PRODUCT INFORMATION

TRAFFIC MANAGEMENT ACCESSORY

J-Boxes (Junction Boxes)

s.m.s, smart microwave sensors GmbH
In den Waashainen 1
38108 Braunschweig
Germany

Phone: +49 531 39023-0
Fax: +49 531 39023-599
info@smartmicro.de
www.smartmicro.com

CONTENT

1 USER SAFETY WARNING

Please read the entire document carefully before using the device.

INSTALLATION

Please pay attention to the details below before installing and connecting the device:

- Only use provided or approved equipment for the operation.
- Only skilled and instructed persons shall install and connect the device.
- All connectors are pin-coded and fit in only one position.
- Be cautious when using the device on or around active roadways and pay attention to moving traffic.
- Make sure that test procedures are in accordance with local safety policies and procedures as well as company practices.

OPERATION

Please note that the device is not waterproof unless it is attached to a sensor. Take care of proper rain coverage when working outside. Do not operate the device if the device itself or any cables are damaged.

Do not dispose waste electrical and electronic equipment in household trash.

TECHNICAL SERVICE

Only use provided or approved equipment for operation.

Do not attempt to service or repair this device:

- No user-maintainable parts are contained in the device.
- To avoid electrical shock, do not remove or open the cover.
- Unauthorized opening will void all warranties.
- smartmicro is not liable for any damages or harms caused by unauthorized attempts to open or repair the device.

2 PRODUCT SPECIFICATION

The smartmicro Junction Box (J-Box) offers a universal and easy-to-use field installation for connecting and surge protecting one of the following sensors to the home run cable.

- TRUGRD (UMRR-12 Type 48)
- TRUGRD Stream
- TRUGRD LR
- UMRR-11 Type 44
- UMRR-11 Type 45
- UMRR-11 Type 132

2.1 FEATURES

A J-Box offers the following features:

- Easy-to-use universal electrical interface through a terminal block
- Field installable: A simple screwdriver is sufficient to install the J-Box.
- Surge and lightning protection on all power and data lines compliant to IEC-61000 (see details below)
- Compatible with smartmicro brackets
- Robust: The J-Box is watertight (when attached to the sensor) and almost unbreakable.
- Captive screws
- Signal names printed on the circuit board

3 SIMPLE J-BOX

The Simple J-Box features a terminal block for RS485 and Power lines. It allows for RS485 connection, but no CAN connection and no Ethernet connection. If such other data links are required, please use the Full J-Box.

The terminal block has only 6 terminals allowing greater wire gauge compared to the Full J-Box.

Figure 1: Simple J-Box

3.1 SIMPLE J-BOX VARIANTS

The following variants are available:

J-Box Variant	Compatibility
Simple J-Box for TRUGRD Products[1]	TRUGRD TRUGRD LR
Simple J-Box for UMRR-11[2]	UMRR-11 Type 44 UMRR-11 Type 45 UMRR-11 Type 132

Table 1:SimpleJ-Box variants

[1] Current hardware: J-BOX-020502 Previously referred to as JBOX-020501.
[2] Current hardware: J-BOX-020402 : Previously referred to as JBOX-020401.

3.2 SIMPLE J-BOX SPECIFICATIONS

Parameter	Details
Mechanical	
Weight	180g | 6.34oz (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
Supported Cables	
Supported cable diameter	9-13mm | 0.35-0.51in (smaller diameter available on request)
Supported conductor cross section range	0.13-2.5mm² | 0.0002-0.0038in²
Recommended cable	Draka Cable UC300, Draka Cable UC900, Lapp UNITRONIC BUS YV COMBI IBS type 2170217
Surge Protection	
Surge protection of power lines	Compliant to IEC 61000-4-2 (ESD) and IEC 61000-4-4, Class 4 (fast transients)
Surge protection of data lines	Compliant to IEC 61000-4-2 (ESD) and IEC 61000-4-4, Class 4 (fast transients)
Further Information	
Operating temperature	-40…+80°C | -104…+176°F
Vibration	0.015 in DA (Nema TS2-Standards)
Shock	10 g's (Nema TS2-Standards)

Table 2: Simple J-Box specifications

3.3 SIMPLE J-BOX JUMPERS J1 AND J2

The jumpers J1 and J2 are bridges between pins 1 and 3 / pins 2 and 4 of the terminal block. Those bridges must be **open for full-duplex RS485** operation.

Note: Half-duplex RS485 is no longer used.

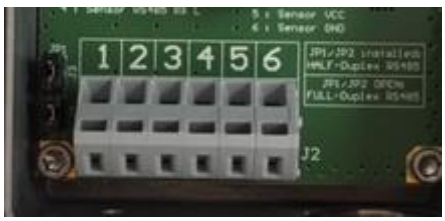

Figure 2: J3 and J4 determine RS485 full-/half-duplex operation

3.4 SIMPLE J-BOX PINOUT

Figure 3: Terminal block with pin numbering on PCB

Pin No.	Function
1	Sensor RS485 TX H[3]
2	Sensor RS485 TX L[4]
3	Sensor RS485 RX H
4	Sensor RS485 RX L
5	VCC
6	GND

Table 3: pinout of terminal block connector

[3] In half-duplex mode the pins 1 and 3 have to be hard-wired connected, use J1 and J2
[4] In half-duplex mode the pins 2 and 4 have to be hard-wired connected, use J1 and J2

4 FULL J-BOX

The Full J-Box features 2 terminal blocks: one for RS485 and Ethernet and the other for power.

Therefore, the terminal block for the communication bus has 8 terminals (4 for RS485 and 4 for Ethernet) allowing only smaller wire gauge compared to the Simple J-Box. However, the separate terminal for power has 2 terminals and can be wired with greater wire gauge.

Figure 4: Full J-Box

4.1 FULL J-BOX VARIANTS

The following variants are available:

J-Box Variant	Compatibility
Full J-Box for TRUGRD Products[5]	TRUGRD TRUGRD Stream TRUGRD LR
Full J-Box for UMRR-11[6]	UMRR-11 Type 44 UMRR-11 Type 45 UMRR-11 Type 132

Table 4:Full J-Box variants

[5] hardware with CAN: JBOX-010501. Current hardware: J-BOX-030100
[6] hardware with CAN: JBOX-010401 Current hardware: J-BOX-030000

4.2 FULL J-BOX SPECIFICATIONS

Parameter	Details
Mechanical	
Weight	180g | 6.34oz (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
Supported Cables	
Supported cable diameter	9-13mm | 0.35-0.51in (smaller diameter available on request)
Supported conductor cross section range	0.08-0.5mm² | 0.00012-0.00077in²
Recommended cable	MEDI #KU110C12J002
Surge Protection	
Surge protection of power lines	Compliant to IEC 61000-4-2 (ESD) and IEC 61000-4-4, Class 4 (fast transients)
Surge protection of data lines	Compliant to IEC 61000-4-2 (ESD) and IEC 61000-4-4, Class 4 (fast transients)
Further Information	
Operating temperature	-40…+80°C | -104…+176°F
Vibration	0.015 in DA (Nema TS2-Standards)
Shock	10 g's (Nema TS2-Standards)

Table 5: Full J-Box specifications

4.3 FULL J-BOX PINOUT

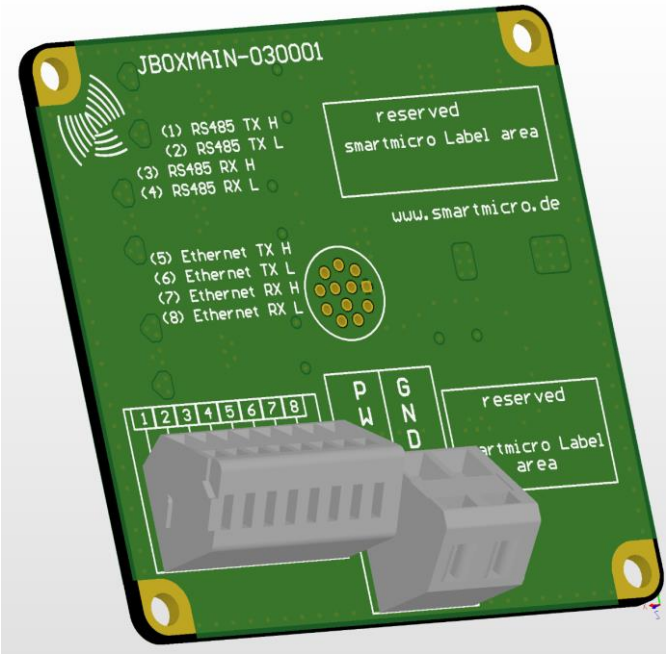

Figure 5: Terminal blocks with pin numbers

Pin No.	Function	Wire Color (MEDI type #KU110C12J001)
1	**Sensor RS485 TX H**	**white**
2	Sensor RS485 TX L	pink
3	**Sensor RS485 RX H**	**gray**
4	Sensor RS485 RX L	brown
5	Sensor Ethernet TX H	gray / red
6	**Sensor Ethernet TX L**	**red / blue**
7	Sensor Ethernet RX H	black
8	**Sensor Ethernet RX L**	**purple**
GND	Sensor GND	blue
PWR	**Sensor VCC**	**red**

Table 6: Pinout of 2 terminal block connectors

5 - PLC J-BOX

The PLC J-Box must be used in combination with COM HUB Sync PLC. It converts the 4-wire standard Ethernet communication to a high-definition powerline (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 from the cabinet side (usually through COM HUB).

Figure 6: PLC J-Box

5.1 PLC J-BOX 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
Supported Cables	
Supported cable diameter	6-9mm | 0.23-0.35in
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 6803SD with ferrite (Würth snap-on ferrit 74275815) See section 5.4
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, Class 4 (power surges and lightning)
Further Information	
Operating temperature	-34…+74°C | -29…+165°F
Vibration	0.015 in DA (Nema TS2-Standards)
Shock	10 g (Nema TS2-Standards)

Table 7: PLC J-Box specifications

5.2 PLC J-BOX PINOUT

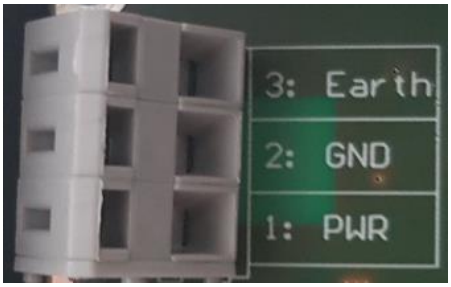

Figure 7: Terminal block with pin numbers of the PLC J-Box

Pin No.	Function
1	Power
2	Ground
3	Earth

Table 8: Pinout of terminal block connector

5.3 PLC J-BOX VARIANTS

The following variants are available:

J-Box Variant	Compatibility
PLC J-Box for TRUGRD Products[7]	TRUGRD TRUGRD Stream TRUGRD LR
PLC J-Box for UMRR-11[8]	UMRR-11 Type 44 UMRR-11 Type 45 UMRR-11 Type 132

Table 9: PLC J-Box variants

5.4 Wiring recommendation

The cables between PLC J-Box and COM HUB Sync PLC should be Advanced Digital Cable PVC/Nylon 18AWG, Part Number 6803SD.

[7] Current hardware: J-BOX-040302 ,.
[8] Current hardware: J-BOX-040202.

On the cable next to the PLC J-Box (see picture below), one snap-on ferrite Würth 74275815 should be used, in order to reduce the cable radiated emissions.

Figure 8: Ferrites on the PLC J-Box side

6 GENERAL INFORMATION

6.1 J-BOX 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.

6.2 ATTACHMENT TO SENSOR

The 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 J-Box. The following picture explains the position of all threaded holes available on the rear side of the sensor.

Figure 9: Threaded holes on the rear side of the sensor

7 COMPLIANCES

The PLC J-Box and J-Box complies with the following EU directives:

- EMC 2014/30/EU
- Safety 2014/35/EU
- RoHS 2011/65/EU
- EC 1907/2006 REACH

Applied standards:

- EMC:
  - EN IEC 61000-6-2:2005
  - EN IEC 61000-6-3:2007+A1:2011 + AC:2012
- Health and Safety:
  - EN 62368-1: 2014 + AC: 2015

According to the surge protection, the COM HUB SYNC PLC complies also with the following regulations:

- IEC 61000-4-2 (ESD)
- IEC 61000-4-4 (fast transients)
- IEC 61000-4-5 (Surges)

With regard to operating conditions like temperature, vibration etc., the COM HUB SYNC PLC was tested and certified by independent test labs to comply with:

  - NEMA TS-2

Regarding spectrum usage, this sensor model was tested and certified by independent test labs (formally approved by a test lab or notified body):

- EU EMC directive
- 47 CFR FCC Part 15 B
- ICES 003

Note: This statement of compliance means that the PLC J-Box allows operation compliant to the listed standards. However, not all standards are certified through test labs. Formal frequency approval or registration is not accomplished for all countries. In certain countries or regions, a customer-specific local frequency approval is reasonable. smartmicro supports customers throughout this process.

8 LEGAL DISCLAIMER NOTICE

All products, product specifications and data in this document may be subject to change without notice to improve reliability, function or otherwise.

Not all products and/or product features may be available in all countries and regions. For legal reasons features may be deleted from products or smartmicro may refuse to offer products. Statements, technical information and recommendations contained herein are believed to be accurate as of the stated date. smartmicro disclaims any and all liability for any errors, inaccuracies or incompleteness contained in this document or in any other disclosure relating to the product.

To the extent permitted by applicable law, smartmicro disclaims (i) any and all liability arising out of the application or use of the product or the data contained herein, (ii) any and all liability of damages exceeding direct damages, including - without limitation - indirect, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of the suitability of the product for particular purposes.

Statements regarding the suitability of products for certain types of applications are based on smartmicro's knowledge of typical requirements that are often placed on smartmicro products in generic/general applications. Statements about the suitability of products for a particular/specific application, however, are not binding. It is the customer's/user's responsibility to validate that the product with the specifications described is suitable for use in the particular/specific application. Parameters and the performance of products may deviate from statements made herein due to particular/specific applications and/or surroundings. Therefore, it is important that the customer/user has thoroughly tested the products and has understood the performance and limitations of the products before installing them for final applications or before their commercialization. Although products are well optimized to be used for the intended applications stated, it must also be understood by the customer/user that the detection probability may not be 100% and that the false alarm rate may not be zero.

The information provided, relates only to the specifically designated product and may not be applicable when the product is used in combination with other materials or in any process not defined herein. All operating parameters, including typical parameters, must be validated for each application by the customer's/user's technical experts. Customers using or selling smartmicro products for use in an application which is not expressly indicated do so at their own risk.

This document does not expand or otherwise modify smartmicro's terms and conditions of purchase, including but not being limited to the warranty. Except as expressly indicated in writing by smartmicro, the products are not designed for use in medical, life-saving or life-sustaining applications or for any other application in which the failure of the product could result in personal injury or death.

No license, expressed or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of smartmicro. Product names and markings noted herein may be trademarks of their respective owners.

Please note that the application of the product may be subject to standards or other regulations that may vary from country to country. smartmicro does not guarantee that the use of products in the applications described herein will comply with such regulations in any country. It is the customer's/user's responsibility to ensure that the use and incorporation of products comply with regulatory requirements of their markets.

If any provision of this disclaimer is, or is found to be, void or unenforceable under applicable law, it will not affect the validity or enforceability of the other provisions of this disclaimer.