



Basic and System Components/Devices – Minimum Requirements – Standardised solutions - Tests KNX System Conformance Testing

BCUs and BIMs

BIMs

9

4

2

Summary

This document contains the requirements for standardised Bus Interface Modules.

This document is part of the KNX Specifications v2.1.

Version 01.01.01 is a KNX Approved Standard.

Document Updates

Version	Date	Modifications
1.0	2001.12.19	Approved Standard
1.1	2009.06	Readying document for publication as part of V2.0 of KNX standard – removal of BIM M113, TP0 and PL132 BIM – removal SnPb requirements for BIM M111 – adding of BIM M132
01.01.01	2013.10.23	Editorial updates for the publication of KNX Specifications 2.1.

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1 Preface

In the light of the multi-vendor philosophy within KNX, KNX has opted for a standardisation of a number of crucial basic and system components/devices providing standardised interfaces not only to manufacturers but also installers and users. However, it is still possible to design non-standardised solutions.

In the following clauses, the underneath connotation is used:

No.	Abbreviation	Meaning
1	M	Minimum requirements for certification – the ‘M’ requirements are only a subset of the standardised/optional requirements respectively recommendations – devices not complying to at least these requirements cannot be certified
2	O	Optional requirement - when implemented, the KNX requirements shall be met
3	F	Recommendations (free to implement)
4	S	Feature of standardised solutions
5	VI	Visual inspection (test guidelines)

If the names of basic and system components/devices have been standardised respectively exclusively assigned to this type of products (e.g. BCU), non-standardised versions may not bear this same name. For the example given above, the system device would have to be named BAU or Bus Access Unit.

Note: For commercially available basic and system components/devices, consult the KNX Directory of KNX registered/certified solutions.

2 Introduction

The name BIM is reserved for standardised bus access units without housing and intended for piggyback use to be directly mounted on PC-boards. The term BIM shall not be used to denote bus access units not complying with the underneath BIM requirements.

3 BIM M 111 (TP1)

A BIM 111 is especially designed as small module for piggyback use and can be fitted directly into PC-boards.

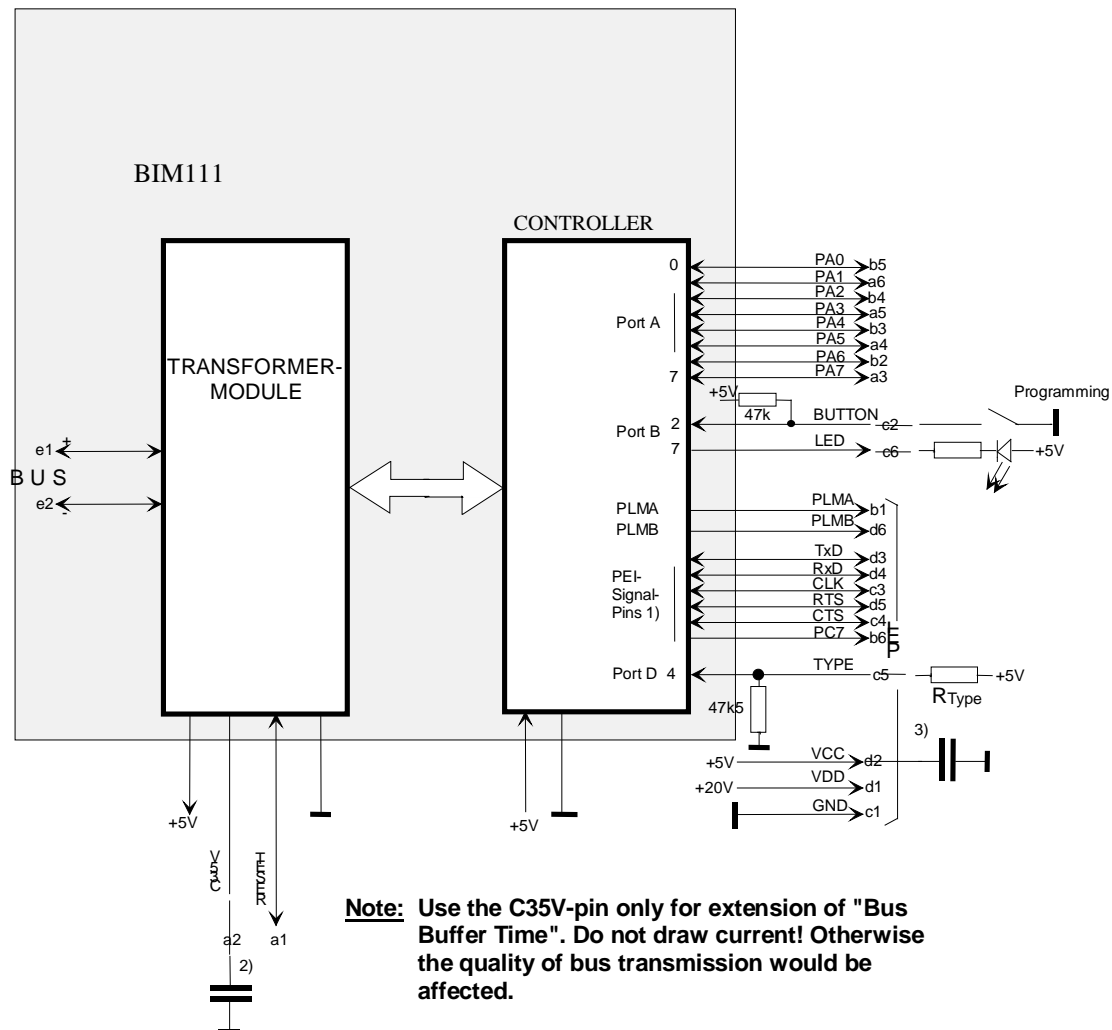


Figure 1: BIM M 111 TP 1 block diagram

- 1) For detailed description see "PEI"-Table.
- 2) Additional Capacitance (Vc=35V) for extended "Bus Buffer Time", e.g. 100µF.
- 3) Additional Capacitance (Vc=5V) for extended "Bus Buffer Time", e.g. 470µF.

3.1 Communication Requirements

No.	Requirements	M
1	BIM 111 shall offer the same features (including identical memory map) as the TP1 BCU1 (see Volume 9/4/1), except for the following: <ul style="list-style-type: none"> - only PEI signals shall be available (no true PEI connector) - no shift register - no housing and therefore no EMC related shielding - no programming button - access to PLMA and Port A of microprocessor possible - support of maximum 14 Group Objects - reset output available 	M/S
2	The BIM 111 shall comply to the BCU1 profile in Volume 6	M/S
3	Pin Assignment and correspondence with PEI: see underneath table and figure	M/S

	Pin Mnemonics	Power Supply	Serial Interface async./ sync.	I-Ports or A/D- Ports	Digital I/O- Ports	Corres- ponding PEI pin	Remarks
a1	RESET				_RESET		In-/Output
a2	C35V						Buffer Capacitor
a3	PA7				PA7		Digital Input/Output
a4	PA5				PA5		Digital Input/Output
a5	PA3				PA3		Digital Input/Output
a6	PA1				PA1		Digital Input/Output
b1	PLMA				PLMB		Pulse-Length-Mod.
b2	PA6				PA6		Digital Input/Output
b3	PA4				PA4		Digital Input/Output
b4	PA2				PA2		Digital input/output
b5	PA0				PA0		Digital Input/Output
b6	PC7				PC7	6a	Dig. Outp. (In./Outp. when PEI-Type17)
c1	GND	Ground				1/10	
c2	BUTTON				PB2		Digital Input
c3	CLK		SCLK	PD6	PC4	3	Clock •→
c4	CTS			PD3	PC6	7	Clear to Send •←
c5	TYPE			PD4		6	PEI-Type
c6	LED				PB7		Digital Output

	Pin Mnemonics	Power Supply	Serial Interface async./sync.	I-Ports or A/D-Ports	Digital I/O-Ports	Corresponding PEI pin	Remarks
d1	VDD	Vdd (20V)				8	2mA Current Limit.
d2	V _{CC}	V _{CC} (5V)				5	
d3	TxD		TDO	PD5	PC3	4	Data •→
d4	RxD		RDI	PD7	PC2	2	Data •←
d5	RTS			PD2	PC5	9	Request to Send •→
d6	PLMB				PLMB	5a	Pulse-Length-Mod.
e1	+ Bus						Bus Line
e2	- Bus						Bus Line

Figure 2: Pin assignment and correspondence between BIM 111 pinning and PEI

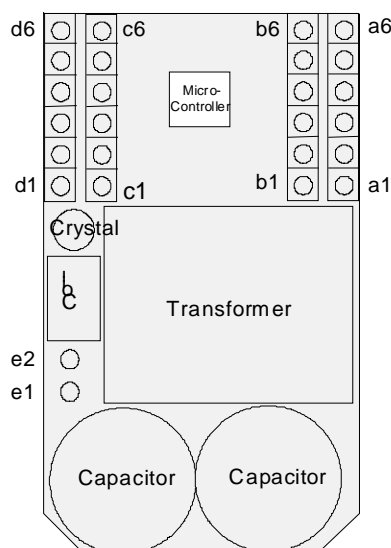


Figure 3: Pin assignment of BIM 111

3.2 Electrical Safety

No.	Requirements	M
1	No requirements as such for the component itself. When assembled into devices, the requirements of Volume 4 Part 1 shall be complied with.	M/S

3.3 Environmental conditions

No.	Requirements	M
1	BIM 111 shall comply with the requirements of Volume 4 Part 1 clause 2.1.2	M/S

3.4 EMC

No.	Requirements	M
1	BIM 111 shall comply with the requirements of Volume 4 Part 1 clause 2.3	M/S

3.5 Mechanical, Dimensions, Constructional Features

The BIM 111 shall comply to the underneath dimensions and constructional features

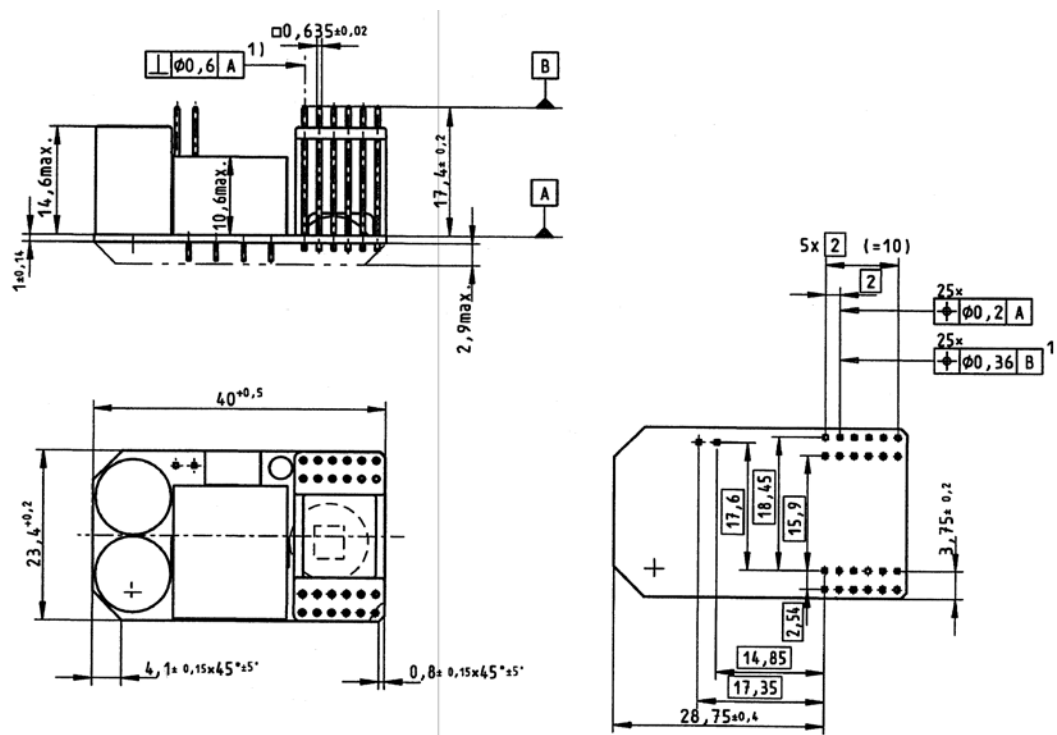


Figure 4: Constructional and mechanical features of BIM111

3.6 Electrical Features

Characteristics	Symbol	Min.	Max	typical	Unit	Remarks
Operating Voltage	V_{Bus}	21	30		V	
Current bus consumption	I_{Bus}		12	5	mA	
Reset conditions	V_{cc}	4,5			V	Reset generated by transformer-module
BCU-Buffer-Time		50			ms	PEI-Load: 50mW

3.7 Testing

The following test shall be carried out to show compliance:

- Communication testing: according Volume 8 System Conformance testing (if applicable)
- Environmental conditions: according Volume 4 Part 3
- EMC: according Volume 4 Part 2
- Mechanical and electrical properties according to this Handbook clause

3.8 Functional Safety

Under Consideration

3.9 Interfaces, Connectors

See Figure 4 for details on length and width of connectors and interfaces.

3.10 Marking

The BIM 111 components can be marked by the manufacturer at his discretion.

3.11 Installation

Not applicable

4 BIM M 13x (TP1)

A BIM 13x is especially designed as small module for piggyback use and can be fitted directly into PC-boards.

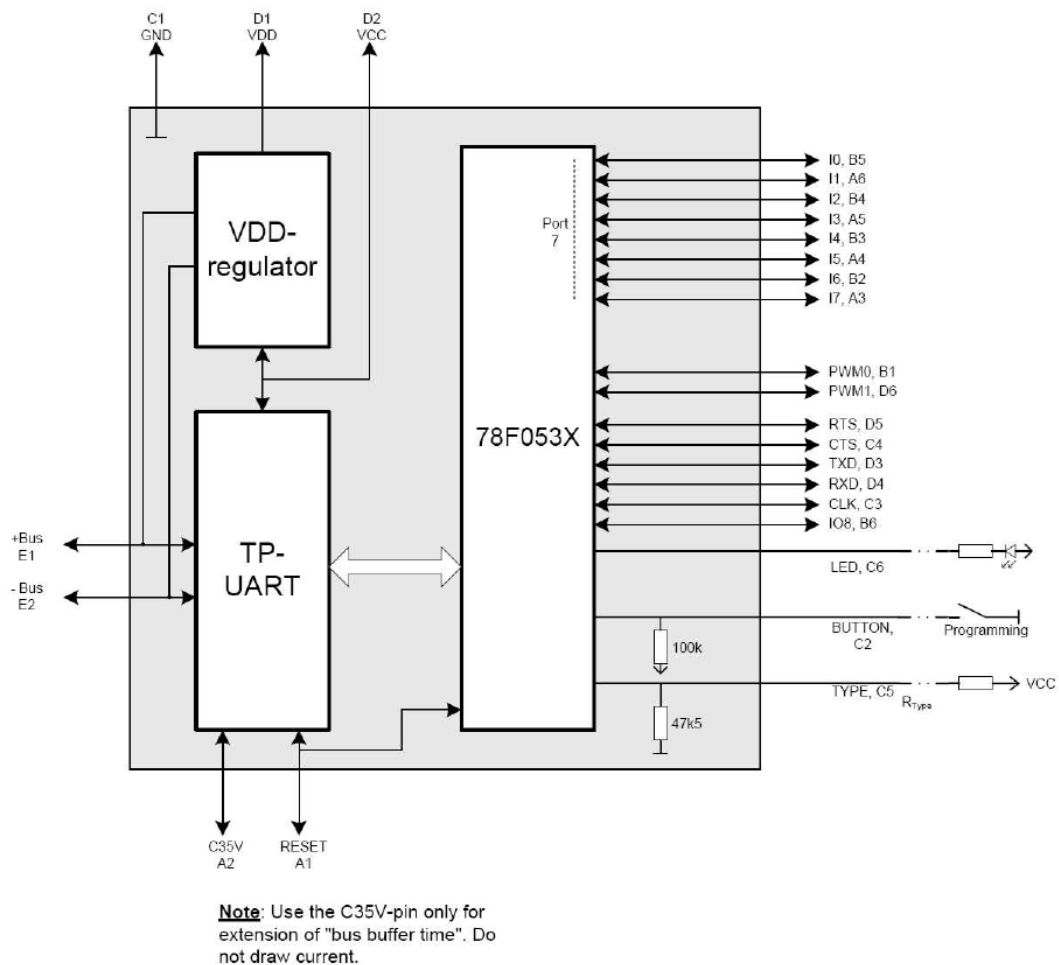


Figure 5: BIM M 13x TP 1 block diagram

4.1 Communication Requirements

No.	Requirements	M
1	The BIM 13x shall comply to the System 2 profile in Volume 6	M/S
2	Pin Assignment and correspondence with PEI: see underneath table and figure	M/S

	EVB-Adapter-Connector	BIM Pin Mnemonics	µC-Pins (BIM M113)	Input Options (•) (BIM M113)	Output Options (•) (BIM M113)	µC-Pins (BIM M13x)	Input Options (•) (BIM M13x)	Output Options (•) (BIM M13x)	Remarks
A1	21	RESET	_RESET			_RESET			In-/Output
A2	17	C35V							Buffer Capacitor
A3	13	IO7	PA7			P77			Digital I/O
A4	9	IO5	PA5			P75			Digital I/O
A5	5	IO3	PA3			P73			Digital I/O
A6	1	IO1	PA1			P71			Digital I/O
B1	23	PWM0	PC0	•AN0 •BEI06	•PWMA •BEI06	P15	•ANI0	•TOH0	Digital I/O, A/D-Converter, Pulse-Width-Modulation
B2	19	IO6	PA6			P76			Digital I/O
B3	15	IO4	PA4			P74			Digital I/O
B4	11	IO2	PA2			P72			Digital I/O
B5	7	IO0	PA0			P70			Digital I/O
B6	3	IO8	PC7	•AN1	•PWMA •TCMPB	P01	•ANI1 •TI010	•TO00	Digital I/O, A/D-Converter, Capture, Compare
C1	24	GND							Ground
C2	20	BUTTON	BEI05			P63			Only Digital In
C3	16	CLK	PC4	•AN6 •SPI-CLK •TCAPB •BEI07	•SPI-CLK •BEI07	P04	•ANI6 •SCK11		Digital I/O, A/D-Converter, (SPI-Clock-Out only in Software)
C4	12	CTS	PC6	•AN3 •TCAPA	•PWMA •BEI01	P33	•ANI3	•TO51	Digital I/O, A/D-Converter, Pulse-Width-Modulation, Clear to Send •←
C5	8	TYPE		•AN4		P25	•ANI4		PEI-Type, A/D-Converter
C6	4	LED	BEI05			P62			Port is an open drain
D1	22	VDD							20V
D2	18	VCC							5V
D3	14	TxD	PC3	•AN5 •SPI-MOSI	•SCI-TDO •SPI-MOSI •TCMPA	P10	•ANI5 •SI11	•TxD0	Digital I/O, A/D-Converter, UART-TxD, (SPI-Master-Out only in software)
D4	10	RxD	PC2	•AN7 •SCI-RDI •SPI-MISO	•SPI-MISO	P11	•ANI7 •RxD0	•SO11	Digital I/O, A/D-Converter, UART-RxD, (SPI-Master-In only in software)
D5	6	RTS	PC5	•AN2	•PWMB •TCMPB	P00	•ANI2 •TI000		Digital I/O, A/D-Converter, Capture, Request to Send •→
D6	2	PWM1	PC1		•PWMB	P16		•TOH1	Digital I/O, Pulse-Width-Modulation
E1	25	+ Bus							Bus Line
E2	26	- Bus							Bus Line

Figure 6: Pin assignment and correspondence between BIM 13x pinning and PEI



Figure 7: Pin assignment of BIM 13x

4.2 Electrical Safety

No.	Requirements	M
1	No requirements as such for the component itself. When assembled into devices, the requirements of Volume 4 Part 1 shall be complied with.	M/S

4.3 Environmental conditions

No.	Requirements	M
1	BIM 13x shall comply with the requirements of Volume 4 Part 1 clause 2.1.2	M/S

4.4 EMC

No.	Requirements	M
1	BIM 13x shall comply with the requirements of Volume 4 Part 1 clause 2.3	M/S

4.5 Mechanical, Dimensions, Constructional Features

The BIM 13x shall comply to the underneath dimensions and constructional features

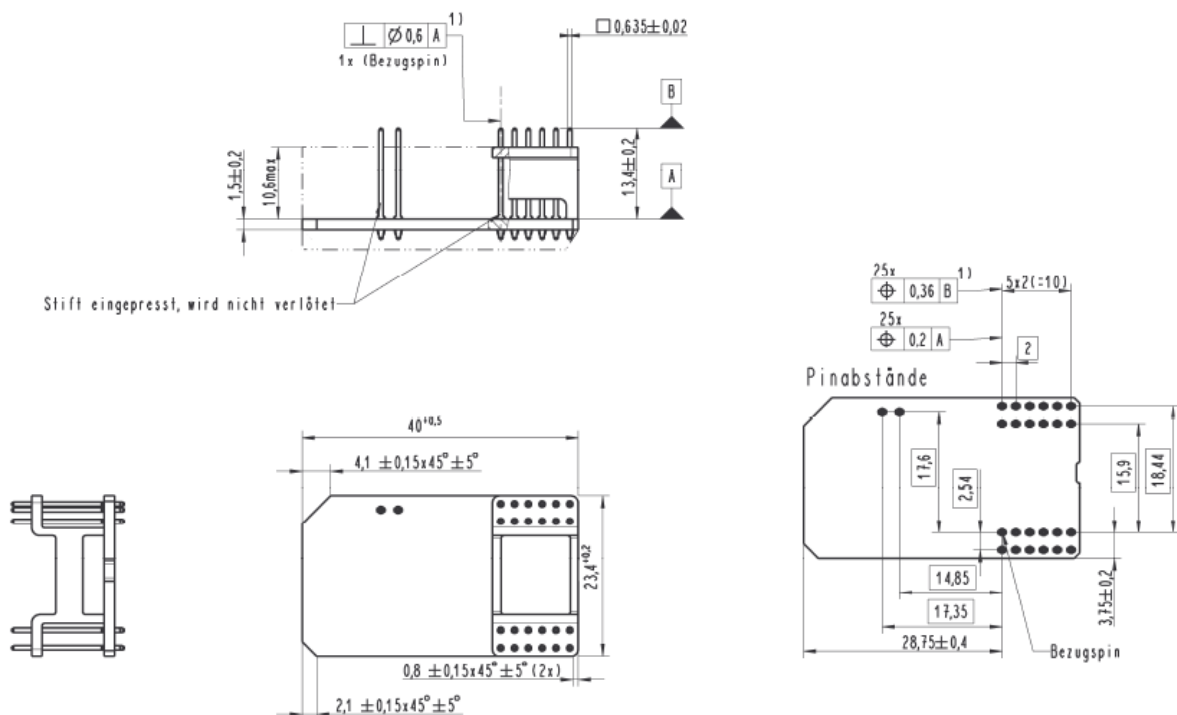


Figure 8: Constructional and mechanical features of BIM13x

4.6 Electrical Features

Bus Interface Characteristics:

Characteristics	Symbol	Min	Max	Typical	Unit	Remarks
Operating Voltage	V_{Bus}	21	30		V	
Current consumption	I_{Bus}			5,5	mA	$V_{bus} = 30\text{ V}$ $I_{DD} = 0\text{ mA}$, $I_{CC} = 0\text{ mA}$
Reset activation condition	VCC	4.0	4.6		V	Reset generated by transceiver. Conditions for active to reset state
	V_{C35V}	5.8	6.2			
Transmission Rate				9600	bit/s	

PEI DC-Characteristics:

Characteristics	Symbol	Min	Typ	Max	Unit	Remarks
Supply Output Voltage +5V	VCC	4.65		5.3	V	Load $\leq 10\text{ mA}$
Supply Output Voltage +20V	VDD	17	19	23	V	Load $\leq 5\text{ mA}$
Supply current	ICC			10	mA	$I_{PIN} < 2,5\text{ mA}$ (source). I_{PIN} : sum of current on i/o pins.
	ICC			7,5 $-I_{PIN}$		
Current limitation	IDD		10		mA	ICC $\leq 5\text{ mA}$
	IDD		5		mA	ICC = 10mA
Data output voltage	VOL			0.7	V	$I_{sink} < 5\text{ mA}$ $I_{source} < 3\text{ mA}$
	VOH	VCC-0.7				
Data input voltage	VIL			0.2		
	VIH	0.8 VCC		VCC		
Analog input voltage range	VAIH	0		VCC		
	VAIH					
Input leakage current	IL		1		μA	
IO selectable pullup		10	20	100	k Ω	
Internal reset pullup		10		25	k Ω	

4.7 Testing

The following test shall be carried out to show compliance:

- Communication testing: according Volume 8 System Conformance testing (if applicable)
- Environmental conditions: according Volume 4 Part 3
- EMC: according Volume 4 Part 2
- Mechanical and electrical properties according to this Handbook clause

4.8 Functional Safety

Under Consideration

4.9 Interfaces, Connectors

See Figure 8 for details on length and width of connectors and interfaces.

4.10 Marking

The BIM 13x components can be marked by the manufacturer at his discretion.

4.11 Installation

Not applicable