Test Report acc. to FCC Title 47 CFR Part 15
relating to
s.m.s, smart microwaves sensors GmbH
COM HUB PLC System

Annex no. 4
User Manual
Functional Description

Title 47 - Telecommunication
Part 15 - Radio Frequency Devices
Subpart B – Unintentional Radiators
Measurement Procedure:
ANSI C63.4-2014

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User Manual / Functional Description of the test equipment (EUT)

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USER MANUAL FCC/ISED COM HUB PLC SYSTEM

PROJECT TITLE:

USER MANUAL COM HUB PLC SYSTEM

PROJECT NO.:

…

KEYWORD(S):

COM HUB SYNC PLC, PLC J-BOX, COM HUB PLC SYSTEM

DATE:

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STATUS:

IN PROGRESS

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1 CONTENT

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2 PLC J-BOX

2.1 Description

The PLC J-BOX must be used in combination with COM HUB PLC Module. It converts the 4-wire standard Ethernet communication to a high-definition powerline (HD-PLC) communication.

It allows for large wire gauges and is very simple to install, with only 3 wires to be connected (Ground, power, Earth).

Using the recommended cable, it provides Ethernet connectivity over a cable length of up to 300m (984.25ft).

The PLC J-BOX is always powered with +48V DC through the cable (usually through COM HUB PLC Module).

Figure 1: PLC J-BOX

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2.2 Specifications

Parameter	Details
Mechanical	
Weight	181g | 6.38oz (excluding cable)
Height	79.8mm | 3.14in (excluding cable outlet) ca. 116mm | 4.56in (including cable outlet)
Width	84mm | 3.30in
Depth	29mm | 1.14in
Operating temperature	-34°..... +74°C
Supported Cables	
Supported cable diameter	9-13mm | 0.35-0.51in (smaller diameter available on request)
Supported conductor cross section range	0.08-3.31mm² | 0.00012-0.005in² / 28-12 AWG
Recommended cable	Advanced Digital Cable PVC/Nylon 18AWG, Part Number 6803D
Other	
Norm	IEEE 1901-HDPLC/ITU G.9905
Speed: Data Rate	< 90Mbps
Surge protection of power lines	Compliant to IEC 61000-4-2 (ESD) and IEC 61000-4-5 (power surges and lightning)
Frequency Approvals[1]	
Europe	CENELEC
Japan	ARIB
China	ERPI
USA	FCC

Table 1: PLC J-BOX specifications

[1] These approvals are planned for the PLC J-Box

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2.3 Pinout

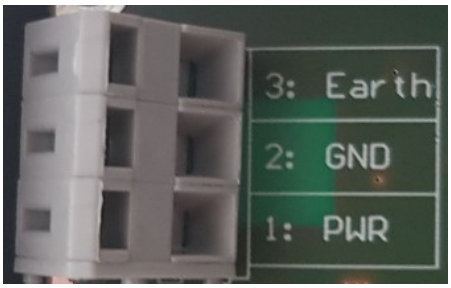

Figure 2: Terminal block with pin numbers

Pin No.	Function
1	Power
2	Ground
3	Earth

Table 2: Pinout of terminal block connector

2.4 Variants

The following variants are available:

J-Box Variant	Compatibility
PLC J-BOX for TRUGRD Products[2]	TRUGRD TRUGRD Stream
PLC J-BOX for UMRR-11[3]	UMRR-11 Type 44 UMRR-11 Type 45 UMRR-11 Type 132

Table 3: PLC J-BOX variants

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2.5 Grounding Requirements

Neither the housing of the smartmicro sensor nor the J-Box is electrically floated but connected to the negative supply voltage instead. To assure correct operation of the sensor, please contact us for further details.

2.6 Attachment to Sensor

The PLC J-BOX is attached to the sensor using the threaded holes on the **back** of the sensor. Please consider this in case you design your own bracket or integrate the sensor in another housing.

Note: The threaded holes on the sides of the sensor are intended for the attachment of the sensor to the bracket, not the PLC J-BOX. The following picture explains the position of all threaded holes available on the rear side of the sensor.

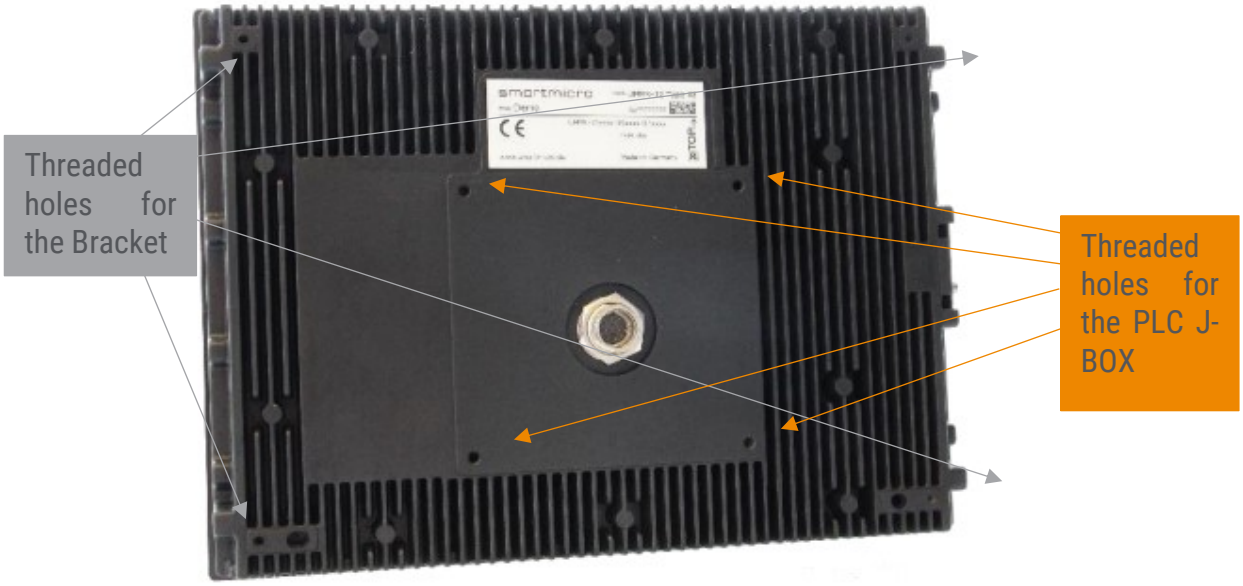

Figure 3: Threaded holes on the rear side of the sensor

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3 COM HUB PLC MODULE

3.1 PRODUCT SPECIFICATIONS

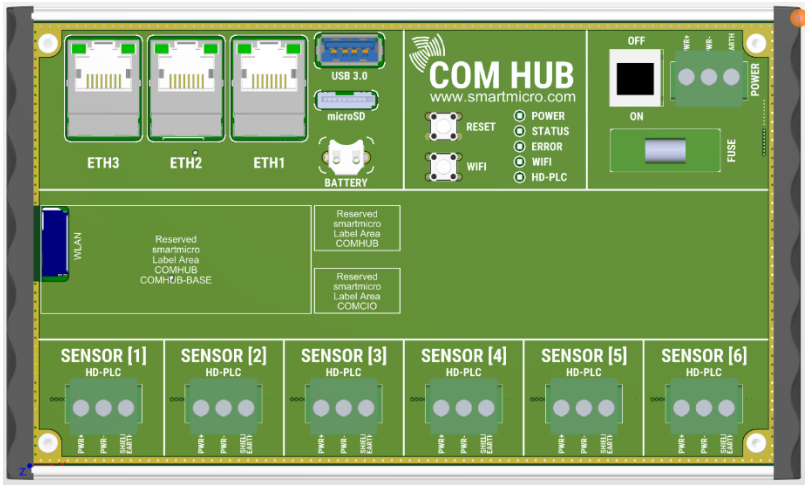
The smartmicro COM HUB PLC Module is a high-performance edge computer connected to an interface panel to enable the connection to and time synchronization of up to 6 smartmicro sensors via Ethernet or HD-PLC (High-definition Power Line Communication) communication interface or up to 4 smartmicro sensors via RS485 interface.

FEATURES

COM HUB PLC Module has the following features:

- Built-in surge- and power protection
- On/off switch and resettable fuse for the main DC power supply
- Six Ethernet interfaces with activity LEDs for sensors
- Six HD-PLC Ethernet interfaces for sensors
- Four RS485 interfaces with activity LEDs for sensors
- Three high speed Ethernet interfaces for external modules such as SDLC module or V2X Module
- WIFI communication with on/off button and automatic turn-off feature
- SD Card and USB 3.0 interfaces for additional mass storage devices
- Real-time clock option
- Pluggable terminal blocks for power and data interfaces
- DIN rail mounting

COM HUB PLC Module is a hardware module that enables connection of up to 6 smartmicro sensors via PLC terminal blocks. Additionally, there are 3 Ethernet ports to connect other devices like a user PC, V2X Modules or SDLC.



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Besides the front panel board that serves as interface board, the COM HUB PLC Module includes protection circuitry and a processing board. The interface board can be used to provide power to the sensors, including surge and overvoltage protection for all connected sensors. It also includes status and activity LEDs for all interfaces.

NOTE: For COM HUB PLC Module it is mandatory to use PLC J-BOX to connect the sensor with the COM HUB PLC Module

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3.2 CHARACTERISTICS

Parameter		Details
Power Supply	Supply Voltage[4]	24-48V
	Max Input Voltage[5]	max. 53V
	Max Input Current	max. 10A
Sensor Interfaces	HD-PLC	6 ports
Module Interfaces	Ethernet Interface	3 x 10/100/1000Mbit
	WIFI Module	Switchable, IEEE 802.11 b/g/n compliant
Extension Interfaces	USB 3.0	SuperSpeed, Dual-Role-Device
	Micro SD	Up to 64GByte
Display	Ethernet activity LEDs	Link and Activity
	Status LEDs	Power, Processor, WIFI
Dimensions	Outline Dimensions (H/W/D)	176.5 x 105 x 51.3mm | 6.95 x 4.13 x 2.02in
	Weight	517.85 g | 18.27 oz
Environment	Operating Temperature	min. -40°C, max. +85°C | min. -40°F, max. +185°F
Housing	Case material	Metal
Surge Protection	Of Power Lines	Compliant to IEC 61000-4-2 (ESD) and IEC 61000-4-4 (fast transients)
	Of Data Lines	Compliant to IEC 61000-4-2 (ESD) and IEC 61000-4-4 (fast transients)

[5] Transient voltages above 53V will be suppressed.

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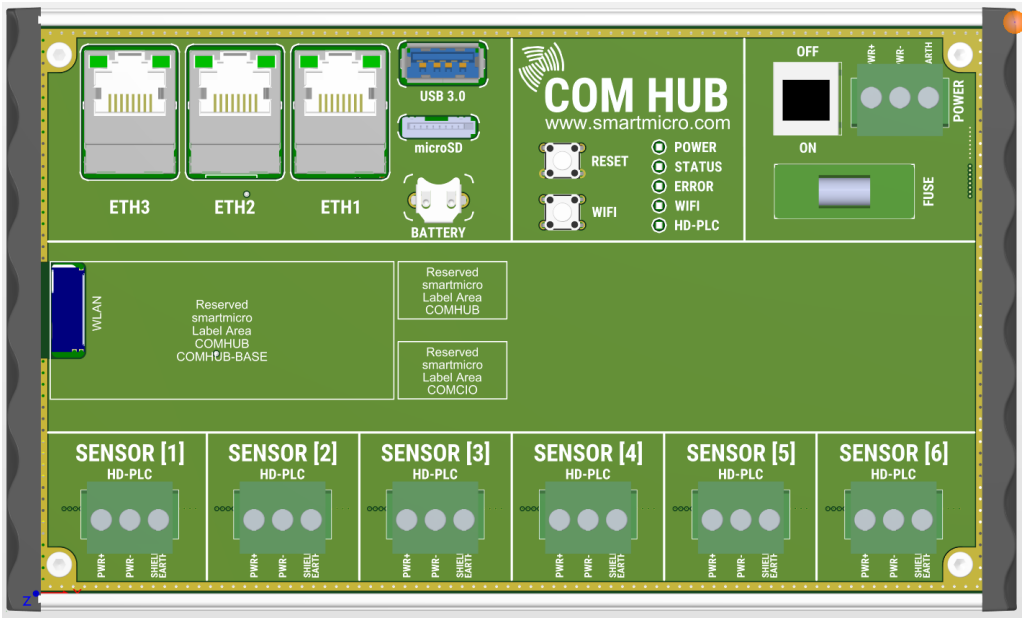
3.3 CONNECTORS

The COM HUB PLC Module has connectors for input power, sensors, and external modules.

External modules and user PC connectors

Input Power Connector

HD-PLC Connector



COM HUB PLC Module interface pin descriptions:

Connector	Pin No.	Function
Input Power Connector	1	Cabinet Earth
1x Pluggable terminal block 5mm	2	Negative Power Supply PWR-
Supported Cables AWG 24-12	3	Positive Power Supply PWR+
Sensor HD-PLC Connectors	1	Sensor PWR+
6x Pluggable terminal blocks 5mm	2	Sensor PWR-
Supported Cables AWG 24-12	3	Shield Earth
ETH1 RJ45 connector		External modules or user PC
ETH2 RJ45 connector		External modules or user PC
ETH3 RJ45 connector		External modules or user PC

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USB 3.0		
Micro SD		

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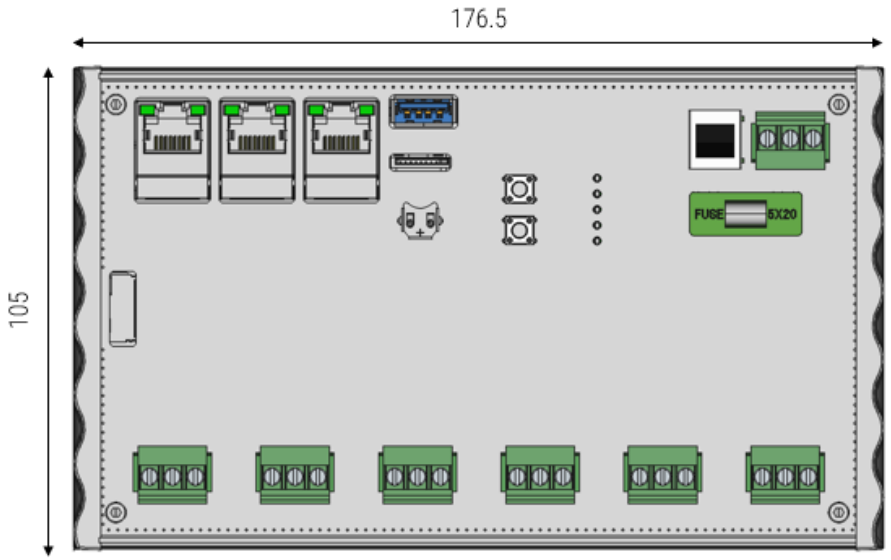
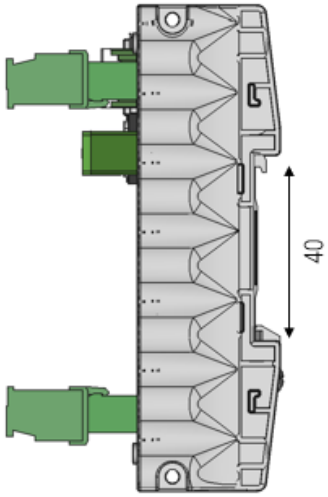
3.4 DIMENSIONS

All values are given in mm



Product Front Side



Product Right Side

Product Top Side

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4 COM HUB BASE

The COM HUB Base consists of a COM HUB PLC Module on a rail with power supply, circuit breaker, terminal blocks, and end brackets. It comes with power signals pre-wired from the factory.

- Circuit breaker
- Power supply
- Pre-wired power cables
- Terminal blocks for the main AC power supply
- DIN rail
- Grounding for all parts including the DIN rail

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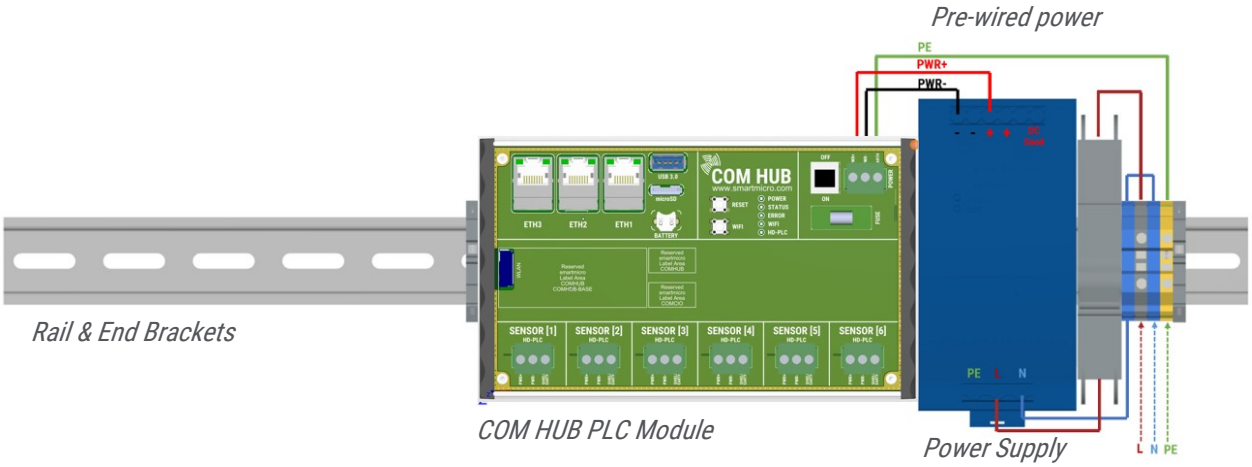

Connector	Pin No.	Function
Input power terminal blocks	L	Phase
Screw terminal blocks	N	Neutral
Supported Cables AWG 26-12	PE	Cabinet Earth
COM HUB PLC connectors	See section 3.3	

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4.1 COM HUB BASE CHARACTERISTICS

Parameter		Details
Power Supply Unit	Model	24-48V
	AC Input Voltage range	93-132/186-264VAC, single phase, auto select
	Input Frequency	47 - 63Hz
	Input Current (115/230VAC)	5A
	Overcurrent Protection (Type)	110 - 145%
	Output Voltage	48V
	Overvoltage Protection	60 - 69.6V
	LED Indicators	Green LED = On, Red LED = DC Output Low
	Operating Temperature	(-40...+71°C) | (-40...+160°F)
	Case Material	metal
	Mounting Type	DIN Rail TS 35/7.5 or TS 35/15
	Immunity	IEC 61000-4-2, -3, 4, -5, -6. -8, -11
Circuit Breaker Unit	Model	Phoenix Contact TMC 81C 05A
	Operating voltage	120 V AC (277 V AC)
	Rated current	5 A
	Operating Temperature	(-35...+74°C) | (-31...+158°F)
	Mounting type	DIN Rail TS 35
	Standards/specifications	UL 489 IEC 60947-2
Dimensions	Outline Dimensions (H/W/D)	500 x 125 x 126 mm | 19.68 x 4.92 x 4.96 in
	Weight	[133]g | [4,69]oz
COM HUB PLC Module	See section 0	

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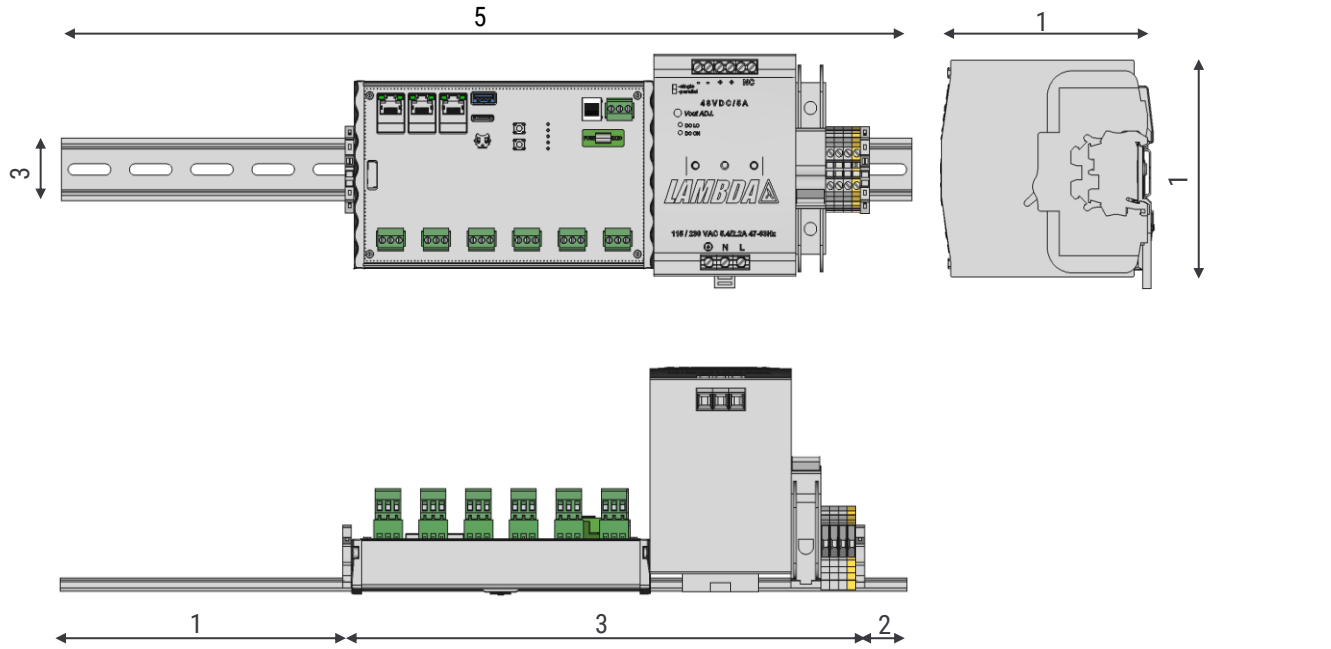
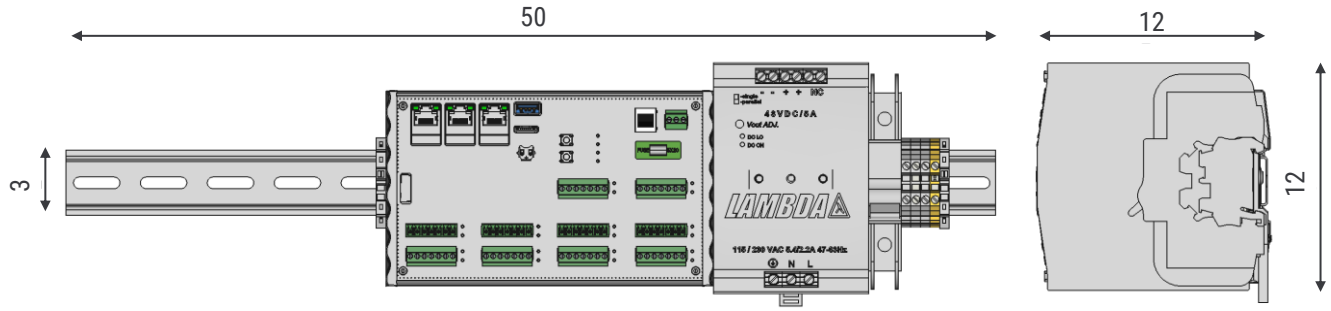
4.2 COM HUB BASE DIMENSIONS

All values are given in mm.



Product Front Side



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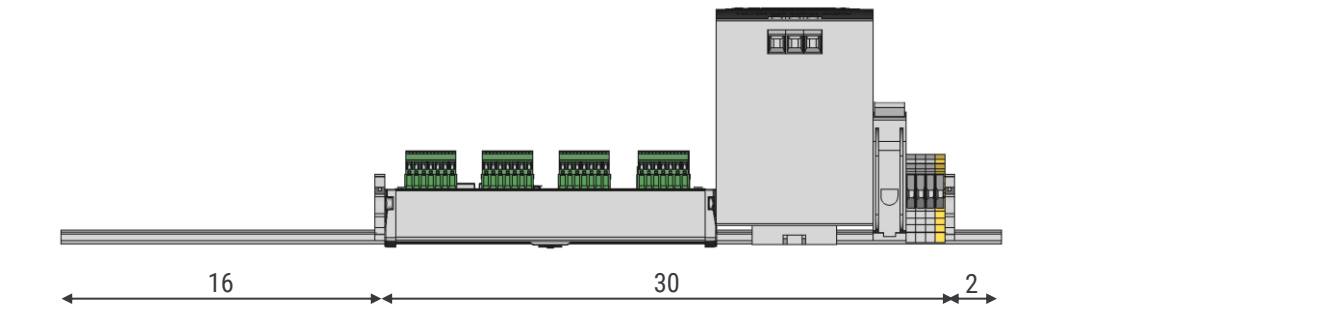

Product Top Side

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5 COM HUB PLC SYSTEM

Because the COM HUB PLC Module or the PLC J-BOX alone cannot be reasonable operated (no part can establish a communication without the other part), there must always be at least one COM HUB PLC Module and one PLC J-BOX, connected by a 3-wire cable.

This shall be referred to as COM HUB SYSTEM and this shall be tested w.r.t. conducted and radiated emissions and susceptibility, as well as further tests.

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6 DECLARATION OF CONFORMITY

6.1 DECLARATION OF CONFORMITY FOR USA

This device has been tested and found to comply with the requirements set forth in 47 CFR Part 15, Subpart 15B for both fundamental emissions and unwanted emissions. These limits are designed to provide reasonable protection against any harmful interference when the device is operated in a commercial environment.

Modifying the device without smartmicro's authorization may result in the device being no longer compliant with FCC requirements. In that event, your right to use the device may be limited by FCC regulations, and you may be required to correct any interference to radio or television communications at your own expense.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the device.

This device complies with the requirements set forth in 47 CFR Part 15 , Subpart 15 B which regulates everything from spurious emissions to unlicensed low-power broadcasting of Class B digital device and peripherals.

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6.1.1 FCC LABEL

Figure 4 Sample of FCC Label for COM HUB PLC Module

Figure 5: Sample of FCC Label for PLC J-BOX

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6.2 DECLARATION OF CONFORMITY FOR CANADA

6.2.1 DECLARATION OF CONFORMITY IN ENGLISH

This device complies with Industry Canada license-exempt RSS standard(s).

Operation is subject to the following two conditions:

(1) this device may not cause interference, and

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

IC Radiation Exposure Statement:

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with the minimum distance 20cm between the radiator & your body.

6.2.2 DÉCLARATION DE CONFORMITÉ EN FRANCAIS

Le present appareil est conforme aux CNR d'Industrie Canada applicables aus appareils radio exempts de licence. Léxploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisaeur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

DÉCLARATION D'EXPOSITION AUX RADIATIONS

Cet equipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cetéquipement doit être installé et utilisé avec un minimum de 20cm de distance entre la source de rayonnement et votre corps.

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6.2.3 INDUSTRY CANADA (IC) LABEL

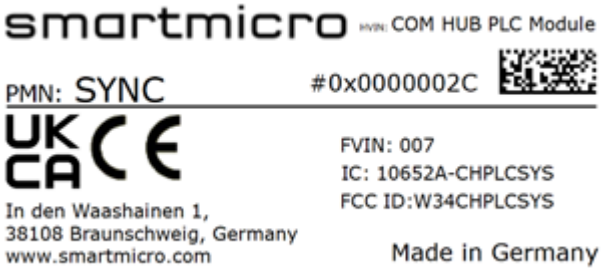

Figure 6 Sample of IC Label for COM HUB PLC Module

Figure 7: Sample of IC Label for PLC J-BOX

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