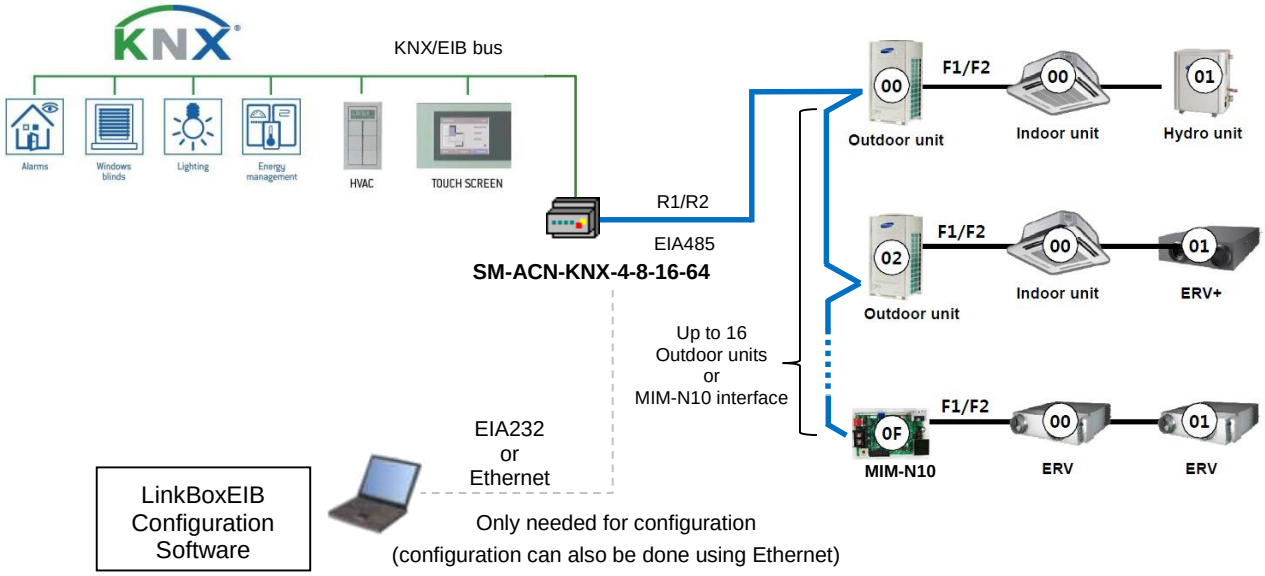
IntesisBox®

KNX – SAMSUNG NASA Air Conditioners

Gateway for integration of Samsung NASA air conditioners into KNX control systems.

Integrate Samsung Air Conditioners into KNX.



This integration requires the Samsung AC system being equipped with the Samsung MIM-N10 or the R1/R2 connector in the Outdoor Units. Samsung AC's system supports up to 16 outdoor units – all of them can be integrated with IntesisBox, allowing a maximum of 4 indoor units (SM-ACN-KNX-4), 8 indoor units (SM-ACN-KNX-8), 16 indoor units (SM-ACN-KNX-16) or 64 indoor units (SM-ACN-KNX-64) to be integrated. MIM-N10 is supplied by Samsung. Contact your nearest Samsung AC Systems distributor for details.

IntesisBox® can *talk* to up to 16 Outdoor Units interfaces using Samsung's EIA485 protocol (R1/R2 connector) and offers the signals of all indoor units connected each of them through its KNX EIB interface, allowing up to 4 indoor units (SM-ACN-KNX-4), 8 indoor units (SM-ACN-KNX-8), 16 indoor units (SM-ACN-KNX-16) or 64 indoor units (SM-AC-KNX-64) to be integrated into KNX.

The KNX interface of IntesisBox

IntesisBox simulates a KNX device and acts as if it was one more device into the KNX system. The IntesisBox's KNX interface connects directly to the EIB bus and is opto-isolated from the rest of the internal electronics.

The configuration of IntesisBox

IntesisBox KNX series are configured using *LinkBoxEIB*, a software tool for windows™ which is supplied along with the purchase of IntesisBox with no additional cost. *With the standard installation of LinkBoxEIB, a Demo project for integration of several MIM devices is also installed, using this demo project makes the engineering needed for this integration easy and quick, almost plug&play.*

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1. IntesisBox capacity

Element	Max.	Notes
Number of Outdoor Units or MIM interfaces	16	Maximum number of MIM interfaces or Outdoor Units that a Samsung AC system supports
Number of indoor units	64 *	Maximum number AC indoor units that can be controlled.

*There are different models of *IntesisBox KNX – SAMSUNG NASA AC* each with different capacity. The table above shows the capacity for the top model (with maximum capacity).

Their order codes are:

- Model supporting up to 4 Samsung indoor units. *Ref.: SM-ACN-KNX-4*
- Model supporting up to 8 Samsung indoor units. *Ref.: SM-ACN-KNX-8*
- Model supporting up to 16 Samsung indoor units. *Ref.: SM-ACN-KNX-16*
- Model supporting up to 64 Samsung indoor units. *Ref.: SM-ACN-KNX-64*

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2. KNX interface of IntesisBox

General	
Max. Number of Samsung MIM interfaces	Up to 16 R1/R2 connections can be supported. There 4 different versions of IntesisBox, supporting a maximum 64, 16, 8 or 4 indoor units respectively.
Virtual signals	• One communication error virtual signal per every single MIM in the system • One communication error virtual signal per every indoor unit attached to the MIM interface. All these virtual signals are available from KNX.
KNX/EIB interface	
Bus coupler	Internal KNX TP1 (EIB) opto-isolated bus coupler unit for direct connection to EIB bus. Connector: 2 poles plug-in screw terminal block.
Configuration parameters	• Physical address.
Interactivity with KNX/EIB system	• All signals per indoor unit and functionalities offered by the MIM interface are directly available from KNX. • When IntesisBox starts up, or after a KNX bus reset detection, all the current values read from the AC system will be sent to KNX. *Configurable individually per point.* • Any change detected in Samsung AC system (i.e. Ambient Temperature of an indoor unit) is immediately transmitted to KNX. *Configurable individually per point.* • Any point's value can be updated with a read request sent to KNX when IntesisBox starts up or after a KNX bus reset detection (i.e. Temperature Set Point). *Configurable individually per point.* • Multiple KNX group addresses can actuate on the same IntesisBox's point. • Mode, Fan Speed and Air Direction of each indoor unit can be monitored/controlled from KNX using objects of type EIS 10 (8-bit counter) (i.e. writing the value corresponding to the Mode desired: 0, 1, 2, 3…), or also using simpler objects of type EIS 1 (1-bit Switching) (i.e. one different object per each possible Mode: Cool, Heat…).
Points	
Parameters configurable per point	AC system related fields. • MIM interface address: Address of the MIM interface the point relates to. • Indoor unit main address: Main Address of the indoor unit the point relates to. KNX/EIB related fields. • Group address (in format P/I/S or P/S). *Is the sending group address.* • Listening addresses (in format P/I/S or P/S separated by comma). IntesisBox will listen for KNX write requests of these listening addresses, when received then it will act as if they where for the sending group address defined. This can be useful to translate actions to the Samsung AC system coming from different KNX commands, for example from an individual start/stop button and also from a general start/stop button • R. Specifies if the point accepts read requests from KNX. • W. Specifies if the point accepts write requests from KNX. • T. Specifies if a write request will be sent to KNX when the point's value changes. • U. Specifies if a read request will be sent to KNX to get the current value when the IntesisBox starts up or after a KNX bus reset detection.
KNX EIS (Datapoints)	Each point has a predefined and fixed KNX EIS associated according to the type of signal in the air conditioner.

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2.1 Integration signals

The following list shows the available signals* to integrate for each Samsung AC indoor unit, and the type of KNX object on which their information is available.

Signal	EIS type	Signal type
CommError	1 – Switching (1bit)	R
CommStatus	14 – Counter (8bit)	R
Unit Type	14 – Counter (8bit)	R
On / Off	1 – Switching (1bit)	R/W
OpMode	14 – Counter (8bit)	R/W
Mode::Cool	1 – Switching (1bit)	R/W
Mode::Heat	1 – Switching (1bit)	R/W
Mode::Dry	1 – Switching (1bit)	R/W
Mode::Fan	1 – Switching (1bit)	R/W
Mode::Auto	1 – Switching (1bit)	R/W
FanSpeed	14 - Counter (8 bit)	R/W
FanSpeed ::Auto	1 – Switching (1bit)	R/W
FanSpeed ::Low	1 – Switching (1bit)	R/W
FanSpeed ::Mid	1 – Switching (1bit)	R/W
FanSpeed ::High	1 – Switching (1bit)	R/W
UpDownSwing	1 – Switching (1bit)	R/W
FilterAlarm	1 – Switching (1bit)	R
FilterReset	1 – Switching (1bit)	W
SetpointTemp	5 – Float (16bit)	R/W

Signal	EIS type	Signal type
AmbientTemp	5 – Float (16bit)	R
ErrorCode	10-Counter (16bit sig.)	R
RC Restriction	1 – Switching (1bit)	R, R/W
BuzzerSound	1 – Switching (1bit)	W
WaterInTemp	5 – Float (16bits)	R
WaterOutTemp	5 – Float (16bits)	R
WaterOutSetpoint	5 – Float (16bits)	R/W
VentOnOff	1 – Switching (1bit)	R/W
VentOpMode	14 – Counter (8bit)	R/W
VentOpMode::Bypass	1 – Switching (1bit)	R/W
VentOpMode::HeatEx	1 – Switching (1bit)	R/W
VentOpMode::Sleep	1 – Switching (1bit)	R/W
VentOpMode::Auto	1 – Switching (1bit)	R/W
VentFanSpeed	14 – Counter (8bit)	R/W
VentFanSpeed::Low	1 – Switching (1bit)	R/W
VentFanSpeed::High	1 – Switching (1bit)	R/W
VentFanSpeed::Turbo	1 – Switching (1bit)	R/W
DischTempCool	5 – Float (16bit)	R/W
DischTempHeat	5 – Float (16bit)	R/W

* Note: Depending on the indoor unit type, some signals may not be present. Check user manual for more information.

EIA485 (R1/R2) interface of IntesisBox

RS485/MIM interface	
Device type	Master
Configuration Parameters on IntesisBox	For each Indoor Unit to be integrated: • Descriptive name. • MIM Outdoor Unit Address (0..15) for each indoor unit • Main Address

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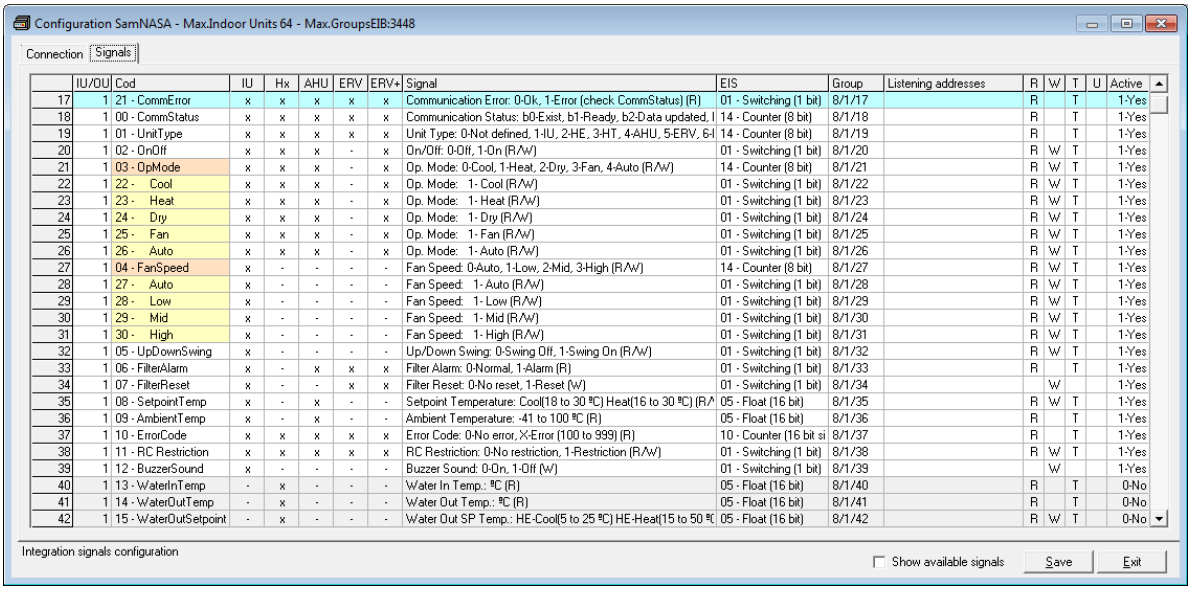
Configuration tool

LinkBoxEIB	• Visual engineering tool, easy of use, for IntesisBox's configuration and monitoring compatible with Microsoft Windows operating systems, supplied with the purchase of IntesisBox. • Multi-window tool allowing to monitor simultaneously the communication activity with both protocols (systems), real time values for all the points allowing to modify any value (very useful for test purposes), console window showing debug and operation status messages, and configuration windows to configure all IntesisBox's parameters and points. • Point's configuration in plain text files (tab separated) for easy and quick configuration using Microsoft Excel (very useful in projects with a lot of points). • Allows configuring the IntesisBox's parameters and points while in off-line (not connected to the IntesisBox). • Connection to the IntesisBox for download the configuration and monitoring by using serial COM port of the PC (serial cable also supplied). • Allows configuring all the external protocols available for IntesisBox® KNX series. • Upgrades for this software tool available free of charge whenever a new version or feature is available. • Multi-project tool allowing having in the engineer's PC the configuration for all the sites with different IntesisBox® KNX series gateways. • Multi-language tool, all the language-dependent strings are in a plain text file (tab separated) for easy modification or addition of new languages.



	IU/OU	Cod	IU	Hx	AHU	ERV	ERV+	Signal	EIS	Group	Listening addresses	R	W	T	U	Active
17	1	21 - CommError	x	x	x	x	x	Communication Error: 0-Ok, 1-Error (check CommStatus) (R)	01 - Switching (1 bit)	8/1/17		R		T		1-Yes
18	1	00 - CommStatus	x	x	x	x	x	Communication Status: b0-Exist, b1-Ready, b2-Data updated, I	14 - Counter (8 bit)	8/1/18		R		T		1-Yes
19	1	01 - UnitType	x	x	x	x	x	Unit Type: 0-Not defined, 1-IU, 2-HE, 3-HT, 4-AHU, 5-ERV, 6-I	14 - Counter (8 bit)	8/1/19		R		T		1-Yes
20	1	02 - OnOff	x	x	x	-	x	On/Off: 0-Off, 1-On (R/W)	01 - Switching (1 bit)	8/1/20		R	W	T		1-Yes
21	1	03 - OpMode	x	x	x	-	x	Op. Mode: 0-Cool, 1-Heat, 2-Dry, 3-Fan, 4-Auto (R/W)	14 - Counter (8 bit)	8/1/21		R	W	T		1-Yes
22	1	22 - Cool	x	x	x	-	x	Op. Mode: 1- Cool (R/W)	01 - Switching (1 bit)	8/1/22		R	W	T		1-Yes
23	1	23 - Heat	x	x	x	-	x	Op. Mode: 1- Heat (R/W)	01 - Switching (1 bit)	8/1/23		R	W	T		1-Yes
24	1	24 - Dry	x	x	x	-	x	Op. Mode: 1- Dry (R/W)	01 - Switching (1 bit)	8/1/24		R	W	T		1-Yes
25	1	25 - Fan	x	x	x	-	x	Op. Mode: 1- Fan (R/W)	01 - Switching (1 bit)	8/1/25		R	W	T		1-Yes
26	1	26 - Auto	x	x	x	-	x	Op. Mode: 1- Auto (R/W)	01 - Switching (1 bit)	8/1/26		R	W	T		1-Yes
27	1	04 - FanSpeed	x	-	-	-	-	Fan Speed: 0-Auto, 1-Low, 2-Mid, 3-High (R/W)	14 - Counter (8 bit)	8/1/27		R	W	T		1-Yes
28	1	27 - Auto	x	-	-	-	-	Fan Speed: 1- Auto (R/W)	01 - Switching (1 bit)	8/1/28		R	W	T		1-Yes
29	1	28 - Low	x	-	-	-	-	Fan Speed: 1- Low (R/W)	01 - Switching (1 bit)	8/1/29		R	W	T		1-Yes
30	1	29 - Mid	x	-	-	-	-	Fan Speed: 1- Mid (R/W)	01 - Switching (1 bit)	8/1/30		R	W	T		1-Yes
31	1	30 - High	x	-	-	-	-	Fan Speed: 1- High (R/W)	01 - Switching (1 bit)	8/1/31		R	W	T		1-Yes
32	1	05 - UpDownSwing	x	-	-	-	-	Up/Down Swing: 0-Swing Off, 1-Swing On (R/W)	01 - Switching (1 bit)	8/1/32		R	W	T		1-Yes
33	1	06 - FilterAlarm	x	-	x	x	x	Filter Alarm: 0-Normal, 1-Alarm (R)	01 - Switching (1 bit)	8/1/33		R		T		1-Yes
34	1	07 - FilterReset	x	-	-	x	x	Filter Reset: 0-No reset, 1-Reset (W)	01 - Switching (1 bit)	8/1/34			W			1-Yes
35	1	08 - SetpointTemp	x	-	x	-	-	Setpoint Temperature: Cool(18 to 30 ºC) Heat(16 to 30 ºC) (R/	05 - Float (16 bit)	8/1/35		R	W	T		1-Yes
36	1	09 - AmbientTemp	x	-	x	-	-	Ambient Temperature: -41 to 100 ºC (R)	05 - Float (16 bit)	8/1/36		R		T		1-Yes
37	1	10 - ErrorCode	x	x	x	x	x	Error Code: 0-No error, X-Error (100 to 999) (R)	10 - Counter (16 bit si	8/1/37		R		T		1-Yes
38	1	11 - RC Restriction	x	x	x	x	x	RC Restriction: 0-No restriction, 1-Restriction (R/W)	01 - Switching (1 bit)	8/1/38		R	W	T		1-Yes
39	1	12 - BuzzerSound	x	-	-	-	-	Buzzer Sound: 0-On, 1-Off (W)	01 - Switching (1 bit)	8/1/39			W			1-Yes
40	1	13 - WaterInTemp	-	x	-	-	-	Water In Temp.: ºC (R)	05 - Float (16 bit)	8/1/40		R		T		0-No
41	1	14 - WaterOutTemp	-	x	-	-	-	Water Out Temp.: ºC (R)	05 - Float (16 bit)	8/1/41		R		T		0-No
42	1	15 - WaterOutSetpoint	-	x	-	-	-	Water Out SP Temp.: HE-Cool(5 to 25 ºC) HE-Heat(15 to 50 º	05 - Float (16 bit)	8/1/42		R	W	T		0-No

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3. Mechanical & Electrical characteristics

Enclosure	Plastic, type PC (UL 94 V-0). Dimensions: 107mm x 105mm x 58mm.
Color	Light Grey. RAL 7035.
Power	9 to 30Vdc +/-10%, Max.: 125mA. 24Vac +/-10% 50-60Hz, Max.: 127mA Must use a NEC Class 2 or Limited Power Source (LPS) and SELV rated power supply. Plug-in terminal block for power connection (2 poles).
Terminal wiring (for power supply and low-voltage signals)	Per terminal: solid wires or stranded wires (twisted or with ferrule) 1 core: 0.5mm^2… 2.5mm^2 2 cores: 0.5mm^2… 1.5mm^2 3 cores: not permitted
Mounting	Wall. DIN rail EN60715 TH35.
KNX (EIB) port	1 x KNX TP1 (EIB) opto-isolated (Plug-in screw terminal block 2 poles)
Samsung AC port	1 x EIA485. Plug-in screw terminal block (2 poles). SELV
LED indicators	1 x Power. 2 x KNX port activity (Tx, Rx). 2 x Serial port Samsung AC activity (Tx, Rx). 2 x Ethernet port link and activity (LNK, ACT).
Console port	EIA232. DB9 female connector (DCE). SELV
Ethernet port	1 x Ethernet 10Base-T (RJ45).
Configuration	Via console port[1] and through Ethernet port.
Firmware	Allows upgrades via console port.
Operational temperature	0°C to +70°C
Operational humidity	5% to 95%, non-condensing
Protection	IP20 (IEC60529).
RoHS conformity	Compliant with RoHS directive (2002/95/CE).
Norms and standards	CE conformity to EMC directive (2004/108/EC) and Low-voltage directive (2006/95/EC) EN 61000-6-2 EN 61000-6-3 EN 60950-1 EN 50491-3

[1] Along with the device it is also supplied a standard DB9 male - DB9 female 1.8 m. cable for configuring and monitoring the device using a PC via serial COM port. The configuration software, compatible with MS Windows® operating systems, is also supplied.

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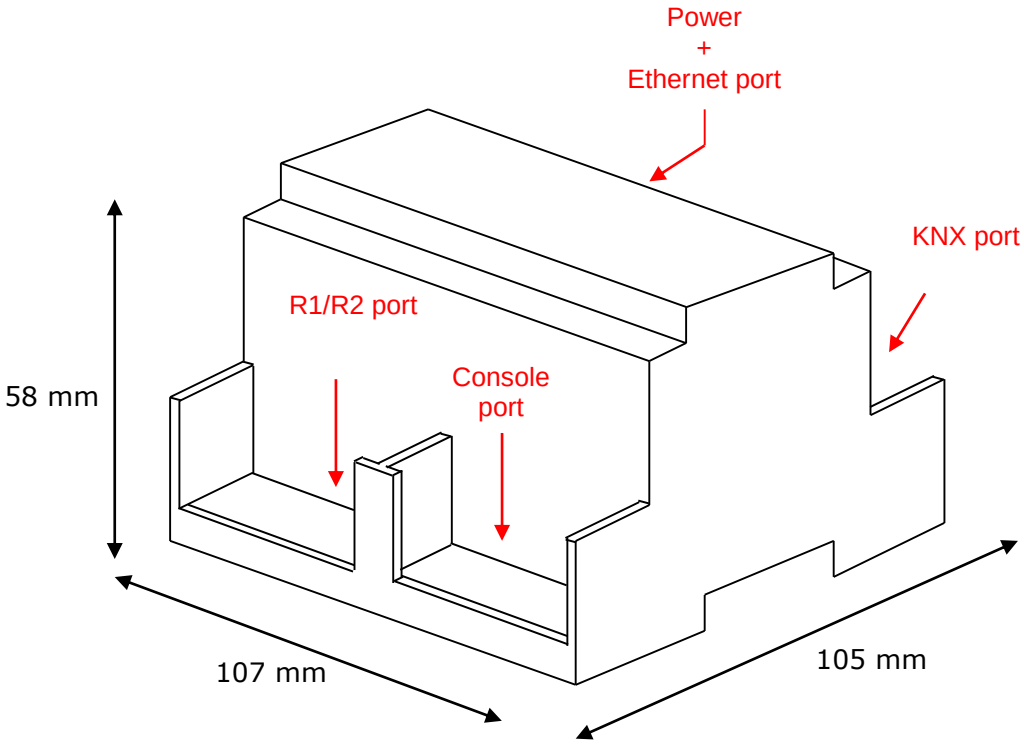
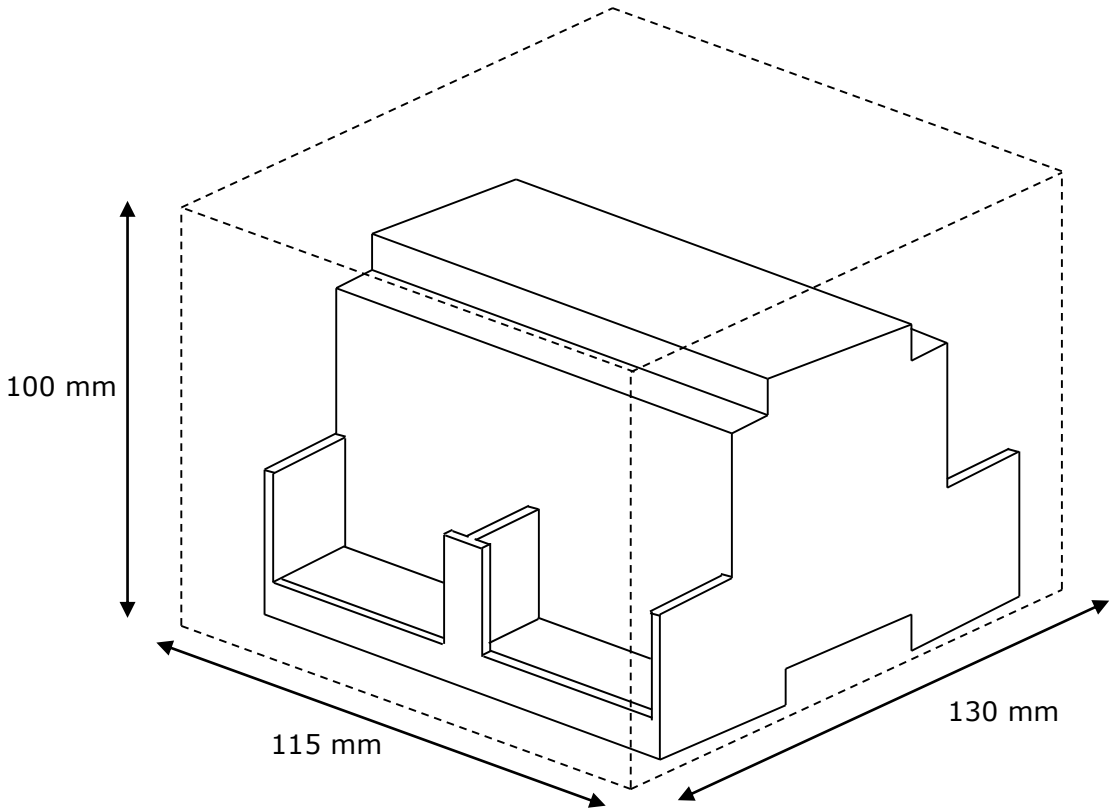
4. Dimensions



Recommended available space for its installation into a cabinet (wall or DIN rail mounting), with space enough for external connections:



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