Project Documentation | JBOX - Junction Box

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1 User Safety Warning Information

Read the instructions carefully before you start to work.

Installation
Please observe the following advices when installing and connecting JBOXes to the sensors:

- Only use provided or approved equipment for installation. Use screws with metric thread M3x8.
- Only skilled and instructed persons shall install and connect the devices. Proper experience in working with mains voltage, electrical and electronic devices is required.
- Don't wire any connections while power is applied to the device.
- Ground the devices carefully to prevent electrical shock.
- The connector to the sensor is pin-coded and fits in only one position. Also note the arrows indicating the top side of sensor and JBOX.
- After the JBOX is connected to the sensor, don't turn or twist it until all screws are tightened as this may damage the connector.
- Only use fully functional equipment (ladders, aerial work platform, …) when working above ground. Staff shall be capable of working at heights.
- Use caution when installing the devices on or around active roadways. Pay attention to moving traffic.
- Mount the devices carefully to prevent them from shifting or dropping.
- Make sure that your installation methods are in accordance with local safety policy and procedures and company practices.

Technical service
Only use provided or approved equipment for operation.
Persons other than authorized and approved electrical technicians shall NOT attempt to connect this unit to a power supply, Traffic Management Interface Board and/or other controllers, as there is a risk of electrical shock by unsafe handling of the power source.
Do not attempt to service or repair this unit.

- No user-maintainable parts are contained within 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.

Operation
Using a JBOX does not influence sensor performance.
Do not operate the device if the device itself or any cables are damaged. The JBOXes are designed to work under different environment conditions (temperature, rain, dust, …). Regular maintenance such as cleaning or recalibration is not required.

2 Data Sheet

The Smartmicro **Junction Box** offers a universal and easy to use field installable way of connecting and surge protecting a UMRR-0A or UMRR-0C or UMRR-0F radar to the home run cable.

2.1 Features

- Provides an **easy-to-use** universal electrical interface through a terminal block.
- **Field installable**: A simple screwdriver is sufficient to install the Junction Box.
- **Surge Protection**: The Junction Box features protection for power, CAN and RS485 communication wires.
- **Robust**: The Junction Box is watertight and almost unbreakable.
- Gen. 01 and Gen. 02 Junction boxes feature
    - Captive screws
    - Signal names printed on PCB
    - Jumpers to determine RS485 full or half duplex operation[1]
- Versions for **all UMRR-0A and UMRR-0F and UMRR-11 models** available.
- Versions for **UMRR-0C** require HOUSING-070707 or compatible.
- Integrates into smartmicro's BRACKETs.

[1] UMRR hardware has to offer both options, check UMRR datasheet.

3 Junction Box for UMRR-0A sensors

Figure 1: Junction Box JBOX-000000 with attached Lapp cable

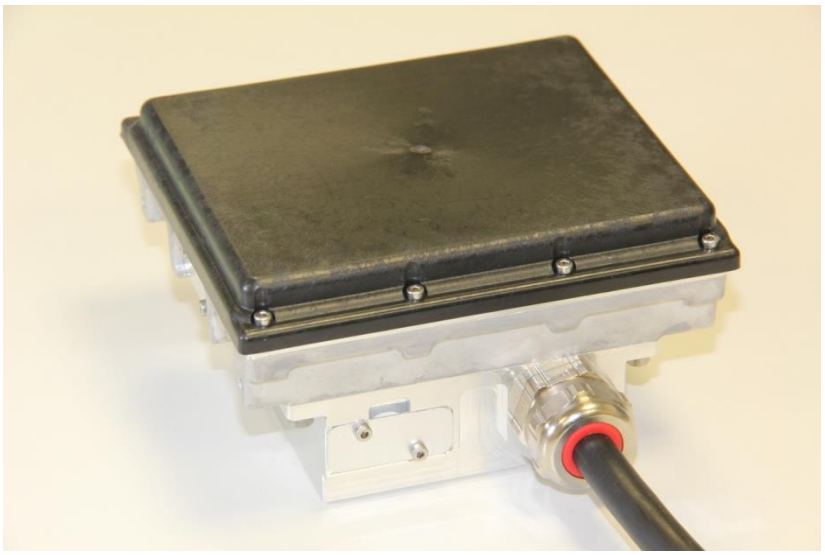

Figure 2: Junction Box JBOX-000000 with attached Sensor

3.1 Specifications

Model No.	JBOX-000000 / JBOX-000100
Mechanical	
Weight	183 g, excluding cable.
Height	79.8 mm excluding cable outlet ca. 116 mm including cable outlet
Width	84 mm
Depth	29 mm
Supported Cables	
Supported cable diameter	9 mm – 13 mm (smaller diameter available on request)
Supported conductor cross section range	0.13 mm^2 – 2.5 mm^2
Recommended cable	Lapp cable UNITRONIC BUS IBS Yv COMBI type 2170217 or MEDI no. 9DB280431
Surge Protection	
Surge protection of power lines	Compliant to IEC 61000-4-2 (ESD) and IEC 61000-4-4 (fast transients)
Surge protection of data lines	Compliant to IEC 61000-4-2 (ESD) and IEC 61000-4-4 (fast transients)

Table 1: JBox Gen. 00 specifications

3.2 Pinout

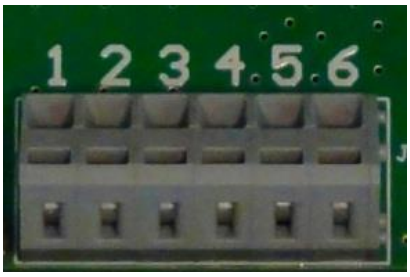

Figure 3: Terminal block with "pin" numbers

Pin No.	Function	Wire Color (Lapp type 2170217)	Wire Color (MEDI type #9DB280431)
1	CAN H	green	green
2	CAN L	yellow	yellow
3	Sensor RS485 TX/RX High	gray	gray
4	Sensor RS485 TX/RX Low	pink	pink
5	Sensor_VCC	red	red
6	Sensor_GND	blue	blue

Table 2: pinout of terminal block connector

3.3 Variants

See **Table 3** for a list of Junction Box variants and the sensor types they support.

Junction Box variant	Supported UMRR-0A
JBOX-000000	Type 29 Type 31
JBOX-000100	Type 30 Type 32 (with Housing-070602)

Table 3: Junction Box Gen 00 variants

3.4 Recommended Cable

Lapp cable UNITRONIC BUS IBS Yv COMBI type 2170217.

4 SIMPLE Junction Box for UMRR-0C, UMRR-0F and UMRR-11 sensors

The Junction Box Gen. 02 features a terminal block for RS485 and Power lines. The terminal block has only 6 terminals allowing greater wire gauge than the FULL Junction Box.

If other data lines are required, use the FULL Junction Box Gen. 01.

Figure 4: Junction Box JBOX- 02xxxx

4.1 Specifications

Model No.	**JBOX-02xxxx**
Mechanical	
Weight	180 g, excluding cable.
Height	79.8 mm excluding cable outlet ca. 116 mm including cable outlet
Width	84 mm
Depth	29 mm
Supported Cables	
Supported cable diameter	9 mm – 13 mm (smaller diameter available on request)
Supported conductor cross section range	0.13 mm^2 – 2.5 mm^2
Recommended cable	MEDI #KU110C12J002
Surge Protection	
Surge protection of power lines	Compliant to IEC 61000-4-2 (ESD) and IEC 61000-4-4 (fast transients)
Surge protection of data lines	Compliant to IEC 61000-4-2 (ESD) and IEC 61000-4-4 (fast transients)

Table 4: JBox Gen. 02 specifications

4.2 Jumpers J1 and J2

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, and must be **closed for half-duplex RS485**.

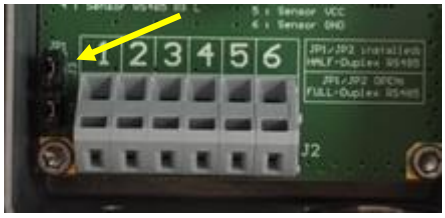

Figure 5: J3 and J4 determine RS485 full/half duplex operation

Please note J1 and J2 are open or closed depending on order code**.** Check **Table 6.**

4.3 Pinout

Figure 6: Terminal block with "pin" numbers

Pin No.	Function	Wire Color (MEDI type #KU110C12J001)
1	Sensor RS485 TX H[2]	white
2	Sensor RS485 TX L[3]	brown
3	Sensor RS485 RX H	gray
4	Sensor RS485 RX L	pink
5	VCC	red
6	GND	blue

Table 5: pinout of terminal block connector

4.4 Variants

See **Table 6** for a list of Junction Box variants and the sensor types they support.

Junction Box variant	Supported UMRR-0C	Supported UMRR-0F	Supported UMRR-11
JBOX-020000	none	Type 29 Type 31	none
JBOX-020100	none	Type 30	none
JBOX-020400	none		Type 44 Type 45
JBOX-020500	Type 39 Type 40 Type 42 Type 43		none

Table 6: Junction Box Gen 02 variants

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

5 FULL Junction Box for UMRR-0C, UMRR-0F and UMRR-11 sensors

Figure 7: Junction Box JBOX-010001 inner view

Figure 8: Junction Box JBOX-010001 outer view

5.1 Specifications

Model No.	**JBOX-010001 / JBOX-010101 / JBOX-010501**
Mechanical	
Weight	180 g, excluding cable.
Height	79.8 mm excluding cable outlet ca. 116 mm including cable outlet
Width	84 mm
Depth	29 mm
Supported Cables	
Supported cable diameter	9 mm – 13 mm (smaller diameter available on request)
Supported conductor cross section range	0.08 mm^2 – 0.5 mm^2
Recommended cable	MEDI #KU110C12J002
Surge Protection	
Surge protection of power lines	Compliant to IEC 61000-4-2 (ESD) and IEC 61000-4-4 (fast transients)
Surge protection of data lines	Compliant to IEC 61000-4-2 (ESD) and IEC 61000-4-4 (fast transients)

Table 7: JBox Gen. 01 specifications

5.2 Jumpers J3 and J4

J3 and J4 are bridges between pins 3 and 5 / pins 4 and 6 of the terminal block. Those bridges must be **open for full duplex RS485** operation, and must be **closed for half-duplex RS485**.

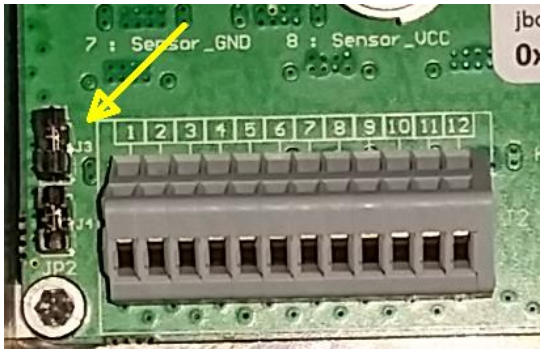

Figure 9: J3 and J4 determine RS485 full/half duplex operation

Please note J3 and J4 are open or closed depending on order code**.** Check **Table 10.**

5.3 Pinout

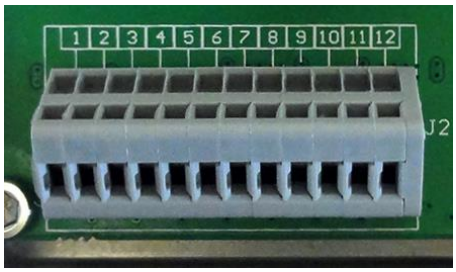

Figure 10: Terminal block with "pin" numbers

Pin No.	Function	Wire Color (MEDI type #KU110C12J001)
1	Sensor Ethernet TX H	gray / red
2	Sensor Ethernet TX L	red / blue
3	Sensor RS485 TX/RX L	pink
4	Sensor RS485 TX/RX H	gray
5	connect to pin 3[4]	brown
6	connect to pin 4[5]	white
7	Sensor_GND	blue
8	Sensor_VCC	red
9	Sensor Ethernet RX L	black
10	Sensor Ethernet RX H	purple
11	CAN H	green
12	CAN L	yellow

Table 8: pinout of terminal block connector (half-duplex/2-wire RS485, UMRR-0F products)

Pin No.	Function	Wire Color (MEDI type #KU110C12J001)
1	Sensor Ethernet TX H	gray / red
2	Sensor Ethernet TX L	red / blue
3	Sensor RS485 RX L	pink
4	Sensor RS485 RX H	gray
5	Sensor RS485 TX L	brown
6	Sensor RS485 TX H	white
7	Sensor_GND	blue
8	Sensor_VCC	red
9	Sensor Ethernet RX L	black
10	Sensor Ethernet RX H	purple
11	CAN H	green
12	CAN L	yellow

Table 9: pinout of terminal block connector (full-duplex/4-wire RS485, UMRR-0C and UMRR-11 products)

[4] In half-duplex mode the pins 3 and 5 has to be hard-wired connected, use J3 and J4
[5] In half-duplex mode the pins 4 and 6 has to be hard-wired connected, use J3 and J4

5.4 Variants

See **Table 10** for a list of Junction Box variants and the sensor types they support.

Junction Box variant	Supported UMRR-0C	Supported UMRR-0F	Supported UMRR-11
JBOX-010001	none	Type 29 Type 31	none
JBOX-010101	none	Type 30	none
JBOX-010401	none		Type 44 Type 45
JBOX-010501	Type 39 Type 40 Type 42 Type 43		none

Table 10: Junction Box Gen 01 variants

6 General Information

6.1 JBOX Grounding Requirements

Neither the housing of the UMRR sensor nor the JBOX is electrically floated but connected to the negative supply voltage instead. To assure correct operation of the sensor, please refer to the grounding requirements described in UMRR_Traffic_Sensor_Grounding_Requirements.pdf.

6.2 Fixation

The JBOX will be attached to the UMRR sensor using the threaded holes on the back of the sensor. Please consider this in case that you design your own bracket or integrate the sensor in another housing. The threaded holes **on the sides** of the sensor are intended for the fixation of the sensor instead.

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