



## **System Conformance Testing**

**8**

### **Test Suite Supplement E**

**E**

#### **Testing of Easy Configurators (controllers – Logical Tag Supervisors); channel codes – connection rules**

##### **Summary:**

This document contains test specifications for Testing of Easy Configurators and their knowledge of channel codes and connection rules.

Version 01.01.01 is a KNX Approved Standard.

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**Document Updates**

Version	Date	Modifications
0.8	2002.09	Working Document in KonCert
0.9RfV	2002.11	Release for voting in KTB
0.9FVb	2003.06	Final voting in KTB – integrated all comments from RfV cycle (second try)
1.0	2003.09	Approved standard – integrated all comments from Final voting cycle
1.1	2009.06	Readying document for publication in V2.0 of KNX specifications - keeping LTR and LTS references for the time being in view of Easy implementations based on Link services
01.01.01	2013.10.24	Editorial updates for the publication of KNX Specifications 2.1.

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## 1 Presentation of the document

This document provides test specifications for easy channels and connection rules supported by easy configurators (according to Volume 6, for the time being only applicable to controller and supervised mode).

In view of the above, the term ‘BDUT’ in the underneath document refers to the to be tested easy configurator (“client”).

The document is principally divided into three parts:

- test of the channel codes supported by the configurator (i.e. the Easy Controller or Easy Logical Tag Supervisor)
- test of the handling of parameters of supported channel codes by the configurator
- test of connection rules used by the configurator

The document provides a framework for the conformance testing of the above-mentioned features by giving a number of examples of “Abstract Test Suites” for each to be tested feature. It for instance does not contain for each defined channel code a detailed test procedure (called “Executable Test Suites”).

For all tests, dummy products (“servers”) shall be used as auxiliary equipment. In some cases, it might be possible to simulate these products by an appropriate tool (e.g. EITT). The objective of the tests is not to verify the correct functioning of the auxiliary devices but whether the configurator establishes the correct links.

All implemented channel codes with all related in/outputs respectively connection rules as supported by a configurator (as laid down in the PICS/PIXIT – Proforma supplied by the manufacturer) shall be tested.

In the case where for a supported channel’s in or output, a corresponding channel to link is not implemented in the configurator, it is allowed to skip the testing of this in- or output.

As regards handling of parameters of supported channel codes, the general rules for the modification of parameters as laid down in Volume 8/7/1 ‘Interworking Tests’ apply.

For tests other than the checking of the correct support of channels codes (and their parameters) respectively connection rules (e.g. management procedures to be fulfilled by the configurators), please refer to the test specifications for Easy controller (Test Suite Supplement B) and Easy Logical Tag Supervised (Test Suite Supplement A).

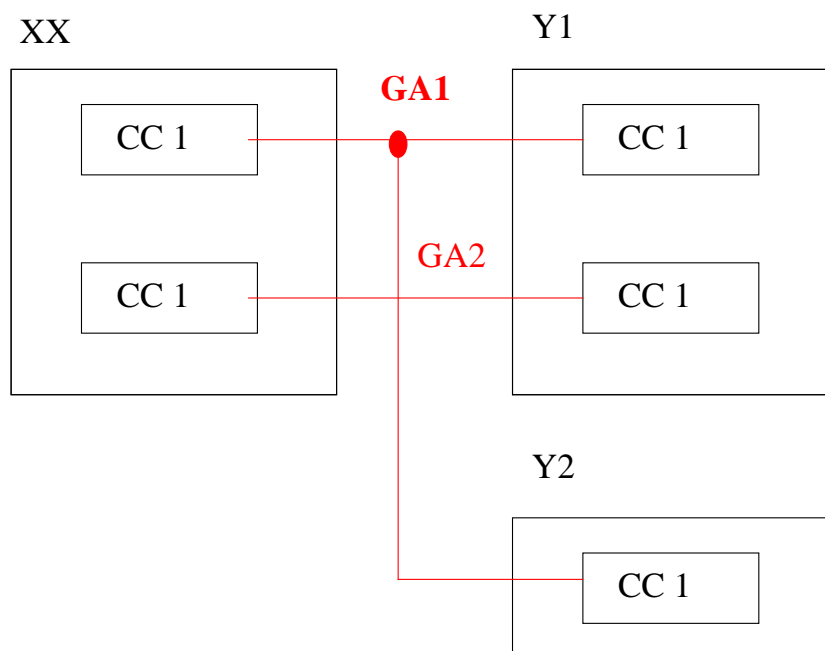
## 2 Test supported Channel Codes

### 2.1 Abstract Test Suite

ID	XX
Name	XX
PROP	Check whether the BDUT is able to connect the Channel 'xx' according Easy channel codes
Config	Check the BDUT with devices supporting channel 'xx' together with devices supporting channels y1 and y2
Proc	<p>Have the configurator localise the devices and check whether the configurator sets the L-flag of the dedicated Datapoint according to the channel definitions.</p> <p>Stimulate the BDUT to link the desired channels and check after the linking the linking information in the devices</p> <ul style="list-style-type: none"> <li>positive tests to cover all possible connection codes (both main as well as sub connection codes)</li> <li>at minimum one negative test (test with incompatible connection codes<sup>1</sup>)</li> </ul>
Confor	The links have to be established in the following way

The following semantics are used in the underneath test specifications:

- "# n" = n-th Group Address in the address table associated to the respective Group Object
- "# -" = no Group Address associated to the respective Group Object



**Figure 1: Testing Channel codes general**

<sup>1</sup> In the case where the configurator e.g. after having selected a sensor, only gives the user the possibility to link devices with matching actuator channels (i.e. offers the user a pre-selection), this test can be skipped.

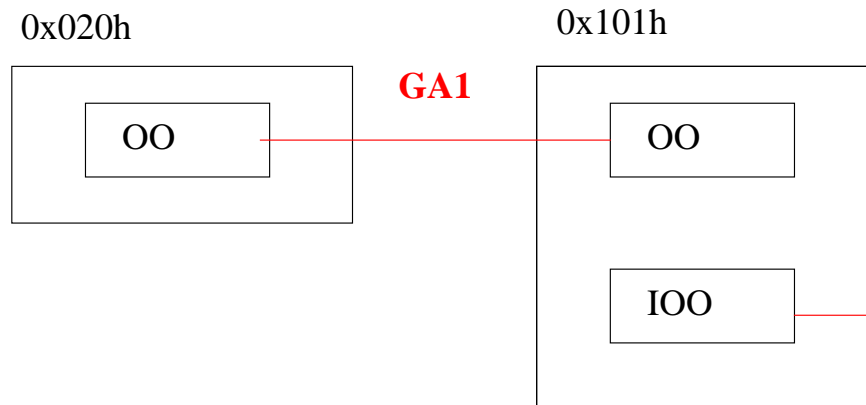
## 2.2 Test Channel Codes Example 1

### 2.2.1 Case 1 – Positive test – connection via main connection codes

XX = 0x020h Ch\_PushButton

Y1 = 0x101h Ch\_Binary\_Actuator\_Basic

Confor 1 :



**Figure 2: Testing Channel codes example 1 – connection via main connection codes**

#### LTS:

Confor 1 Device (xx)

A\_Link\_Read (Obj 0) via A\_Link\_Response (GA1)

Device (y1)

A\_Link\_Read (Obj 0) via A\_Link\_Response (GA1)

A\_Link\_Read (Obj 1) via A\_Link\_Response (---)

#### Ctrl

Device (xx)

Adr-Tab : GA1 <sup>2</sup>	Assoc-tab : # 1 : GO 0
----------------------------	------------------------

Device (y1)

Adr-Tab : GA1	Assoc-tab : # 1 : GO 0 # - : GO 1
---------------	---

### 2.2.2 Case 2 – Positive test – connection via sub connection codes

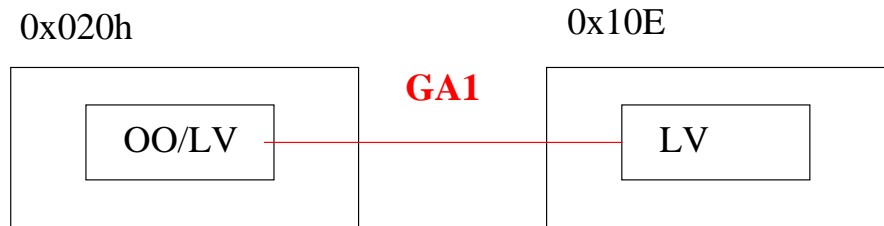
XX = 0x020h Ch\_PushButton

Y2 = 0x10E Ch\_Logical\_Actuator

Confor 2:

<sup>2</sup> In case of the use of additional localisation channels, the address and association tables will also contain the addresses respectively associations of those channels. Differences between the tables before and after linking can be verified by reading the tables after localisation.

In case of the use of localisation flags only, the address and association table may be different (not the case when localisation addresses are reused during linking).



**Figure 3: Testing Channel codes example 1 – connection via sub connection codes**

### LTS

Device (xx)

A\_Link\_Read (Obj 0) via A\_Link\_Response (GA1)

Device (y2)

A\_Link\_Read (Obj 0) via A\_Link\_Response (GA1)

### Ctrl

Device (xx)

Adr-Tab : GA1	Assoc-tab : # 1 - GO 0
---------------	------------------------

Device (y2)

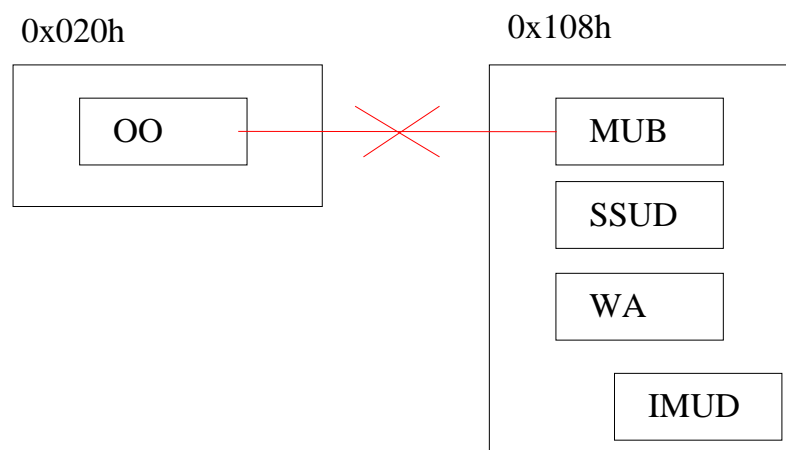
Adr-Tab : GA1	Assoc-tab : # 1 - GO 0
---------------	------------------------

## 2.2.3 Case 3 – Negative test – incompatible connection codes - no connection

XX = 0x020h Ch\_PushButton

Y3 = 0x108 CH\_Shutter\_Actuator\_Basic\_Wind

Confor 3



**Figure 4: Testing Channel codes example 1– no connection**

### LTS

Device (xx)

A\_Link\_Read (Obj 0) via A\_Link\_Response (---)<sup>3</sup>

<sup>3</sup> it is possible that some default addresses and/or associations are still present in the devices.

Device (y3)

A\_Link\_Read (Obj 0) via A\_Link\_Response (---)

A\_Link\_Read (Obj 1) via A\_Link\_Response (---)

A\_Link\_Read (Obj 2) via A\_Link\_Response (---)

A\_Link\_Read (Obj 3) via A\_Link\_Response (---)

**Ctrl**

Device (xx)

Adr-Tab : -	Assoc-tab : # - : GO 0
-------------	------------------------

Device (y3)

Adr-Tab : --	Assoc-tab : # - : GO 0 # - : GO 1 # - : GO 2 # - : GO 3
--------------	---

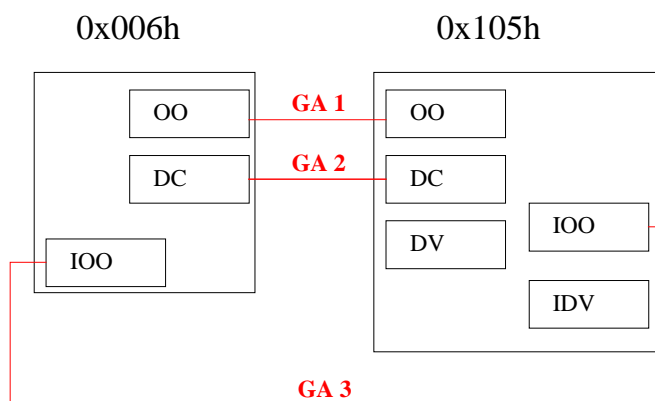
## 2.3 Test Channel Codes Example 2

### 2.3.1 Case 1 – Positive test – connection via main connection codes

xx=0x006h Ch-PB-Dimmer-Toggle

y1=0x105h Ch-Dimming Actuator-Basic

Confor 1



**Figure 5: Testing Channel codes example 2 –connection via main connection codes**

**LTS**

Device (xx)

A\_Link\_Read (Obj 0) via A\_Link\_Response (GA 3)

A\_Link\_Read (Obj 1) via A\_Link\_Response (GA 1)

A\_Link\_Read (Obj 1) via A\_Link\_Response (GA 2)

Device (y1)

A\_Link\_Read (Obj 0) via A\_Link\_Response (GA1)

A\_Link\_Read (Obj 1) via A\_Link\_Response (GA2)



A\_Link\_Read (Obj 2) via A\_Link\_Response (---)

A\_Link\_Read (Obj 3) via A\_Link\_Response (GA3)

A\_Link\_Read (Obj 4) via A\_Link\_Response (---)

### Ctrl

Device (xx)

Adr-Tab :	Assoc-tab :
GA 1	# 3 : GO 0
GA 2	# 1 : GO 1
GA 3	# 2 : GO 2

Device (y1)

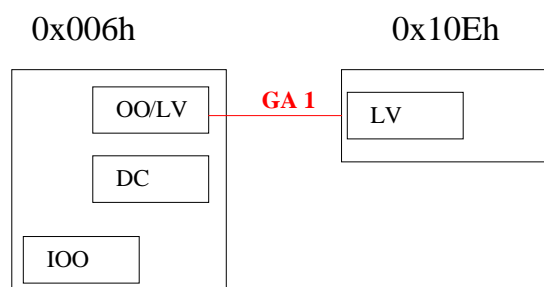
Adr-Tab :	Assoc-tab :
GA 1	# 1 : GO 0
GA 2	# 2 : GO 1
GA 3	# - : GO 2
	# 3 : GO 3
	# - : GO 4

## 2.3.2 Case 2 – Positive test – connection via sub connection codes

Confor 2

xx=0x006h Ch-PB-Dimmer-Toggle

y2 = 0x10E CH\_Logical\_Actuator



**Figure 6: Testing Channel codes example 2 –connection via sub connection codes**

### LTS

Device (xx)

A\_Link\_Read (Obj 0) via A\_Link\_Response (---)

A\_Link\_Read (Obj 1) via A\_Link\_Response (GA1)

A\_Link\_Read (Obj 2) via A\_Link\_Response (---)

Device (y2)

A\_Link\_Read (Obj 0) via A\_Link\_Response (GA1)

### Ctrl

Device (xx)

Adr-Tab :	Assoc-tab :
GA 1	# - : GO 0
	# 1 : GO 1

	# - : GO 2
Device (y2)	
Adr-Tab : GA 1	Assoc-tab : # 1 : GO 0

### 2.3.3 Case 3 – Negative test – incompatible connection codes - no connection

Confor 3

xx=0x006h Ch-PB-Dimmer-Toggle

Y3 = 0x108 CH\_Shutter\_Actuator\_Basic\_Wind

0x006h

0x108h



**Figure 7: Testing Channel codes example 2 – no connection**

#### LTS

Device (xx)

A\_Link\_Read (Obj 0) via A\_Link\_Response (---)

A\_Link\_Read (Obj 1) via A\_Link\_Response (---)

A\_Link\_Read (Obj 2) via A\_Link\_Response (---)

Device (y3)

A\_Link\_Read (Obj 0) via A\_Link\_Response (---)

A\_Link\_Read (Obj 1) via A\_Link\_Response (---)

A\_Link\_Read (Obj 2) via A\_Link\_Response (---)

A\_Link\_Read (Obj 3) via A\_Link\_Response (---)

#### Ctrl

Device (xx)

Adr-Tab : --	Assoc-tab : # - : GO 0 # - : GO 1 # - : GO 2
--------------	---

Device (y3)

Adr-Tab : -	Assoc-tab : # - : GO 0 # - : GO 1 # - : GO 2 # - : GO 3
-------------	---

## 2.4 Test Channel Codes Additional tests

### 2.4.1 Deleting of linked functionality

Delete in the controller already linked functionality.

Check whether the controller removes all the addresses as well as associations from the auxiliary devices, resets all the parameter values to the default values and resets the localisation values.

### 3 Test Channel Code Parameters

#### 3.1 Abstract Test Suite

ID	XX
Name	XX
PROP	Check that the BDUT is able to adjust the Value of Parameter “pp” of easy channel “xx”
Config	Check the BDUT with a device supporting channel ‘xx’
Proc	<ul style="list-style-type: none"> <li>• check the current Value of Parameter “pp” in device “xx”</li> <li>• Stimulate the BDUT to change the value of the Parameter “pp” in the device “xx”</li> <li>• Check if the parameter value “pp” has been updated in device “xx”</li> </ul>
Confor	The parameter value “pp” in device “xx” has changed to the new value on the right location inside the parameter block.

#### 3.2 Test Channel Codes Parameter

LTS (optional if supported):

- Property access point to point connectionless
- A\_Property\_Read (Obj. = 0, Property = 101) – A\_Property\_Response (Parameter Block)
- Check the parameter Value inside the Parameter Block with bit offset and size

Ctrl:

- Read the parameter Block of the device via DMA
- Calculate the absolute start address of the Parameter Block at the end of the Group Object Table
- Read the parameter block (DMA)
- Check the parameter Value inside the Parameter Block with bit offset and size

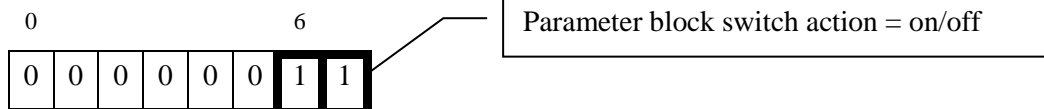
#### 3.3 Test Channel Parameters Example<sup>4</sup>

Xx = 0x020h CH\_Pushbutton

Pp : Switch\_action

Confor

- Parameter Value before change



- Change Parameter Value to “OFF”

<sup>4</sup> applicable for devices with parameter block only

- Parameter Value after change

0

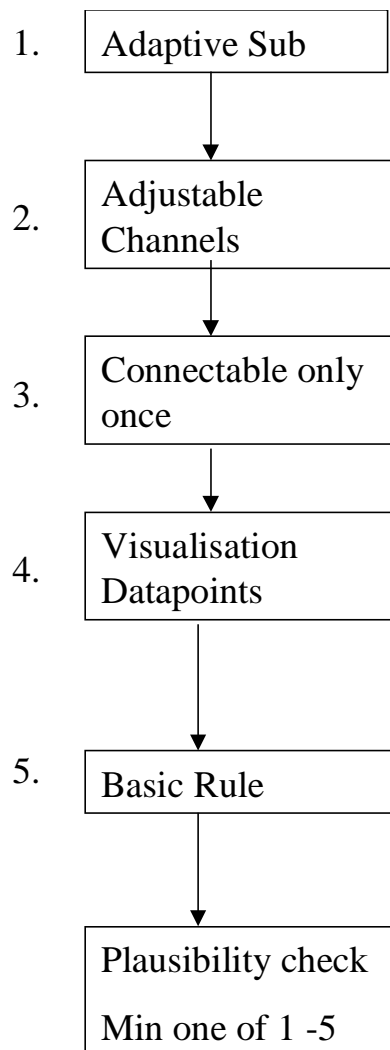
6

0	0	0	0	0	0	0	0
---	---	---	---	---	---	---	---

Parameter block switch action = off

## 4 Connection Rules

### 4.1 Introduction

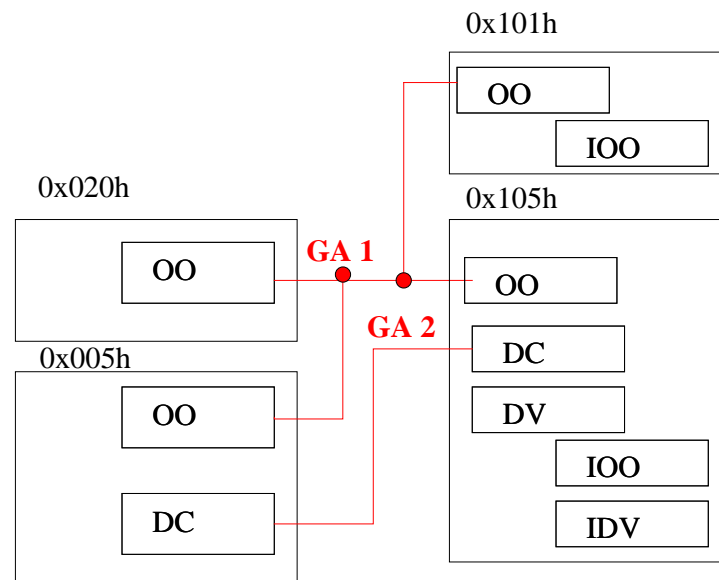


**Figure 8: Connection sequence for one connection procedure by a controller/supervisor**

V	visualisation Datapoints	this Datapoint shall be connected on one and only one sending Datapoint and one or more receiving Datapoint. (1 to N connection)
X	Datapoints connectable only once	to have one exact connection. Only one Group Address shall be assigned to this Datapoint. (1 to 1 connection)
XC	Datapoint connectable only once with an information if it is connected  Need a specific parameter "used input bit stream"	Only one Group Address shall be assigned to this Datapoint. (1 to 1 connection)  If the Datapoint is connected, the corresponding bit in the parameter "used input bit stream" must be set. The application knows the connected Datapoints via this parameter.
O	Output Datapoint	The value of this Datapoint will be sent
I	Input Datapoint	The value of this Datapoint can be received
L	Localisation Datapoint	This Datapoint is used for the localisation procedure in the controller mode
T	Adaptive Datapoint	This Datapoint is defined only by this format (1bit, 8bits, 16bits) and can be adapted during the calculation of the link. Need a additional definition in the sub-block list to know the possibilities of adaptation

## 4.2 Test of the Basic Rule

### 4.2.1 Case 1



**Figure 9: Test of the basic rule – Case 1<sup>5</sup>**

Confor 1: see Channel Code Test

<sup>5</sup> Optimisation as depicted in the above figure is recommended. It is also possible that the configurator attributes two different addresses to the OO output data points and the OO input data point.

### 4.2.2 Case 2 – test n : m

Confor 2:

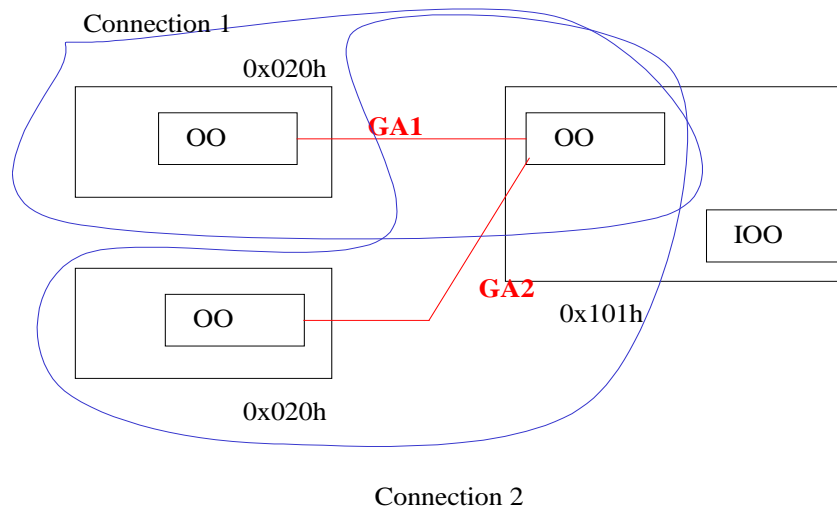


Figure 10: Test of the basic rule – Case 2

### 4.2.3 Case 3

Confor 3: new GA for each new connection

### 4.2.4 Case 4: negative test 1

Confor 4<sup>6</sup>:

2 inputs connection - not connectable X

### 4.2.5 Case 5: negative test 2

Confor 5:

2 outputs connection – not connectable X

<sup>6</sup> Such a test is automatically passed if a controller user interface does not allow to make such a selection



## 4.3 Test of Visualization Datapoints

### 4.3.1 Case 1

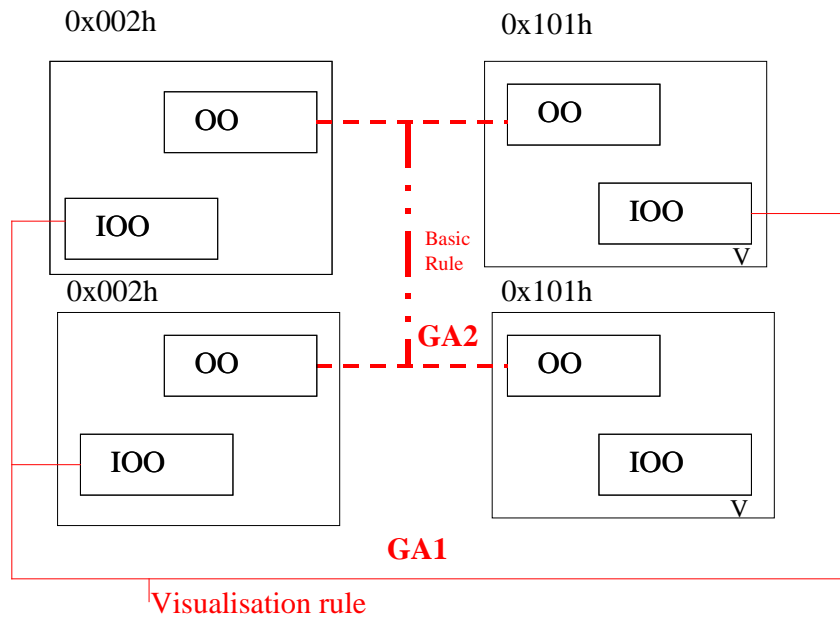


Figure 11: Test of the visualization Datapoints – Case 1

Confor 1

only one V-Data point may be connected

### 4.3.2 Case 2

Confor 2

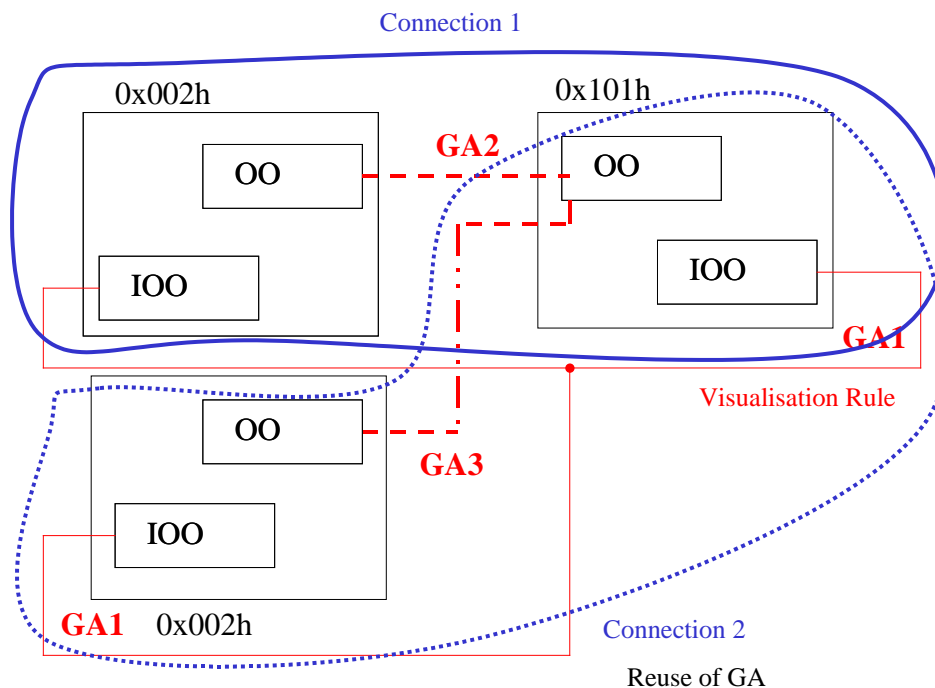


Figure 12: Test of the visualization Datapoints – Case 2

## 4.4 Test of Datapoints that are connectable only once

### 4.4.1 Case 1 – More X input Datapoints than output Datapoints

Confor 1

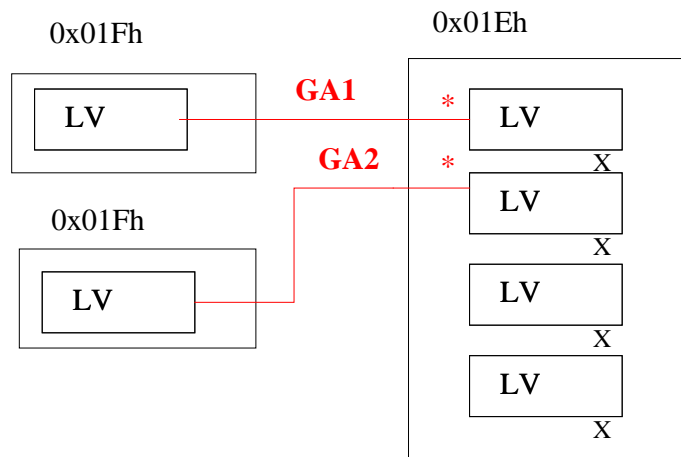


Figure 13: Test of Datapoints connectable only once – Case 1

### 4.4.2 Case 2 – more output Datapoints than X input Datapoints

Confor 2

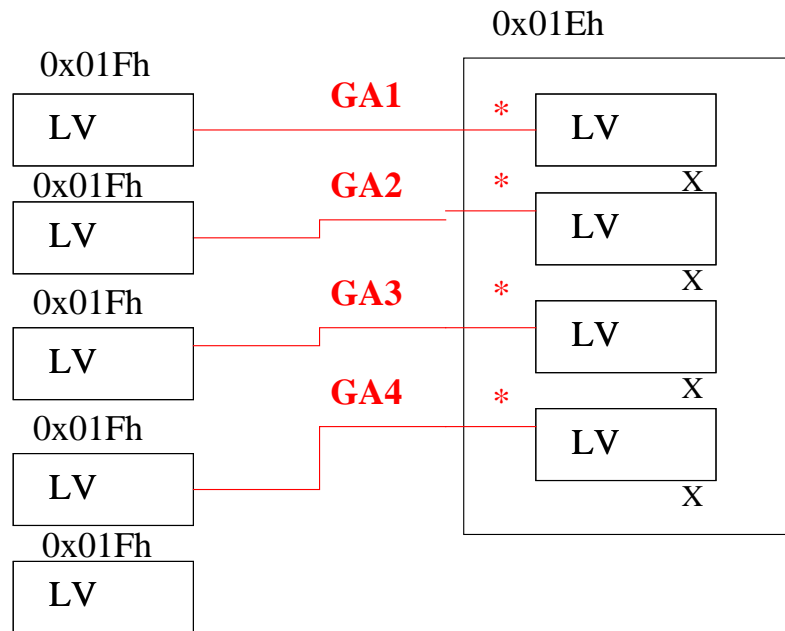


Figure 14: Test of Datapoints connectable only once – Case 2

#### 4.4.3 Case 3

Confor 3

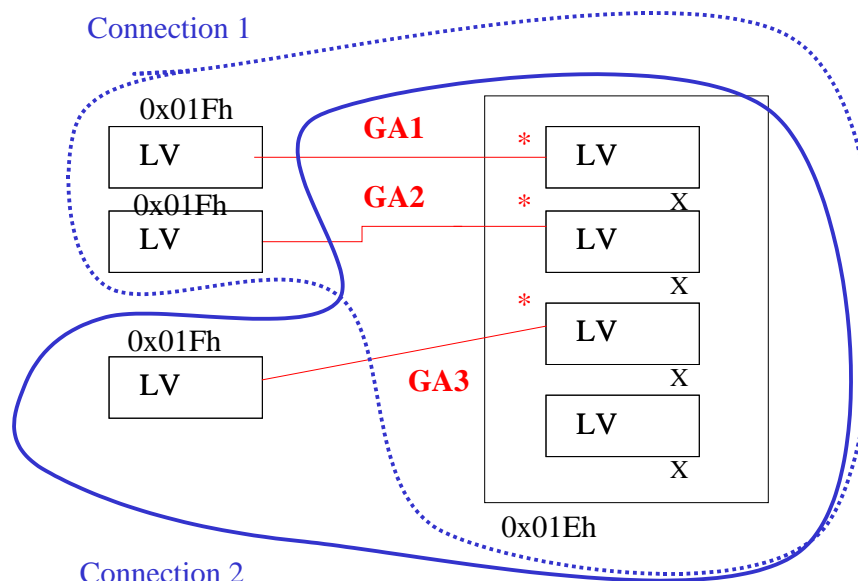


Figure 15: Test of Datapoints connectable only once – Case 3

\* If channel requires “C”- Flag, then update relevant Parameter Bit in the parameter “Used input Bitstream” for each connection.

## 4.5 Test of Adjustable channels

### 4.5.1 Case 1

Confor 1

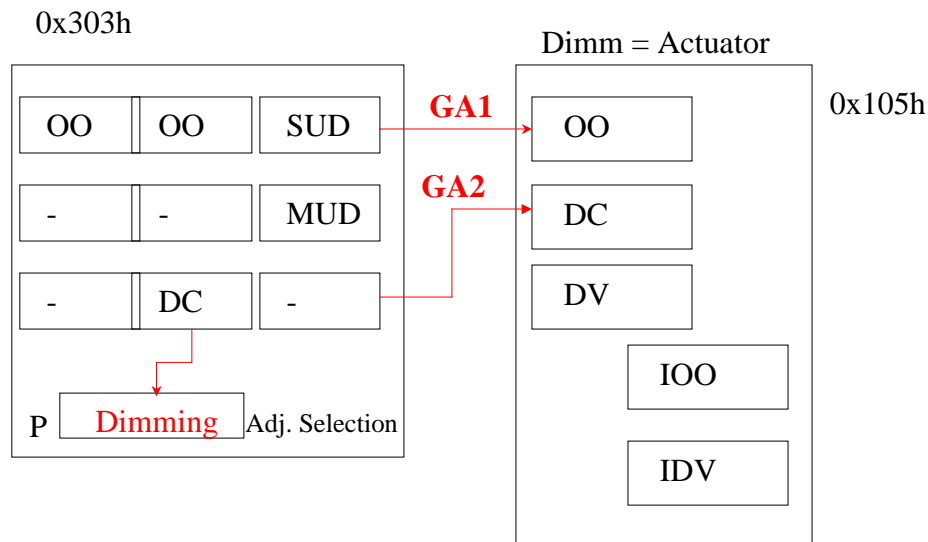


Figure 16: Test of adjustable channels – Case 1

### 4.5.2 Case 2

Confor 2

Equivalent Test with Shutter actuator

### 4.5.3 Case 3

Confor 3

Equivalent test with switching actuator

## 4.6 Test of Adaptive subblocks

### 4.6.1 Case 1

Confor 1

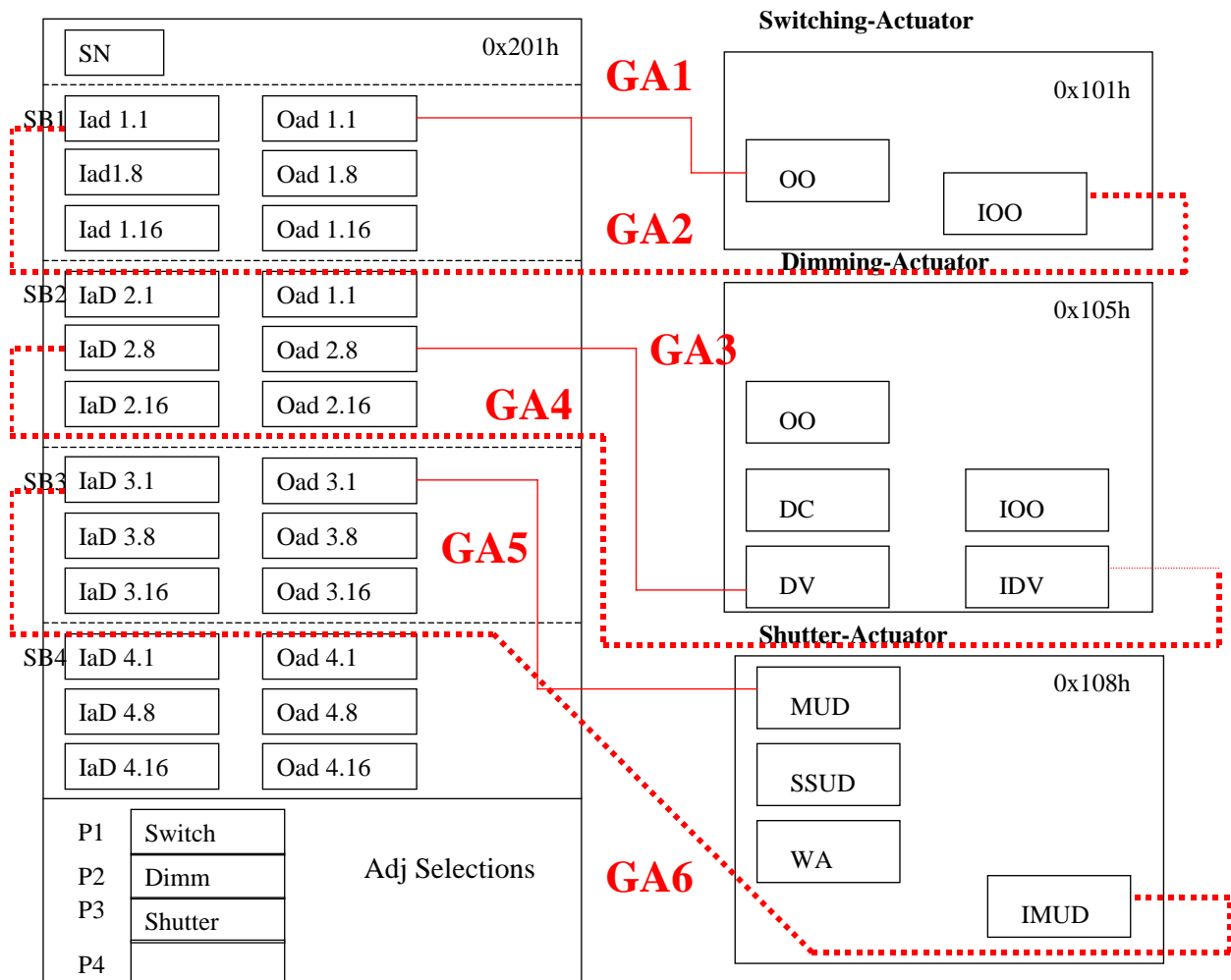


Figure 17: Test of adaptive subblocks– Case 1

### 4.6.2 Case 2

Confor 2: equivalent Test with 4 Shutter Actuators

### 4.6.3 Case 3

Confor 3: equivalent test with 2 Dimming Actuators

## 4.7 Test of subconnection code testing

### 4.7.1 Case 1

Confor 1

Test output DP “main” with input DP “sub” connection code

→ is tested during Channel black-box testing

**4.7.2 Case 2**

Confor 2

Test output DP “sub” with input DP “main” connection code

→ is tested during Channel black-box testing