SAIA-Burgess Electronics

SWITCHES • MOTORS • CONTROLLERS

SAIA®PCD

Process Control Devices

EIB library

Edition 26/750 E3

SAIA® Process Control Devices

EIB Library

Version 2.0.70

Edition 26/750 E3 - 04.99

Created by ENGIBY, G. Bovigny
Subject to technical changes

Contents

1. Generalities

1.1 Hardware and software references

Recommended PG4 version 2.0.70

Minimum PG4 version: 1.4

Minimum Firmware version:	PCD1	V001
	PCD2	V004
	PCD4.Mxx0	Not possible
	PCD4.Mxx5	V00C
	PCD6.M1	Not possible
	PCD6.M2	Not possible
	PCD6.M3	V001
	PCD6.M540	Not possible

1.2 Supported functions

The following functions correspond to EIS functions specified by EIB.

Reception functions

Function	Definition	EIS
RCV Switch *	Reception of binary commands	1 Switching
RCV Dimmer *	Reception of progressive commands	2 Dimming
RCV Preset	Reception of preselected levels	2 Dimming
RCV Value	Reception of physical values	5 Value
	Reception of physical values	9 Float value (as integer)
	Reception of physical values	10 Counter value
RCV Scale	Reception of relative scaled values	6 Scaling
RCV Drive *	Reception of movement commands	7 Drive control

Transmission functions

Function	Definition	EIS
SEND Switch	Transmission of binary commands	1 Switching
SEND Dimmer	Transmission of progressive commands	2 Dimming
SEND Value	Transmission of physical values	5 Value
	Transmission of relative scaled values	6 Scaling
	Transmission of counter values	9 Float value (as integer)
	Transmission of counter values	10 Counter value
SEND Drive	Transmission of movement commands	7 Drive control

Legend

* These functions have also a general command over a second group address.

Utilization example	Used function
On/off lighting	RCV/SEND Switch
Progressive lighting	RCV/SEND Dimmer and Preset
Command of shades or blinds	RCV/SEND Drive
Measurement of luminosity	RCV/SEND Value
Measurement of temperature	RCV/SEND Value
Measurement of working hours	RCV/SEND Value (Counter value)

1.3 Working principle

The EIB library allows access to EIB network by means of a BCU coupler with RS 232 interface. The same coupler is used for configuration of the EIB network using the ETS software tool.

The SAIA-PCD can work simultaneously in transmission (Send) and reception (Receive) mode as well as send polling requests.

A RS 232 serial interface of the PCD must be used. The library uses the MC0 communication mode supplied as standard in all PCDs.

The library has been created as an optional family of Fboxes for the SAIA programming tool Fupla for Windows.

1.4 Possibilities / restrictions

The transmission speed can be adapted to any standard value ranging from 9'600 bauds to 19,2 kbauds. Some combinations with other lines are not allowed by the PCD.

Any line, from 0 to 4 can be used, however some restrictions exist using the PGU line.

A time base of one millisecond is necessary. It is only available with the firmwares mentioned in chapter Hardware and software references.

As to insure a correct and performant working of the driver, the cycle time of the user program may not go beyond 0,1 second.

As to insure a quick message transmission to BCU, the CPU of PCD is maintained by the driver during the whole telegramme transmission. The following consequences must be considered:

- The maximum duration of a telegramme is 100 ms
- The average duration of most telegrammes is 30 ms.
- In case of transmission break, the CPU may remain in waiting state for 1 to 150 ms. This waiting time may be exceptional (random error) or at each cycle (break of RS 232 interface).

The reserve cycle time for applications combined with the EIB application is 70 ms.

Performance measurements have shown that in normal conditions, a PCD system can handle up to 500 EIB variables.

Assumptions: Mix of 50% SEND and 50% RCV functions
Mix of 50% Switch and 50% Value functions
Maximum Fbox size of 10 elements per Fbox
PCD2 system
No polling function activated
No other application running

This amount of elements must be reduced if other applications run in parrallel of the EIB Driver. The reduction can be estimated in proportion of the cycle time needed relatively to the reserve time of 100ms.

Example: The application linked with the EIB Driver needs 20ms cycle time (20% of 100ms). The number of EIB elements must be reduced to 400 (500 – 20%).

1.5 Safety

Parity

The parity check is not possible between the PCD and the BCU coupler. However, the transmission is synchronized character after character.

Collision / Priority

Anytine, both devices, the EIB driver and the BCU coupler can generate telegrammes. However, the link is not 'duplex'. In case of collision (simultaneous transmission start), the BCU coupler is Master. The PCD driver interrupts its telegramme and restarts it when reception is finished. In case of collision, the 'Warning counter' is incremented. Monitoring this counter, makes it possible to check the communication load.

Load of network

According to EIB specifications, an EIB network should not be loaded unnecessarily. In this respect, a transmission occurs only when a sender or receiver changes effectively its state. Consequently, as long as this principle is respected, the traffic on the EIB Driver remains quite low.

Lost of telegramme

The maximum telegramme transmission frequence between the EIB driver and the BCU coupler depends on the CPU total load. The BCU coupler has only a limited number of memories available for the incoming telegrammes from the EIB network. In case of overrun, the telegrammes are lost.

1.6 Load of CPU

The EIB driver is developed in PCD user language. The functioning requires that the CPU runs constantly its programme (RUN status). It is simply supported by the firmware up to the level of sending and receiving characters. In this way, the load of the CPU is combined with the load given by the other application programmes.

The load of CPU is influenced by:

- the transmission of the EIB driver
- the load of the other applications (the cycle time)
- the load of the other interfaces
- the number of timers and their time base

If the load of CPU becomes too high, the driver's reaction is slowed down. This can lead to telegramme losts in the BCU coupler.

1.7 Hardware Installation

Please refer to SAIA manuals and BCU couplers.

For some PCD serial interfaces, the type (RS 232) is defined by the choice of hardware module. Please refer to SAIA documents as to select the available equipments and the corresponding wiring.

For switchable software interfaces, the driver automatically insures the functioning in RS 232.

Particular points to respect

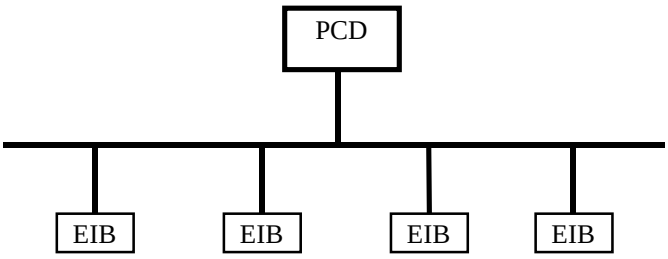
The length of a RS232 line should not exceed 15m. The cable must be as distant as possible from the power cables.

2. Typical applications

2.1 EIB Sensor and actor mixed with PCD Input and Output

Depending on the application type or the building structure, it can be interesting to connect sensors or actors direct to the PCD. The EIB driver alows to connect EIB sensor with PCD output and PCD Input with EIB actors in a common function.

In other cases, some actors type are not awailable as EIB componnents. In any case, it is possible to opimize the cost of the final solution in working on both systems.

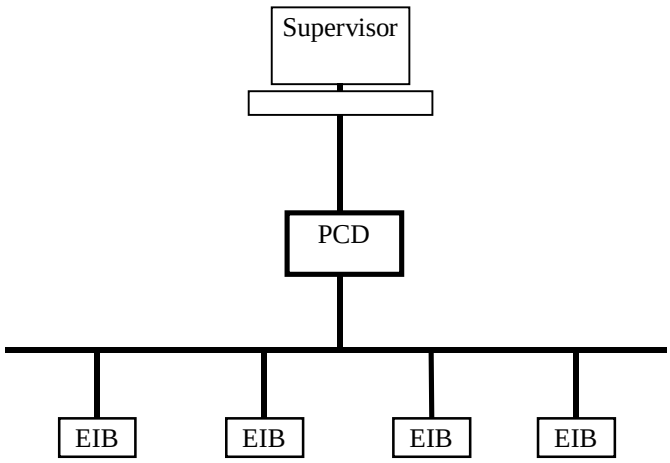


The EIB components are configured on the bus with the ETS tool. The corresponding PCD fonctions are programmed in Fupla using Fboxes of the EIB library.

The functionality of the EIS functions can then be extended with all basic Fboxes of Fupla. Complex functions can be executed in the PCD. General commands can be send from PCD.

2.2 Gateway for Supervisor

The PCD is used as gateway for a supervisor system using other driver like S-Bus, Profibus or Modbus. The PCD alows to get the actual state of EIB sensors and also to send indivudual or general command to the EIB actors.



Using Receive Fboxes in the PCD, the actual state of sensor is always up to date in PCD variables. No pooling is necessary on the EIB Bus. The supervisor can read this values in PCD variables.

When necessary, commands can be send to the PCD by writing into PCD variables. Using Send Fboxes in the PCD, these variables are automatically sent to the corresponding actors when the values change in the PCD.

The EIB components are configured on the bus with the ETS tool.

In some large application, the EIB bus may be split in several independent sections. It can be necessary to install several PCD Gateway. A simple PCD2 system supporting up to 4 serial lines offer good possibilities with a reduced investment.

3. Programming and functioning

3.1 Assignation of a line with EIB Driver

See example EIB_EX file and the detailed description of the EIB Driver Fbox.

Before being able to program a data exchange with Fupla, a communication line must be assigned with the EIB Driver Fbox. The send and receive functions of this library cannot work without this Fbox.

Only one EIB Driver can be used in the same Fupla file.

This function is used for assignation of the line in MC0 mode and generates a routine in user language supporting the link with the BCU coupler. Its adjust window allows, OFFLINE, to select the serial line number and to adjust the communication parameters. Once loaded and put into RUN, the functioning of the link can be viewed ONLINE.

The driver is permanently listening the telegrammes sent by the BCU coupler. The coupler is listening the EIB bus. This mechanism is initialized when starting the programme, when the BCU coupler is switched on and off as well as when the serial line is disconnected and reconnected.

The transmission/reception Fboxes define the data effectively used in the PCD.

3.2 Programming of transmission/reception

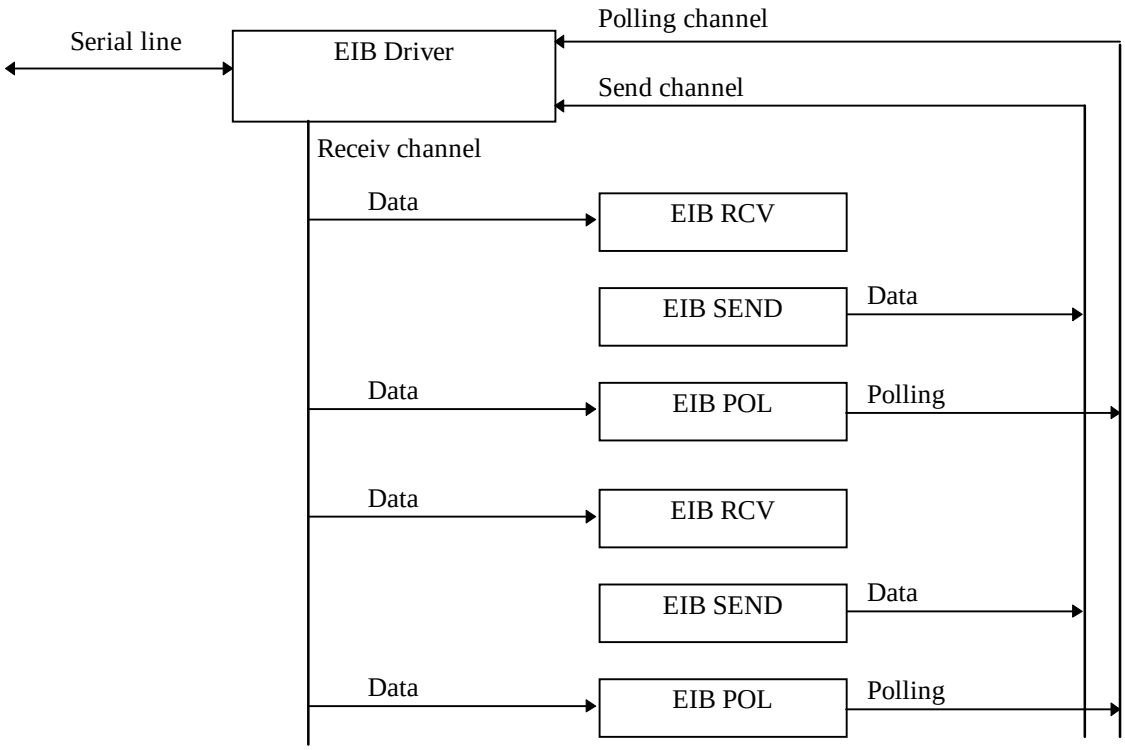
When the EIB Driver Fbox has been configurated, the programming of the communication can be realized.

Transmission (SEND) and reception (RCV) Fboxes may be used at will on the programme pages. The data to be transmitted must be linked to the function connections. If the connections are PCD variables, they can be linked to the Input/Output fields. They can also be linked directly to Inputs or Outputs of other Fboxes.

The addresses of transmission/reception devices receiving or providing information messages can be given in the adjust window.

For each binary function, the transmission of a telegramme is automatically launched whenever the status changes. For numeric values, the transmission frequency is ajustable.

Principle



3.3 First putting into service and initialization

During the first putting into service or after loading a modified programme, the variables of the RCV and POL Fboxes contain random values until transmission of a new value. After power off and on, the last received value is memorized until a new transmission.

The PCD can be initialized in the following ways:

1. Initialization by clearing all PCD elements using the debugger

Action	**Debugger command**
Stop the programme	Stop
Set the registers to 0	Clear Registers
Set the flags to 0	Clear Flags
Set the counters to 0	Clear Timers+counters
Re-initialize the system	Restart Cold All
Launch the programme	Run

2. For RCV and POL Fboxes with initialization option and value, it is possible to define a startup value. These values remain stable until transmission of a new value.

3. RCV Fboxes with polling option and POL Fboxes can be configured to execute a polling request at startup.

   Note that the polling of a large amount of values can take time and all values are not up to date until the polling is ended.

4. SEND fboxes have an initialization option to initialize the receivers elements (not PCD elements) by transmitting the PCD values at startup.

3.4 Cyclical functioning

All Fboxes are taken cyclically, one after the other in the order they are programmed (see option Show Fbox priorities of Fupla) as quickly as the link allows. A token mechanism insures a correct, coordinated handling of all Fboxes.

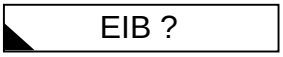
3.5 Transmission error

The telegrammes are not acknowledged by the BCU coupler. If a telegramme does not reach the receiver, the information is lost.

4. Fboxes

4.1 Version EIB

Fbox:



This Fbox is used for marking in the user's file, the version of the used library.

The ONLINE version is the one used when creating and loading the programme in the PCD.

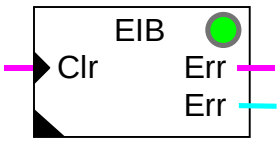
The OFFLINE version is the one actually installed in the Fupla on the PC.

If the 2 versions do not match, incompatibilities may lead to wrong display in the Fupla windows. It is then recommended to recompile and reload the programme in the PCD.

If the display of the ONLINE version shows <140>, it means that the PCD version is higher than the PC one. It is then strongly recommended not to work in this condition. The right version must be installed on PC.

4.2 EIB Driver

Fbox:



This Fbox is used for assignation of the line in MC0 mode and generate a routine in user's language supporting the link with the BCU coupler. It checks the answer validity and controls the errors according to the following description.

Only one EIB Driver can be used in the same Fupla file.

Input

Clr: Allows to clear the error code and to acknowledge the binary error signal.

See 'Clear button'.

Output

Err: The binary output Err indicates that a communication error has been detected. See error handling below.

Err: The numeric output Err indicates that the code of the last detected error. See error handling below.

LED

The red LED indicates that a communication error has been detected. The LED turns back to green when the error has been acknowledged. See error handling below.

Parameters

Serial channel	Range 0 to 4. Number of the serial line used for the EIB connection.
Transmission speed	9'600 bps or 19,2kbps. This parameter must match the the BCU coupler used.
Option	Only the 'Standard' option is available. This parameter is foreseen for future extensions.
Load on CPU	Only the 'Standard' option is available. This parameter is foreseen for future extensions.

RCV Info / SEND Info /

Polling Info

The ONLINE control fields allow to visually follow the functioning of the EIB driver. The informations 'Main-Group', 'Sub-Group', 'Fonction', 'Value' allow to identify the Fbox currently handled.

Counter

The number of transmissions, receptions and polling allows to control the line activity and to visually 'measure' the transmission speed.

Polling pause time

This value defines the frequence at wich polling requests are sent. This parameter must be set to the highest possible value as to reduce the load on the bus.

Polling busy

The online state indicate if the polling channel is busy or not. It is possible to clear all polling command with the Reset button.

See also Use of the EIB POL Fboxes.

Error/Warning

Last error

This field informs the user about the detected error at EIB level protocole. The errors of the PCD MC0 mode are summarized by the 'Diag' code.

The error message indicates the kind of the last detected error. The numeric output Err provides the error code corresponding to the message in the adjust window.

Code	**Message**	**Description**
0	OK	No error since the last clearing
1	SASI	The line could not be assigned
2	Diag	Diagnostic through the firmware (parity, format, line interruption...)
3	SEND	Error during transmission
4	RCV	Error during reception
90..99	<90...99>	Library internal error. Should not occur when running. If such error occurs, please inform ENGIBY, and describe the circumstances.

Error counter

The error counter indicates the number of errors detected since the last reset. When the counter is higher than 0, the LED of the EIB function is red. As long as the counter is 0, the LED remains green. The binary output Err has the same state as the LED (red=1, green=0).

Last Warning

This field informs the user about minor warnings detected at EIB protocole level.

The message indicates the kind of warning.

Code	Message	Description
0	OK	No warning since the last reset
1	Collision	Collision Transmission-Reception.
	The transmission is interrupted and will be restarted when the reception is finished.	
2	Code	Service code not supported
3	Power up	The BCU has been disconnected. It has been re-initialized at power on.

Warning counter

The warning counter indicates the number of warnings detected since the last reset.

Clear Button

The 'Clear' button allows to clear the ONLINE diagnostics:

- the error counter is set to 0
- the last error code is cleared (code OK), the Err output is set to 0
- the warning counter is set to 0
- the last warning counter is cleared (code OK)
- the binary output is set to 0, the LED returns to green

The Clr input has the same function as the Clear button.

4.3 General principle of Fboxes RCV EIB, SEND EIB and POL EIB

The Fboxes RCV EIB, SEND EIB and POL EIB allow to define the reception and transmission functions which are representing the EIB elements in the PCD. Thank to the EIB driver, these elements react as if they were directly connected to the EIB bus. For this reason, they must receive one or more addresses (Group and Sub-Group) which define their connections with the related EIB bus elements.

For stretchable Fboxes, only the inputs present on the Fbox are representing an EIB element.

Inputs and outputs

The transmission Fboxes (SEND) have input connections. These signals provided by the PCD are transmitted to the corresponding receivers on the EIB bus.

The reception Fboxes (RCV) have output connections. These signals are received from the corresponding senders on the EIB bus.

Some SEND Fboxes have Snd and En inputs. They can be used for controlling more specifically the values transmission or the states of inputs. As long as the En input is not activated, no transmission is performed. If En is activated, the transmission can take place automatically when the the signals are changing. One pulse on the Snd input forces the transmission of all values or states even if they are not changed.

General description of parameters:

Initialization	Initialization option. From version 1.1 of the library.
- Yes	All values or input states are transmitted once at PCD initialization. This allows to initialize the receivers on the EIB bus at first putting into service or after a PCD power off. See description of each Fbox for the conditions when this initialization is performed.
- No	No transmission at initialization.

Polling option	Option to define the use of the polling mechanisms. See also Use of the EIB POL Fboxes.
- No polling	No polling used.
- At startup	One polling is executed at PCD startup.
- Cyclically	The polling is executed cyclically if enabled.
- Start + Cyclic	One polling is always executed at PCD startup and cyclically if enabled.
- 10 sec.	The polling is executed cyclically every 10 seconds.
- 1 min.	The polling is executed cyclically every minute.

Minimum value variation	For SEND Value. The new value is transmitted only if the variation is bigger than the presently set value.

	If this parameter is set to 0, the value is transmitted without taking into account the variation.
Minimum time interval	For SEND Value and SEND Switch. A new value or a new state is not transmitted before this minimum time interval. If this parameter is set to 0, the minimum variation or the maximum interval is taken into account.
Maximum time interval	For SEND Value and SEND Switch. The value or the state is transmitted at the latest after this interval, even if the minimum variation is not reached. If this parameter is set to 0, this function is deactivated.
Send option	For SEND Switch.
-ON-OFF	The switch-on and switch-off commands are transmitted after each state change of the input. The EIB receivers take the same state as the PCD element.
- ON	Only switch-on commands are transmitted at each positive edge of input S.
- OFF	Only switch-off commands are transmitted at each positive edge of input S.
- Toggle	Alternate commands are transmitted at each positive edge of input S. 1st edge switch-on 2nd edge switch-off 3rd edge switch-on etc.
- Toggle+RCV	Same function as toggle. Moreover, the function takes into account the other senders which are sending commands to the same addresses. The code generated is more significant than the option Toggle.
Main-Group 0..15	Main-Group address. The Main-Group address is sometimes the same for several elements of one Fbox. The elements being in different groups must be realized with several Fboxes.
Sub-Group 0..2047	Sub-Group address.

The parameters Sub-Group 0 to 9 correspond to different inputs/outputs 0 to 9. The inputs/outputs addresses which do not exist are ignored.

Configuration tool ETS2

In this tool, the addresses are structured in 3 levels:

- Main Group
- Middle Group
- Sub-Group

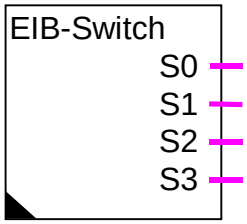
The Sub-Group addresses have a reduced range from 0 to 255 (8 bits). These addresses remain compatibles with the existing Fboxes when the Middle-Group is 0. In the other case, the Middle-Group must be multiplied by 256, and then added to the Sub-Group as to find the corresponding value.

Examples:

	Address ETS2	Address ETS and Fbox
Main-Group	0	0
Middle-Group	0	
Sub-Group	125	125
Main-Group	0	0
Middle-Group	1	
Sub-Group	0	256
Main-Group	3	3
Middle-Group	2	
Sub-Group	100	612

4.4 EIB RCV Switch

Fbox:



This Fbox defines 1 to 10 EIB elements supporting the reception function for binary commands. The typical application is the lighting control.

A general command can be activated. It allows to control the simultaneous switch on or the switch off of all Fbox elements. Moreover, the same address can be used in several RCV Switch Fboxes.

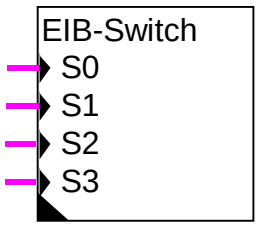
Parameters

Initial value	Initialization option for all outputs.
- No init	No initialization. The outputs keep their value from last switch-off. After a program loading, the outputs have a random value until the first reception.
- Init to 0	The outputs are initialized at 0 at PCD power on.
- Init to 1	The outputs are initialized at 1 at PCD power on.
General command	With this address, it is possible to receive a general command for simultaneous switch on or switch off of all Fbox elements. With one value >= 900, the general control function command is deactivated.
Individual command	Address of each element on the EIB bus.

See also General principle of Fboxes RCV EIB, SEND EIB and POL EIB.

4.5 EIB SEND Switch

Fbox:



This Fbox defines 1 to 10 EIB elements supporting the transmission function for binary commands.

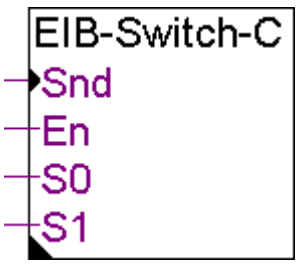
Parameters

Initialization	Initialization option. From version 1.1 of the library.
- Yes	All input status are transmitted once at PCD initialization. This function is not realized with 'SEND option' at 'ON' or 'OFF'.
- No	No transmission at initialization
Send option	Transmission option. Available from version 1.01
ON-OFF	The switch on and switch off commands are transmitted at each input status change. The EIB receivers take the same status as the PCD element.
- ON	Only the switch on orders are transmitted at each input rising edge.
- OFF	Only the switch off orders are transmitted at each input rising edge.
Toggle	Alternate orders are transmitted at each input rising edge.
1st pulse ->	switch on 2nd pulse -> switch off 3rd pulse -> switch on etc...
Toggle+RCV	Same functioning as 'Toggle'. In addition to that, the function is listening the other senders transmitting orders at the same addresses. The generated code is more important than with the option 'Toggle'.
Main-Group and	
Sub-Group 0..9	Address of each element on the EIB bus.

See also General principle of Fboxes RCV EIB, SEND EIB and POL EIB.

4.6 EIB SEND Switch Cyclically

Fbox:



This Fbox defines 1 to 10 EIB elements supporting the transmission function for binary commands. It allows to send the input states cyclically or on demand, even if their states haven't changed.

Inputs

Snd	Transmission command of all states.
En	Enable. Activation of state transmission.
S0..S9	State of the Switches 0 to 9

Parameters

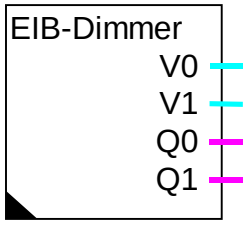
Initialization	Initialization option
- Yes	All input states are transmitted once at PCD initialization. This function is not realized with 'SEND option' at 'ON' or 'OFF'.
- No	No transmission at initialization

Minimum/Maximum time interval and Send option: See General principle.

See also General principle of Fboxes RCV EIB, SEND EIB and POL EIB.

4.7 EIB RCV Dimmer

Fbox:



This Fbox defines 1 to 5 EIB elements supporting the receive function for progressive commands. The typical use is the lighting control.

The Dimmer function contains 2 sub-functions, Position and Control. The sub-function 'Position' allows to command the switch-on and off. The subfunction 'Control' allows to increase or decrease the output value for progressive adjustments.

A switch-on command sets the output Q to 1 and sets the output V to the adjusted value in the start option. A switch-off command sets the Q output and the V output to 0.

The commands 'Increase' and 'Decrease' start a ramp at the output, depending on the adjusted time. If the function is switched off when the command 'Increase' is working, a switch-on is executed as described above.

Ouputs

V0..V4	Numeric values 0 to 4 calibrated in the Min-Max range. Value 0 in switch-off state.
Q0..Q4	State of the function Position: 0=switched off, 1=switched on

Parameters

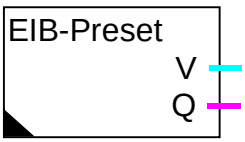
-----[Delay - Limits - Start]-----

Control delay	Delay of the progressive ramp for 100% of the variation range.
Maximum value	Maximum value of the variation range.
Minimum value	Minimum value of the variation range.
Start option	Option for the initial value at switch-on.
- Last value	The switch-off value is saved.
- Min value	Switch-on with the minimum value.
- 10%..90%	Switch-on with 10%..90% of the variation range.
- Max value	Switch-on with the maximum value.

See also General principle of Fboxes RCV EIB, SEND EIB and POL EIB.

4.8 EIB RCV Dimmer/Preset

Fbox:



This Fbox defines 1 EIB element supporting the receive function for progressive commands (Dimmer). It contains also 3 preselected values(Preset). The typical use is the lighting control.

The Dimmer function contains 2 sub-functions, Position and Control. The sub-function 'Position' allows to command the switch-on and off. The subfunction 'Control' allows to increase or decrease the output value for progressive adjustments.

A switch-on command sets the output Q to 1 and sets the output V to the adjusted value in the start option. A switch-off command sets the Q output and the V output to 0.

The commands 'Increase' and 'Decrease' start a ramp at the output, depending on the adjusted time. If the function is switched off when the command 'Increase' is working, a switch-on is executed as described above.

The 3 preselected values can be called by Switch commands. Only the switch-on command is executed. The switch-off is operated by the above described command 'Position'. Each preselected value can be adjusted between maximum and minimum with 10%steps.

Ouputs

V	Numeric values calibrated in the Min-Max range. Zero value in switch-off state.
Q	State of the function 'Position': 0=switched-off, 1=switched-on

Parameters

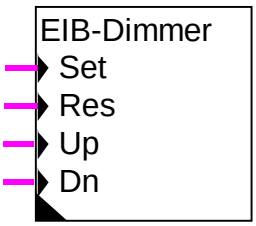
-----[Delay - Limits - Start - Preset]-----

Control delay	Delay of the progressive ramp for 100% of the variation range.
Maximum value	Maximum value of the variation range.
Minimum value	Minimum value of the variation range.
Start option	Option for the initial value at switch-on.
- Last value	The switch-off value is saved.
- Min value	Switch-on with the minimum value.
- 10%..90%	Switch-on with 10%..90% of the variation range.
- Max value	Switch-on with the maximum value.
Preset 1..3	Preselected value for the Preset commands 1 to 3

See also General principle of Fboxes RCV EIB, SEND EIB and POL EIB.

4.9 EIB SEND Dimmer

Fbox:



This Fbox defines one EIB element supporting the 'Send function' for progressive commands. The typical use is the lighting control.

The Dimmer function contains 2 sub-functions 'Position' and 'Control'. The sub-function 'Position' with the inputs Set and Res allows to command switch-on and switch-off. The sub-function 'Control' allows to make progressive settings as to increase (Up) and decrease (Dn) the lighting intensity.

Inputs

Set	Switch-on command
Res	Switch-off command
Up	Progressive command for increase
Dn	Progressive command for decrease

Parameters

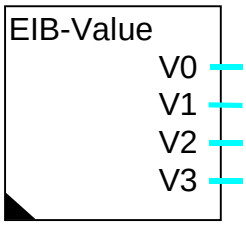
Step value

- START-STOP	The input switch-on starts the progression. The switch-off stops the progression.
- 100%...12%	A progression of 100%, 50%, 25% or 12% is transmitted to a pulse.

See also General principle of Fboxes RCV EIB, SEND EIB and POL EIB.

4.10 EIB RCV Value

Fbox:



This Fbox defines 1 to 10 EIB elements supporting the reception function for physical values. The typical applications are the measurement of temperature, lighting, wind speed, air pressure, voltage and current.

It supports also the function 'EIS 10: Counter value' and 'EIS 9: Float value'. The counter values can be 16 bits or 32 bits format, signed or unsigned.

Outputs

V0..V9	Numeric values 0 to 9

Parameters

Value type	Data type and value format.
- FixPoint16	Format 16 bits with fix decimal point. Its the format to use for the EIS function 'Value'.
- Count 32 S	Function 'Counter Value', Format 32 bits, signed
- Count 32 US	Function 'Counter Value', Format 32 bits, unsigned
- Count 16 S	Function 'Counter Value', Format 16 bits, signed
- Count 16 US	Function 'Counter Value', Format 16 bits, unsigned
- Float	Function 'Float'
- Float*10	Function 'Float'. Output value in 1/10. See below
Main-Group and Sub-Group	Address of each element on the EIB bus.

See also General principle of Fboxes RCV EIB, SEND EIB and POL EIB.

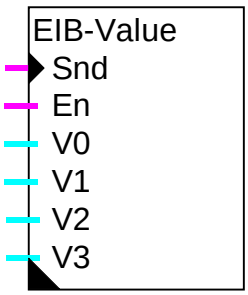
Float Formats

The value type 'Float' corresponds to the EIS function 9. The conversion of the integer values (Fbox input) into float is made automatically by the Fbox.

For the value type 'Float*10', the value is multiplied by 10 before being converted into integer. This type should be used for the Heavac values.

4.11 EIB SEND Value

Fbox:



This Fbox defines 1 to 10 EIB elements supporting the transmission function for physical values. The typical applications are the measurement of temperature, lighting, wind speed, air pressure, voltage and current.

It supports also the function 'EIS 10: Counter value', 'EIS 6:Scaling' and 'EIS 9: Float value'. The counting values (EIS 10) can be 16 bits or 32 bits format, signed or unsigned. The calibrated values (EIS 6) can be in a range of 0 to 255 or 1 to 1000.

Parameters allow to define the transmission of the value at minimum and/or maximum intervals and at minimum value difference.

The transmission can also be switched on by a binary signal. An other binary input allow to temporarily deactivate the value transmission.

Inputs

Snd	Transmission command of all values.
En	Enable. Activation of value transmission.
V0..V9	Numeric values 0 to 9

Parameters

Initialization	Initialization option
- Yes	All values are transmitted once at PCD initialization
- No	No transmission at initialization.
Minimum value variation	The value is transmitted only if the variation is bigger than the parameter value, since the last transmission. If the parameter is 0, the value is transmitted whatever the variation.
Minimum time interval	A new value is not transmitted before this minimum interval. If the parameter is 0, the minimal variation or the maximum interval is deciding.
Maximum time interval	The value is transmitted at least after this interval, even if the minimal variation is not reached. If this parameter is 0, this function is deactivated.
Value type	Type of data and format of value.
- FixPoint Auto	Format 16 bits with automatic adaptation of decimal point. See below.
- FixPoint*1	Format 16 bits with fix decimal point. It is the format to use, if possible for the function EIS 'Value'. The value range goes from -2048 to + 2047.
- FixPoint*10..*10000	Extended value range. See below.
- Count 32 S	Function 'Counter Value', Format 32 bits, signed
- Count 32 US	Function 'Counter Value', Format 32 bits, unsigned
- Count 16 S	Function 'Counter Value', Format 16 bits, signed
- Count 16 US	Function 'Counter Value', Format 16 bits, unsigned
- Scale 0-255	Function 'Scaling', gross values from 0 to 255.
- Scale 0-1000	Function 'Scaling', values limited and calibrated from 0 to 1000.
- Float	Function 'Float'
- Float*10	Function 'Float'. Input value in 1/10. See below

See also General principle of Fboxes RCV EIB, SEND EIB and POL EIB.

Initialization

At PCD initialization, the transmission of the values is locked during 2 seconds. It avoids the transmission of any value before the analogic values are stable. After this time:

- the values at inputs V0..V9 are taken as first reference values
- the min and max time are started
- if the initialization option is activated, all values are transmitted once

Time min / max and minimal variation

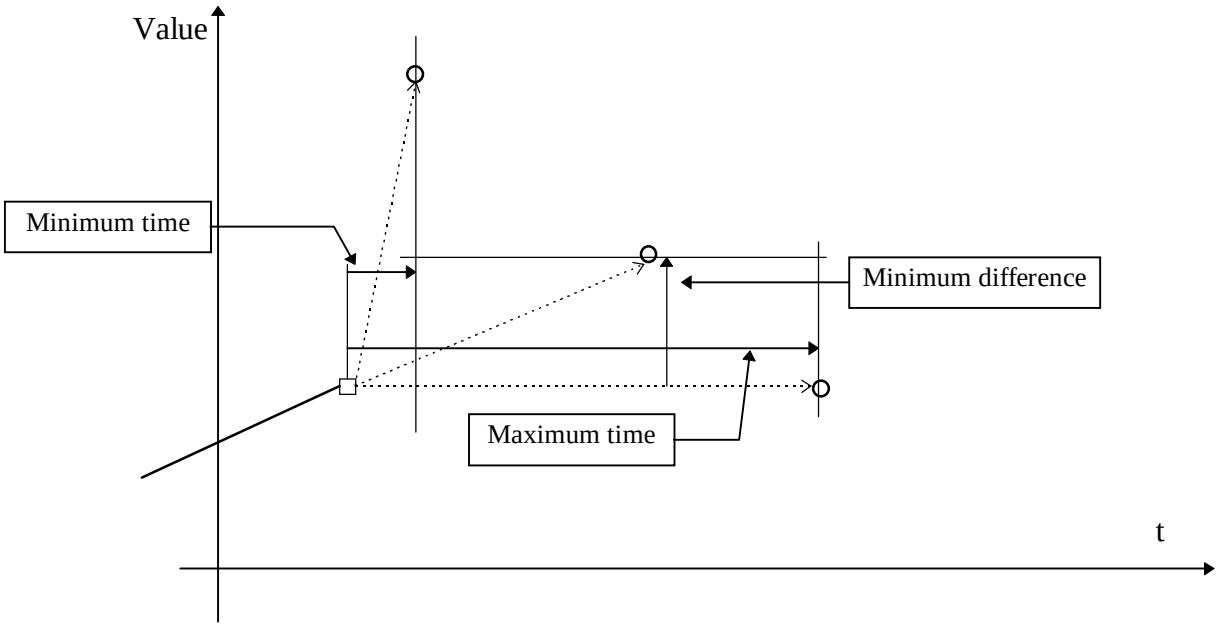
The 3 parameters allow to automatize and optimize the number of transmissions of the value.

The minimum time allow not to transmit too many telegrammes (load on the bus) when the value changes too quickly.

The maximum time allow to force the transmission of the value regularly even if it does not change. It insures that the receivers has a value after a switch off and insures the repetition of a possibly lost telegramme.

The minimal variation avoids to transmit to often values that change less or not. For the FixPoint format, this parameter must be bigger than the resolution according to the following description. Otherwise equal values can be transmitted uselessly since the variation is evaluated before the conversion in FixPoint.

Each function can be individually deactivated by setting the parameter to 0. If the 3 parameters are 0, the value is never transmitted automatically. Only the input 'Snd' can lead to a transmission.



Legend

□ Last transmitted value = reference value

○ Next transmitted value

Inputs 'Snd' and 'En'

The input 'Snd' allows to make a transmission even if the time and the minimal variation are not respected.

If input 'En' is 0, no transmission can take place. This is useful for avoiding the transmission of wrong values, during the putting into service, when out of order or during repair.

Format 'FixPoint Auto'

The FixPoint format allows to code with 16 bits, values situated in a large range. However, the more the range is large, the more the resolution is poor. With the option 'FixPoint Auto', the range and the resolution are automatically adapted to the value to transmit. This option can be used if the normal value range cannot be defined in advance.

Value range: -67'108'864 to +67'076'096 with a resolution going from 1 (low values) to 32768 (high values).

This format requires for each transmission an important calculation of the PCD. It is then recommanded to select if possible a predefined range as described below.

Format FixPoint*1..10000

Thank to these options, the choice of range and resolution is made by the user, depending on the physical value to transmit.

The indication FixPoint*1...10000 indicates approximatively, the available range for the following calculation:

Range FixPoint*n = +/-2000*n with a resolution of about n.

The following table gives the exact values.

Note also that EIB suggests to represent the values in unit/100.

For example: Temperature in degree/100. It should be taken into consideration by the user, the values in the PCD or in the receiver must eventually be adapted.

Ranges and resolutions as a function of the format FixPoint*1..10000

Format	Range	Resolution
FixPoint*1	-2'048 to +2'047	1
FixPoint*10	-32'768 to +32'767	16
FixPoint*100	-262'144 to +262'143	128
FixPoint*1000	-2'097'152 to +2'097'151	1'024
FixPoint*10000	-33'554'432 to +33'554'431	16'384

Ranges with Format Count 16 and 32

The formats for the counter values define each a precise given value range. The value range in the PCD is always the same:

32 bits signed values, it means -2147483648 to +2147483647.

This corresponds to format 'Count 32 S'.

For other ranges, the values in the PCD can be out of the available range. In this case, wrong values can be transmitted.

Format	Available range	Comment
Count 32 S	-2147483648 to +2147483647	Compatible to PCD
Count 32 US	0 to 4294967296	Negative values cannot be transmitted
Count 16 S	-32768 to +32767	Values out of the range cannot be transmitted
Count 16 US	0 to 65535	Negative values and values out of the range cannot be transmitted

Ranges with Scale format

The function Scale allows to transmit calibrated relative values in %. The value effectively transmitted is coded with one byte in a range 1-255. The value 0 is reserved for an auxiliary switch-off function.

The option Scale 0-255 allows to transmit precalibrated and limited values in the PCD. The lowest byte is simply transmitted.

With the option Scale 1-1000, the input value is limited and recalibrated. The negative values are replaced by 0%. The biggest values are replaced by 100%.

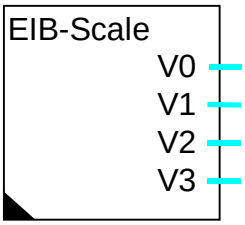
Float Formats

The value type 'Float' corresponds to the EIS function 9. The conversion of the float value into integer (Fbox output) is made automatically by the Fbox.

For the value type 'Float*10', the value is converted into float format and divided by 10 before being sent. This type should be used for the Heavac values.

4.12 EIB RCV Scale

Fbox:



This Fbox defines 1 to 10 EIB elements supporting the receive function for calibrated values. The typical applications are the measurement of luminosity (0-100%), relative humidity (0-100%) or wind direction (0-360°).

By means of an emitter supporting the Scale function, the output can be set between the maximum and the minimum adjusted value or set to 0.

Outputs

V0..V9	Numeric values 0 to 9 calibrated or set to 0.

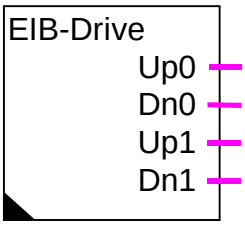
Parameters

Maximum value	Maximum value of the calibration range.
Minimum value	Minimum value of the calibration range.

See also General principle of Fboxes RCV EIB, SEND EIB and POL EIB.

4.13 EIB RCV Drive

Fbox:



This Fbox defines 1 to 5 EIB elements supporting the reception function for movement commands. The typical application is the shade command.

The Drive function contain 2 sub-functions STEP and MOVE. The sub-function STEP is used for the control of short movements (shade end movement). The sub-function MOVE is used for long movement (complete opening or closing of shade). It can control a permanent movement with the maximum time of 6'000.0 sec = 1 hour 40 min.

A general command can be given for the sub-function MOVE. It allows to control the simultaneous opening and closing of all Fbox shades. In addition to that, the same address can be used in several Fboxes RCV Drive.

Outputs

Up 0 to 4	Control of up movement.
Dn 0 to 4	Control of down movement.

Parameter

-----[Pulse time]-----

STEP pulse [sec]	Pulse time on outputs for STEP command.
MOVE pulse [sec]	Pulse time on outputs for MOVE command.

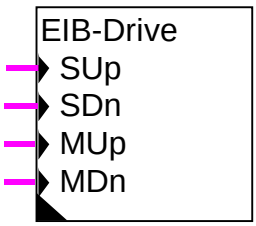
-----[General command MOVE]-----

Main-Group and Sub-Group	With this address, it is possible to receive a general MOVE command simultaneously downwards or upwards for all Fbox elements. With a value >= 900, the general command function is deactivated.
Individual commands	These addresses define each element on the EIB bus.

See also General principle of Fboxes RCV EIB, SEND EIB and POL EIB.

4.14 EIB SEND Drive

Fbox:



This Fbox defines one EIB element supporting the transmission function for movement commands. The typical application is the shade command.

The Drive function contain 2 sub-functions STEP and MOVE. The sub-function STEP is used for the control of short movements (adjustment of shade end movement). The sub-function MOVE is used for long movement (complete opening or closing of shade). Each sub-function has the opening control (Up) and the closing command (Dn).

Two uses are possible: 2 signals or 4 signals

Use with 2 signals

Only the inputs SUp and SDn are used.

A short pulse activates the STEP command. A long pulse activates the MOVE command. The pulse length to activate the MOVE command is adjustable.

The 2 inputs MUp and MDn must be connected but are not used.

Use with 4 signals

The inputs SUp and SDn activates the sub-function STEP. The inputs MUp and MDn activate the sub-function MOVE. To deactivate the MOVE command with a long pulse on inputs SUp et SDn, the time is set at the maximal value of 60.0 sec.

Inputs

SUp	STEP Command upward
SDn	STEP Command downward
MUp	MOVE Command upward
MDn	MOVE Command downward

Parameters

-----[Pulse time]-----

Long STEP = MOVE [sec]	Pulse time on inputs SUp and SDn which activates the MOVE command.

-----[Addressing]-----

Main-Group and Sub-Group	Addresses of functions STEP and MOVE on the EIB bus.

See also General principle of Fboxes RCV EIB, SEND EIB and POL EIB.

4.15 EIB POL Value

Fbox

This Fbox defines 1 to 10 EIB elements supporting the polling and the reception functions for physical values.

Its basic function is similar to the RCV Value Fbox. For the polling functions, please consult the topic Use of the EIB POL Fboxes.

Input

Pol	Polling. Command to start polling of all values.
En	Enable. Activation of polling actions.

Output

V0..V9	Numeric values 0 to 9

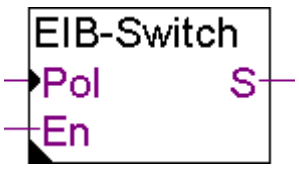
Parameters

Polling option	This option defines if an automatic polling action must be executed.
- No polling	No automatic polling is executed. Only pollings with the Pol input are possible.
- Startup	A polling is automatically executed at startup.
- Cyclically	Pollings are cyclically executed at the defined interval time. Cyclic polling are stopped if the En input is Low.
- Start+Cyclic	Pollings are executed at startup and then cyclically.
Polling time	Interval time between cyclic pollings.

See also General principle of Fboxes RCV EIB, SEND EIB and POL EIB.

4.16 EIB POL Switch

Fbox:



This Fbox defines 1 to 10 EIB elements supporting the polling and the reception functions for binary commands.

Its basic function is similar to the RCV Switch Fbox. For the polling functions, please consult the topic Use of the EIB POL Fboxes.

Input

Pol	Polling. Command to start polling of all values.
En	Enable. Activation of polling actions.

Output

S0..S9	States of the Switches 0 to 9

Parameters

Polling option	This option defines if an automatic polling action must be executed.
- No polling	No automatic polling is executed. Only polling with the Pol input are possible.
- Startup	A polling is automatically executed at startup.
- Cyclically	Pollings are cyclically executed at the defined interval time. Cyclic polling are stopped if the En input is Low.
- Start+Cyclic	Pollings at startup and then cyclically are executed.
Polling time	Interval time between cyclic pollings.

See also General principle of Fboxes RCV EIB, SEND EIB and POL EIB.

4.17 Use of the EIB POL Fboxes

From version older than V1.3, the EIB-Driver Fbox does not support the polling mechanisms. Please replace this Fbox by the new one. As to be sure, the correct Fbox is in use, check that the 'Polling Info' section exists in the adjust window.

The EIB network is based on event-triggered transmission. Therefore, permanent polling should not be performed.

With the EIB POL Fboxes, the polling actions can be limited to the strict minimum by using the following features:

- The Pol input must be used to execute ponctual polling.
- The Enable input can stop any polling when this is not anymore useful.
- As to update values only when the PCD is shutdown, the polling option 'Startup' must be selected.
- When cyclic polling is necessary, the polling time must be adjusted to the highest possible value.

With the RCV Fboxes, a simple polling function is available. It allows to perform a polling at startup and, optionally repeat the polling with 1 min. interval. The polling time of 10 sec. is only intended for test purpose.

Note also that the polling channel of the EIB Driver is handled with lower priority and is limited in frequency. The polling of POL and RCV Fboxes can be slower than the specified time if too many Fboxes use the polling channel.

Note that response to polling request must be enabled in the detector when configuring the network with the ETS tool. The EIB Fboxes in a PCD are not able to respond to a polling request.

5. Description of the versions

It is recommended to program the Fbox for version indication (About EIB) in each programme. It allows to verify the library version installed in the PCD and in the PC.

The updating in the PCD is simply made by recompilation (Compile+Make) and reloading of the programme in the PCD.

5.1 Version 1.01

Modifications compared to version 1.00

The following error has been corrected:

If 2 binary signals change their status simultaneously, only one change is transmitted. The error occurs with short programmes only.

Send Option in SEND Switch

With this new option, it is possible to define 4 different working modes. They are used to transmit the switch on, switch off or both commands, or inversions. See Fbox EIB SEND Switch for more details.

The inputs have now the indication of dynamized inputs.

The old Fboxes already in use are still supported.

5.2 Version 1.1

Modifications compared to version 1.01

Fbox RCV Value, counters values

The reception of counter values (format 16 Bits S, 16 Bits US, 32 Bits S and 32 Bits US) has been correctly implemented.

New Fbox SEND Value

This new Fbox allows the transmission of numeric values.

Parameters allow to define the value transmission at minimum, and/or maximum intervals and at value minimum difference.

The transmission can be given by a binary signal. An other binary input allow to temporarily deactivate the transmission of values.

For more details, see Fbox EIB SEND Value.

Reading of PCD elements

The following error has been corrected:

A reading attempt made the setting to 0 of the element. The reading of the elements is not supported.

Initialization option

This option has been added in the Fbox SEND Switch. It allows to force a transmission at PCD start as to initialize the receivers on the EIB Bus. The initialization is not made with the option 'ON' and 'OFF'.

5.3 Version 1.2

Modifications compared to version 1.1.

Fbox SEND Value, options Scale

This Fbox supports the emission of the function EIS 6 Scale.

The option Scale 0-255 transmits gross values, without limitation.

The option Scale 0-1000 converts and transmits values limited to the range 0-1000.

See description of Fbox SEND Value for more details.

New Fbox RCV Scale

This new Fbox allows to receive relative calibrated values.

See description of Fbox RCV Scale for more details.

New Fbox Dimmer

- EIB RCV Dimmer
- EIB RCV Dimmer/Preset
- EIB SEND Dimmer

These new Fboxes allow the send and receive commands for progressive lighting.

The function Dimmer contains 2 sub-functions 'Position' and 'Control'. The sub-function 'Position' allows to command switching on and off. The sub-function 'Control' allows make progressive lighting for increasing or decreasing the luminosity. The function 'preset' allows to call back preselected value with the Switch command.

See description of Fbox EIB SEND Dimmer, Fbox EIB RCV Dimmer, Fbox EIB RCV Dimmer/Preset for more details.

Display in Fbox EIB Driver

The informations SEND and RCV are now displayed in online mode.

Fbox RCV Switch

A new option allows to initialize the outputs to 0 or 1 at PCD start.

EIB Driver

When binary values are sent, the non-used bits are cleared to 0.

Error corrected

The assembler error with the SEND Switch Fbox and the option Initilization=YES is corrected.

5.4 Version 2.0

Modifications compared to version 1.2.

Performance measurements.

The results are described in the in topic Possibilities / restrictions.

EIB Driver

Added channel 4 for PCD6.M3.

The EIB Driver can now be used with PCD6.M3. The minimum version is V001.

New EIB Driver

The polling mechanism has been implemented in the EIB Driver and can now be used by several SEND and RCV Fboxes. On existing projects, the EIB-Driver Fbox must be replaced as to support the polling functions.

Version EIB ?

The name of this Fbox is now the same in the 3 languages DEF.

SEND Switch-C

New Fbox SEND Switch Cyclically. This Fbox allows to send Switch states cyclically even if the state don't change. The sending can be managed by digital Inputs.

RCV Switch

The Fbox RCV Switch now has a simple polling option to read the state of the associated element.

More polling options are available in the POL-Switch Fbox.

RCV Value

The Fbox RCV Value now has a simple polling option to read the value of the associated element.

More polling options are available in the POL-Value Fbox.

The initialisation option has been introduced.

POL Switch

New Fbox POL Switch to poll the associated element on the EIB Bus. This Fbox allows to specify the polling rate and poll command can be managed by digital Inputs.

POL Value

New Fbox POL Value to poll the associated element on the EIB Bus. This Fbox allows to specify the polling rate and poll command can be managed by digital Inputs.

Routing counter

Modification made for version 2.0 Beta-A.

The routing counter is initialized to 6 (instead of 7). This allows the telegrams sent by the Driver to be checked by the filter table in the Line Couplers.

Float values

The Fboxes RCV Value and SEND Value support the Float format. The Fboxes convert automatically from PCD integer format to Float format.

PG4 Versions

Adaptation to PG4 Version 2.0 for adjustable Time base.

This version works with PG4 version 1.4 and 2.0.70.