SIM-EIB is now SIM-KNX

TAPKO TECHNOLOGIES GMBH

SERIAL INTERFACE MODULE KNX

SIM-KNX

DOCUMENTATION

V 1.3

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1 CONTENTS

2 INDEX

2.1 API

3 GENERAL

Since the EIB system has evolved to KNX system, we also changed the name of our product from SIM-EIB to SIM-KNX. There is no other substantial change.

The SIM-KNX is an easy to use serial interface to the KNX. The access to the KNX is realized as an serial ASCII protocol.
The SIM-KNX consists of an micro controller and galvanic isolation and contains the complete certificated KNX communication system and conversion to the data formats used on KNX. This module is designed to connect controller or other devices to the KNX. Due to its design it is also applicable for small and mid range quantities.

The SIM-KNX can be used in several different modes:

- Raw mode
  In this mode the SIM-KNX transfers the data transparent from the serial interface to KNX and vice versa. Here the transmission of the data are triggered complete by the serial interface. The configuration of this mode is normally done via the serial interface – no external tool is required.
- Interoperability mode
  In this mode the SIM-KNX converts the data, which are transmitted from the serial interface to the KNX in an KNX conform data format. The transmission of the data are controlled by the SIM-KNX depending on the configuration. In additional for a part of the group communication objects advanced transmit conditions are available. These are cyclic sending and a integrated threshold switch.
  The configuration of this mode can be done via ETS or serial interface.
- Transparent mode
  Transparent mode enables receiving from, and sending to all group addresses without any filtering. There are no data type limitations for sending.
  This mode is suitable for tracing the group oriented message traffic.

3.1 General Features

Application Interface
- serial asynchronous interface
- 3V to 5V interface
- 3- wire interface
- ASCII protocol
- Configurable baud rate and transmission parameter
- Access to KNX group communication objects (runtime communication)
- Access to KNX interface objects (configuration)
- Configurable indication when group communication value was received

KNX features (raw + interoperability mode)
- device model 0701
- mechanism for configuration via KNX integrated
- read requests from KNX serviced internally in the module
- Two different numbers of group objects: 128 or 254

KNX group communication objects (raw mode)
- transparent transmission of the group communication object data
- data conversion not active
- telegram generation triggered via serial interface
- configuration via serial interface

KNX group communication objects (interoperability mode)
- support of EIB / KNX data types (EIS / DPT)
- data conversion for group object values (e.g. temperature -> EIS5)
- configurable send conditions for all group communication objects
- configuration via ETS database entry or serial interface
- indication when data received, value changed, positive/negative edges (EIS 1)
- cyclic (time configurable between 3 to 255 sec, 3 to 255 minutes)
- advanced transmit conditions
  - send on value difference
  - receive timeout on received telegrams
  - integrated threshold switch
  - triggers another group communication object when threshold value was passed

Transparent mode
- receiving of all group oriented messages
- no filtering of messages
- sending on all group addresses
- no restriction of a specific data type to a specific group address for sending
- not needed protocol oriented information is removed
- also suitable for tracing and logging of messages

3.1.1 RESOURCES IN RAW / INTEROPERABILITY MODE

3.1.1.1 SIM-KNX 128

Number of group addresses: 254
Number of associations: 254
Number of Communication objects: 128
Number of application parameter: 512 byte

Communication object	max. Size (Bytes)	Comments
0 – 15	4 Byte	Supports advanced transmit conditions
16 – 63	4 Byte	
64 – 111	1 Byte	
112 - 127	14 Byte	

3.1.1.2 SIM-KNX 250

Number of group addresses: 254
Number of associations: 254
Number of Communication objects: 254
Number of application parameter: 512 byte

Communication object	max. Size (Bytes)	Comments
0 – 15	14 Byte	Supports advanced transmit conditions
16 – 111	4 Byte	
112 - 127	14 Byte	
128 - 253	4 Byte	

3.2 READING THIS DOCUMENTATION

3.2.1 COMMAND DESCRIPTION

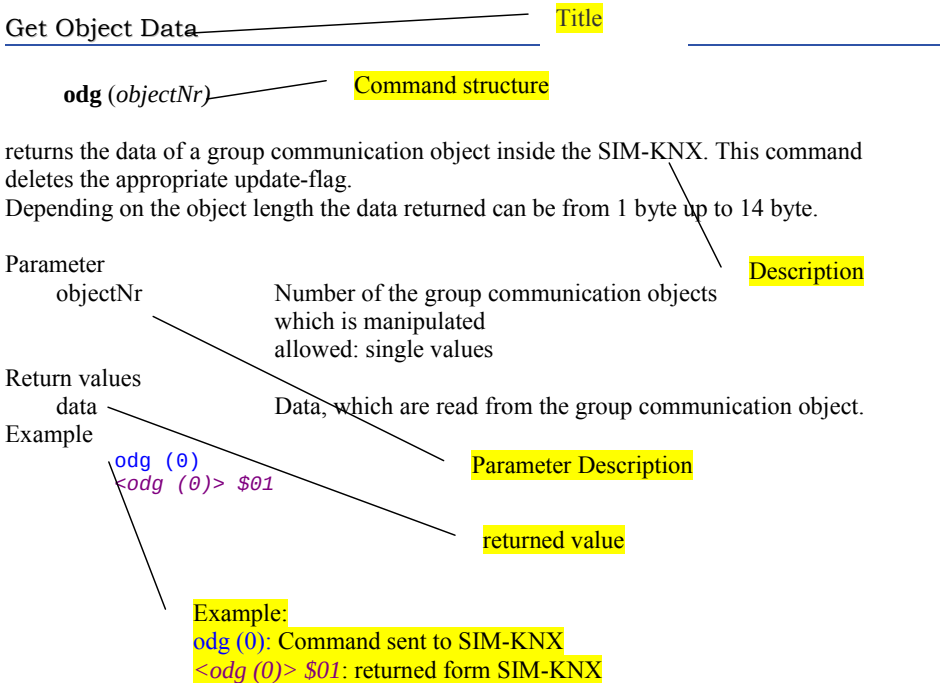


Figure 1: command description

4 HARDWARE

4.1 BLOCK DIAGRAM

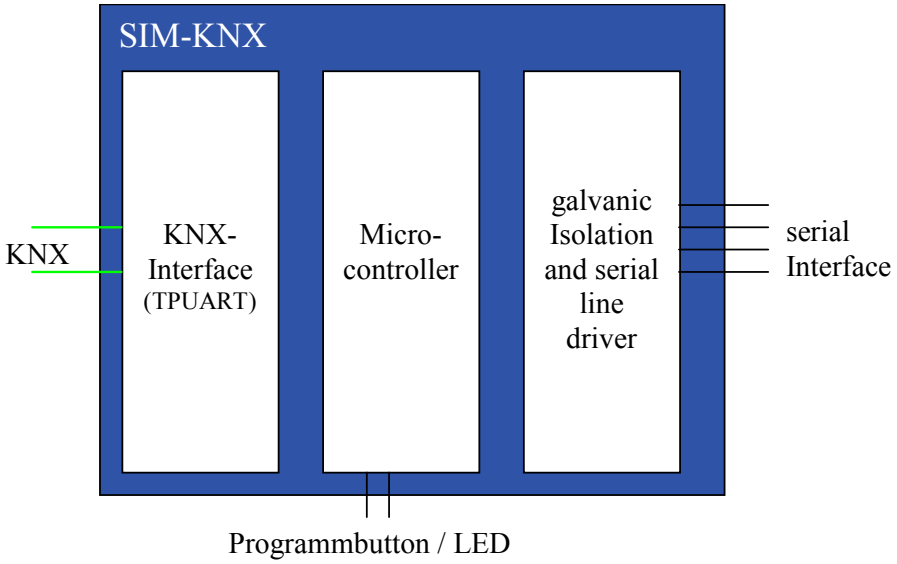


Figure 2 Block diagram of SIM-KNX

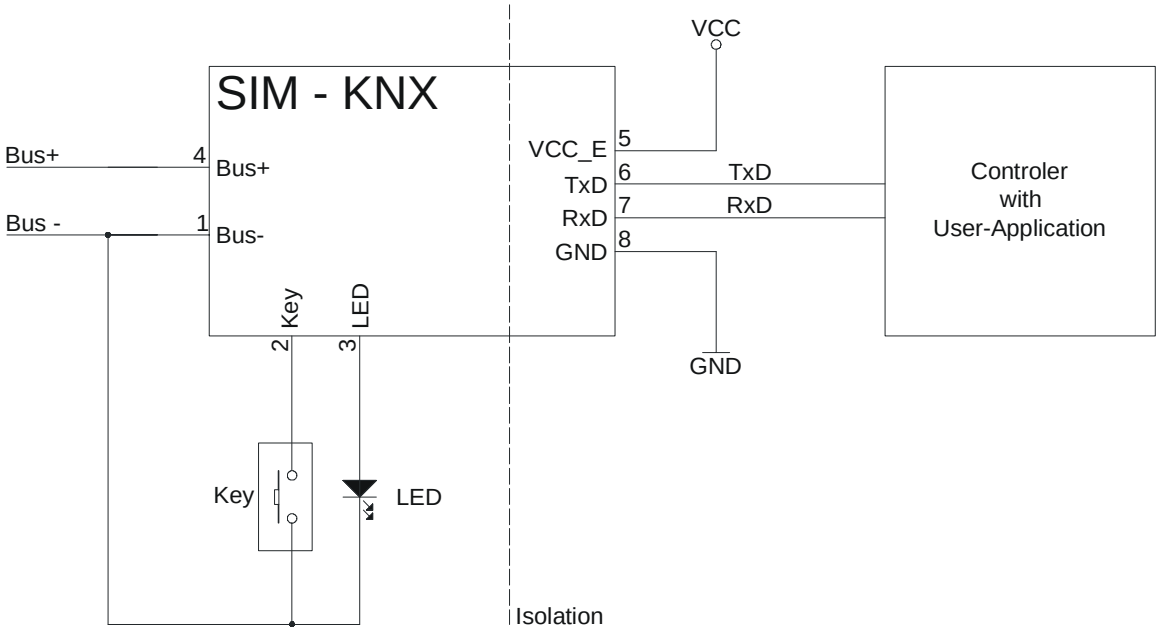


Figure 3: Example, how to use SIM-KNX

4.2 PIN – DESCRIPTION

PinNr.	Pin	Description
1	Bus-	Negative bus pin
4	Bus+	Positive bus pin
2	Key	Connector for KNX programming button
3	LED	Connector for KNX programming LED
8	GND	Ground
7	RXD	Input of the serial interface
6	TXD	Output of the serial interface
5	VCC_E	Power supply input for the galvanic isolated part

4.3 General Device Specification

4.3.1 Absolute Maximum Ratings

All voltages are referring to GND. Currents are declared positive in case of flowing into pin.

Symbol	Parameter	Min	Type	Max	Unit
V_{ISO}	Isolation Voltage	4000			V
V_{Bus}	Bus Voltage (Bus+ to Bus-)	-45		45	V
V_{VCC}	supply voltage	-0,5		5,5	V
V_{RXD}	voltage on pin RXD	-0,5		5,5 / V_{VCC}	V
	Storage temperature	-40		85	°C
	maximum power dissipation			1	W

4.3.2 Recommended Operating Conditions

Symbol	Parameter	Min	Type	Max	Unit
V_{Bus}	Bus Voltage (Bus+ to Bus-)	20	28	33	V
V_{VCC}	supply voltage	3		5	V
V_{RXD}	voltage on pin RXD	-0,5		V_{VCC}	V
	Operating temperature	-25		85	°C
I_{Bus}	Bus power consumption		5		mA
I_{RXD}			7		mA
$V_{RXD(low)}$				0,7	V
$V_{RXD(high)}$	I_{TXD} < 100µA	V_{VCC} –1,5			V
I_{TXD}	with V_{VCC}=5,5V		0,1	0,8	mA
$V_{TXD(low)}$		0		0,7	V
$V_{TXD(high)}$	I_{TXD} < 100µA	V_{VCC} –0,8		V_{VCC}	V
	I_{TXD} < 50µA	V_{VCC} –0,4		V_{VCC}	V
I_{VCC}	with V_{VCC}=5,5V			1,5	mA
I_{LED}			2,6		mA
I_{KEY}			33	50	µA

4.3.3 Tested EMC Levels

All EMC tests are done together with an evaluation board.

KNX Standard: Volume 4; Part 2:2002
EN 50090-2-2:1996 + Corrigendum 1997
EN 55022:1998 + A1:200 + A2:2003
EN 61000-3-2: 2000, EN 61000-3-3: 1995 + A1: 2001
EN 50090-2-2: 1996 + Corrigendum 1997
EN 6100-4-2: 1995 + A1:1998 + A2: 2001
EN 6100-4-3: 2002 + A1:2002
EN 6100-4-4: 1995 + A1:2001 + A2: 2001
EN 6100-4-5: 1995 + A1:2001
EN 6100-4-6: 1996 + A1:2001
EN 6100-4-8: 1993
EN 6100-4-11: 1994
It is thus fully compliant with the EMC requirements for CE marking.

5 SOFTWARE

5.1 BLOCK DIAGRAM

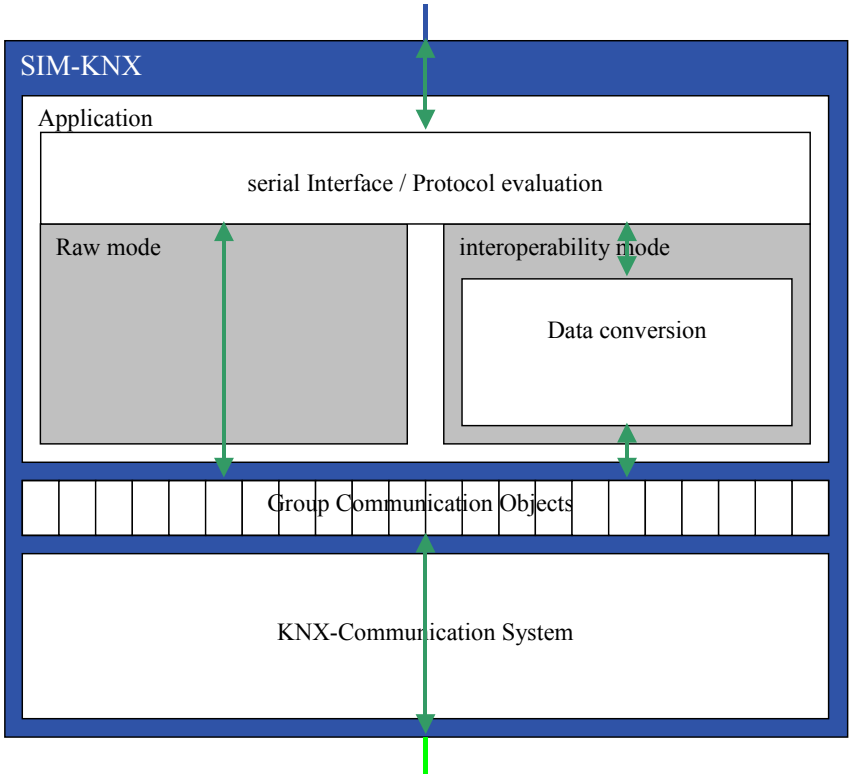


Figure 4: Structure of software

5.2 Introduction

There are two general ways of operation for the SIM-KNX.

- In the first way of operation the SIM-KNX behaves like a normal device. It has its own physical address, an address table, communication objects and a complete device management.
- In the second way of operation the SIM-KNX has an additional bypass activated in the lower layers for group oriented communication. Thus the complete group oriented traffic is routed to the serial interface without any communication objects or any filtering.

5.2.1 Operation with Communication Objects (Raw / interoperability mode)

The runtime communication on EIB / KNX is done via the communication objects.

SIM-KNX has a set of communication objects in its memory. It receives the EIB / KNX group telegrams and stores the values of the associated group addresses in the corresponding communication objects. So SIM-KNX has always the latest value of the communication objects. This values can be read via the serial interface.
In the other direction the value is transferred via the serial interface to the communication objects in SIM-KNX and SIM-KNX sends than the value depending on the send conditions to the bus.
It is also possible to read a value from KNX. Therefore SIM-KNX can be triggered via the serial interface to send a read request to the bus. When an value read was received from KNX, the response is handled inside SIM-KNX, the stored values of the communication objects are then sent to the bus.
SIM-KNX can also create an indication on the serial interface, when an object value was received or changed.
SIM-KNX has two modes to exchange data via the communication objects, which can be selected for each communication object independent.

- RAW-mode
- Interoperability mode

5.2.1.1 Raw-mode

In Raw mode the raw data is exchanged via the serial interface with SIM-KNX. In this mode SIM-KNX has no knowledge about the format and semantics of the exchanged data. Only the size of the communication object is known by SIM-KNX.
This mode is normally used, when SIM-KNX is configured via serial interface.
To configure the communication object in Raw mode you set the DPT in the command **ocs** to 0 and configure the size of the object via the parameter object type.

5.2.1.2 Interoperability-mode

In Interoperability mode SIM-KNX has not only the size of the communication objects but also the type of the data point. This data point types (DPT) are standardized in KNX to guarantee interworking of the devices. The DPT definition contains the format and also the usage of the various data point types.
In interoperability mode SIM-KNX supports a wide range of data point types. The complete list of DPTs is available at KNX Association.

To configure the communication object in interoperability mode set the DPT in the command **ocs**. The parameter object type is than ignored be SIM-KNX.

5.2.1.3 FEATURES OF THE COMMUNICATION OBJECTS

The configuration objects of SIM-KNX haves the following features:
Standard features of communication objects as defined in the device model:

- Enable the transmission and reception of communication object value
- Enable receiving of the value read from the bus
- setting priorities

Specific features of SIM-KNX for all communication objects

- format conversion in interoperability mode
- object values can be sent to the bus
  - when value from serial interface was received
  - when value from serial interface was changed
  - for EIS 1: on change on positive and / or negative edge
  - cyclic
- indication to serial interface can be generated
  - when a value was received from EIBKNX
  - when the value, which was received from KNXEIB was changed
  - when the receive timeout was elapsed

Advanced send transmit conditions for SIM-KNX, available only for the first block of communication objects.

- configurable only with ETS,
- send on bus, when the value was changed for a certain value
- Threshold switch
  - triggers another communication object when threshold value was passed.

The configuration of SIM-KNX is stored in nonvolatile memory. The configuration is not changed with a restart or power down.
The values of the communication objects are stored in volatile memory. The values are deleted with a restart or power down of SIM-KNX.

5.2.1.4 TRANSFERRING COMMUNICATION OBJECT DATA VIA SERIAL INTERFACE

The data of the communication object are set via the command

- **ods** in raw mode
- **ovs** in interoperability mode

To receive the data of the communication objects the commands are:

- **odg** in raw mode
- **ovg** in interoperability mode

The format in which the data are transferred in raw mode are hex bytes. In interoperability mode the data format depends on the used data point type and can be for example a simple number, a float value or a string. The data format are described in the list of data point types.

5.2.1.5 DATAPOINT TYPES

The Datapoint types and their usage are standardized inside KONNEX / KNX. Definitions of the datapoint types can be found in KNX handbook “Volume 3 / Part 7 / Chapter 2: Datapoint Types”, available from the KNX-website (see also : Page 13 Further Documentation) or on the CD of the SIM-KNX evaluation kit. The following DPT are mainly used:

5.2.1.5.1 DPT1 (1BIT) ON / OFF

This DPT is used to switch on (1) or off(2) lights, relays,…
It is also used to move blinds up (0) and down (1). Further usages as enable / disable are defined.
On the serial interface of SIM-KNX the data are transferred as a single value 0 or 1.

5.2.1.5.2 DPT3 DIMMING CONTROL

This DPT is defined as a 4 bit communication object. The values of this DPT are interpreted as follow:
C VVV
Data format of SIM-KNX: *C* {0,1}: control (0=off, 1=on)
V {0 .. 7}: value

5.2.1.5.3 DPT9 TEMPERATURE

This DPT is in KNX defined as a 16bit floating point value.
Data format of SIM-KNX (interoperability mode): single value
Due to conversion of the value, it may happen that the value you read back from SIM-KNX is not exactly the one you write.

5.2.1.5.4 DPT5 SCALING

This DPT is used for absolute dimming, absolute blind position, value of valves, …
On the bus the value is transmitted as a 1byte value(0..255). 100% is coded as 255.
In interoperability mode the value is transmitted as a single value in the range of 0 to 100 ($64). Due to conversion of the value, it may happen that the value you read back from SIM-KNX is not exactly the one you write.

5.2.1.5.5 DPT10 TIME

On KNX the time is transmitted as a 3byte value.
Dataformat of SIM-KNX:
SIM-KNX expects 4 values in the following format: w *h m s*

5.2.1.5.6 DPT11 DATE

This DPT is similar to DPT10
The following interpretation are carried out by SIM-KNX:
If Octet3 contains value ≥ 90 : interpret as 20th century
If Octet 3 contains value < 90: interpret as 21st century
This format covers the range 1990 to 2089.
SIM-KNX expects 3 values in the following format: d *m y*

5.2.1.6 CONFIGURATION OF THE COMMUNICATION OBJECTS

The configuration of the communication can be done via

- serial interface or
- application specific ETS database entry

5.2.1.6.1 CONFIGURATION OF THE COMMUNICATION OBJECTS VIA SERIAL INTERFACE

The configuration of the communication objects are split in several parts:

- assignment of group addresses
- setting the communication parameter
- configuring the indications

SETTING THE GROUP ADDRESSES

The group addresses for the communication objects are configured via the commands:

- **ogs**: set sending group address
- **oga**: add group address
- **ogd**: delete group addresses

Each communication object can be associated with several group addresses. One group address is always the sending group address. It is used to send the object values on the bus. All other group addresses are used to receive object values.
Receiving group addresses are set via the command **oga** (e.g. oga (1) 1/0/0). The group address can be transferred as hex number ($1000) or in ETS format (2/0/0).
The sending group address is set via **ogs**. If there was one sending group address, before sending this command, the old sending group address is still active as receiving group address. If the sending group address is deleted or no group address was marked specially as sending, one of the receiving group address becomes automatically the sending group address.
Single group addresses can be deleted by using the command **ogd**. To delete all group addresses associated to one communication object the command **ogd (0) "all"** can be used.

The number of group addresses which can be associated to the communication objects is limited by the global resources address and association table.
For each group address one entry of the address table is used, independently how many communication objects are associated.
For each association of a group address and communication object one entry in the association table is used.

SETTING THE COMMUNICATION PARAMETER

The communication parameter for the communication objects are configured via the command **ocs**. The current configuration of an communication object can be retrieved via **ocg**. The commands has several parameter:

- DPT: data point type
- objectType: type of the communication object
- flags configuration flags
- sendConfig configuration when the value is send
- rcvConfig configuration when the indications will be sent
- time delay time

Via the parameter DPT and objectType the operation mode and the size / format of the communication object is set.
To set the format for the interoperability mode, set the parameter DPT to the according data point type. The parameter objectType is than not used.
To set the size of the communication object in raw mode, set the parameter DPT to 0 and set the objectType according to the size which is required.
The data size of the communication objects is limited for the different communication objects.

The parameter flags contains the configuration flags, of the communication objects, which are also displayed in ETS. Via this flags, the transmission / reception of the communication object values can be controlled.

Via the parameter sendConfig is configured the behavior, when to send an object value on the bus. Depending on this parameter, the object value is sent when a value was received from the serial interface, or only when it was changed, or e.g. cyclic.

Via the parameter rcvConfig it can be configured, which indication should be sent via the serial interface.

The parameter time specific the time for cyclic sending or the receive timeout. If this parameter is set to 0, the cyclic sending or receive timeout is switched off.

If not all parameter of the command **ocs** are to be modified, it is possible to replace the parameter, which should not be modified by a '*'.

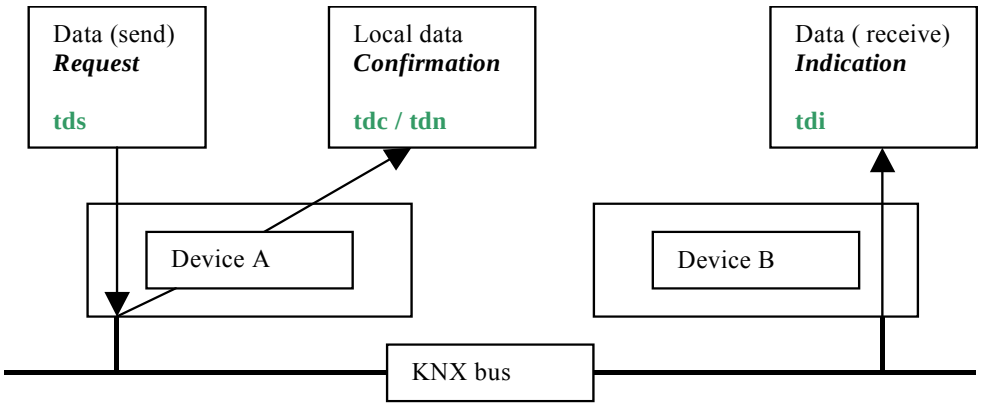
5.2.1.6.2 CONFIGURATION OF THE COMMUNICATION OBJECTS VIA ETS DATABASE ENTRY

All the settings, which can be set via the serial interface can also set via ETS. In addition the complex advanced send transmit conditions are available for the ETS data base entry.
The required information, which is required to build the ETS database entry can be found in chapter 8 ETS.

5.2.2 Operation without Communication Objects (Transparent mode)

In Transparent mode the SIM-KNX activates a bypass that channels all group oriented messages from the lower layers directly to the serial interface without filtering. Also all requests coming from the serial interface are sent directly to the lower layers. Care should be taken when transparent mode is switched on that all communication objects should be erased by the command *gci* to prevent unpredicted interference between objects and incoming messages, since the bypass does not deactivate the object handling. Transparent mode may be switched on or off with the command **dts.**
For using the Transparent mode, it is essential to understand the communication mechanism for group oriented communication. Here they will be described step by step in three communication situations.

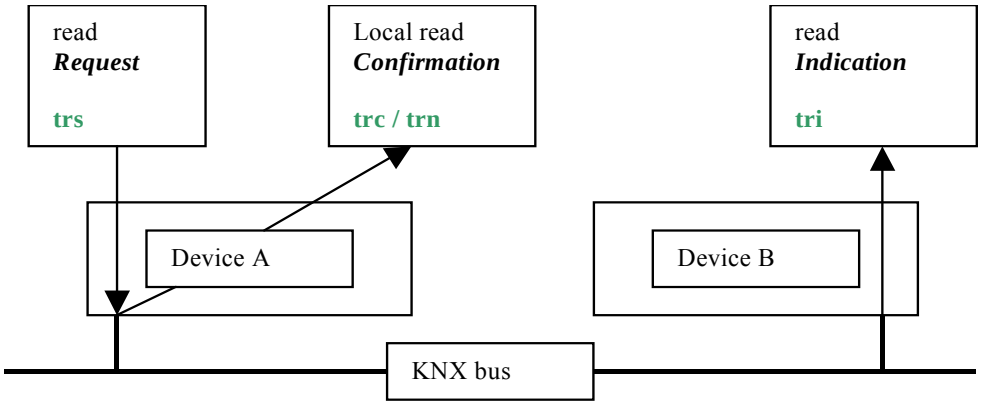
Case 1) The most simple communication situation is when one device wishes to distribute a value.



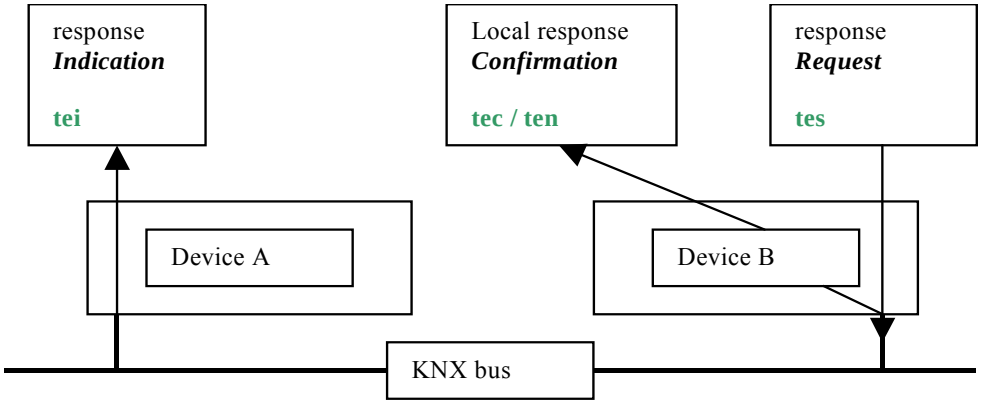
For that a ‘send data request’ is sent to the SIM-KNX. This request is forwarded by the device A to the bus. If local confirmations are enabled, a message is returned to the serial interface with the information of success or fail in transmitting. This is based on the result of immediate acknowledge reception after transmission of the message on KNX bus. The remote device B is receiving the message from device A and indicates this fact to its own serial interface by sending a data indication.

In green letters you see the appropriate ASCII commands on the serial interface.

Case 2) The second possibility is when you ask a device to send you its actual value. This request for data is called a read request. A local confirmation is sent via serial interface once the transmission is completed. The remote device receives the request and sends a read indication to its own serial interface.
This step does not yet involve getting the value requested!



Case 3) The last possibility is sending the answer as a result of the request of the case 2. The remote device sends a response message from its serial interface to the KNX bus. It is locally confirmed in the remote device and the same message is distributed via the KNX bus to the other devices connected. Our device A receives this message and sends a response indication via serial interface.



5.2.2.1 CONFIGURATION OF TRANSPARENT MODE

In transparent mode the local confirmations could be suppressed by appropriate setting of the parameters of the **dts** command.

5.2.3 DEVICE INFORMATION

5.2.3.1 PHYSICAL ADDRESS

The physical address and the assignment of the physical address was generally handled completely inside SIM-KNX. Normally there is no need to set or read the physical address. Anyway, if it is required, it is possible to read and to set it via **dag** and **das.**

5.2.3.2 PROGRAM MODE

The program mode and the program LED and push button is generally handled inside SIM-KNX. Normally there is no need to set for read the program mode via the serial interface. Anyway, if it is required, it is possible to read and to set it via **dpg** and **dps**.

5.2.3.3 OTHER DEVICE INFORMATION

SIM-KNX provides also other device information as version and state of the internal application.

6 SERIAL PROTOCOL

6.1 SETTINGS

The default setting for the serial interface are:

- 9600 baud
- 8 databit
- no parity
- 1 stopbit
- no hardware handshake

6.1.1 CHANGE THE SETTINGS:

The settings are represented by 2 Bytes in the Flash-memory and can be changed via ETS (see 8.2) or the Application Interface object (see 7.1).

The meanings of the 2 Bytes are:

Bit 0,1: Handshake (reserved for future use)
Bit 2-7: not used
Bit 8: Number of data bits (0 = 7 Bits, 1 = 8 Bits)
Bit 9, 10: parity (0 = none, 1 = even, 2 = odd)
Bit 11: Number of Stop bits (0 = 1 Stop bit, 1 = 2 Stop bits)
Bit 12-15: Baudrate

-the following Baudrates are possible:
0 = 1200 bps
1 = 2400 bps
2 = 4800 bps
3 = 9600 bps (preferred)
4 = 19200 bps
5 = 38400 bps

After a change of these settings, a restart is necessary!

6.1.1.1.1 EXAMPLES FOR CHANGING THE BAUD RATE TO 38400 BAUD

```
ids (5 50) $51 $00
```

SYNTAX

6.1.2 GENERAL SYNTAX (COMMAND BASED)

The Syntax is a command based and uses the ACSII char set. Each command is terminated by a <CR>.
The general syntax for the commands is:

command<CR>
command (*parameter)*<CR>
command (*parameter) data*<CR>

The command can contain 3 parts:

- Command
  The command itself. It specifies what operation should be executed
- Parameter
  The parameter specifies which element is manipulated. e.g. which group communication object.
- Data
  The data contains the values which are transmitted to the SIM-KNX. e.g. value of group communication object or physical address

6.1.3 Strings from SIM-KNX

There are three types of strings, which are sent from the SIM-KNX.

- Responses
- Indications
- Error-Messages

6.1.3.1 Responses

The responses are following to the commands and contains of 2 parts:

- generic response
  The generic response is general for all command. It can be configured whether the received command string will be returned or not.
  If the echoing of the received command string is active, the response is the following:
  <*commandstring*>*returnValues*<CR>
  If the command string is not echoed, it looks like the following:
  returnValues<CR>
- return values
  The return values depend on the command and are the data which are requested. The data format depends on the command.

6.1.3.1.1 Change the Responses in raw / interoperability mode

The settings are represented by one byte in the Flash-memory and can be changed via ETS (see 8.2) or the Application Interface Object (see 7.1 property ID 52).
The following settings are possible:

Bit 0: 0 = response without command string
1 = response with command string
Bit 1: 1 = print “ok” if no data are following

6.1.3.1.2 Examples of responses

Setting: 0x00	**Setting: 0x01**	**Setting: 0x02**	**Setting: 0x03**
`odg (0)` `$01`	`odg (0)` `<odg (0)>$01`	`odg (0)` `$01`	`odg (0)` `<odg (0)>$01`

`odt (0)`	`odt (0)`
	`<odt (0)>`
		`odt (0)`
		`ok`
			`odt (0)`
			`<odt (0)>`
			`ok`

6.1.3.2 Indications

Indications are sent without requests. They are independent from the response-syntax.
For details see 6.4.6 Indications

6.1.3.3 Error Messages

Error-Messages are sent, if an invalid command was received. The error-message consists of 3 parts:

- keyword “!error”
- error-number
- the received command

6.1.3.3.1 Examples of Error Messages

```
!error $0215 : <abc>
```

6.1.4 VALUES

There are different types of values

- **single values**
  This is one single value. It can be a one byte value or also a 2 or 4 byte value.
  Single values can be specified in the following formats:
  1234 decimal
  $1234 Hexadecimal
  %10101 Binary
- **Hex stream**
  Defines a sequence of hexadecimal bytes
  #12345678
- **String**
  strings have to be enclosed in quotation marks
  “Hello”
- **Wildcard**
  in some commands it is allowed to use ‘*’ as wildcard
- **GroupAddress in ETS-Format**
  for manipulation of group-adresses it is allowed to use the ETS-Format
  1/234
  1/2/24

The usage is defined per command.

6.2 COMMAND OVERVIEW

6.2.1 GENERAL

Command	usage
dag	Get physical address
das *physicalAddress*	Set physical address
dpg	Get program mode
dps *progMode*	Set program mode
dr	Restart
dsg	Get State of device
dvg	Get version
dts *data*	Device Transparent Set
gci	Reset to the manufacturer state
pdg (*index count*)	Parameter Data Get
ids (*ioIndex propertyID*) *data* **ids** (*ioIndex propertyID elementIndex) data*	Set interface object data
idg (*ioIndex propertyID)* **idg** (*ioIndex propertyID elementIndex)*	Get interface object data

6.2.2 COMMANDS IN RAW-MODE AND NTEROPERABILITY-MODE

Command	usage
ods (*objectNr) data*	Set Object Data (Raw mode)
odg (*objectNr)*	Get Object Data (Raw mode)
odt (*objectNr)*	Send group telegram
odr (*objectNr)*	Send group read telegram
ofg (*objectNr)*	Get RAM-Flags
ovs (*objectNr*) *data*	Set Object Value (interoperability mode)
ovg (*objectNr)*	Get Object Value (interoperability mode)
ogs (*objectNr*) *group*	Set Sending group address
oga (*objectNr*) *group*	Add group address
ogd (*objectNr*) *group*	Delete group address
ogg (*objectNr)*	Get group addresses
ocs (*objectNr) DPT objectType comFlags sendConfig rcvConfig time*	Set Object Configuration
ocg (*objectNr)*	Get Object Configuration
dus	Set Event Generation
gug	return the update flag of all group object
gcg	return the valueChanged flag of all group object
gtg	return the timeout flag of all group object
gui	Indication: sends the global update flag
oui	Indication: sends the update flag for a communication object

6.2.3 COMMANDS IN TRANSPARENT-MODE

Command	**usage**
dts *data*	Device Transparent Set
tds *(dest) data* **tds** *(dest length) data*	Transparent Data Send
tes *(dest) data* **tes** *(dest length) data*	Transparent Response Send
trs *(dest)*	Transparent Read Request
tri *(source dest)*	Transparent Read Indication
tdi *(source dest length) data*	Transparent Data Indication
tei *(source dest length) data*	Transparent Response Indication
trc *(source dest)*	Transparent Read Confirmation)
tdc *(source dest length) data*	Transparent Data Confirmation
tec *(source dest length) data*	Transparent Response Confirmation
trn *(source dest)*	Transparent Read Negative Confirmation)
tdn *(source dest length) data*	Transparent Data Negative Confirmation
ten *(source dest length) data*	Transparent Response Negative Confirmation

6.3 COMMAND REFERENCE (GENERAL)

6.3.1 ACCESSING INTERFACE OBJECTS

SET INTERFACE OBJECT DATA

ids (*ioIndex propertyID*) *data*
ids (*ioIndex propertyID elementIndex) data*

sets the data of one property of an interface object. The property is selected via interface object index and propertyID. If the property is implemented as an array, the elements are selected via elementIndex

Parameter

ioIndex	index to the interface object allowed: single values
propertyID	ID of the property allowed: single values
elementIndex	element of the property allowed: single values is set to 1, if skipped
data	Data for one element only, which are written to the property. allowed: single values, hex stream for elements of size >1byte

Example

```
ids (5 52) 1
```

GET INTERFACE OBJECT DATA

idg (*ioIndex propertyID)*
idg (*ioIndex propertyID elementIndex)*

returns the data of one property of an interface object. The property is selected via interface object index and propertyID. If the property is implemented as an array, the elements are selected via elementIndex

Parameter

ioIndex	index to the interface object allowed: single values
propertyID	ID of the property allowed: single values
elementIndex	element of the property allowed: single values is set to 1, if skipped

Return values

data	Data, which are read from the property.

Example

```
idg (5 52)
<idg (5 52)>$01
```

6.3.2 DEVICE SETTINGS

GET PHYSICAL ADDRESS

dag

returns the physical address of the SIM-KNX.

Parameter
-
Return value
physicalAddress physical address as one single value
Example

```
dag
<dag>$ffff
```

SET PHYSICAL ADDRESS

das *physicalAddress*

This command is modifying the internal flash memory. This command should only be used at configuration time and not on a permanent basis.

Parameter
physicalAddress physical address
allowed: single values
Return value

Example

```
das $1508
<das $1508 >
```

GET PROGRAM MODE

dpg

returns the state of the programming mode of the device. This state is also reflected with the LED

Parameter
-
Return value

progMode	state of the program mode 0: off 1: on

Example

```
dpg
<dpg>$01
```

SET PROGRAM MODE

dps *progMode*

sets the state of the programming mode of the device.

Parameter

progMode	state of the program mode 0: off 1: on allowed: single values

Return value

Example

```
dps 1
<dps 1>
```

RESTART

dr

executes a restart of the SIM-KNX, after a delay of 50ms

Parameter
-
Return value
-
Example

```
dr
<dr>
gui $01[1]
```

GET STATE OF DEVICE

dsg

returns various states of the device

Parameter
-
Return value

bit0	0: normal mode 1: transparent mode
bit1	1: application loaded
bit2	1: application is running
bit7	1: device is in program mode

Example

```
dsg
<dsg>$06
```

[1] if the global indication for restart is set

GET VERSION

dvg

returns the version of the SIM-KNX.

Parameter
-
Return value

device version	single value, which shows the kind and version of this device. high byte: general type of the device: 00: means bus coupling via TP1 media low byte: version of this device
protocol version	version of the software protocol high byte: main version of this protocol. If this version changes the protocol may have incompatible changes low byte: sub version of this protocol. Higher sub versions are always upward compatible.
active Objects	number of activated communication objects

Example

```
dvg
<dvg>$0001 $0001 $80
```

RESET TO MANUFACTURER STATE

gci

Clears all settings which were done via ETS or over the serial interface and executes a restart.

Example

```
gci
```

6.3.3 PARAMETER

PARAMETER DATA GET

pdg (*index)*
pdg (*index count)*

gets the Parameter, which could be written only with ETS.

Parameter

index	index to the Parameter
count	number of Parameter, which should be read is set to 1 if skipped

Return values

data

Example

```
pdg (10 4)
<pdg (10 4)>$01 $02 $03 $04

pdg (11)
<pdg (11)>$02
```

6.4 COMMAND REFERENCE (RAW / INTEROPERABILITY MODE)

6.4.1 CONFIGURATION

SET EVENT GENERATION

dus *globalEvent*

sets the configuration of the global event generation
This command is modifying the internal flash memory. This command should only be used at configuration time and not on a permanent basis.

Parameter

globalEvent	send global Event: bit 0: at restart bit 3: if global update flag is set bit 4: if global changed flag is set bit 6: if time out on serial interface has occured bit 7: if global receive timeout is set

Return value

-

Example

```
dus $01
<dus $01>
```

For getting the status see 7.1 property ID 128.

6.4.2 ACCESSING GROUP COMMUNICATION OBJECTS (RAW MODE)

SET OBJECT DATA

ods (*objectNr) data*

sets the data of a group communication object inside the SIM-KNX. The transmission is automatically initiated depending on the send condition. This command deletes the appropriate update-flag.
Depending on the object length the data of this command can be from 1 byte up to 14 bytes.

Parameter

ObjectNr	Number of the group communication object which are manipulated allowed: single values
Data	Data, which are written to the group communication object. allowed: single values, hex stream Take care that you set the correct length of the data.

Example

```
ods (0) 1
<ods (0) 1>
ods ($1) $0 $1 $2
<ods ($1) $0 $1 $2>
ods (1) #000102
<ods (1) #000102>
```

GET OBJECT DATA

odg (*objectNr)*

returns the data of a group communication object inside the SIM-KNX. This command delete the appropriate update-flag.
Depending on the object length the data returned can be from 1 byte up to 14 bytes.

Parameter

objectNr	Number of the group communication object which is manipulated allowed: single values

Return values

data	Data, which are read from the group communication object.

Example

```
odg (0)
<odg (0)> $01
```

6.4.3 ACCESSING GROUP COMMUNICATION OBJECTS (INTEROPERABILITY MODE)

SET OBJECT VALUE

ovs (*objectNr*) *data*

sets the value of a group communication object inside the SIM-KNX. The transmission is automatically initiated depending on the send condition.
The data and its format are depending on the configured data point type.

Parameter

objectNr	Number of the group communication object which is manipulated allowed: single values
data	Data, which are written to the group communication object. allowed: single values, hex stream depending on data point type

Example

```
ovs (0) 1
<ovs (0) 1>
ovs ($1) 2100
<ovs ($1) 2100>
```

GET OBJECT VALUE

ovg (*objectNr)*

Returns the value of a group communication object inside the SIM-KNX.
The data and its format are depending on the configured data point type.

Parameter

objectNr	Number of the group communication object which is manipulated allowed: single values

Return values

data	Data, which are read from the group communication object. the data format is depending on data point type

Example

```
ovg (0)
<ovg (0)>1
ovg ($1)
<ovg ($1)>2100>
```

6.4.4 ACCESSING GROUP COMMUNICATION OBJECTS (RAW / INTEROPERABILITY MODE)

SEND GROUP TELEGRAM

odt (*objectNr)*

Starts the transmission of the value of a group communication object on the KNX as A_ValueWrite, without a check of the send condition.

Parameter

objectNr	Number of the group communication object which is manipulated allowed: single values

Example

```
odt (0)
<odt (0)>
```

SEND GROUP READ TELEGRAM

odr (*objectNr)*

Starts the request of the value of a group communication object. An A_ValueRead is transmitted on KNX.

Parameter

objectNr	Number of the group communication object which is manipulated allowed: single values

Example

```
odr (1)
<odr (1)>
```

GET RAM-FLAGS

ofg (*objectNr)*

Returns the RAM-flags of the object

Parameter

objectNr	Number of the group communication object which is manipulated allowed: single value

Return values

RAM-Flags	RAM-flags of the Object

Example

```
ofg (1)
<ofg (1)> $01
```

6.4.4.1 STRUCTURE OF THE RAM-FLAGS

The RAM-flags contain the information about the communication status of the communication object. Of your application's interest are normally only the indications (update, value changes and rcv-timeout).

Bit	7	6	5	4	3	2	1	0
	rcv-timeout			Value Changed	Update	read-Request	transmittionState	transmittionState
0	I	0	0	C	U	R	T	T

Figure 5: Structure of RAM-flags

TT transmission flags
information about the transmission of the value on KNX.

R read flag
Flag to trigger the sending of value read request. This flag is used in combination with the transmission state

U update flag
This flag indicates, that a value was received from the bus.

C value changed on update
This flag indicates, that the value, which was received from the bus was changing the communication object value

I receive-timeout
This flag was set, when no value was received inside the configured time.

0 not used

RETURN THE UPDATE FLAG OF ALL GROUP OBJECT

gug

Sends the update flags of all object

Return values
updateFlags packed update flags
Example

```
gug
<gug>$01 $00 $00 $00 $00 $00 $00 $00 $00 $00 $00 $00 $00 $00 $00
$00
```

RETURN THE VALUECHANGED FLAG OF ALL GROUP OBJECT

gcg

Sends the valueChanged flags of all object

Return values
valueChangedFlags packed valueChanged flags
Example

```
gcg
<gcg>$04 $00 $00 $00 $00 $00 $00 $00 $00 $00 $00 $00 $00 $00 $00
$00
```

RETURN THE TIMEOUT FLAG OF ALL GROUP OBJECT

gtg

Sends the update flags of all object

Return values
timeoutFlags packed timeout flags
Example

```
gtg
<gtg>$10 $00 $00 $00 $00 $00 $00 $00 $00 $00 $00 $00 $00 $00 $00
$00
```

6.4.5 CONFIGURE GROUP COMMUNICATION OBJECTS

All this commands are modifying the internal flash memory. This commands should only be used at configuration time and not on a permanent basis.

6.4.5.1 CONFIGURE GROUP ADDRESSES

SET SENDING GROUP ADDRESS

ogs (*objectNr*) *group*

sets the sending group address of a group communication object. The existing sending group address is still connected as receiving group address.

Parameter

objectNr	Number of the group communication object which is manipulated allowed: single values
Group	sending group address as one single value allowed: single values or ETS format

Example

```
ogs (0) $affe
<ogs (0) $affe>
ogs (0) 21/2046
<ogs (0) 21/2046>
ogs (0) 21/7/254
<ogs (0) 21/7/254>
ogs (0) 21/7/$fe
<ogs (0) 21/7/$fe>
```

ADD GROUP ADDRESS

oga (*objectNr*) *group*

adds a group address to a group communication object as receiving group address. If no group address is existing before, this group address also becomes the sending group address.

Parameter

objectNr	Number of the group communication object which is manipulated allowed: single values
group	group address as one single value allowed: single values or ETS format

Example

```
oga (0) $affe
<oga (0) $affe>
oga (0) 21/2046
<oga (0) 21/2046>
oga (0) 21/7/254
<oga (0) 21/7/254>
oga (0) 21/7/$fe
<oga (0) 21/7/$fe>
```

DELETE GROUP ADDRESS

ogd (*objectNr*) *group*

deletes one or all group addresses of a group communication object. If the sending group address is deleted, the next one becomes the sending group address

Parameter

objectNr	Number of the group communication object which is manipulated allowed: single values
group	group address as one single value allowed: single values and string “all”

Example

```
ogd (0) $4711
<ogd (0) $4711>
ogd (0) 8/1809
<ogd (0) 8/1809>
ogd (0) 8/7/17
<ogd (0) 8/7/17>
ogd (1) “all”
<ogd (1) “all”>
```

GET GROUP ADDRESSES

ogg (*objectNr)*

returns the group addresses of a group communication object. The first group address is the sending one

Parameter

objectNr	Number of the group communication object which is manipulated allowed: single values

Return values

group	group addresses as single values in hex-format

Example

```
ogg (0)
<ogg (0)>$4711 $affe
```

6.4.5.2 CONFIGURE GROUP COMMUNICATION OBJECTS

SET OBJECT CONFIGURATION

ocs (*objectNr) DPT objectType comFlags sendConfig rcvConfig time*

Sets the configuration of the group communication object
To configure the communication object in Interoperability mode, set the DPT and leave the object type to 0.
To configure the communication object in Raw mode, set the DPT to 0, and configure the length via the parameter object type.
When the wildcard '*' is used in this command, the related parameter was not changed.

Parameter

objectNr	Number of the group communication object which is manipulated allowed: single values, *
DPT	data point type allowed: single values, * see also Page 44 Data point types (DPT)
objectType	object type allowed: single values, * see also Page 49 Group object types (objectType)
comFlags	configuration flags of the group communication object allowed: single values, * see also Page 52 Structure of the configuration flags (comFlags)
sendConfig	configuration when the value is sent allowed: single values, * see also Page 50 Send configuration (sendConfig)
rcvConfig	configuration when indications will be sent allowed: single values, * see also Page 51 Receive configuration (rcvConfig)
time	delay time, when the time is set to 0 the send and receive timeout was disabled. The time base can be changed via sendConfig. allowed: single values, *

Return values
Example

```
ocs (0) 1 0 $df $0001 $0001 0
<ocs (0) 1 0 $df $0001 $0001 0>
ocs ($1) 9 0 &df $0002 $0004 120
<ocs ($1) 9 0 &df $0002 $0004 120>
```

GET OBJECT CONFIGURATION

ocg (*objectNr)*

Returns the configuration of the group communication object

Parameter

objectNr	Number of the group communication object which is manipulated allowed: single values

Return values

DPT	data point type see also Page 44 Data point types (DPT)
objectType	object type see also Page 49 Group object types (objectType)
comFlags	configuration flags of the group communication object see also Page 52 Structure of the configuration flags (comFlags)
sendConfig	configuration when the value is sent see also Page 50 Send configuration (sendConfig)
rcvConfig	configuration when indications will be sent see also Page 51 Receive configuration (rcvConfig)
time	delay time

Example

```
ocg(0)
<ocg(0)> 1 0 $df $0001 $0001 0
```

6.4.5.2.1 DATA POINT TYPES (DPT)

The following DPT are supported by SIM-KNX:
For information about the usage, please check also the KNX documentation, especially the Specification of the interworking datapoint types.

Value (code)	Data point type	expected Values / response Format
1	DPT 1 “Boolean”	Format: *V* *V* {0,1}: value (0=off, 1=on) Object Size: 1 Bit Usage: on / off blinds up / down enable / disable
2	DPT 2 “1-Bit controlled”	Format: *C V* *C* {0,1}: control (0=off, 1=on) *V* {0,1}: value (0=off, 1=on) Object Size: 2 Bit Usage: Priority
3	DPT 3 “3-Bit controlled”	Format: *C V* *C* {0,1}: control (0=off, 1=on) *V* {0 .. 7}: value Object Size: 4 Bit Usage: Dimming Control Blinds Control Boiler Mode
4	DPT 4 “character set”	Format: String with one charater Object Size: 1 Byte
5	DPT 5 “8-Bit unsigned value” (DPT5.001 DPT_Scaling)	Format: Value {0..100} allowed: single value Object Size: 1 Byte Usage: Scaling (0..100%) complex advanced sendingtransmit conditions: send on difference send on threshold Usage: Scaling (0..100%) Absolute dimming

Value (code)	Data point type	expected Values / response Format
200	DPT 5 “8-Bit unsigned value” (DPT5.003 DPT_Angle)	Format: Value {0..360} allowed: single value Object Size: 1 Byte advanced transmit conditions: send on difference send on threshold Usage: Angle(0..360°) complex sending: send on difference send on threshold
201	DPT 5 “8-Bit unsigned value” (DPT5.010 DPT_Value_1_Ucount)	Format: unsigned value {0..255} Usage: counter Object Size: 1 Byte advanced transmit conditions: complex sending: send on difference send on threshold Usage: counter
6	DPT 6 “8-Bit signed value”	Format: signed value {-128..127} Object Size: 1 Byte Usage: Counter
7	DPT 7 “2-octet unsigned value”	Format: unsigned value {0..65535} Object Size: 2 Byte Usage: counter pulses
8	DPT 8 “2-octet signed value”	Format: signed value {-32 768..32 767} Object Size: 2 Byte Usage: counter pulses

Value (code)	Data point type	expected Values / response Format
9	DPT 9 “2-octet float value”	Format: signed float value {-671088.64..670760.96} Object Size: 2 Byte Usage: temperature, pressure, voltage, time, current, brightness advanced transmit conditions: complex sending: send on difference send on threshold Usage: temperature, pressure, voltage, time, current, brightness
10	DPT 10 “time”	Format: *w h m s* w {0..7}: weekday[2] h: {0..23}: hours m: {0..59}: minutes s:{0..59}: seconds Object Size: 3 Byte
11	DPT 11 “date”	Format: *d m y* d {1..31[3]}: day m: {1..12}: month y: {0..99}: year[4] Object Size: 3 Byte
12	DPT 12 “4-octet unsigned value”	Format: unsigned value {0…4294967295} Object Size: 4 Byte Usage: counter pulses Comment: range is not validated Usage: counter pulses
13	DPT 13 “4-octet signed value”	Format: signed value { -2147483648 .. +2147483647} Object Size: 4 Byte Usage: counter value Comment: range is not validated Usage: counter value
14	DPT 14 “4-octet float value”	Format: float value Object Size: 4 Byte
15	DPT 15 “Access”	Format: 4 byte allowed: single values Object Size: 4 Byte

[2] Monday=1, Sunday=7, no day=0
[3] valid days for the month
[4] <90 interpret as 21th century

Value (code)	Data point type	expected Values / response Format
16	DPT 16 “String”	Format: string {maximum length: 14 characters}[5] valid for object number >112Object Size: 14 Byte
18	DPT 18 “Scene control”	Format: 2 values *C V* C {0,1}: 0= control, 1=learn V {0..63}: value Object Size: 1 Byte
19	DPT 19 “date time”	Format: 9 values *d m y w h m s f1 f2* d {1..31[6]}: day m: {1..12}: month y: {0..199}: year w {0..7}: weekday[7] h: {0..24}: hours m: {0..59}: minutes s:{0..59}: seconds f1,f2 (see also: page 71 Further Documentation) Object Size: 8 f1,f2 (see also: page 71 Further Documentation) valid for object number >112
20	DPT 20	Format: unsigned value {0..255} Object Size: 1 Byte
21	DPT 21 “general status”	Format: unsigned value {0..255} Object Size: 1 Byte
22	DPT 22 “16-Bit Set“	Format: 2 unsigned value {0..255} Object Size: 2 Byte
23	DPT23 “Enum8”	Format: 2bit {0..3} Object Size: 2 Byte

[5] Response has always 14 characters (unused characters were set to 0 <NULL>)
[6] valid days for the month
[7] Monday=1, Sunday=7, no day=0

EXAMPLES

DIMMING CONTROL

Command	Value binary (Control Value)	Action
ovs(9) $1 1	1 001	1/1 brighter (dim to on)
ovs(9) 0 $1	0 001	1/1 darker (dim to off)
ovs(9) 1 8	1 100	⅛ brighter
ovs(9) 0 $3	0 011	¼ darker
ovs(9) 1 $0	1 000	Stop dimming

$$Value = \frac{1}{2^{stepcode-1}}$$

TEMPERATURE[8]

Command
ovs(9) –12.75
ovs(9) 37

ABSOLUTE DIMMING

Command	Usage	Action
ovs(9) $13	Wind direction	26.82°
ovs(9) $A5	Relative Brightness	64.71%
ovs(9) $DC	Counter	220

TIME

Command	Action
ovs(9) 1 12 45 59	Monday, 12:45:59
ovs(9) 5 $A $1F $2F	Friday, 10:31:47

DATE

Command	Action
ovs(9) 24 12 56	24.12.2056
ovs(9) $F $B 5C	15.11.1992

[8] Due to conversion of the value, it may happen that the value you read back from SIM-KNX is not exactly the one you write

6.4.5.2.2 GROUP OBJECT TYPES (OBJECTTYPE)

The group object types are according to the resource definition in the Konnex KNX Handbook.

value (code)	size	used memory
0,	1 bit	1 byte
1,	2 bit	1 byte
2,	3 bit	1 byte
3,	4 bit	1 byte
4,	5 bit	1 byte
5,	6 bit	1 byte
6,	7 bit	1 byte
7,	1 byte	1 byte
8,	2 byte	2 byte
9,	3 byte	3 byte
10,	4 byte	4 byte
11,	6 byte	6 byte
12,	8 byte	8 byte
13,	10 byte	10 byte
14	14 byte	14 byte

6.4.5.2.3 SEND CONFIGURATION (SENDCONFIG)

This byte contains configuration of the send conditions:

Bit	Meaning
0	send on receive 1: sends the object value when the value was received from the serial interface
1	send on change (not DPT1) 1: sends the object value when the value received from the serial interface different than the current value
1	send on falling edge (DPT1 only) 1: sends the object value when the value changes from 1 to 0
2	send on rising edge (DPT1 only) 1: sends the object value when the value changes from 0 to 1
3	reserved (0)
4	reserved (0)
5	reserved (0)
6	selection of the timer usage 0: send-timer 1: receive-timer
7	selection of the time base (timer is activated when time != 0) 0: time in seconds 1: time in minutes
8	reserved (0)
9	reserved (0)
10	reserved (0)
11	reserved (0)
12	reserved (0)
13	reserved (0)
14	reserved (0)
15	reserved (0)

6.4.5.2.4 RECEIVE CONFIGURATION (RCVCONFIG)

This byte contains configuration of the receive conditions:

Bit	Meaning
0	usage of the indication 0: single indication 1: global indication
1	format of the single-indication 1: send Object-Value with the indication
2	reserved (0)
3	reserved (0)
4	reserved (0)
5	reserved (0)
6	reserved (0)
7	reserved (0)
8	reserved (0)
9	reserved (0)
10	reserved (0)
11	indication on rcv
12	indication on changed
13	reserved (0)
14	reserved (0)
15	indication on timeout

6.4.5.2.5 STRUCTURE OF THE CONFIGURATION FLAGS (COMFLAGS)

The configuration-flags contains the information about the communication. They are identical to the flags in ETS in the „Edit Object“ dialog.

Bit	7	6	5	4	3	2	1	0
	read response enable	transmit enable	0	write enable	read enable	comm. enable	priority	priority
0	U	T	0	W	R	C	P	P

PP priority
possible values are:
3 = low
1 = high
2 = urgent
0 = system (do not use!)

C Communication Enable
Enables the communication of the object

R Read Enable
Has to be set, if the Object-value should be readable from the EIBKNX

W Write Enable
Enables the receiving from the EIBKNX

T Transmit Enable
Enables the sending to the EIBKNX

U Update Enable
Has to be set, if the Object-value should be updated with read-responses

0 not used

Definition of the direction:

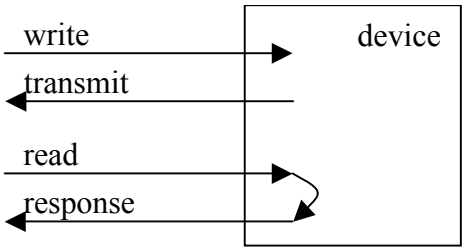


Figure 6: direction of telegrams

The default configuration is “0xD3”.

read response enable	transmit enable	write enable	read enable	comm. enable	priority	priority
Yes	Yes	Yes	No	No	Yes	yes

6.4.6 INDICATIONS

The following commands are sent from the Module without any requests. They are independent from the Response-Syntax.

SENDS THE GLOBAL UPDATE FLAG

gui

Sends the global update flag

Return values

global updateFlag	bit 0: restart of the application bit 3: update flag bit 4: changed flag bit 6: time out on serial interface has occured bit 7: receive timeout

Example

```
gui $01
```

SENDS THE UPDATE FLAG FOR A COMMUNICATION OBJECT

oui

sends the global update flag
the update-, transmit- and timeout-flag are cleared after the indication

Return values

groupObjectNo	Number of the group communication object, which was updated
flags	RAM-flags of the communication object
(Object Value)	the actual Value of the communication object sending of this value is dependent of the rcvConfig

Example

```
oui $01 $10
oui $01 $10 50
```

SEND STATE OF DEVICE

dsi

sends states of the device

Return value

bit0	0: normal mode 1: transparent mode
bit1	1: application loaded
bit2	1: application is running
bit7	1: device is in program mode

Example

```
dsi$06
```

6.5 COMMAND REFERENCE (TRANSPARENT MODE)

DEVICE TRANSPARENT SET

dts *data*

switch on/off transparent mode

Parameter

Data	BIT0: 1 = transparent mode enabled 0 = transparent mode disabled BIT1: 1 = send ack on every group-message (recommended) 0 = no ack on every group-message BIT2: 1 = generate confirmation on serial interface 0 = no confirmation on serial interface BIT3: not used BIT4: format of address 0 = Hex – format 1 = format depends on bit 5 BIT5: 1 = address as 2-level group address 0 = address as 3-level group address

Example

```
dts 7
```

TRANSPARENT DATA SEND

tds (dest) *data*
tds (dest length) *data*

Sends ValueWrite

Parameter

dest	also usable as ETS-Group
length	0 = 1..6Bit (default) 1 = 1Byte …
data	Data, which are send to destination allowed: single values

Example

```
tds(2/0/0) 2
```

TRANSPARENT RESPONSE SEND

tes (dest) *data*
tes (dest length) *data*

Sends ValueResponse

Parameter

dest	also usable as ETS-Group
length	0 = 1..6Bit (default) 1 = 1Byte …
data	Data, which are send to destination allowed: single values

Example

```
tes ($1000) $01
tes (2/0/1 2) $01 $02
```

TRANSPARENT READ SEND

trs (dest)

Sends ValueRead

Parameter

dest	also usable as ETS-Group

Example

```
trs ($1000)
```

TRANSPARENT READ INDICATION

tri (source dest)

Gets a value read indication

Parameter

Source	physical address
Dest	group address

Example

```
tri ($ffff $1000)
```

TRANSPARENT DATA INDICATION

tdi (source dest length) *data*

Gets a value write indication

Parameter

source	physical address
dest	group address
length	0 = 1..6Bit 1 = 1Byte …
data	Data, which are received for destination

Example

```
tdi ($ffff $17d0 $06) $01 $00 $00 $00 $00 $01
```

TRANSPARENT RESPONSE INDICATION

tei (source dest length) *data*

Gets a value response indication

Parameter

Source	physical address
Dest	group address
Length	0 = 1..6Bit 1 = 1Byte …
Data	Data, which are received for destination

Example

```
tei ($ffff $17d0 $00) $01
```

TRANSPARENT READ CONFIRMATION

trc (source dest)

Gets a value read confirmation – only if enabled in dts (bit2)

Parameter

Source	physical address
Dest	group address

Example

```
trc ($ffff $1000)
```

TRANSPARENT DATA CONFIRMATION

tdc (source dest length) *data*

Gets a value write confirmation – only if enabled in dts (bit2)

Parameter

source	physical address
dest	group address
length	0 = 1..6Bit 1 = 1Byte …
data	Data, which are received from destination

Example

```
tdc ($1508 $0002 $00) $01
```

TRANSPARENT RESPONSE CONFIRMATION

tec (source dest length) *data*

Gets a value response confirmation – only if enabled in dts (bit2)

Parameter

source	physical address
dest	group address
length	0 = 1..6Bit (default) 1 = 1Byte …
data	Data, which are received from destination

Example

```
tec ($1508 $0002 $00) $01
```

TRANSPARENT READ NEGATIVE CONFIRMATION

trn (source dest)

Gets a value read negative confirmation – only if enabled in dts (bit2)

Parameter

source	physical address
dest	group address

Example

```
trn ($1508 $1000)
```

TRANSPARENT DATA NEGATIVE CONFIRMATION

tdn (source dest length) *data*

Gets a value write negative confirmation – only if enabled in dts (bit2)

Parameter

source	physical address
dest	group address
length	0 = 1..6Bit
	1 = 1Byte
	…
data	Data, which are received from destination

Example

```
tdn ($1508 $1000 $00) $01
```

TRANSPARENT RESPONSE NEGATIVE CONFIRMATION

ten (source dest length) *data*

Gets a value response negative confirmation – only if enabled in dts (bit2)

Parameter

source	physical address
dest	group address
length	0 = 1..6Bit
	1 = 1Byte
	…
data	Data, which are received from destination

Example

```
ten ($1508 $1000 $00) $01
```

6.6 Error Codes

errCode	internal Name	meaning	possible reasons
$0010	TRANSMIT_FAIL	requested Transmission of an object failed	- object is already transmitting
$0101	APPL_STOP	requested command is denied, because Application is stopped	- illegal memory-Access over the Bus - incomplete download with ETS
$0102	NO_OBJ	requested Object-Number is invalid	
$0103	NUMBER_EXP	expected value should have a number format	
$0104	VALUE_RANGE	the value is out of range	
$0105	COMMAND_END	end of the command expected	
$0106	TYPE_RANGE	given type of the object is not allowed	- requested object type exceeds the size of the object
$0109	TO_MUCH_VALUES	bytestream is too long	
$010b	NUMBER_OR_COMMA	a number or a comma is expected	
$010d	NUMBER_OF_INDEX	too much indices are given	
$010e	LINK_WRITE	manipulation of group-addresses failed	- deleting of non existing address - maximum number of addresses reached
$010f	NO_OF_VALUES	number of values in bytestream is incorrect	
$0110	SYNTAX_ERROR	invalid syntax	
$0111	STRING_EXP	expected parameter is a string	
$0112	SOE_KEY_ALREADY_EXIST	security key already set	
$0112	STRING_SIZE	the size of the string is too large	
$0210	TYPE_EXPECTED	command expected	- serial string doesn't start with an command
$0215	ILLEGAL_OPERATION	unknown command	
$0216	NO_PROP	Property in Interfaceobject not found	
$0217	IO_ELEMENT	elementindex for the property to large	
$0218	RO	property is ReadOnly	
$0219	TYPE_MISMATCH	Objecttype and DPT are incompatible	
$0220	DPT_NOT_FOUND	given DPT is not supported	

errCode	internal Name	meaning	possible reasons
$0221	WRONG_PARAMETER	given parameter is invalid	
$0222	ACCESS_DENIED	access to the given command is denied	some commands are disabled after an ETS-download
$0223	NO_PARAMETER	the requested userParameter doesn't exist	
$0224	TO_MUCH_PARAMETER	to much userParameter are requested	

7 IMPLEMENTED APPLICATION INTERFACE OBJECTS

Access to the interface objects of this device is possible from the bus with stander property access mechanisms and through the serial interface with the commands **ids** (*ioIndex propertyID elementIndex) dat)* and **idg** (*ioIndex propertyID elementIndex)*. For access from the bus tools like "Device editor" provided with ETS3 could be used.

7.1 OBJECT INDEX: 5

In the commands ids and idg for this object the ioIndex is always 5.

Property ID	**Type Read/Write**	**Element Index**	**Usage**
1	PDT_UNSIGNED_INT R		Object Type
50	PDT_GENERIC_02 RW		Parameter of the serial interface
		1	For detailed description of the 2 bytes configuring the serial interface see 6.1.1 *Example: setting default values to the serial interface* *ids (5 50) $31 $00*
51	PDT_GENERIC_02 RW		Parameter for transparent mode See 9.3 *Example: reading the transparent mode setting* *idg (5 51)*
52	PDT_GENERIC_01 RW		Syntaxe options See 6.1.3 *Example: enable responding OK if no data in response* *ids (5 52) $02*
53	PDT_GENERIC_02 R		Reserved
54	PDT_GENERIC_01 RW		Controls the replacement of text on receiving from the serial interface 0 = disable text replacement 1 = enable text replacement The original strings and replacement strings are defined in property 136 *Example: enable* replacement of text *ids (5 54) $01*
55	PDT_GENERIC_01 RW		Controls the sending of user-defined strings on the serial interface (replacing the standard indication) on reception of group oriented communication objects 0 = disable 1 = enable

60	Array PDT_GENERIC_06 RW		Object configuration Every element (index) configures one communication object The element structure is as follows: Byte 0: Data point types (DPT) Byte 1: delay time Byte 2: upper byte Send configuration (sendConfig) Byte 3: lower byte of Send configuration (sendConfig) Byte 4: upper byte of Receive configuration (rcvConfig) Byte 5: lower byte of Receive configuration (rcvConfig)
		1	Configuration for communication object 0
		…	…
		128 (254)	Configuration for communication object 127 (253)
96	Array PDT_GENERIC_06 RW		User definable serial number *Example: getting the serial number* *idg (5 96)* *Example: setting the 6 byte serial number 123456789ABC* *ids (5 96) $12$34 $56 $78 $9A $BC*
128	PDT_GENERIC_01 RW		Global event generation See 6.4.1 *Example: reading the global event generation setting* *idg (5 128)*
130	PDT_GENERIC_01 RW		Reserved
132	Array PDT_GENERIC_06 RW		Reserved
133	Array PDT_GENERIC_01 RW		Reserved
134	Array PDT_GENERIC_01 RW		User defined parameter (ETS or local) in non volatile memory See also command pdg 6.3.3 *Example: reading byte 4 of parameter* *idg (5 134 4)* *Example: writing byte 4 with $D6* *ids (5 134 4) $D6*
135	Array PDT_GENERIC_01 RW		Complex send conditions
136	Array PDT_GENERIC_01 RW		Strings to be replaced and replacement strings. Replacement of complete strings or string fragments received from serial interface before the command string is processed for execution. If the string is shorter then 32 bytes it is ‘0’ terminated. *For explanation of function see:* *“Using SIM-KNX with Doepke fingerprintsensor” in “SIM-KNX EVALUATION KIT Documentation”.*
		1 .. 32	1.st original string that should be replaced
		33 .. 64	1.st replacement string inserted instead the original
		65 .. 96	2.nd original string that should be replaced
		97 .. 128	2.nd replacement string inserted instead the original
		…	…
		1985 .. 2016	32.nd original string that should be replaced
		2017 .. 2048	32.nd replacement string inserted instead the original

137	Array PDT_GENERIC_01 RW		Replacement indication text on reception. Each replacement is a structure with 35 bytes: Byte 1 – 32: string that is sended Byte 33 object number where to replace indication Byte 34 value = 0 send this string regardless of received value value ≠ 0 send string if received value matches value in byte 35 byte 35 compare value
		1 .. 35	Replacement structure 1
		36 .. 70	Replacement structure 2
		…	…
		1086 .. 1120	Replacement structure 32
140[9]	PDT_GENERIC_01 RW		Controls the communication time out supervision of the serial interface - time value = 0 disable time out supervision value ≠ 0 enable time out supervision value is the time out value *ids (5 140) $10* When enabled, a time out is detected when the given time expires and no communication on the serial interface takes place. The time out flag is set an the given object with the given value is sent to the bus. After communication resumes, depending on configuration, this changed situations is sent on the bus or not. A global update indication informing about the previous lost communication is sended on the serial interface.
141[9]	PDT_GENERIC_02 RW		Configuration 1 of the communication time out supervision of the serial interface – behaviour 1.st byte: not used 2.nd byte: Bit 7 0 = time (value in byte 1) in seconds 1 = time (value in byte 1) in minutes Bit 6, 5, 4, 3, 2, 1 not used Bit 0 0 = do nothing on communication resume 1 = clear time out flag on communication resume and time out restart On communication resume time out supervision starts automatically if enabled (property 140). On value change of the time out flag the object (number in property 142) with value given in property 143 is sended
142[9]	PDT_GENERIC_02 RW		Configuration 2 of the communication time out supervision of the serial interface – object number 1.st byte: not used 2.nd byte: Number of communication object that is used for sending communication lost alarm message
143[9]	PDT_GENERIC_02 RW		Configuration 3 of the communication time out supervision of the serial interface – object value 1.st byte: this value is used when time out flag is set 2.nd byte: this value is used when time out flag is cleared
144[10]	PDT_GENERIC_01 RW		Device State Generation

[9] available since protocol version $0106
[10] available since protocol version $0111

8 ETS

8.1 Group Objects

Number of group addresses	254
Number of associations	254
Number of communication objects	128
Address of association table	0x41FF
Address of communication object table	0x43FC

8.2 Parameter

Address	Internal Name	Description
0x47FA	serParam	
0x47FC	syntaxOptions	
0x47FE	globalEventGeneration	
0x47FF	serialTimeout	
0x4800	securityLevel.	
0x4801	enableReplacement.	
0x4802	sendString.	
0x4804	setTransparentMode	
0x4806	serialTimeoutConfiguration	
0x4808	setSerialTimeoutObject	
0x480A	serialTimeoutOnValue	
0x480B	serialTimeoutOffValue	
0x480C	deviceStateEventGeneration	
0x4846 + 6*x + 0	objectConfig[x].objEisTypes	Configuration for Object x Datapoint type (DPT) x is in the range of 0..127
0x4846 + 6*x + 1	objectConfig[x].repTime	Configuration for Object x Datapoint type (DPT) x is in the range of 0..127
0x4846 + 6*x + 2	objectConfig[x].sendConfig	Configuration for Object x Datapoint type (DPT) x is in the range of 0..127
0x4846 + 6*x + 4	objectConfig[x].rcvConfig	Configuration for Object x Datapoint type (DPT) x is in the range of 0..127
0x4E3C + 32*x + 0	complexSendCondition[x].config	Advanced send configuration for Object “x” x is in the range of 0..15
0x4E3C + 32*x + 2	complexSendCondition[x].diffSendValue	Advanced send configuration for Object “x” x is in the range of 0..15
0x4E3C + 32*x + 6	complexSendCondition[x].hysteresesOn	Advanced send configuration for Object “x” x is in the range of 0..15
0x4E3C + 32*x + 10	complexSendCondition[x].hysteresesOff	Advanced send configuration for Object “x” x is in the range of 0..15
0x4E3C + 32*x + 14	complexSendCondition[x].objectIndex	Advanced send configuration for Object “x” x is in the range of 0..15
0x4E3C + 32*x + 15	complexSendCondition[x].value0	Advanced send configuration for Object “x” x is in the range of 0..15
0x4E3C + 32*x + 16	complexSendCondition[x].value1	Advanced send configuration for Object “x” x is in the range of 0..15
0x503C .. 0x523B	userParameter	
0x523C + 64*x + 0	sendOnString[x].originalString	String Replacement x is in the range of 0..32

Address	Internal Name	Description
0x523C + 64*x + 32	sendOnString[x].replaceString	String Replacement x is in the range of 0..32
0x5A3C + 35*x + 0	sendStringInd[x].sendString	Send String on received Object x is in the range of 0..32
0x5A3C + 35*x + 32	sendStringInd[x].objectNr	Send String on received Object x is in the range of 0..32
0x5A3C + 35*x + 33	sendStringInd[x].evaluateValue	Send String on received Object x is in the range of 0..32
0x5A3C + 35*x + 34	sendStringInd[x].value	Send String on received Object x is in the range of 0..32

9 EXAMPLES HOW TO USE SIM-KNX

9.1 USING SIM-KNX WITHOUT ETS-DATABASE ENTRY

In this case complete configuration is done via the serial interface

- Configuration of communication objects
- Assignment of group address

9.2 USING SIM-KNX WITH ETS- DATABASE ENTRY

In this case the configuration of SIM-KNX is done via your database entry
so no configuration is required via the serial interface
During development phase it may be necessary that you configure SIM-KNX via the serial interface.

9.3 USING SIM-KNX IN TRANSPARENT MODE

By switching on transparent mode with e.g.:
Device Transparent Set 7
all group oriented messages are passed through from the bus to the serial interface in the form of a *Transparent Data Indication* (normal writing coming from the bus), *Transparent Read Indication* (asking a sensor its value) or a *Transparent Response Indication* (the answer on a request from the sensor). The information passed to the serial interface is the physical address of the originating device (source) the destination group address and the data itself (with length information)
From the serial interface you can send a *Transparent Data Send* (normal writing to the bus), *Transparent Response Send* (answer to a request from the bus) or *Transparent Read Send (sending a request for a value to the bus).*

In this example no local confirmations are generated and hex format in displaying received messages is used.

For getting the status of transparent mode see 7.1 property ID 51.

10 MECHANICAL SPECIFICATIONS

10.1 STRAIGHT CONNECTOR (-S OPTION)

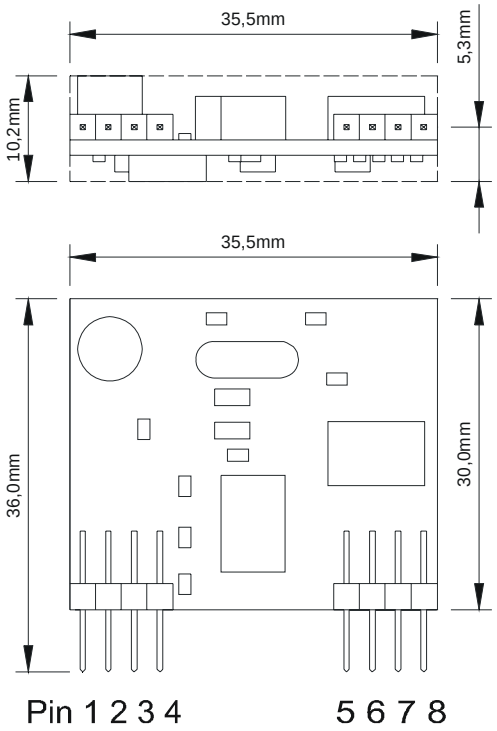


Figure 7: Dimensions in mm (not to scale)

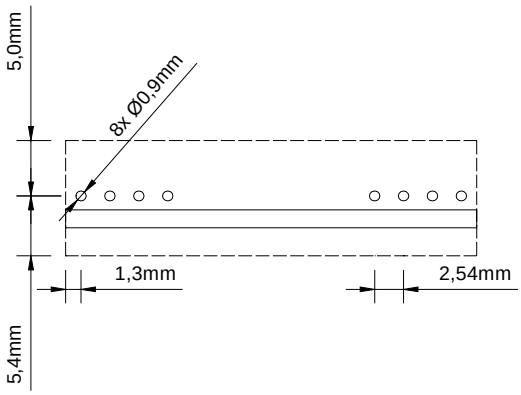


Figure 8: Recommended Footprint

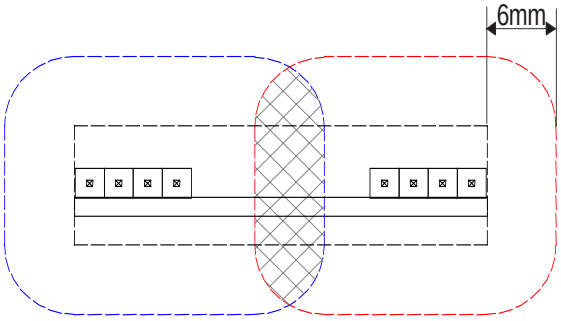


Figure 9: Necessary Isolation-Areas between KNX and Application-Circuits

10.2 RIGHT ANGLE CONNECTOR (-R OPTION)

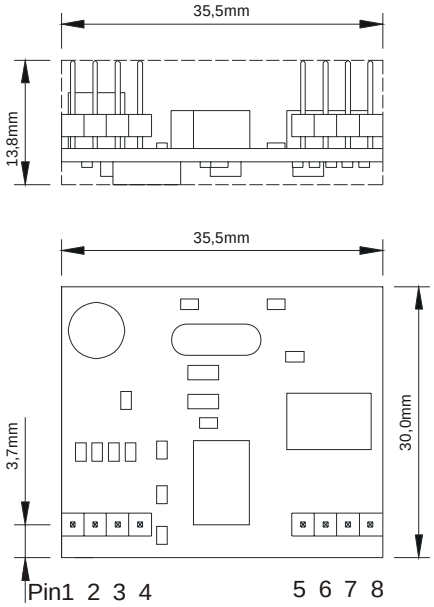


Figure 10: Dimensions in mm (not to scale)

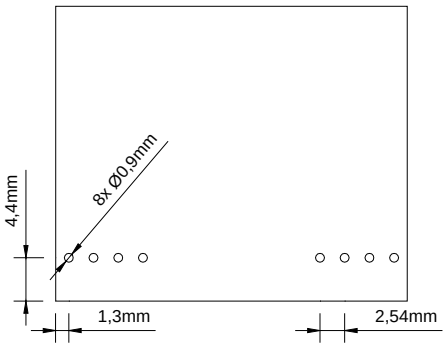


Figure 11: Recommended Footprint

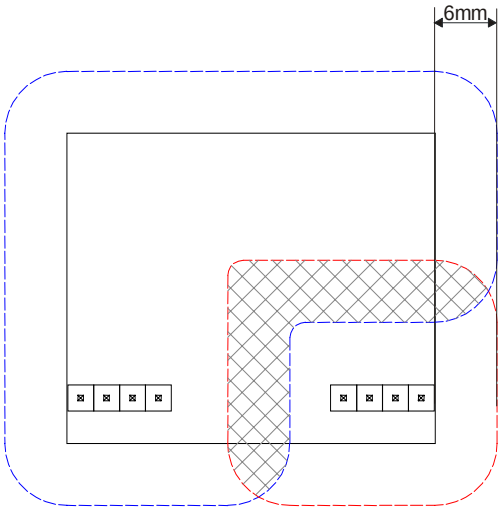


Figure 12: Necessary Isolation-Areas between KNX and Application-Circuits

11 ORDERING DETAILS

SIM-KNX 128-S	SIM-KNX Module with 128 communication objects and straight connector
SIM-KNX 128-R	SIM-KNX Module with 128 communication objects and right angle connector
SIM-KNX 250-S	SIM-KNX Module with 250 communication objects and straight connector
SIM-KNX 250-R	SIM-KNX Module with 250 communication objects and right angle connector
SIM-KNX 128 USB EVA	SIM-KNX Evaluation board with mounted SIM-KNX 128-R module for USB connection
SIM-KNX 128 RS232 EVA	SIM-KNX Evaluation board with mounted SIM-KNX 128-R module for RS232 connection
SIM-KNX 250 USB EVA	SIM-KNX Evaluation board with mounted SIM-KNX 250-R module for USB connection
SIM-KNX 250 RS232 EVA	SIM-KNX Evaluation board with mounted SIM-KNX 250-R module for RS232 connection

12 GLOSSARY

Communication Objects
see Group Communication Object

Data point types (DPT)
Standardized format and usage for transmitting data via EIB / KNX. The complete list of DPTs is available at KNX Association.

KNX

Group address
Group addresses are used to link group communication objects.
see Group Communication Object

Group Object
see Group Communication Object

Group Communication Objects
Group communication objects contains the data points which are transmitted via runtime communication. One or more group addresses can be assigned to group communication objects. Always on group address is the sending address. Via this address the values of the group communication object are sent on the bus. The other group addresses are only used to receive values.
The sending group address is set via the command '**ogs'** or ETS. If the sending group address is deleted, the next group address becomes the sending one.
Other words for group communication object are
- group object
- communication objects

Individual Address
see physical address

Physical Address
This address is the unique device address inside an EIB / KNX-System. This address is independent of the group addresses and is used for configuration of the device.
Another word for physical address is:
- individual address

13 FURTHER DOCUMENTATION

KNX Handbook
3_7_2 Datapoint types[11]
S14 DPT_DateTime v1.0

[11] http://www.konnex.org/fileadmin/downloads/03%20-%20KNX%20Standard/KNX%20Standard%20Public%20Documents/KNX%20interworking%20;%20Datapoint%20types.pdf