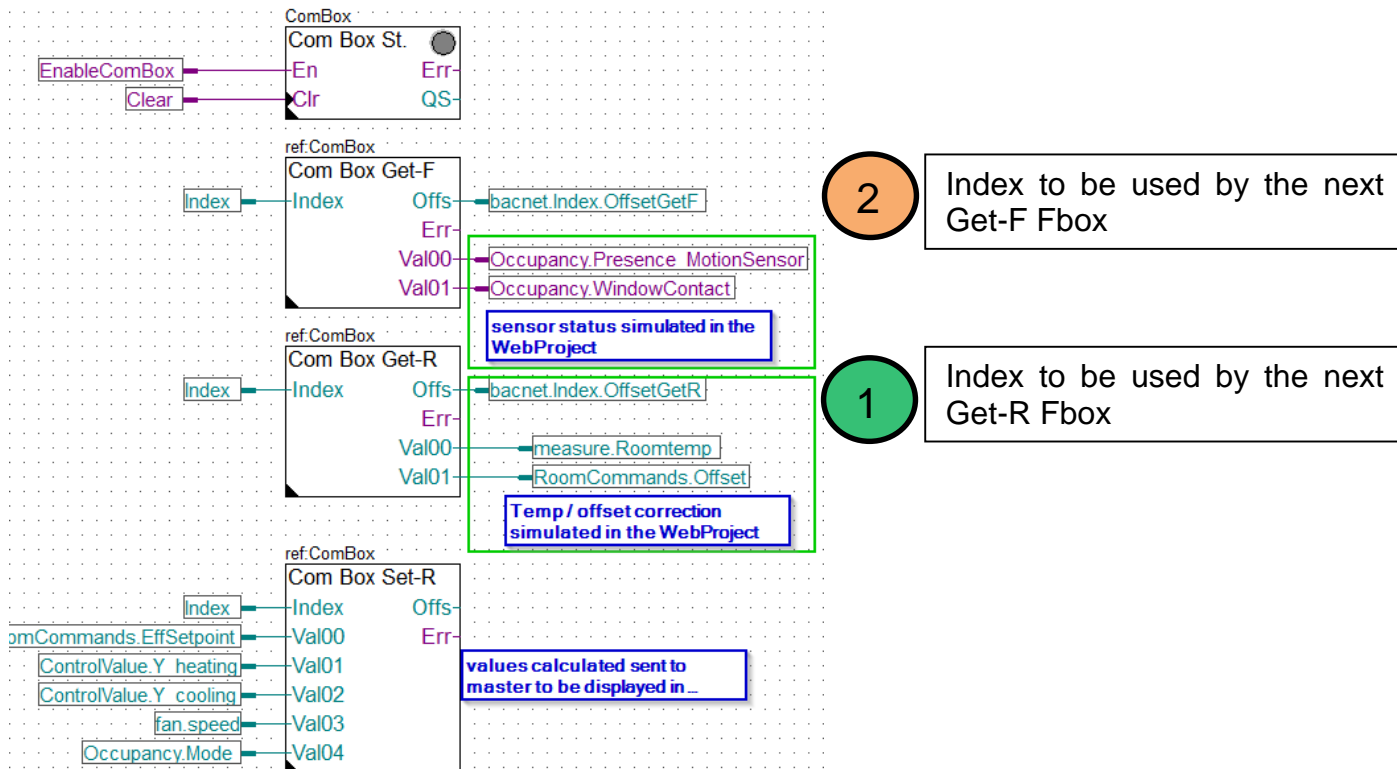
Holidays have been set and static internal symbols have been set as S_ADJUST in order to keep these values at each restart



Symbol Name	Type	Address/Value	Actual	Comment	Tags	Scope
RelayState1	F	S.ELINE.BaseFI...	2013	Relay 1 state	S_IO	External
RelayState2	F	S.ELINE.BaseFI...	2014	Relay 2 state	S_IO	External
TriacDutyCycle0	R	S.ELINE.BaseRe...	2016	Triac 0 duty cycle	S_IO	External
AoutValue0	R	S.ELINE.BaseRe...	2012	Analogue output 0 value	S_IO	External
Holidays_SwitchTime	R	[2]	1080		S_ADJUST	Public
Holidays_1	R	[12]	1064		S_ADJUST	Public
Regular_Programm	R	[12]	1140		S_ADJUST	Public

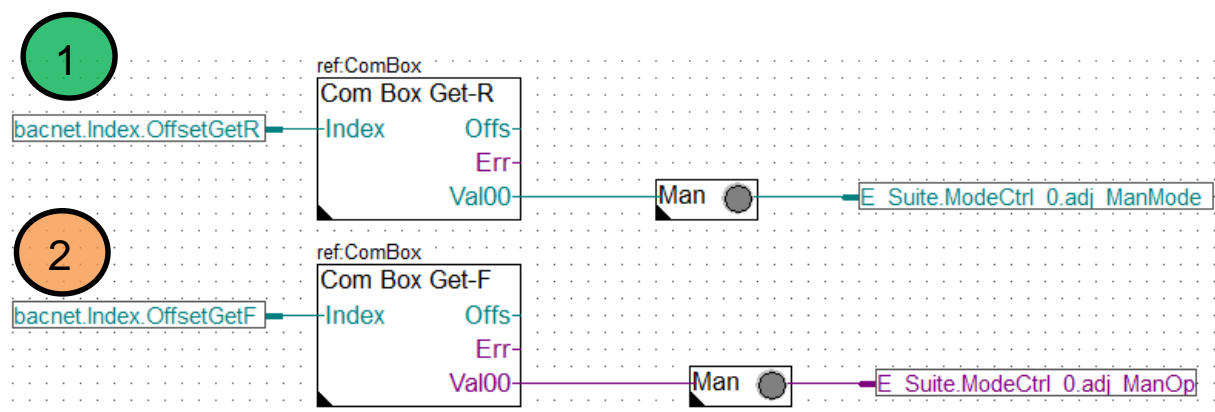
2: Communication

Our Web project will simulate a room. All the “real values” have to be transferred from / to the master



3: Bacnet communication

A typical example would be to overwrite the mode control from a scada supervisor. As the room controller can not be accessed directly with bacnet, the datas have to be transmitted with the ComBox directly to the device. In the Example they are simply changed from the Web Editor



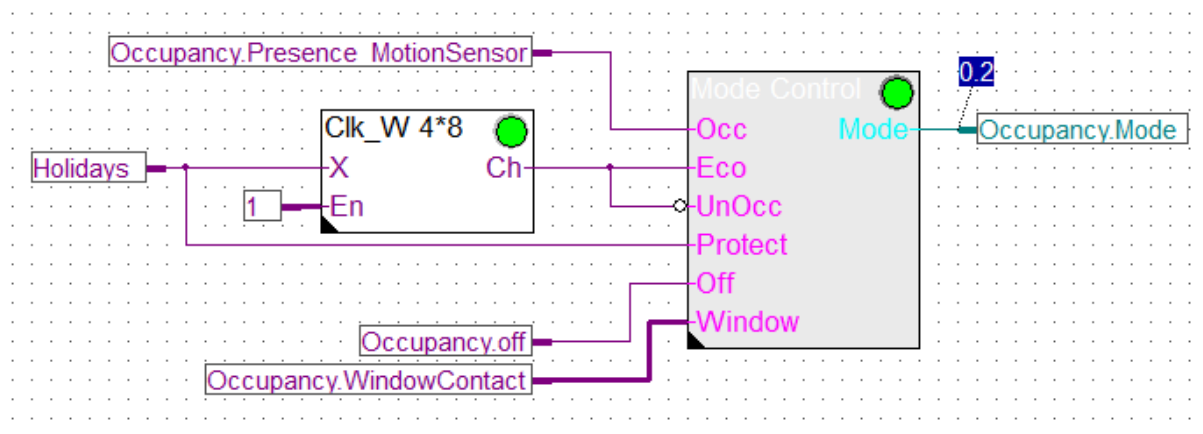
E_Suite.ModeCtrl_0.adj_ManMode & E_Suite.ModeCtrl_0.adj_ManOp

are internal R & F of the mode Control Fbox (see next step). These symbols allow to overwrite the mode in priority:

4: Defining the room occupation

This Fbox does consider

- the regular daily program and holidays (→ holidays does switch to protect mode)
- state of the occupancy sensor
- state of the windows contact

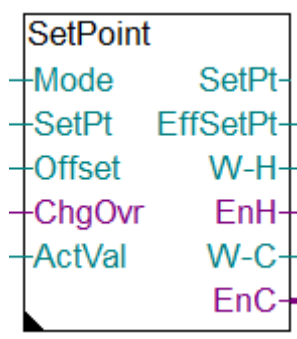


Note that the unoccupied mode will be set when out of schedules.

A code : 0 to 4 will be set in the output. This code will then be used by other Fboxes.

5: Calculation of settings

The Set Point FBox provides a set of set points and dead bands:



Example of the settings for Unoccupied mode & Protection mode

[--- Unoccupied Mode ---]			
Setpoint Data Origin	>	Internal	<
Setpoint Offset	>	Disabled	<
Internal Setpoint	>	20.0	<
Deadband Heating	>	5.0	<
Deadband Cooling	>	7.0	<
Heating	>	Enabled	<
Cooling	>	Enabled	<

[--- Protection Mode ---]			
Setpoint Data Origin	>	Internal	<
Internal Setpoint	>	10.0	<
Setpoint Heating	>	10.0	<
Setpoint Cooling	>	30.0	<
Heating	>	Enabled	<
Cooling	>	Disabled	<

If unoccupied or in protection mode, is not possible for the user to do any change

- setpoint is internal and heating / cooling preset if functional or not

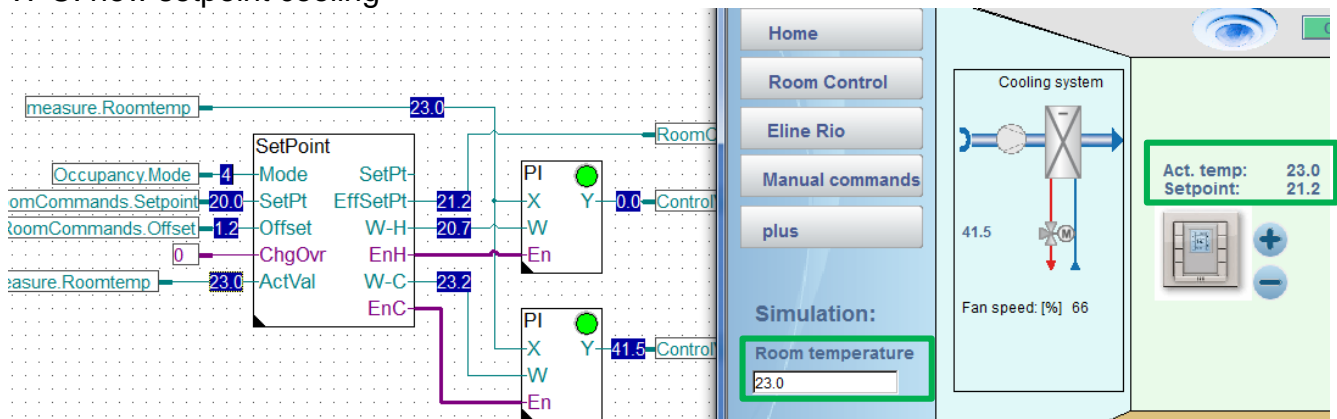
Example when mode = occupied (4)

The actual temp is 23°C and the user set the setpoint from 20 (default) to 21.2°C

The offset is then +1.2°C

W-H: new setpoint heating

W-C: new setpoint cooling



[--- Occupied Mode ---]			
Setpoint Data Origin	>	External	<
Setpoint Offset	>	Enabled	<
Internal Setpoint	>	20.0	<
Deadband Heating	>	0.5	<
Deadband Cooling	>	2.0	<
Heating	>	Enabled	<
Cooling	>	Enabled	<

W-H = EffSetPt - deadbandH: $21.2 - 0.5 = 20.7^{\circ}\text{C}$
W-C = EffSetPt + deadbandC: $21.2 + 2 = 23.2^{\circ}\text{C}$

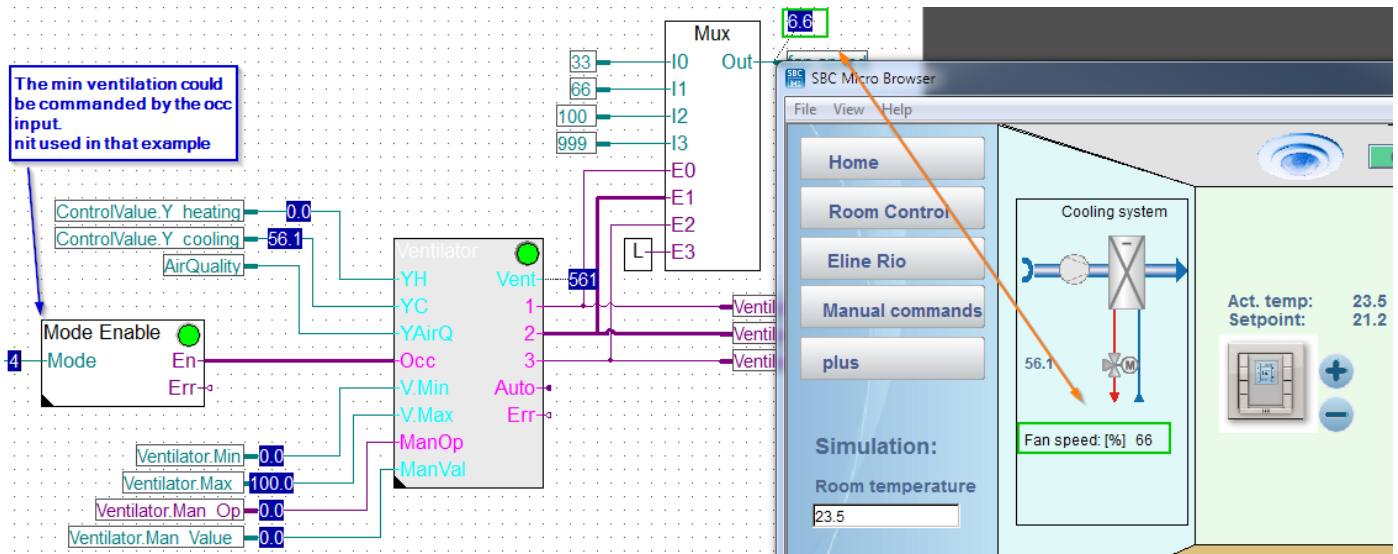
No heating / cooling will be started if room temp is between 20.7°C – 23.2°C

Note: In the screenshot, the output of the PI gives 41.5%. This is due to the integration time of 300sec of the controller PI. The value was slowly going to 0.

6: Ventilation settings

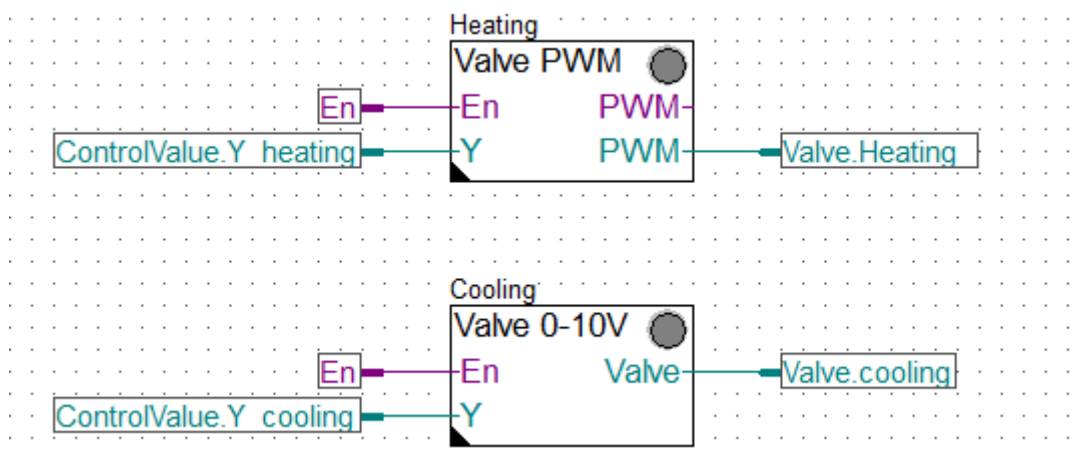
In this example, the ventilation is used only for cooling.

We will use the ventilation for mode eco & Occupied. Cooling is disabled for mode protected and unoccupied by the Fbox mode control.



The Fbox calculate the fanspeed

7: Valve calculation



Theses Fbox allow the user to adjust theoretical values with real characteristics of the used valve.

In that example, The regular characteristics of the valves shows no flow at 10% of opening angle and full flow at 90% opening angle. This Fbox does adapt the signal from 0..100% to 10..90%

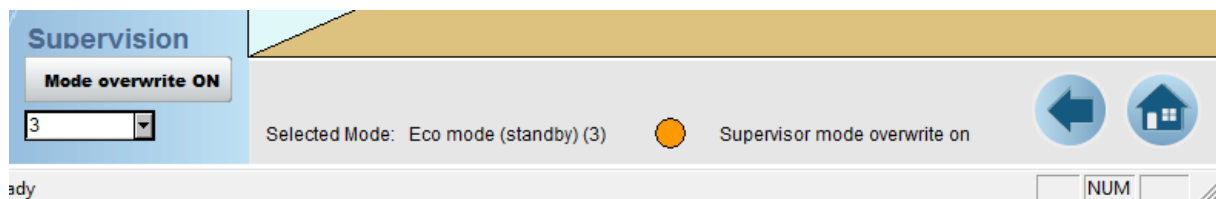
7.3.3 Web editor

The room controller does not have an integrated web server.

In order to visualise values in a web project or any kind of supervisor, the values have to be transmitted to the main CPU.

The controller will manage the whole automation by itself and communicate with the master which has the web project.

In the web Editor, a led would show the user if the mode has been overwritten by a supervisor. This supervisor could be Bacnet. In order to simulate, this supervision can also be done directly from the Web project



7.3.4 Diagnostic possibility

Regulation is not done as expected:

- Check the status of window / sensor
- Check the calculated mode of the Fbox
- Check that communication is correct between the PCD and the room controller

8 Example 3 light & blind

8.1 Target of this example

- Use of E-suites Fboxes for light & blinds automation.
- Provide feedback and actual values to the headstation
- Possibilities to simulate the blinds from the Web

8.2 Material needed

- PCD1.M2220
- PCD1.G1100-C15
- uBrowser for windows or saia webPanel

8.2.1 Goal of the program

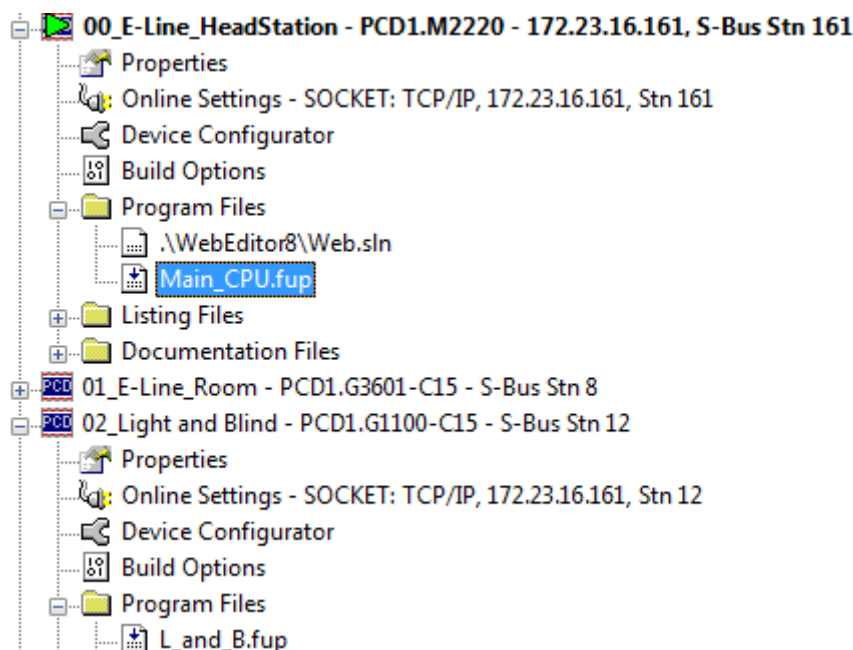
Simulation of a blinds with the Webproject.:

- Open / close the blinds

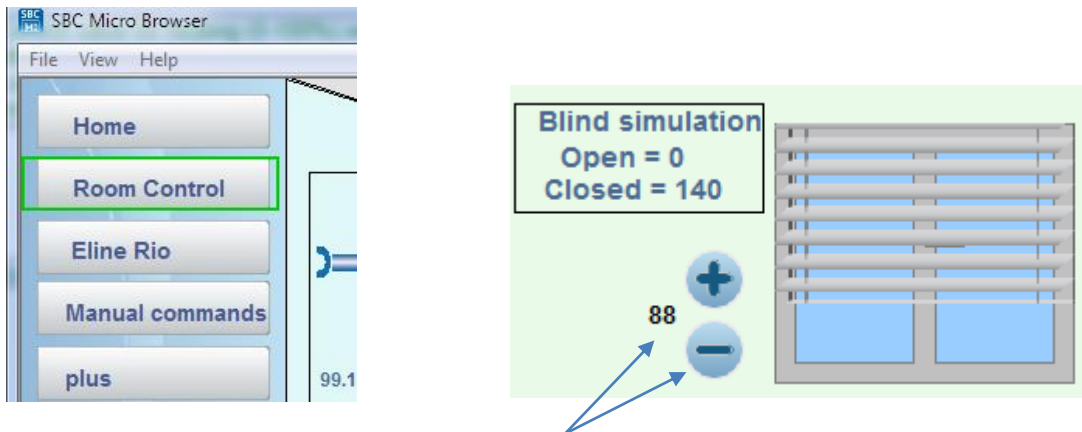
The module will get 2 command signals, calculate functions and timing, send commands to the corresponding relays and give a simulation value back to the master for the webEditor

8.3 Step by step to do the exercise

Download program in the Headstation and in the Light & blinds module



Start the uBrowser and go to the page Room Control



It is now possible to simulate a command of the blinds with these two buttons beside the blinds.

In order to simulate the blinds, a counter is incremented.

The simulation is going from 0 -> full open, to 140 where blinds are fully closed.

In the example the counter is at 88.

- 1 long press (> 500ms) will send an up / down command for 30 seconds.
- 1 short press will send a step up / down command. (About + / - 5 for the counter)

To stop a long press command, do a short press again on the same button.

8.3.1 Parameters

The light and blind module contain:

- 4 digital inputs 24VDC / 24VAC
- 2 relays outputs 25VAC / 30VDC
- 2 analog outputs 0-10V

An input switch could be connected to one of the 4 inputs. In that case, it will be directly program with the media mapping.

In the case that an EnOcean or PEHA system will be used, it would not be possible to connect it directly on this module. It could be connected to the auxiliary RS485 line of a room controller or a Dali for example

8.3.2 Fbox

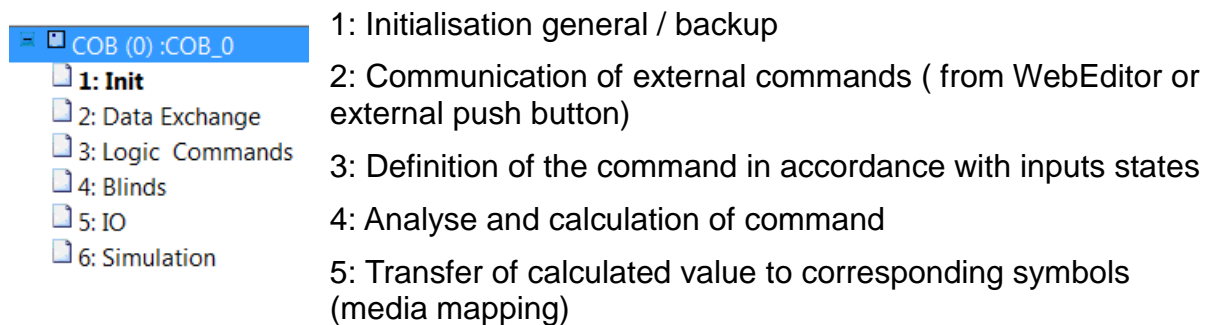
The simulation is done from the Web Editor. Most of the time, it will be done from a switch in the room by the user.

8.3.3 Programmation of the light and blind module

The PCD only transfer datas from Webproject to the light and blind module

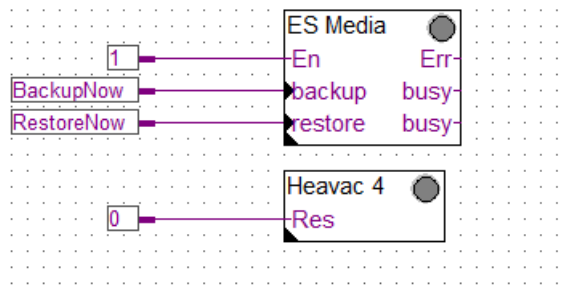
The room controller does manage datas from PCD and manage command for the blinds.

Open the Fupla file of the 01_E-Line_Room device



1: Initialisation

General initialisation for E-lines programmable modules.

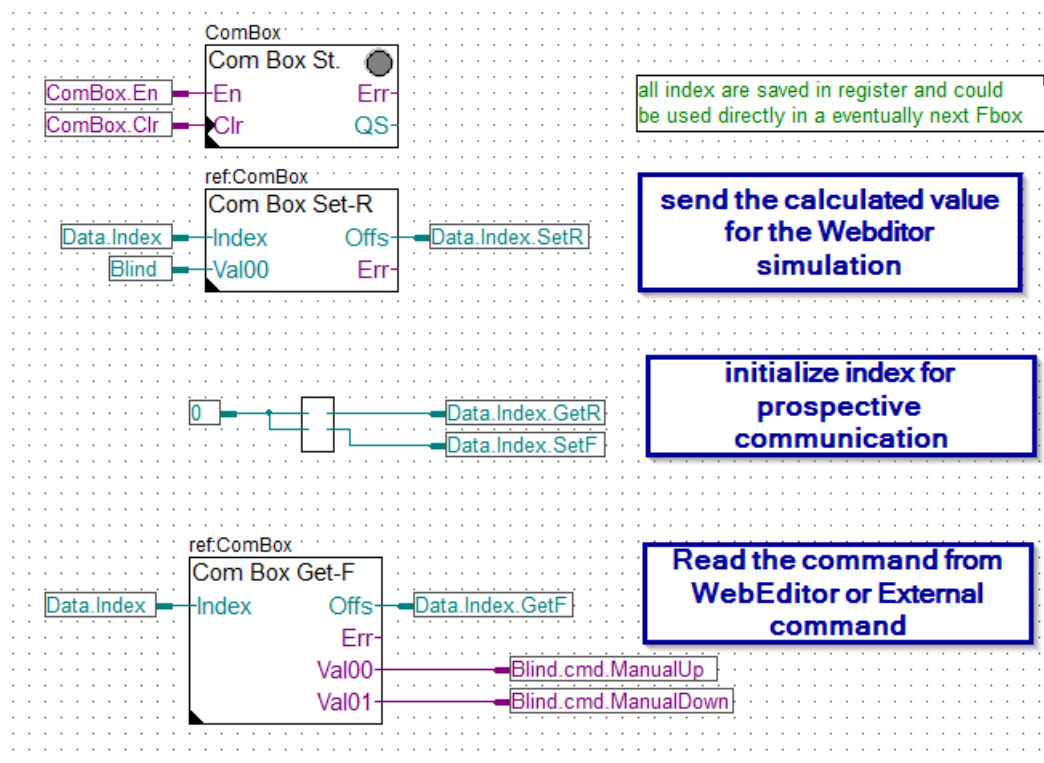
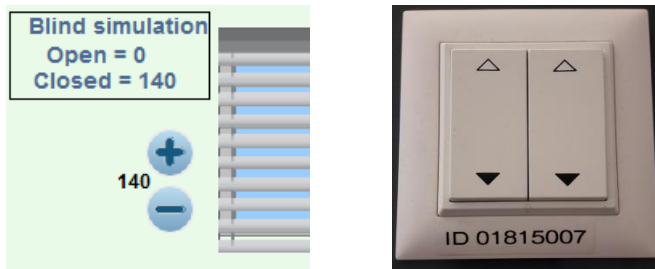


The ES Media Fbox does save and restore all values with the Tag S_ADJUST

In this example, no values are stored with the S_ADJUST tag. It is only placed as a general initialization.

2: Communication

The blind could be driven by the Web project, or any button connected ahead

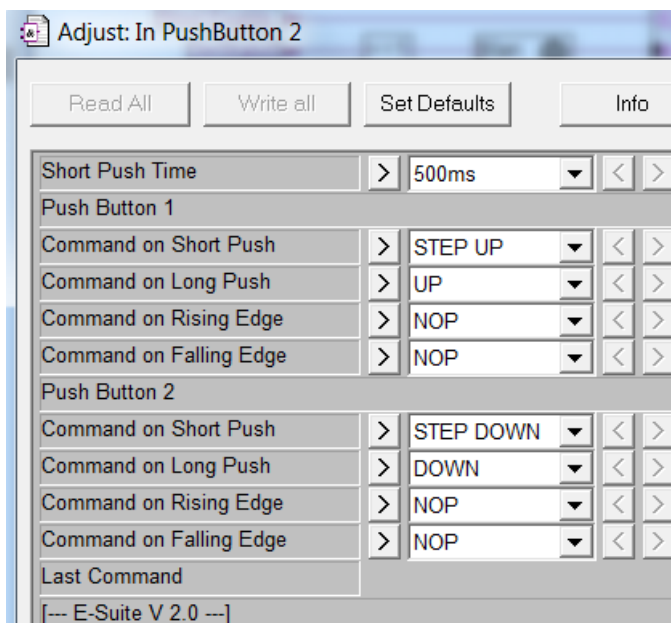
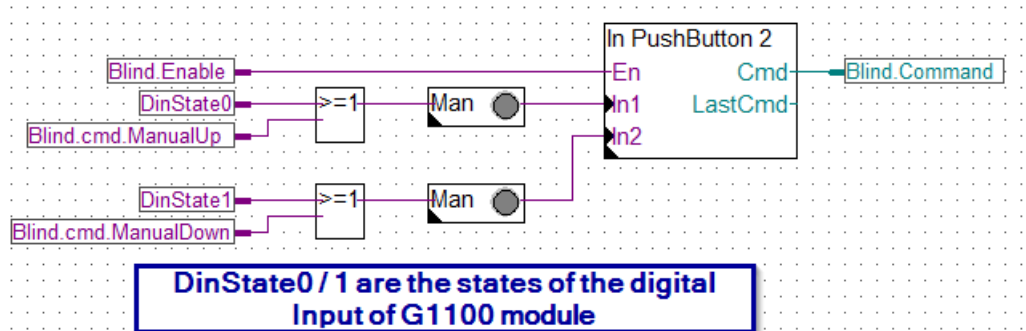


1 register (Blind) will be send to the master with a value between 0 and 140 (0 is fully open and 140 is fully closed)

2 flags are received from the master from Web or from any external command

3: Command generator

This Fbox adjust the command (light or blind) given from 2 push button

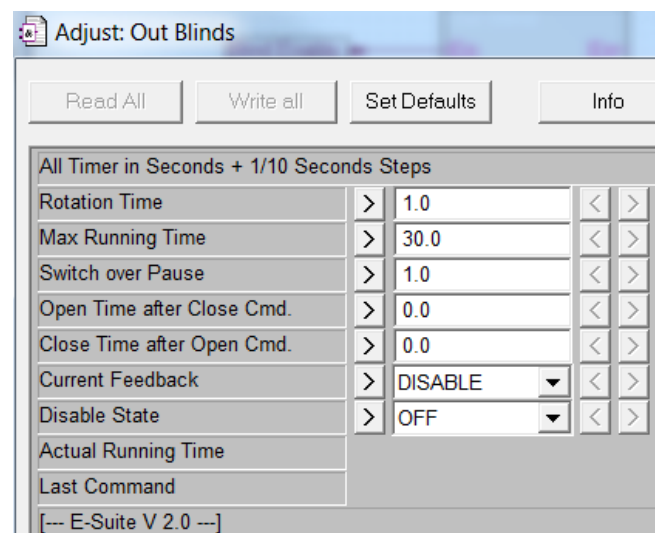
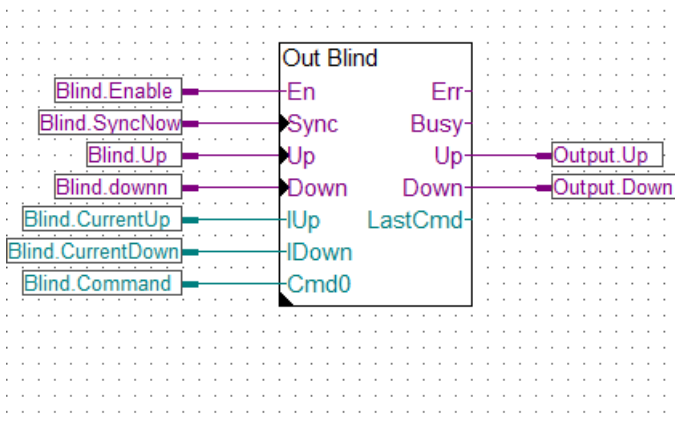


A short press (<500 ms) will give a step up/down command

A long press (>500 ms) will give an up/down command

4: control

The command given by the In PushButton2 will be send to the Out Blind Fbox.



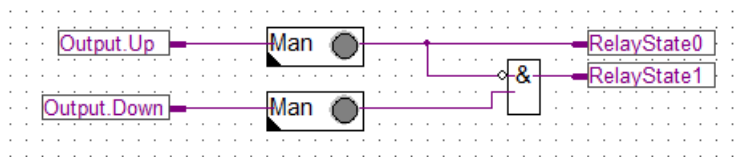
The running time is set to 30 second.

An up/down command will take a bit less than 30 seconds to simulate a blind up or down. (0 -> 140)

5: transfer to I/O

It is recommended to map with the relays on an external page. This allow to re-use the same programming in many devices

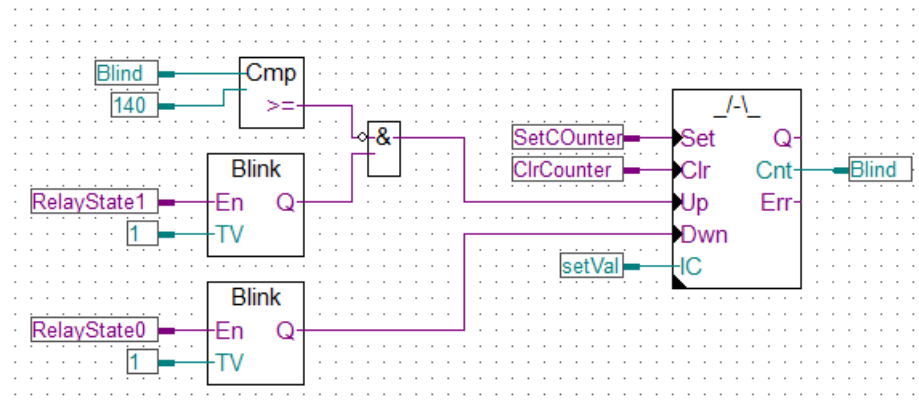
The And Fbox avoid a double activation (up and down) in the case of a manual forcing



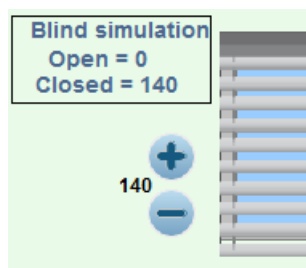
6: Web editor simulation

In order to simulate the blind, a picture of a blind has been placed in the Web editor. The window is fully covered when the length of the blind reach 140.

The blind does move for each step of 10.



8.3.4 Web editor



Use the + & - button in the room control page.

8.3.5 Diagnostic possibility

9 Troubleshooting

Symptom	Possible cause	Solution
Wrong values on Rios output	Output is overwritten	Check manual leds on devices or State of the SW / HW manual mode
Output on rios could not be overwritten	Initialisation does not allow overwriting	Download a new configuration →change the parameter Manual override permission in EL-PCD1.xxxx Fbox
	-	-

10 References

Topic	Document	No.
Misc.	SBC FAQ Manager www.sbc-support.com	-