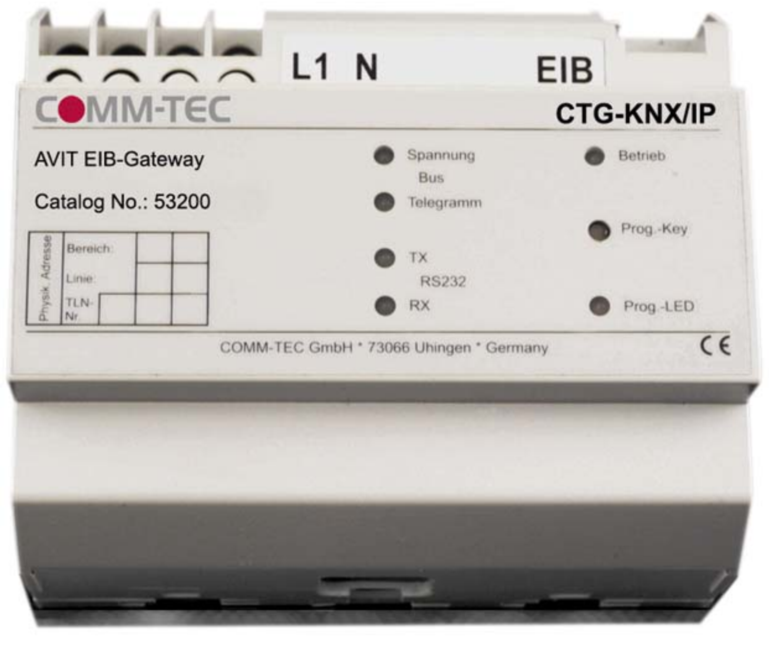
User Manual

for the
COMM-TEC EIB Gateway
CTG-KNX/IP (v1.0.1)



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1 Introduction

1.1 Aims

The software module is being used to connect AVIT and AMX control systems to the "European Installation Bus" EIB ("Instabus"). It provides an easy to use interface for developers to comfortably access the
bus.

1.2 Role of the EIB installer

It can not be expressed strongly enough: when connecting to an EIB system, solid knowledge of the EIB and close contact to experienced EIB installers is strongly recommended. A faulty set Reading flag in an actuator, or a restrictively programmed line coupler can be really hard to find without good analysis tools.

There is now way the Netlinx module is able to configure an EIB system. The package is used to connect to a working EIB, and can access only those bus elements whose usage is permitted. Because of that, it should be planned together with the EIB installers if all desired functions are *allowed* to the bus components.

1.3 EIB from the AMX programmer's point of view

Analog to AMX systems is the European Installation Bus – as the name implies – a bus system: all components are in principle connected to the same wire and share the available bandwidth.
The bus itself is a 2-wire cable, used to supply 24VDC to the devices, as well as transferring data between them.
Unlike AMX, the EIB system is a decentralized structure – there is no special master controlling the communication, but any device can send data to any other device.
A sophisticated protocol ensures that only one device is sending at any time, and collisions are avoided as much as possible.

All communication happens in the form of telegrams. A telegram is a data packet, that consists of the following parts:

- Source ID – Hardware address of the transmitting device
- Destination address – Group address of the receiving devices
- User data

A telegram can be transmitted to several destination devices at the same time, i.e. to switch off all lamps in a room simultaneously.
So there is a fundamental difference between both source and destination addresses:
A source address is a hardware address, describing the *device* that is transmitting the telegram.
A destination address is a group address, describing the *function* to be influenced.

Thus each device connected to EIB has exactly one hardware address, but may have several group addresses.
Furthermore, it is possible and common for several devices to respond to the same group address.

The EIB installer assigns both address types – the hardware addresses describing type and number of utilized devices and assigned during planning and installation. Hardware addresses are of no concern for the gateway.

The much more important addresses for AMX are the group addresses.
They define the functions an EIB installation can perform. So functions are simply used by transmitting specified values to group addresses.

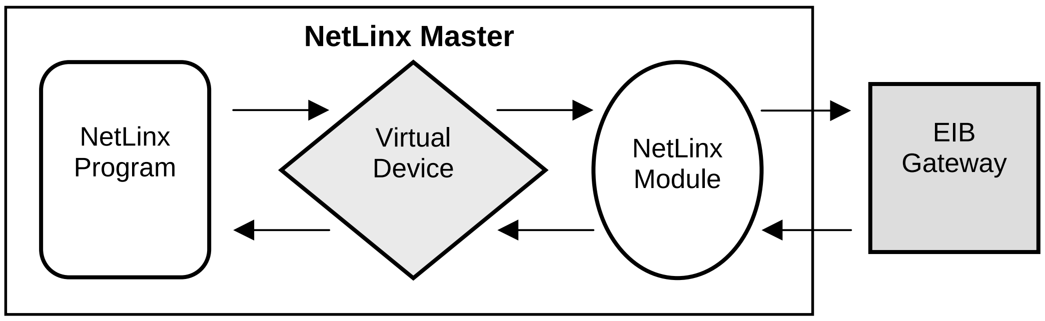
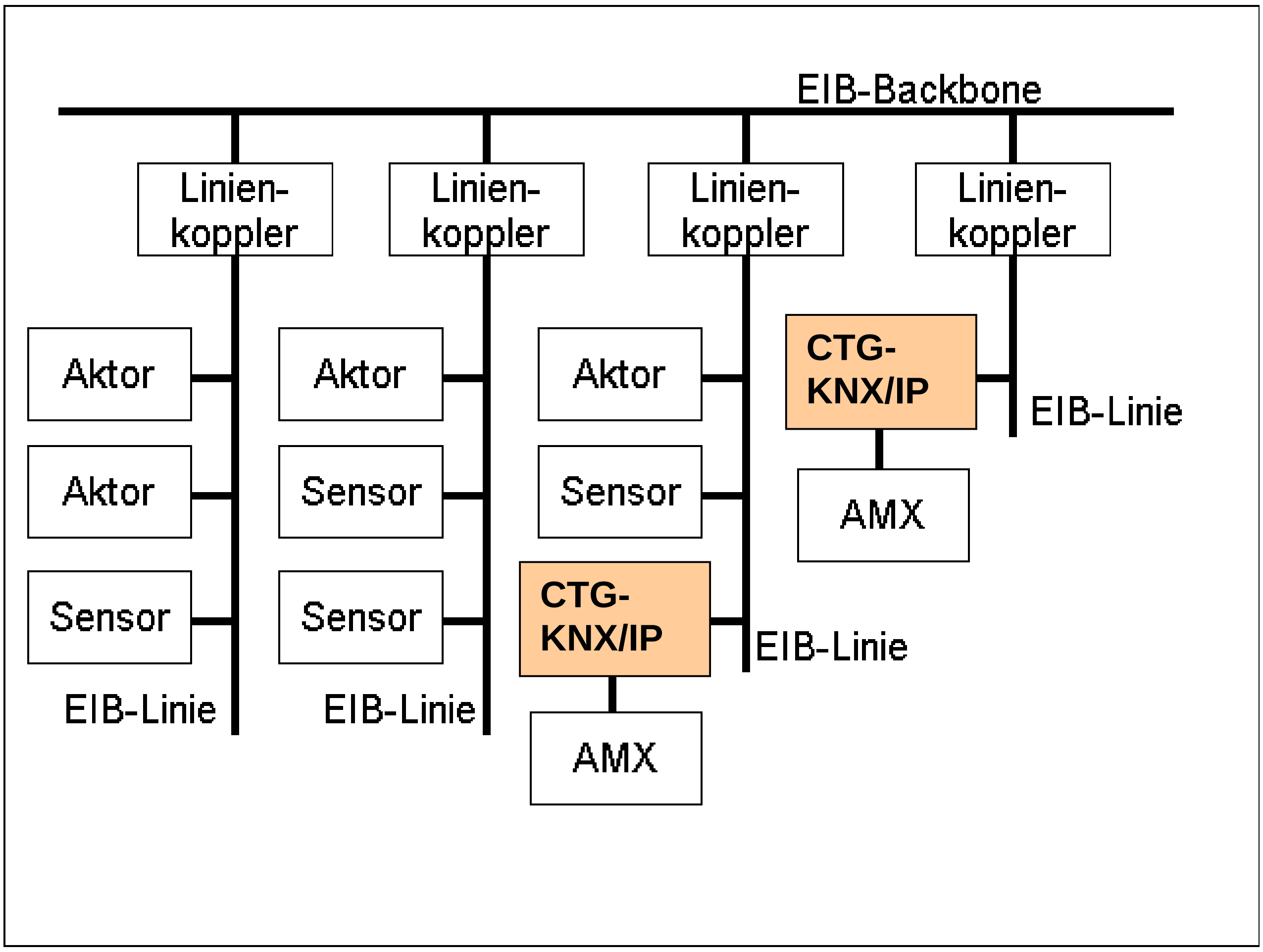


Figure 1 – Process of Communication

1.4 EIB details when using the Gateway



In principle, the EIB gateway CTG-KNX/IP is a normal EIB device, and can therefore be connected at any location to the EI bus. Unlike simple actuators or sensors it can be responsible for a large amount (up to 3000) of group addresses – a normal dimmer for example, just reacts to four addresses.
So one must be very careful to ensure that the gateway has a real chance to react to all bus telegrams of interest. Especially when using line couplers, solid planning is absolutely necessary. The following points should be seriously considered:

On the one hand all telegrams should *reach* the gateway. If line couplers are inserted between gateway and controlled components, their filter tables are to be programmed in such a way that all relevant telegrams are really passed through.

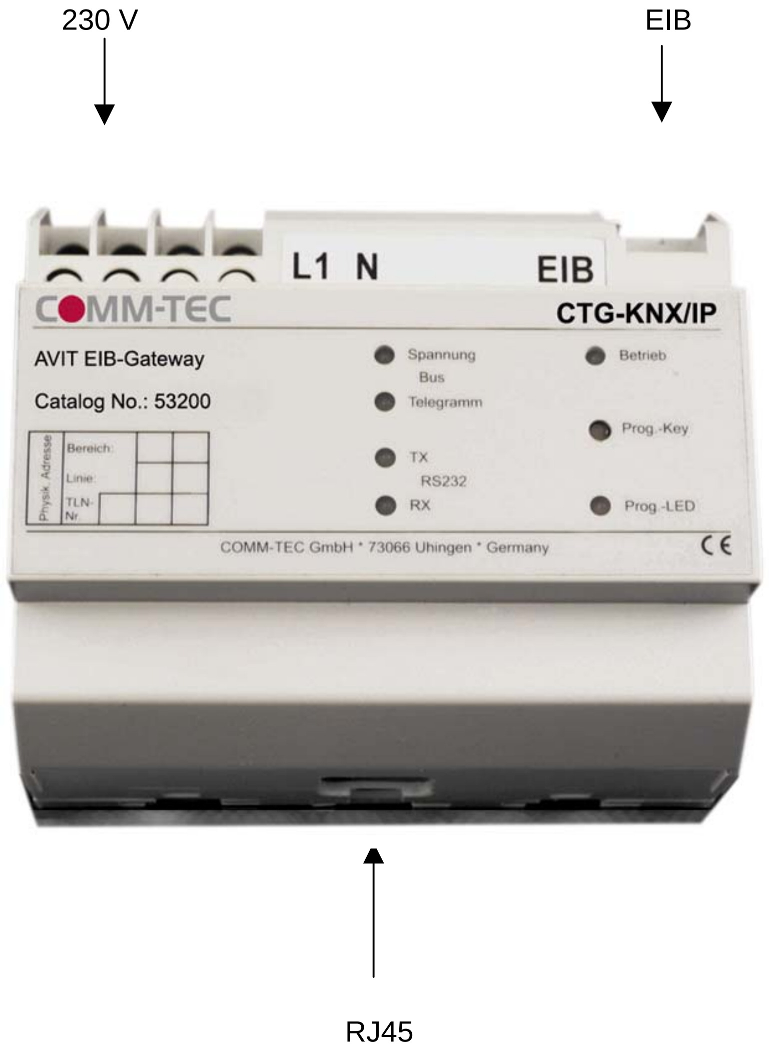
On the other hand the EI bus couplers are slow – upon receipt of a telegram, an EIB device needs some time until the next telegram can be accepted. Especially scene modules can generate a flood of telegrams, which are transmitted to all actuators participating in the scene.
Because these are usually *different* devices, the down time of the bus couplers does not matter – each coupler has enough time to recreate before the next telegram gets received.

The situation with the gateway is different: normally all participating group addresses of a scene are of interest – the gateway needs a recovery time and can read all telegrams, even with high bus load. However, with the activation attention has to be paid, that the activated actuators are given enough time!

2 Hardware

2.1 Interfaces, Indication and Operating Devices

Connections :



LEDs :	Busspannung	flashes when bus voltage drops below 15V
	Bustelegramm	indicates telegrams on the EIB
	TX	indicates data transmission from Gateway to AVIT / AMX
	RX	indicates data transmission from AVIT / AMX to Gateway
	Betrieb	is lightened when voltage feed is being impressed
	Prog.-LED	flashes when the Gateway is being set to programming mode on the EIB-side
Push-button :	Prog.-Key	sets Gateway to programming mode (on EIB-Side)

2.2 Installation

2.2.1 Connection Gateway – TCP/IP Interface

The Gateway is being connected to the network by a standard network cable.

3 Programming

3.1 Integrating the Module

At first, the program needs to get the information, what the Gateway's IP-Address is.
This can be done by the Online_Event of the virtual Devices:

```
DATA_EVENT[vdvEIB]
{
      ONLINE :
      {
            SEND_COMMAND vdvEIB,'IP=172.16.100.123'
      }
}
```

(also see Appendix)

The Port for the Gateway has been set to 10002, which can not be edited.
The IP-Address will be set by the included gateway software.
On delivery, the Ethernet Address of the Gateway is set to 192.168.1.106.

The interface for the module, and for the communcation with the EIB-Gateway provides the virtual device `vdvEIB.` Communication with the gateway is **ONLY** via the virtual device.
A complete documentation of available commands and string feedback is contained in chapter „NetLinx module interface".

The communication module (COMM module) translates between standard command interface on NetLinx side and the protocol for EIB connection.

The communication module for EIB connection is integrated with the following source code line:

```
DEFINE_MODULE 'CTEIB7_mod' EIB7(   vdvEIB,
                                   dvEIB,
                                   lEIB_Value)
```

The parameters are as follows:

- **`vdvEIB`**   - is the virtual device for communication with the module
- **`dvEIB`**   - is the physical interface for EIB connection (gateway)
- **`lEIB_Value`** - is the central value array of the EIB actuators (type LONG!)

This Array hast to be defined in the section DEFINE_VARIABLE, and has to have a size of 3000:

```
DEFINE_VARIABLE
...
LONG lEIB_Value[3000]
...
```

The module also attends to the correct initialization of the serial interface, thus it is not necessary to set the baud rate, for instance.

To access/analyze actuators on the bus, the EIB group addresses must be introduced to the program.
This is done in an external file, mapping group address, type, poll conjunction and additional features

on an „AMX number between 1 and 3000. Communication with the actuators concerned is only made via this number.

This tabel is integrated with the following source code line:

```
#INCLUDE 'EIB_Table.axi'
```

An example for such a file and a sample program is contained in Appendix A.

In addition, the file EIB_Tools.AXI should be integrated to have easy access to commonly used functions (see Appendix B).

```
#INCLUDE 'EIB_Tools.axi'
```

3.2 Analyzing feedback signals

All feedback signals should be analyzed in a Data_Event. **One** DATE_EVENT is being released for each feedback signal – so there is exactly **one** feedback in DATA.TEXT ! In case of several feedback signals, the same amount of Events will be released accordingly.

3.3 The NetLinx module interface

3.3.1 Commands for module

Commands to the module always take place per SEND_COMMAND to the virtual device.

The module knows the following commands:

Command	Description
ADD=<No>: <Type>: <GrpAdr> [:Flags]	Add an EIB group address to list Note: Flags are optional <No> - 1_3000 = AMX number of actuator <Type> - Actuator type (Switch, Dim4, 1Byte, 2Byte, 3Byte, 4Byte) <GrpAdr> - EIB group address in 2 or 3 grouped display <Flags> - EIS5 - value is reported additionally as ASCII float value. The EIB value is converted according to EIS5 standard (only valid for 2Byte actuators) - Time - value is reported additionally as ASCII time (hh:mm:ss) (only valid for 3Byte actuators) - Date - value is reported additionally as ASCII date (Caution: AMX format: MM/DD/YY) (only valid for 3Byte actuators) - PS – actuator is automatically polled with ***Start*** of AMX system Flags are separated by commas Examples: SEND_COMMAND vdvEIB,'ADD=13:Switch:1/0/11' SEND_COMMAND vdvEIB,'ADD=17:1BYTE:4/7/12:PS' SEND_COMMAND vdvEIB,'ADD=45:2BYTE:3/0/11:EIS5' SEND_COMMAND vdvEIB,'ADD=12:3BYTE:2/1/101:TIME,PS'
DATE=<No>: <Date>	Setting the date Note: Only valid for actuators type 3Byte <No> - 1 … 3000 = AMX number of actuator <Date> - date in format dd/mm/yy Example: SEND_COMMAND vdvEIB,'DATE=17:14/08/06'
DATE? <No>	Inquiry date value Note: Only valid for actuators type 3Byte <No> - 1 … 3000 = AMX number of actuator Example: SEND_COMMAND vdvEIB,'DATE?17'
DEBUGON=<Level>	Activating the debug reports <Level> - (… upcoming …) With activated debug report all actuators of the terminal are listed, which can be accessed via EIB. This allows simple diagnostics. Example: SEND_COMMAND vdvEIB,'DEBUGON=1'
DEBUGOFF	Deactivating the debug reports Example: SEND_COMMAND vdvEIB,'DEBUGOFF'
EIS5=<No>: <floating point value>	Setting an EIS5 value Converts a floating-point value mapped in ASCII into 2Byte EIS5 value before transfer. <No> - 1 … 3000 = AMX number of actuator <Floating Point Value> - number in the range of –671088,64 and 670760,96 Note: Only valid for actuators type 2Byte Example: SEND_COMMAND vdvEIB,'EIS5=12:24,3'

Command	Description
EIS5? <No>	Inquiry EIS5 value Converts the 2Byte raw data into ASCII string with floating point Note: Only valid for actuators type 2Byte <No> - 1_3000 = AMX number of actuator Example: SEND_COMMAND vdvEIB,'EIS5:12'
GET=<No> GET? <No>	Inquiry of actuator value stored in the module Note: Creates no telegram on EIB (for synchronization of master-to-master connection only use POLL command) <No> - 1 … 3000 = AMX number of actuator Example: SEND_COMMAND vdvEIB, 'GET=17'
POLL=<No> POLL? <No>	Inquiry current value of actuator (for synchronization of master-to-master connection only use POLL command) <No> - 1 … 3000 = AMX number of actuator Examples: SEND_COMMAND vdvEIB,'POLL=17' SEND_COMMAND vdvEIB,'POLL?17'
POLLDELAY=<Value>	Set pause between (automatic) value inquiries <Value> - 0-2 (default=1) Note: 0 stands for very fast and should not be used, because otherwise the gateway would create a high bus load. For installations with slow bus couplers (BCU1), the value 2 should be selected. Example: SEND_COMMAND vdvEIB,'POLLDELAY=2'
SENDDELAY=<Value>	Delay between commands to EIB. Value is the time in 1/10 sec. The value 0 deactivated the delay
SET=<No>:<Value>	Set actuator Note: Observe actuator type in value range! The module limits the value range automatically to max valid range of the accessed actuator <No> - 1 … 3000 = AMX number of actuator <Value> - value to be set Example: SEND_COMMAND vdvEIB,'SET=5:1'
STARTDELAY=<Value >	Sets point in time, when the module is activated, time for booting of master. <Value> - time in seconds (default = 30, value should not be changed) Example: SEND_COMMAND vdvEIB,'STARTDELAY=40'
STATE?	Output of current module status in terminal
TIME=<No>:<Time>	Set current time Note: Only valid for actuators type 3Byte <No> - 1 … 3000 = AMX number of actuator <Time> - time in format hh:mm:ss Example: SEND_COMMAND vdvEIB,'TIME=8:13:15:00'
TIME=<No>	Inquiry of time Note: Only valid for actuators type 3Byte <No> - 1 … 3000 = AMX number of actuator Example: SEND_COMMAND vdvEIB,'TIME?8'
UPLOAD	Synchronizing internal tables – gateway Writes the current internal table to gateway – **only for debugging**
VERSION	Output of current module version on monitor Example: SEND_COMMAND vdvEIB,'VERSION'

Command	Description
WHEN=<No>:<No2>	Definition of poll triggers Note: The trigger is activated when the first address is accessed, not when changing a value for an address. <No> - 1_3000 = AMX number of actuator activating the polling <No2> - 1_3000 = AMX number of actuator to be polled Example: SEND_COMMAND vdvEIB,'WHEN=32:12'

3.3.2 Feedback from module

The feedback is always in STRING format.

The module can generate the following feedback:

String	**Description**
DATE=<No>:<Value>	Feedback of date Note: Is transmitted as ***ADDITIONAL*** feedback, if in actuator <No> the DATE flag is set. <No> - 1 … 3000 = AMX number of actuator <Value> - Date string in format MM/DD/YY (AMX display) Example: DATE=17:08/14/06
EIS5=<No>:<Value>	Feedback of a value in ASCII floating point display. The actuator value to be coded according to EIS5. Note: Is transmitted as ***ADDITIONAL*** feedback, if in actuator <No> the EIS5 flag is set. <No> - 1 … 3000 = AMX number of actuator <Value> - floating point value (string) converted according to EIS5 specification Example: EIS5=12:20.25
ERRORM=	Error message from gateway and/or bus. The message are only for information.
SET=<No>:<Value>	Report of a ***value change*** Notes: The feedback array (type LONG) is automatically updated, unchanged values are reported as VAL = (see below). <No> - 1 … 3000 = AMX number of actuator <Value> - New value of actuator (raw data) Example: SET=8:1
TIME=<No>:<Value>	Feedback of time Note: Is transmitted as ***ADDITIONAL*** feedback, if in actuator <No> the time flag is set. <No> - 1 … 3000 = AMX number of actuator <Value> - Time string in format hh:mm:ss Example: TIME=18:09:55:30
VAL=<No>:<Value>	Feedback of an unchanged value (for instance after GET or POLL) <No> - 1 … 3000 = AMX number of actuator <Value> - Value of actuator

3.3.3 Terminal Mode

For implementation and diagnostics several monitor functions are available. The following commands can be transmitted directly in monitor mode to the module. These commands are transmitted with SEND_COMMAND to the virtual device.
To visualize the text outputs on the monitor it must be activated with command “**MSG ON**”, and the following **SEND_COMMAND <vdvDEV>, ‚‘DEBUGON=1‘** must be sent to the virtual device.
Capitalization is ignored during input; additional parameters (if available) are separated with a **space** (in this documentation with “_”).
Naturally, in monitor mode also the commands of the regular command interface are available (i.e. ADD=, SET=, etc.).

Acknowledgements/notes generated in this way serve only diagnostics und should be switched off during runtime. Output messages are marked by the prefix “EIB”.

Command	**Description**
ADR_<Value>	Definition of output format of EIB group address (Main/medium/sub group OR main group/sub group) <Value> - 2/3 Example: `SEND_COMMAND vdvEIB,'ADR 3'`
DEL_<Value>	Delete actuator from table <No> - 1 … 3000 = AMX number of actuator Example: `SEND_COMMAND vdvEIB,'DEL 3'`
HELP /?	Output of available monitor commands Example: `SEND_COMMAND vdvEIB,'HELP'`
LIST	List all entered actuators with AMX number, EIB group address, current value, set flags (if applicable) and resulting additional acknowledgement values List sum of individual types, sum of all actuators Example: `SEND_COMMAND vdvEIB,'LIST'`
LIST_<Typ>	List all entered actuators with AMX number, EIB group address, current value, set flags (if applicable) and resulting additional acknowledgement values. Sum of all actuators of one type <Type> - data type, where SW or SWITCH – 1Bit actuators D4 or DIM4 – 4Bit actuators 1B or 1BYTE – 1Byte actuators 2B or 2BYTE – 2Byte actuators 3B or 3BYTE – 3Byte actuators 4B or 4BYTE – 4Byte actuators Example: `SEND_COMMAND vdvEIB,'LIST 1B'`
LIST_<No>	List ONE actuator (AMX number) with EIB group address, current value, set flags (if applicable) and resulting additional acknowledgement values <No> - 1 … 3000 = AMX number of actuator Example: `SEND_COMMAND vdvEIB,'LIST 17'`

Command	Description
LIST_<No>-<No2>	List actuators in the range of <No> to <Nr2> (AMX numbers) with EIB group address, current value, set flags (if applicable) and resulting additional acknowledgement values <No> - 1 … 3000 = AMX number of actuator (start) <No2> - 1 … 3000 = AMX number of actuator (end) Example: `SEND_COMMAND vdvEIB,'LIST 17-24'`
LIST_FLAGS	List ALL actuators with assigned flags in table with EIB group address, current value, set flags (if applicable) and resulting additional acknowledgement values Example: `SEND_COMMAND vdvEIB,'LIST FLAGS'`
LIST_LOAD_[<Filename>]	Reads an entry in table written with LIST_SAVE from CF and back. The current table is replaced with the read one. File name is optional. If no file name is specified, the default file name is used. Default file name: EIBTableNX.TXT (In monitor connection with master the already available files on CF can be listed by entering “list” (no SEND_COMMAND to virtual device!!!).) Example: `SEND_COMMAND vdvEIB,'LIST LOAD'` Example: `SEND_COMMAND vdvEIB,'LIST LOAD MyTable.txt'`
LIST_POLL	List all poll triggers with AMX number and EIB group address Example: `SEND_COMMAND vdvEIB,'LIST POLL'`
LIST_SAVE_[<Filename>]	Writes the current EIB table, including poll trigger, as text file on CF. This file can be edited with simple text editor. The entries correspond with the structure of the regular table. Thus a table can be buffered, modified (i.e. delete or add actuators) and finally reconstructed with LOAD (see above) File name is optional. If no file name is specified, the default file name is used. Default file name: EIBTableNX.TXT (In monitor connection with master the already available files on CF can be listed by entering “list” (no SEND_COMMAND to virtual device!!!).) Example: `SEND_COMMAND vdvEIB,'LIST SAVE'` Example: `SEND_COMMAND vdvEIB,'LIST SAVE MyTable.txt'`
LIST_SUM	List sum of all types, sum of all actuators Example: `SEND_COMMAND vdvEIB,'LIST SUM'`
LIST_WATCH	List currently observed actuator with EIB group address, current value, set flags (if applicable) and resulting additional acknowledgement values Example: `SEND_COMMAND vdvEIB,'LIST WATCH'`
LIST_GAPS	List free (unused) AMX numbers Example: `SEND_COMMAND vdvEIB,'LIST GAPS'`
SEARCH <Groupaddress>	Search for EIB group address Note: Here 2 and 3 grouped mapping is accepted. (Caution: The addresses 7 / 715 and 7 / 2 /203 are i.e. identical EIB group addresses) Example: `SEND_COMMAND vdvEIB,'SEARCH 1/0/101'`
STATUS	List general status information for: A;X hardware, EIB module, gateway, active EIB table Example: `SEND_COMMAND vdvEIB,'STATUS'`

Command	Description
UPLOAD	Write table to gateway Example: `SEND_COMMAND vdvEIB,'UPLOAD'`
WATCH <No>	Activate observation function for actuator. All value changes are recorded on monitor with EIB group address, current value, set flags and resulting additional acknowledgement values. <No> - 1 … 3000 = AMX number with 0 standing for deactivation of observation Example: `SEND_COMMAND vdvEIB,'WATCH 12'`
WATCH_OFF	Deactivate observation function for actuator

3.3.4 Channels and levels

All addresses are available as channels. The current value is displayed on the corresponding channels of the virtual device. For value report “0” the channel is OFF, for all other values ON.

Channel	**Description**
1 … 3000	Display of values (irrespective of EIB type)
3001	Gateway was detected, module ready for ADD = commands
3002	Gateway and module function correct

The first 200 addresses (actuators in EIB table) are available as levels. For every value change the current value is transmitted as level to the program, for instance to control a bar graph.

Level **Description**
lay of values of first 200 group addresses (irrespective of EIB type)

4 Data Types

‘Switch‘	-	Value ‘0‘ or ‘1‘	(e.g. OFF – ON)
‘4 Bit‘	-	Value ‘0‘ to ‘15‘	(e.g. relative dimming – direction, interval)
‘1 Byte‘	-	Value ‘0‘ to ‘255‘	(e.g. value absolute)
‘2 Byte‘	-	Value ‘0‘ to ‘65535‘	(e.g. floating point value in EIS5 Notation)
‘3 Byte‘	-	3 Byte	(e.g. Date or Time)
‘4 Byte‘	-	4 Byte	
‘Text‘	-	1 to 14 ASCII Characters, String automatically filled with spaces	
‘HEXText‘	-	1 to 14 Byte Hexvalue in ASCII-Notation	

5 Appendix A – Sample program

5.1 Notes EIB table

All actuators to be switched/set/controlled are to be introduced to the gateway. This is achieved with a table structure.

If this table is generated with a help file (i.e. ‘EIB_Table.AXI’) it must only be observed, that all entries are edited, meaning the last Switch_Case command (default:) is really edited last. There is to be no gap in the counter. For the entries itself the order is irrelevant.

Recommendation: Use the version with help function (**example 1**, see below). In this version less typing errors will occur and the compiler can perform several checks.

Poll triggers are only entered, if the polling and polled addresses are already entered. We recommend entering the poll triggers at the end.

Alternatively, a table may be loaded from the master’s Compact Flash. The syntax is identical with SEND_COMMAND “ADD=”. The send command and device address are omitted (**example 3**, see below).

5.2 Notes for programming

Predefined functions are available for control to generate the SEND_COMMANDs for the virtual device.

We recommend to always use the functions of the EIB_Tools.AXI include file instead of directly using Send Commands (Appendix B). Less typing errors will occur and the compiler can perform several checks.

5.2.1 Example 1 – Structure of EIB table with functions from EIB_Tools.AXI

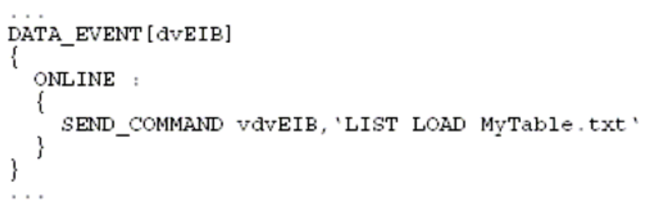
```
PROGRAM_NAME='EIB_Table'

DEFINE_VARIABLE
INTEGER nCounter


DEFINE_START

nCounter = 0
WAIT_UNTIL ([vdvEIB, 3001])    //  Start delay, module reports ready for ADD
{
    nCounter = 1    //  Start
}


#INCLUDE 'EIB_Tools.axi'

DEFINE_PROGRAM

WAIT 1
{
    IF(nCounter)
    {
        SWITCH(nCounter)
        {
            CASE  1: EIBAdd(vdvEIB,  1, eibSwitch, '1/0/1', "")               //  Set light 1
            CASE  2: EIBAdd(vdvEIB,  2, eibSwitch, '1/0/2', "")               //  Set light 2
            CASE  3: EIBAdd(vdvEIB,  3, eibSwitch, '1/0/3', "")               //  Set light 3
            CASE  4: EIBAdd(vdvEIB,  4, eibSwitch, '1/0/11', "eibPollstart")  //  Lights,  status
            CASE  5: EIBAdd(vdvEIB,  5, eibSwitch, '1/0/12', "eibPollstart")  //  Light 2 status
            CASE  6: EIBAdd(vdvEIB,  6, eibSwitch, '1/0/13', "eibPollstart")  //  Light 3 status

            CASE  7: EIBAdd(vdvEIB,  7, eibSwitch, '1/0/21', "")              //  Light scenes 1+2
            CASE  8: EIBAdd(vdvEIB,  8, eibSwitch, '1/0/22', "")              //  Light scenes 3+4

            CASE  9: EIBAdd(vdvEIB,  9, eibSwitch, '1/0/31', "")              //  Shutters, up/down
            CASE 10: EIBAdd(vdvEIB, 10, eibSwitch, '1/0/32', "")              //  Shutters, blinds

            CASE 11: EIBAdd(vdvEIB, 11, eibSwitch, '1/0/111', "")             //  Dimmer, on/off
            CASE 12: EIBAdd(vdvEIB, 12, eibDim4,   '1/0/112', "")             //  Dimmer relative
            CASE 13: EIBAdd(vdvEIB, 13, eib1Byte,  '1/0/113', "")             //  Dimmer absolute
            CASE 14: EIBAdd(vdvEIB, 14, eib1Byte,  '1/0/114', "eibPollstart") //  Dimmer value

            CASE 15: EIBAdd(vdvEIB, 15, eib2Byte,  '1/0/201', "eibEIS5, ',',eibPollstart")
            CASE 16: EIBAdd(vdvEIB, 16, eib1Byte,  '1/0/203', "")             //  Analog value 2

            CASE 17: EIBAdd(vdvEIB, 17, eib3Byte,  '1/0/205', "eibTIME, ',',eibPollstart")//  Time
            CASE 18: EIBAdd(vdvEIB, 18, eib3Byte,  '1/0/206', "eibDATE, ',',eibPollstart")//  Date

            CASE 19: EIBWhenPoll(vdvEIB, 1, 2)                                //  Polltrigger
            CASE 20: EIBWhenPoll(vdvEIB, 1, 3)                                //  Polltrigger

            CASE 21: EIBWhenPoll(vdvEIB, 11, 14)                              //  Polltrigger
            CASE 22: EIBWhenPoll(vdvEIB, 12, 14)                              //  Polltrigger
            CASE 23: EIBWhenPoll(vdvEIB, 13, 14)                              //  Polltrigger
            CASE 24: EIBWhenPoll(vdvEIB, 14, 11)                              //  Polltrigger

            DEFAULT: nCounter = 0
        }
        IF (nCounter)  nCounter ++
    }
}
```

5.2.2 Example 2 - Structure of EIB table with SEND_COMMANDS

```
PROGRAM_NAME='EIB_Table'

DEFINE_VARIABLE
INTEGER nCounter


DEFINE_START

nCounter = 0
WAIT_UNTIL ([vdvEIB, 3001])   //  Start delay, module reports ready for ADD
{
    nCounter = 1        //   Start
}



DEFINE_PROGRAM

WAIT 1
{
    IF(nCounter)
    {
        SWITCH(nCounter)
        {
            CASE  1 : SEND_COMMAND vdvEIB, "'ADD=1:Switch:1/0/1'"              //  Set light 1
            CASE  2 : SEND_COMMAND vdvEIB, "'ADD=2:Switch:1/0/2'"              //  Set light 2
            CASE  3 : SEND_COMMAND vdvEIB, "'ADD=3:Switch:1/0/3'"              //  Set light 3
            CASE  4 : SEND_COMMAND vdvEIB, "'ADD=4:Switch:1/0/11:PS'"          //  Lights1 status
            CASE  5 : SEND_COMMAND vdvEIB, "'ADD=5:Switch:1/0/12:PS'"          //  Light 2 status
            CASE  6 : SEND_COMMAND vdvEIB, "'ADD=6:Switch:1/0/13:PS'"          //  Light 3 status

            CASE  7 : SEND_COMMAND vdvEIB, "'ADD=7:Switch:1/0/21'"             //  Scenes 1+2
            CASE  8 : SEND_COMMAND vdvEIB, "'ADD=8:Switch:1/0/22'"             //  Scenes 3+4

            CASE  9 : SEND_COMMAND vdvEIB, "'ADD=9:Switch:1/0/31'"             //  Shutters  up/down
            CASE 10 : SEND_COMMAND vdvEIB, "'ADD=10:Switch:1/0/32'"            //  Shutters  blinds     n

            CASE 11 : SEND_COMMAND vdvEIB, "'ADD=11:Switch:1/0/111'"           //  Dimmer, on/off
            CASE 12 : SEND_COMMAND vdvEIB, "'ADD=12:Dim4:1/0/112'"             //  Dimmer relative
            CASE 13 : SEND_COMMAND vdvEIB, "'ADD=13:1Byte:1/0/113'"            //  Dimmer absolute
            CASE 14 : SEND_COMMAND vdvEIB, "'ADD=14:1Byte:1/0/114:PS'"         //  Dimmer read          n

            CASE 15 : SEND_COMMAND vdvEIB, "'ADD=15:2Byte:1/0/201:EIS5,PS'"    //  Analog value
            CASE 16 : SEND_COMMAND vdvEIB, "'ADD=16:1Byte:1/0/203'"            //  Analog value

            CASE 17 : SEND_COMMAND vdvEIB, "'ADD=17:3Byte:1/0/205:Time,PS'"    //  Time
            CASE 18 : SEND_COMMAND vdvEIB, "'ADD=18:3Byte:1/0/206:Date,PS'"    //  Date

            CASE 19 : SEND_COMMAND vdvEIB, "'WHEN=1:2'"                        //  Polltrigger
            CASE 20 : SEND_COMMAND vdvEIB, "'WHEN=1:3'"                        //  Polltrigger

            CASE 21 : SEND_COMMAND vdvEIB, "'WHEN=11:14'"                      //  Polltrigger
            CASE 22 : SEND_COMMAND vdvEIB, "'WHEN=12:14'"                      //  Polltrigger
            CASE 23 : SEND_COMMAND vdvEIB, "'WHEN=13:14'"                      //  Polltrigger
            CASE 24 : SEND_COMMAND vdvEIB, "'WHEN=14:11'"                      //  Polltrigger

            DEFAULT:  nCounter = 0
        }
        IF (nCounter)  nCounter ++
    }
}
```

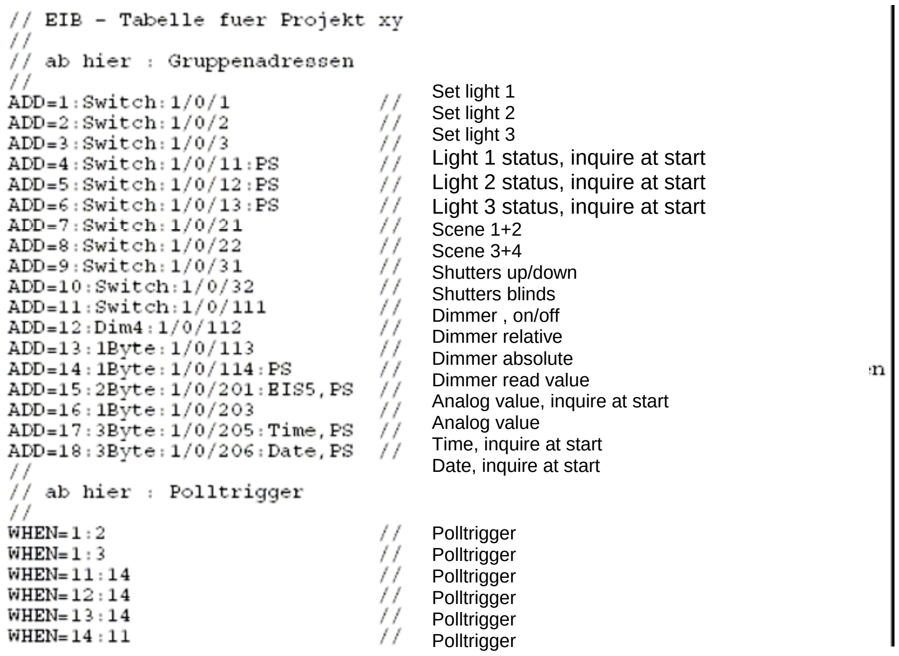
5.2.3 Example 3 – Enter addresses from file

The address table can be read and generated from file on CF card. The reading of the file can for instance be started in the ONLINE section of the interface.
(Description see chapter “Monitor mode”)



```
...
DATA_EVENT[dvEIB]
{
  ONLINE :
  {
    SEND_COMMAND vdvEIB,'LIST LOAD MyTable.txt'
  }
}
...
```

Note: Comments at the end of a line must be separated by at least one space und are initiated – corresponding with programming – with “//”.
Only one command per line is permitted. Leading spaces are ignored.
Lines starting with “//” are completely treated as a comment and not edited by the controls.



```
// EIB - Tabelle fuer Projekt xy
//
// ab hier : Gruppenadressen
//
ADD=1:Switch:1/0/1              //  Set light 1
ADD=2:Switch:1/0/2              //  Set light 2
ADD=3:Switch:1/0/3              //  Set light 3
ADD=4:Switch:1/0/11:PS          //  Light 1 status, inquire at start
ADD=5:Switch:1/0/12:PS          //  Light 2 status, inquire at start
ADD=6:Switch:1/0/13:PS          //  Light 3 status, inquire at start
ADD=7:Switch:1/0/21             //  Scene 1+2
ADD=8:Switch:1/0/22             //  Scene 3+4
ADD=9:Switch:1/0/31             //  Shutters up/down
ADD=10:Switch:1/0/32            //  Shutters blinds
ADD=11:Switch:1/0/111           //  Dimmer , on/off
ADD=12:Dim4:1/0/112             //  Dimmer relative
ADD=13:1Byte:1/0/113            //  Dimmer absolute
ADD=14:1Byte:1/0/114:PS         //  Dimmer read value
ADD=15:2Byte:1/0/201:EIS5,PS    //  Analog value, inquire at start
ADD=16:1Byte:1/0/203            //  Analog value
ADD=17:3Byte:1/0/205:Time,PS    //  Time, inquire at start
ADD=18:3Byte:1/0/206:Date,PS    //  Date, inquire at start
//
// ab hier : Polltrigger
//
WHEN=1:2                        //  Polltrigger
WHEN=1:3                        //  Polltrigger
WHEN=11:14                      //  Polltrigger
WHEN=12:14                      //  Polltrigger
WHEN=13:14                      //  Polltrigger
WHEN=14:11                      //  Polltrigger
```

5.2.4 Example 4 – Main program

```
DEFINE_DEVICE

dvEIB     =  5001:1:0
vdvEIB    =  33001:1:0

dvPanel   =  10001:1:0


DEFINE_CONSTANT
...


DEFINE_VARIABLE

VOLATILE LONG lEIB_Values[3000]   //  feedback array for max 3000 addresses
...


DEFINE_START
...


#INCLUDE 'EIB_Table.AXI'
DEFINE_MODULE 'CTEIB6_mod' GATEWAY_1 (vdvEIB, dvEIB, lEIB_Values)


DEFINE_EVENT
...

BUTTON_EVENT[dvPanel,1]
{
   PUSH :
   {
      EIBSet(vdvEIB,1,1)          //  Light 1 ON
      EIBSet(vdvEIB,16,128)       //  Analog actuator 50%
      EIBSet(vdvEIB,12,10)        //  Dimmer brighter
   }
   RELEASE :
   {
      EIBSet(vdvEIB,12,0)         // Dimmer Stop
   }
}

DEFINE_PROGRAM
...

[dvPanel,11] = lEIB_Values[4]          //  feedback for light 1 (see EIB table)
[dvPAnel,12] = (lEIB_Values[16] > 127) // Key illuminated if actuator >= 50%
```

6 Appendix B – EIB_Tools.AXI

We recommend not to use the send commands directly, but always utilize the functions of this include file. The compiler has the opportunity to avoid typing errors already during compiling. Additional typing is avoided.

This file also provides absolute terms for relative dimming:

```
EIB_DIM_UP = 9        // Heller, Brighter
EIB_DIM_DN = 1        // Dunkler, Dark
EIB_DIM_SP = 0        // Dimmen Stop, Dimming Stop
```

The following functions are available in file EIB_Tools.AXI for programming:

EIBSet (<Virtual Device>,<AMXNo>,<Value>)
Function: Sets actuator <AMXNo> to <Value>
The module limits the value range automatically to the maximum range of the selected actuator.
Example: EIBSet (vdvEIB,13,1)

EIBGet (<Virtual Device>,<AMXNo>)
Function: Gets the value of actuator <AMXNo> to <Value> stored in module
Example: nVAL = EIBGet (vdvEIB,13)

EIBPoll (<Virtual Device>,<AMXNo>)
Function: Polls the actuator <AMXNo>
Example: EIBPoll (vdvEIB,13)

EIBAdd (<Virtual Device>,<AMXNo>,<Type>,<Group Address>,<Flags>)
Function: Adds entry to EIB table (description of parameters see above)
Example: EIBAdd (vdvEIB,13,eib2Byte,'1/0/206',"eibPollstart")

EIBWhenPoll (<Virtual Device>,<AMXNo1>,<AMXNo2>)
Function: Adds a poll trigger. Value report from <AMXNo1> triggers polling on <AMXNo2>.
Example: EIBWhenPoll (vdvEIB,13,20)

7 Appendix C – Comparison with previous version

The general operation of hardware and software has not changed. A filter table has still to be generated and loaded into the gateway. Via this filter the incoming and outgoing telegrams are filtered. The control of actuators or acknowledgements from sensors takes place by setting of values, which are assigned to certain addresses.

- in order to limit the busload created by AMX on the EIB,
  - approx. 10 telegrams are being released per second during polling
  - approx. 35 telegrams are being released per second on triggering (formerly approx. 10 telegrams)
- Telegrams are being read accurately, until the maximum busload is reached.
- resource-sparing operation of both Gateway and Driver. A permanent communication with the Gateway over the serial interface does not apply.
- the driver has been optimized for the ease of use in networked systems.
- the driver eases the examination of the triggering even without operational EIB (compare monitor command "DEBUGON").

7.1 Structure / Generation of filter table in gateway

Previously: SEND_COMMAND vdvEIB,"ADD SW 4 1/0/65"

In the table structure now all actuators/sensors get a distinct number (1 … 3000) independent of their type. Via this number the actuators/sensors are accessed. Additionally, several flags can be set, in the following example for instance "PS". This means, that the corresponding actuator is immediately polled when starting the AMX (description or available flags see chapter "Module commands").

NEW: EIBAdd (vdvEIB, 4,Switch,'1/0/65',"PS") (recommended!) or
SEND_COMMAND vdvEIB,"'ADD=4:Switch:1/0/1:PS'"

7.2 Controllling actuators

Previously: SYSTEM_CALL 'EIB_NX Set Switch' (vdvEIB,1,4)

NEW: EIBSet (vdvEIB,4,1) (recommended!) or
SEND_COMMAND vdvEIB,"'SET=4:1'"

7.3 Feedback

There is now only ONE array to save the values of ALL actuators/sensors.
In addition feedbacks can be output in a readable ASCII display – depending on flags – meaning, the raw data are output as time string, date string, floating point display etc.

<u>Example:</u>

Feedback of a 2Byte value, converted according to EIS5 standard (i.e. temperature value). The corresponding actuator was entered in the filter table with flag "EIS5".
EIBAdd (vdvEIB, 15, eib2Byte, '1/0/201', "eibEIS5")

The virtual device will report two feedback with each value change (or as answer to a poll command):

String 1 from virtual device (value change): 'SET=15:3175'
String 2 from virtual device: 'EIS5=15:22.54'

or

String 1 from virtual device (no value change): 'VAL=15:3175'
String 2 from virtual device: 'EIS5=15:22.54'

8 Appendix D – What to do if it does not work?

The following table provides tips for error definition, in case it does not work.
This serves a quick error analysis **ON SITE**.
We recommend activating debugging mode during diagnostics to display additional error messages. This is activated with monitor command "DEBUGON".

Error	Proposed solution / error definition
No controls possible, no acknowledgement	Enter command "Status" in monitor mode. If the gateway is not detected, the cable is probably wrong / defective or the gateway has no power supply.
No controls possible, no acknowledgement, according to "Status" the gateway is detected	Enter command "List" in monitor mode. Are all addresses entered? Are here acknowledgment values displayed? Try to switch several addresses directly with "SET" (e.g. light). If it works, there is probably an error in the AVIT / AMX program. Is here also no access possible, the reason is probably wrong group addresses. (Is the light still on in the neighboring building?)
The Module consistently reports "no STX at beginning of GW Feedback"	The Gateway is bein recognized by the module, but during the attempt of reading out the version, the connection is getting interrupted again. Solution: Please check teh cabeling from AVIT / AMX to the Gateway.