

# HSPA+ Industrial Router

## UR5i v2

### USER MANUAL



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## Used symbols



*Danger* – Information regarding user safety or potential damage to the router.



*Attention* – Problems that can arise in specific situations.



*Information, notice* – Useful tips or information of special interest.

## GPL licence

Source codes under GPL licence are available free of charge by sending an email to:

techSupport@advantech-bb.com.

Please see <http://ep.advantech-bb.cz/devzone> for more information.



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# 1. Safety Instructions



**Please, observe the following instructions:**

- The router must be used in compliance with all applicable international and national laws and in compliance with any special restrictions regulating the utilization of the router in prescribed applications and environments.
- To prevent possible injury and damage to appliances and to ensure compliance with all relevant provisions, use only the original accessories. Unauthorized modifications or the use of unapproved accessories may result in damage to the router and/or a breach of applicable regulations. Unauthorized modifications or use of unapproved accessories may void the warranty.
- The router can not be opened.
- Turn off the router and disconnect it from power supply before handling the SIM card.
- **Caution!** The SIM card could be swallowed by small children.
- Input voltage must not exceed 36 V DC max.
- Do not expose the router to extreme ambient conditions. Protect the router against dust, moisture and high temperature.
- Only routers with appropriate certification and labelling should be used in locations where flammable and explosive materials are present, including gas stations, chemical plants, or locations in which explosives are used. We remind users of the duty to observe the restrictions concerning the utilization of radio devices at such places.
- Switch off the router when traveling by plane. Utilization of the router on a plane may endanger the operation of the plane or interfere with the mobile telephone network, and may be unlawful. Failure to observe these instructions may result in the suspension or cancellation of telephone services for the respective client and/or may result in legal sanctions.
- When using the router in close proximity to personal medical devices, such as cardiac pacemakers or hearing aids, you must proceed with heightened caution.
- The router may cause interference when used in close proximity to TV sets, radio receivers or personal computers.
- It is recommended that you create an appropriate copy or backup of all important settings that are stored in the memory of the device.



## 2. Product Disposal Instructions

The WEEE (Waste Electrical and Electronic Equipment: 2012/19/EU) directive was introduced to ensure that electrical/electronic products are recycled using the best available recovery techniques in order to minimize impact on the environment. This product contains high quality materials and components which can be recycled. At the end of its life this product **MUST NOT** be mixed with other commercial waste for disposal. The device contains the battery. Remove the battery from the device before disposal. The battery in the device needs to be disposed apart accordingly. Check the terms and conditions of your supplier for disposal information.

### 3. Router Description

3G UMTS/HSPA router UR5i v2 is used to wirelessly connect various equipments and devices via Ethernet interface 10/100 to the internet or intranet. Thanks to high data transfer speed of up to 14,4 Mbps (download) and upload speed up to 5,76 Mbps it is an ideal wireless solution for traffic and security camera systems, individual computers, LAN networks, automatic teller machines (ATM) and other self-service terminals, etc.

As a standard, this exceptionally fast 3G router UR5i v2 is equipped with one Ethernet 10/100, one USB Host port, one binary input/output (I/O) port and one SIM card. To save and backup communication data a version with two SIM cards is available. The wide range of interface options of the 3G router further expands expansion Port1 and Port2, which are selected by the customer. For Port1 are available: Ethernet port 10/100, serial interface ports RS232, RS485, RS422, MBUS or inputs/outputs (I/O – CNT). Port2 may be equipped with serial interfaces RS232, RS485, RS422, MBUS, wireless interfaces WIFI or WMBUS, SDH expansion port or inputs/outputs (I/O – CNT). Both of ports can be fitted with internal switch (exp. port SWITCH). This 3G wireless router is supplied either in a plastic or metal casing, based on the requirements of the customer.

Configuration is done via web interface protected by password. The router supports creation of VPN tunnels using technologies IPsec, OpenVPN and L2TP to ensure safe communication. Web interface provides detail statistics about the 3G router activities, signal strength, detailed log, etc. Cellular router supports functions: DHCP, NAT, NAT-T, DynDNS, NTP, VRRP, control by SMS and many other function.

Other diagnostic functions ensuring continuous communication include automatic inspection of PPP connection offering an automatic restart feature – in case of connection losses, or hardware watchdog which monitors the status of the router. With the help of a special window (start up script window) you may insert Linux scripts for various actions. For some applications the key option to create several different configurations for one 3G cellular router, the so-called profiles (maximum of 4), and the option to switch between them (for example via SMS, binary input status, etc.) is essential. Cellular routers may automatically upgrade configuration and firmware from server. This allows mass reconfiguration of many routers in one time.

The router also supports additional software like R-SeeNet for permanent traffic monitoring of routers or communication VPN server Digicluster.



#### Examples of possible applications

- mobile office
- fleet management
- security system
- telematic
- telemetric
- remote monitoring
- vending and dispatcher machines

## 4. Contents of Package



Basic delivered set of router includes:

- router,
- power supply,
- crossover UTP cable,
- up to three external antennas,
- clip for the DIN rail,
- paper start guide.



Figure 1: Contents of package



Temperature range for power supply is reduced to 0 °C to +40 °C!

As optional accessories can also be supplied the following expansion ports (one for Basic version or two for Full version):

- RS232, RS485/422, MBUS, ETHERNET, CNT, SWITCH, WIFI, WMBUS or SDH.
- Separation columns for mounting expansion boards are included.

## 5. Router Design

### 5.1 Router versions

UR5i v2 router is supplied in the following versions (see table below). All versions are available in plastic or metal box according to customer requirements.

| Router versions | Router Box | SIM1 | SIM2 | I/O | USB | PORT1 | PORT2 | ETH |
|-----------------|------------|------|------|-----|-----|-------|-------|-----|
| UR5i v2B        | Plastic    | 1 x  |      | 1 x | 1 x | 1 x   |       | 1 x |
| UR5i v2B SL     | Metal      | 1 x  |      | 1 x | 1 x | 1 x   |       | 1 x |
| UR5i v2F        | Plastic    | 1 x  | 1 x  | 1 x | 1 x | 1 x   | 1 x   | 1 x |
| UR5i v2F SL     | Metal      | 1 x  | 1 x  | 1 x | 1 x | 1 x   | 1 x   | 1 x |

Table 1: Router versions



Figure 2: Front panel UR5i v2B

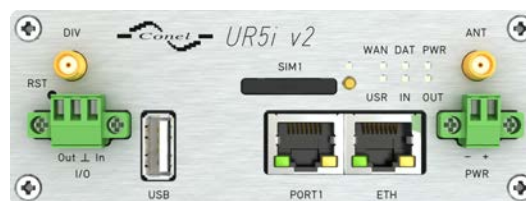


Figure 4: Front panel UR5i v2B SL



Figure 3: Front panel UR5i v2F

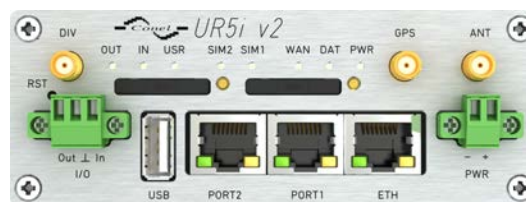


Figure 5: Front panel UR5i v2F SL

## 5.2 Delivery identification

| Trade name  | Order code <sup>1</sup> | Description                      |
|-------------|-------------------------|----------------------------------|
| UR5i v2B    | BB-UR2B61v01y-zzzz      | Basic version in the plastic box |
| UR5i v2B SL | BB-UR2B61v02y-zzzz      | Basic version in the metal box   |
| UR5i v2F    | BB-UR2F61vw1y-zzzz      | Full version in the plastic box  |
| UR5i v2F SL | BB-UR2F61vw2y-zzzz      | Full version in the metal box    |

Table 2: Delivery identification

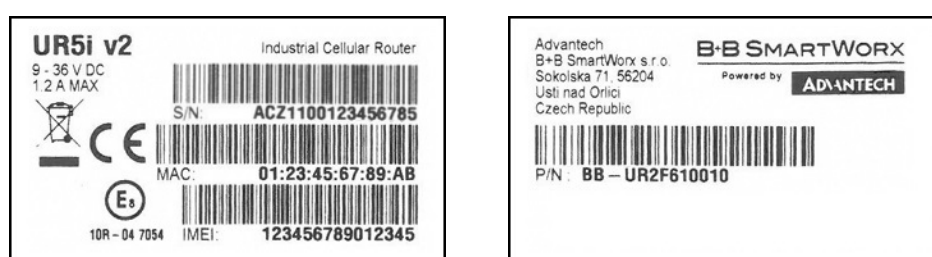


Figure 6: Label examples

<sup>1</sup>Order codes are described in detail in a separate chapter.

## 5.3 Order codes

### 5.3.1 Order code structure

Order code for **basic** version has following structure:

**BB-UR2B61v0xy-zzzz**, where:

- v** = port #1,
- x** = type of router box,
- y** = type of power supply,
- z** = specific variation.

Order code for **full** version has following structure:

**BB-UR2F61vwxy-zzzz**, where:

- v** = port #1,
- w** = port #2,
- x** = type of router box,
- y** = type of power supply,
- z** = specific variation.

#### Letter "v" – port #1

| Port type | Letter "v" incode |
|-----------|-------------------|
| none      | 0                 |
| ETH       | 1                 |
| RS232     | 2                 |
| RS485     | 3                 |
| RS422     | 4                 |
| MBUS      | 5                 |
| CNT       | 6                 |
| SWITCH    | 9 <sup>2</sup>    |

Table 3: Type of port #1

<sup>2</sup>Occupies both, port #1 and port #2. Available for full version only.

## Letter "w" – port #2

| Port type | Letter "w" in code |
|-----------|--------------------|
| none      | 0                  |
| RS232     | 2                  |
| RS485     | 3                  |
| RS422     | 4                  |
| MBUS      | 5                  |
| CNT       | 6                  |
| WiFi      | 7                  |
| WMBUS     | 8                  |
| SDH       | 9                  |

Table 4: Type of port #2

## Letter "x" – type of the router box

| Type of router box | Letter "x" in code |
|--------------------|--------------------|
| Plastic            | 1                  |
| Metal              | 2                  |

Table 5: Type of router box

## Letter "y" – type of the power supply

| Type of power supply | Letter "y" in code |
|----------------------|--------------------|
| none                 | 0                  |
| Europe               | 1                  |
| UK & Ireland         | 2                  |
| Australia            | 3                  |
| USA                  | 4                  |

Table 6: Type of power supply

## Letter "z" – specific variation

| Variation                                                                                | Letter "z" in code |
|------------------------------------------------------------------------------------------|--------------------|
| basic variation                                                                          | not specified      |
| v2F3 (2x SMA, 1x R-SMA: ANT + GPS + WiFi, router does not have diversity antenna)        | -3                 |
| v2F4 (2x SMA, 1x R-SMA: ANT + DIV + WMBUS, router has R-SMA antenna connector for WMBUS) | -4                 |
| v2F5 (3x SMA: ANT + GPS + WiFi, router does not have diversity antenna)                  | -5                 |
| v2F3 (ANT + GPS + WiFi - RSMA version) & SmartWorx HUB                                   | -3SWH              |
| v2F4 (ANT + DIV + WMBUS - RSMA version) & SmartWorx HUB                                  | -4SWH              |
| v2F5 (ANT + GPS + WiFi - SMA version) & SmartWorx HUB                                    | -5SWH              |
| SmartWorx HUB                                                                            | -SWH <sup>3</sup>  |

Table 7: Specific variation

## 5.3.2 Order code examples

Examples of order codes are listed in the table below:

| Order code    | Features – interfaces                                                          | Box     | Power supply |
|---------------|--------------------------------------------------------------------------------|---------|--------------|
| BB-UR2B610010 | HSPA+ module – 1x SIM reader, 1x ETH, 1x USB, 1x I/O,                          | plastic | none         |
| BB-UR2B611021 | HSPA+ module – 1x SIM reader, 2x ETH, 1x USB, 1x I/O                           | metal   | Europe       |
| BB-UR2F614710 | HSPA+ module – 2x SIM reader, 1x ETH, 1x USB, 1x I/O, 1x RS422, WiFi           | plastic | none         |
| BB-UR2F616322 | HSPA+ module – 2x SIM reader, 1x ETH, 1x USB, 1x I/O, 1x CNT (4x BI), 1x RS485 | metal   | UK & Ireland |

Table 8: Order code examples



You can use the order codes configurator on the [www.bb-smartcellular.eu](http://www.bb-smartcellular.eu) webpages.

<sup>3</sup>The only option for basic version.

## 5.4 Basic dimensions of the router box

### 5.4.1 Plastic box

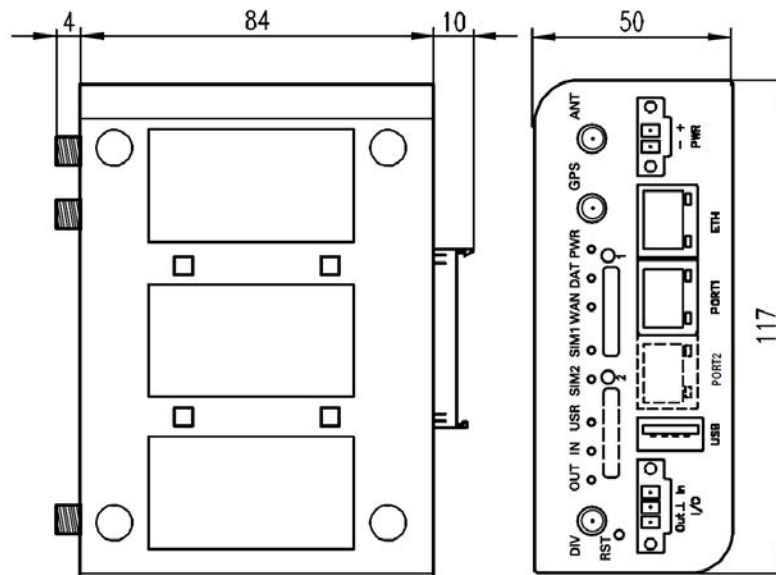


Figure 7: Basic dimensions of plastic box (bottom and front view)

### 5.4.2 Metal box

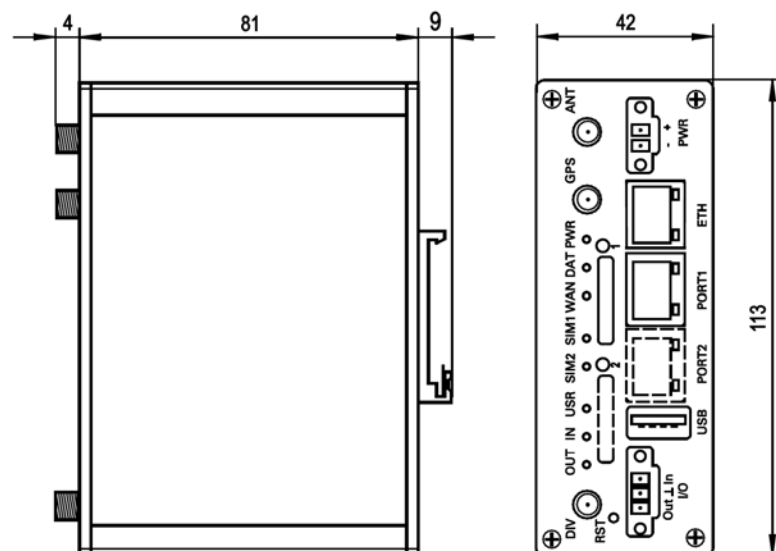


Figure 8: Basic dimensions of metal box (bottom and front view)

## 5.5 Mounting recommendations

- possibility to be put on a work surface,
- DIN rail EN 60715 with included plastic or metal clip.

For the most of applications with a built-in router in a switch board it is possible to recognize two kinds of environments:

- no public and industry environment of low voltage with high interference,
- public environment of low voltage without high interference.

For both of these environments it is possible to mount router to a switch board, the following there is no need to have examination immunity or issues in connection with EMC according to EN 60439-1 ed.2:00 + A1:04.



**Attention:** If the negative pole of the router is grounded, there is no protection against reversed polarity!



Compliance of EN 60439-1 ed.2:00 + A1:04 specification it is necessary to observe next assembly of the router to the switch – board:

- For whip antennas we recommend to observe a distance of 6 cm from cables and metal surfaces on every side due to the elimination of interference. While using an external antenna except for the switch-board it is necessary to fit a lightening conductor.
- Before mounting a router on sheet-steel we recommend using a "cable" antenna.

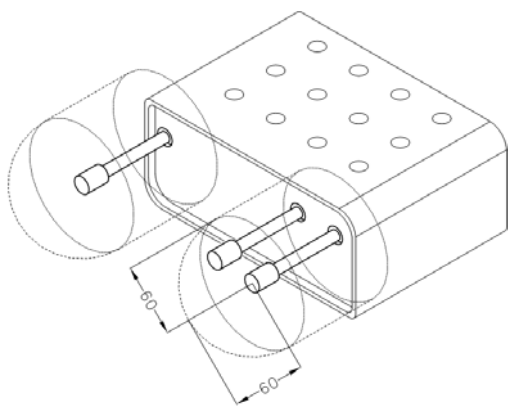


Figure 9: Space around antennas (plastic)

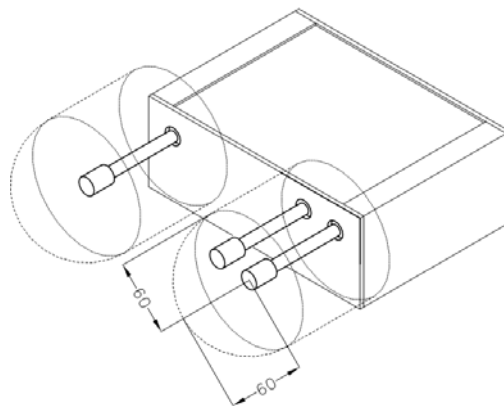


Figure 10: Space around antennas (metal)

- For every cables we recommend to bind the bunch, we recommend for this use:
  - Length of the bunch (combination of power supply and data cables) can be maximum 1.5 m. If the length of data cables exceeds 1.5 m or in the event of, the cable leads towards the switch – board. We recommend installing over – voltage protectors (surge suppressors).
  - With data cables they mustn't carry cables with reticular tension  $\sim 230 \text{ V}/50 \text{ Hz}$ .

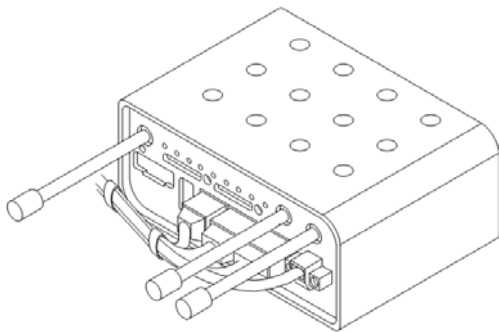


Figure 11: Cable routing (plastic)

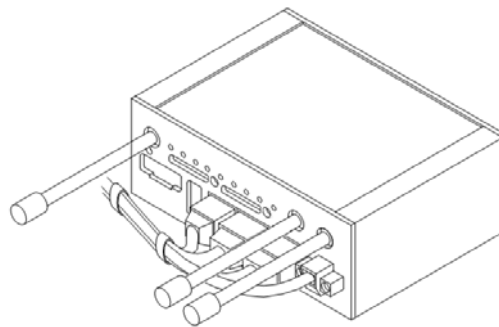


Figure 12: Cable routing (metal)

- Sufficient space must be left in front of individual connectors for handling of cables,

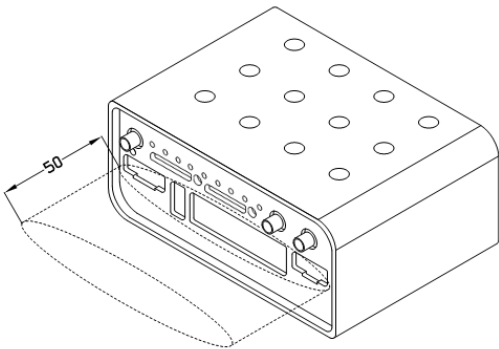


Figure 13: Space in front of connectors (plastic)

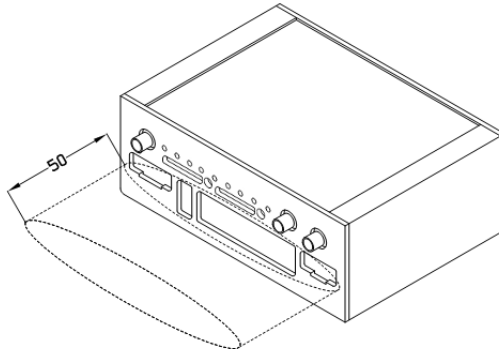


Figure 14: Space in front of connectors (metal)

- For correct function of the router we recommend to use in the switch-board earth-bonding distribution frame for grounding of power supply of router, data cables and antenna.

## 5.6 Removal from the DIN rail



The DIN rail clip is suitable for a DIN rail according to EN 60715 standard only. The default position of plastic or metal rail clip, which is used for mounting the router on a DIN rail, is shown in the following figure. Its position can be changed on some models (back or bottom). When changing the position of the DIN rail clip, tighten the screws with max. 0.4 Nm torque.

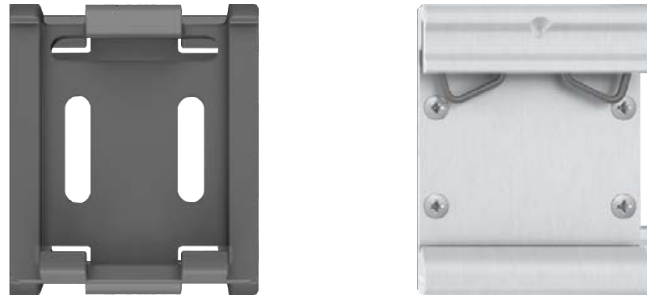


Figure 15: Default position of plastic and metal DIN rail clip

To remove the router from the DIN rail, push the router down lightly, so the bottom part of the DIN rail clip (hitched to the DIN rail) gets out of the rail and then pull out the bottom part of the router away from the DIN rail.

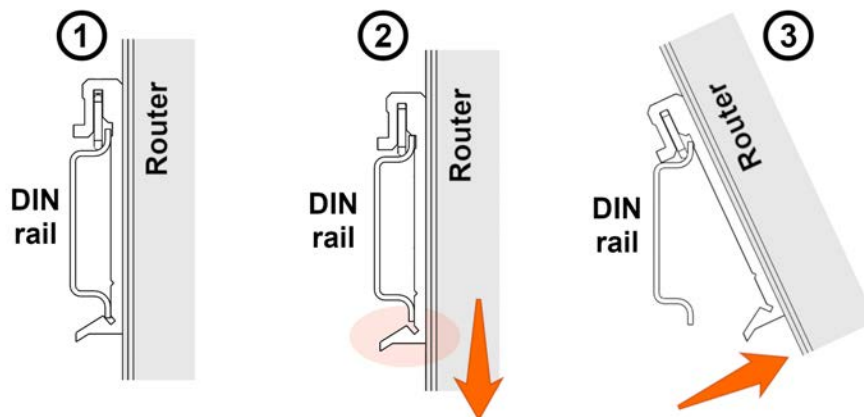


Figure 16: Removal from the DIN rail

## 5.7 Description of the front panel

On the front panel is the following:

| Caption | Connector  | Description                                                                                                         |
|---------|------------|---------------------------------------------------------------------------------------------------------------------|
| PWR     | 2-pin      | Connector for the power supply.                                                                                     |
| ETH     | RJ45       | Connector for connection into the local computer network.                                                           |
| PORT1   | RJ45       | Connector for expansion port RS232, RS458/422, MBUS, ETHERNET, CNT or SWITCH.                                       |
| PORT2   | RJ45       | Connector for expansion port RS232, RS485/422, MBUS, SWITCH, WIFI, WMBUS or SDH ( <b>only FULL versions</b> ).      |
| ANT     | SMA        | Connector for main antenna.                                                                                         |
| DIV     | SMA        | Connector for diversity antenna.                                                                                    |
| GPS     | SMA        | Connector for GPS antenna. It can be replaced with connector for WIFI or WMBUS antenna.                             |
| WIFI    | R-SMA      | Connector for WIFI antenna. <b>Available only when the router is equipped with an expansion port WIFI.</b>          |
| WMBUS   | SMA        | Connector for WMBUS antenna. <b>Available only when the router is equipped with an expansion port WMBUS.</b>        |
| USB     | USB-A Host | Connector for connection of USB devices to the router. Supports devices with PL-2303 and FTDI USB/RS232 converters. |
| I/O     | 3-pin      | Connector for connection of the binary input and output.                                                            |
| SIM1    | —          | Holder for the first SIM card.                                                                                      |
| SIM2    | —          | Holder for the second SIM card ( <b>only FULL versions</b> ).                                                       |

Table 9: Front panel description



Figure 17: Front panel UR5i v2F

## 5.7.1 Status indication

About router status inform eight LED indicators on the front panel. ETH port, PORT1 and PORT2 have two additional LEDs that provide information about port status.

| Caption | Color  | State                                                            | Description                                                                                                                                                                                                              |
|---------|--------|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PWR     | Green  | Blinking<br>On<br>Fast blinking                                  | Router is ready.<br>Starting of the router.<br>Updating firmware.                                                                                                                                                        |
| DAT     | Red    | Blinking                                                         | Communication in progress on radio channel.                                                                                                                                                                              |
| WAN     | Yellow | 1x flash per sec.<br>2x flash per sec.<br>3x flash per sec.      | Signal strength is good.<br>Signal strength is fair <sup>1</sup> .<br>Signal strength is poor <sup>2</sup> .<br>For value ranges of signal strength see <i>Configuration manual</i> , chapter <i>Mobile WAN Status</i> . |
| USR     | Yellow | Function of this LED diode can be selected by user.              |                                                                                                                                                                                                                          |
| OUT     | Green  | On                                                               | Binary output active.                                                                                                                                                                                                    |
| IN      | Green  | On                                                               | Binary input active.                                                                                                                                                                                                     |
| ETH     | Green  | On<br>Off                                                        | Selected 100 Mbit/s.<br>Selected 10 Mbit/s.                                                                                                                                                                              |
| ETH     | Yellow | On<br>Blinking<br>Off                                            | The network cable is connected.<br>Data transmission.<br>The network cable is not connected.                                                                                                                             |
| PORT    | Green  | Depends on the expansion port (see user's manual for used port). |                                                                                                                                                                                                                          |
| PORT    | Yellow | Depends on the expansion port (see user's manual for used port). |                                                                                                                                                                                                                          |
| SIM1    | Yellow | On                                                               | The first SIM card is active.                                                                                                                                                                                            |
| SIM2    | Yellow | On                                                               | The second SIM card is active.                                                                                                                                                                                           |

Table 10: Status indication



State indication of WAN LED is updated every 10 seconds.

<sup>1</sup>Or the difference between neighbouring cells is exactly 3 dBm.

<sup>2</sup>Or the difference between neighbouring cells is smaller than 3 dBm.

## 5.7.2 Power connector PWR

Panel socket 2-pin.

| Pin number | Signal mark | Description                                         |
|------------|-------------|-----------------------------------------------------|
| 1          | VCC(+)      | Positive pole of DC supply voltage (+9 to +36 V DC) |
| 2          | GND(-)      | Negative pole of DC supply voltage                  |

Table 11: Connection of power connector

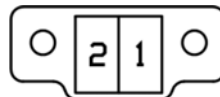


Figure 18: Power connector

Power supply for router is required between +9 V to +36 V DC supply. Protection against reversed polarity without signaling is built into the router. **Note:** The protection against reversed polarity is lost if the negative pole is grounded!

The power consumption during receiving is 2.6 W. The peak power consumption during data sending is 5.5 W. However, values of consumption can be increased, if some expansion port is equipped. For correct operation it is necessary that the power source is able to supply a peak current of 1.2 A.

Circuit example:

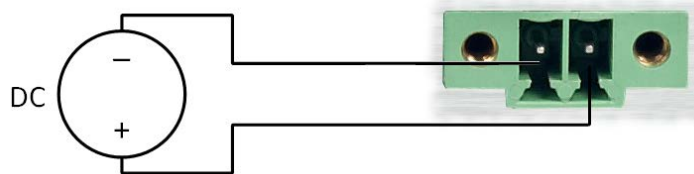


Figure 19: Connection of power supply



The positive pole VCC is marked by a red socket on the power.

## 5.7.3 Antenna connector ANT, DIV and GPS (alternatively WIFI or WMBUS)

Main and diversity antennas are connected to the router using the SMA connector on the front panel. Full version of the router also contains the third SMA antenna connector, through which the additional antenna can be connected (if WIFI expansion port is used, this connector is reverse – RSMA).



The router can not operate without connected main antenna marked as *ANT*!

ANT connector is used to connect the main antenna. For connecting the diversity antenna use the second antenna connector DIV. The third connector (GPS) in the full version of the router is used for additional antenna intended for GPS (router supports active GPS antenna). On user's request, this antenna connector can be modified to WIFI or WMBUS.



The antenna is connected by screwing this antenna to the SMA connector on the front panel of the router (see figure below).

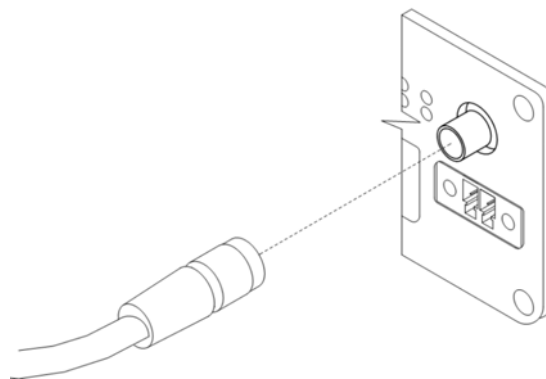


Figure 20: Connecting of the antenna



Diversity antenna improves radio features of the router at low signal strength.

## 5.7.4 SIM card reader

The SIM card reader for 3 V and 1,8 V SIM cards is placed on the front panel of the router. For getting the router to work is necessary to insert an activated SIM card with an unblocked PIN code. The SIM cards might be of different adjusted APN (Access Point Name).



Supported type of SIM cards: **Mini SIM** (2FF), dimensions 25.0 x 15.0 x 0.76 mm.

### Changing the SIM card:



- Before handling of the SIM card disconnect the router from power supply!
- Press the small yellow button to eject the reader holder.
- Insert the SIM card into the reader holder and slide it in the reader (see figure below).

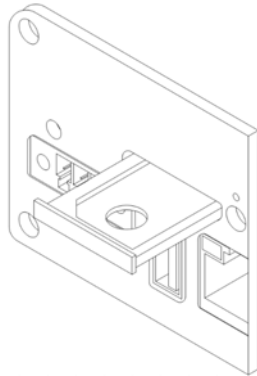


Figure 21: Ejected SIM holder

## 5.7.5 Ethernet Port ETH

Panel socket RJ45.

| Pin | Signal mark | Description                   | Data flow direction |
|-----|-------------|-------------------------------|---------------------|
| 1   | TXD+        | Transmit Data – positive pole | Input/Output        |
| 2   | TXD-        | Transmit Data – negative pole | Input/Output        |
| 3   | RXD+        | Receive Data – positive pole  | Input/Output        |
| 4   | —           | —                             |                     |
| 5   | —           | —                             |                     |
| 6   | RXD-        | Receive Data – negative pole  | Input/Output        |
| 7   | —           | —                             |                     |
| 8   | —           | —                             |                     |

Table 12: Connection of Ethernet connector

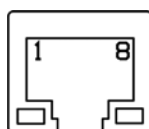


Figure 22: Ethernet connector



**ATTENTION! ETH port is not POE (Power Over Ethernet) compatible!**

Plug Ethernet cable into the RJ45 connector labeled as ETH (see figure below).

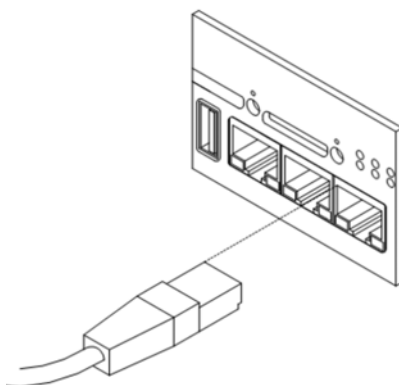


Figure 23: Connection of ethernet cable

## 5.7.6 PORT1

The PORT1 is equipped on customer's request with one of the offered expansion ports:

- RS232
- RS485
- RS422
- ETHERNET
- MBUS
- CNT
- SWITCH (together with PORT2)



Description and examples of expansion ports connection can be found in user's guide for corresponding expansion port.

Plug cable for the first expansion port into the RJ45 connector labeled as PORT1 (see figure below).

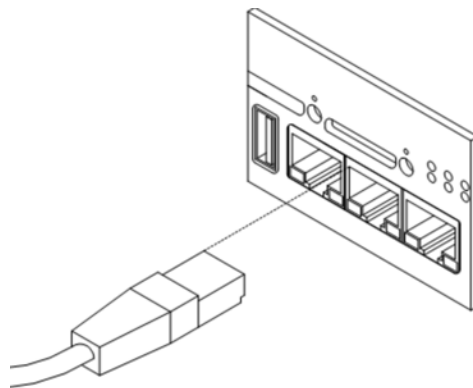


Figure 24: PORT1 cable connection

## 5.7.7 PORT2

The PORT2 is equipped on customer's request with one of the offered expansion ports:

- RS232
- RS485
- RS422
- MBUS
- SDH
- SWITCH (together with PORT1)
- WIFI
- WMBUS



PORT2 is available only in the Full version of the router! Description and examples of expansion ports connection can be found in user's guide for corresponding expansion port.

Plug cable for the second expansion port into the RJ45 connector labeled as PORT2 (see figure below).

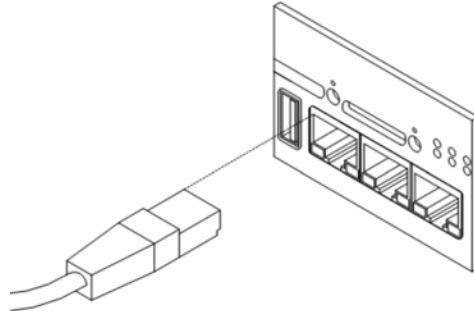


Figure 25: PORT2 cable connection

## 5.7.8 USB Port

Panel socket USB-A.

| Pin | Signal mark | Description                                   | Data flow direction |
|-----|-------------|-----------------------------------------------|---------------------|
| 1   | +5 V        | Positive pole of 5 V DC supply voltage, 0.5 A |                     |
| 2   | USB data -  | USB data signal – negative pole               | Input/Output        |
| 3   | USB data +  | USB data signal – positive pole               | Input/Output        |
| 4   | GND         | Negative pole of DC supply voltage            |                     |

Table 13: Connection of USB connector



Figure 26: USB connector



**Mounting USB flash drive to the system:** To use the USB flash drive in the Linux system of the router, it is necessary to mount it. Use `dmesg` command to see the name of recently connected device (E. g. `sda: sda1`) and then use `mount` command. Example:  
`mount /dev/sda1 /mnt`

## 5.7.9 I/O Port

Panel socket 3-pin.

| Pin | Signal mark | Description   | Data flow direction |
|-----|-------------|---------------|---------------------|
| 1   | BIN0        | Binary input  | Input               |
| 2   | GND         | Signal ground |                     |
| 3   | OUT0        | Binary output | Output              |

Table 14: Connection of I/O port

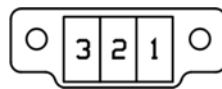


Figure 27: I/O connector

I/O user interface is designed for processing of binary input and control (setting) binary output. Binary output is not switched to ground in the default configuration. Maximum load binary output is 30 V / 100 mA. The constant current supplied by the binary input is 3 mA.

Connect I/O cable into the I/O connector on the front panel of the router and tighten locking screws (see figure below).

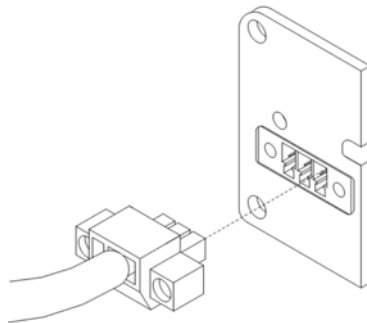


Figure 28: Connection of I/O cable

Example of a circuit describing connection of binary input and output to the router:

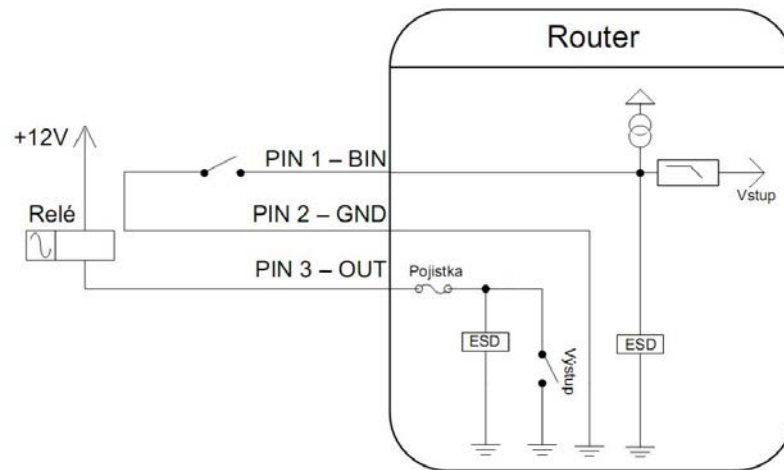


Figure 29: Connection of input and output to the router

## 5.7.10 Reset

When *PWR* LED starts flashing on the front panel, it is possible to restore the default configuration of the router by pressing the *RST* button on the front panel. After pressing this button the default configuration is restored and then router reboots (green LED will be on).



For pressing the *RST* button could be used a narrow screwdriver.

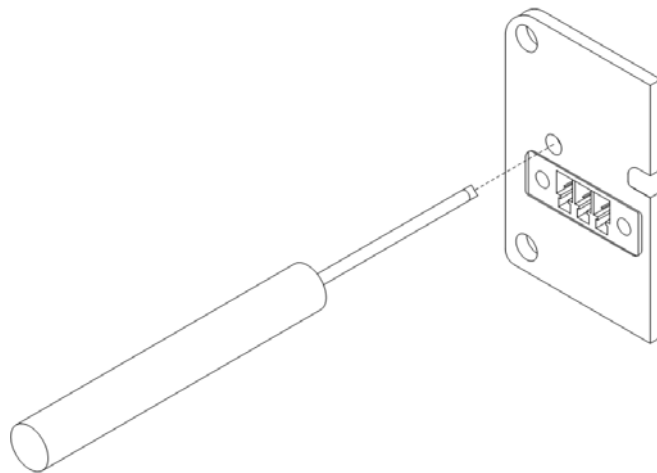


Figure 30: Router reset



We recommend backing up configuration of the router (see *Configuration manual for v2 routers*) because reset of the router sets the configuration to the default state.

It is important to distinguish between reset and reboot the router.

| Action | Router behavior                                     | Invoking events                                                                              |
|--------|-----------------------------------------------------|----------------------------------------------------------------------------------------------|
| Reboot | Turn off and then turn on router                    | Disconnect and connect the power,<br>Press the <i>Reboot</i> button in the web configuration |
| Reset  | Restore default configuration and reboot the router | Press <i>RST</i> button                                                                      |

Table 15: Description of reset and restart router

## 6. First Use

### 6.1 Connecting the router before first use

Before putting the router into operation it is necessary to connect all components which are required to run your applications. Don't forget to insert SIM card.



The router can not operate without connected antenna, SIM card and power supply. If the antenna is not connected, router can be damaged.

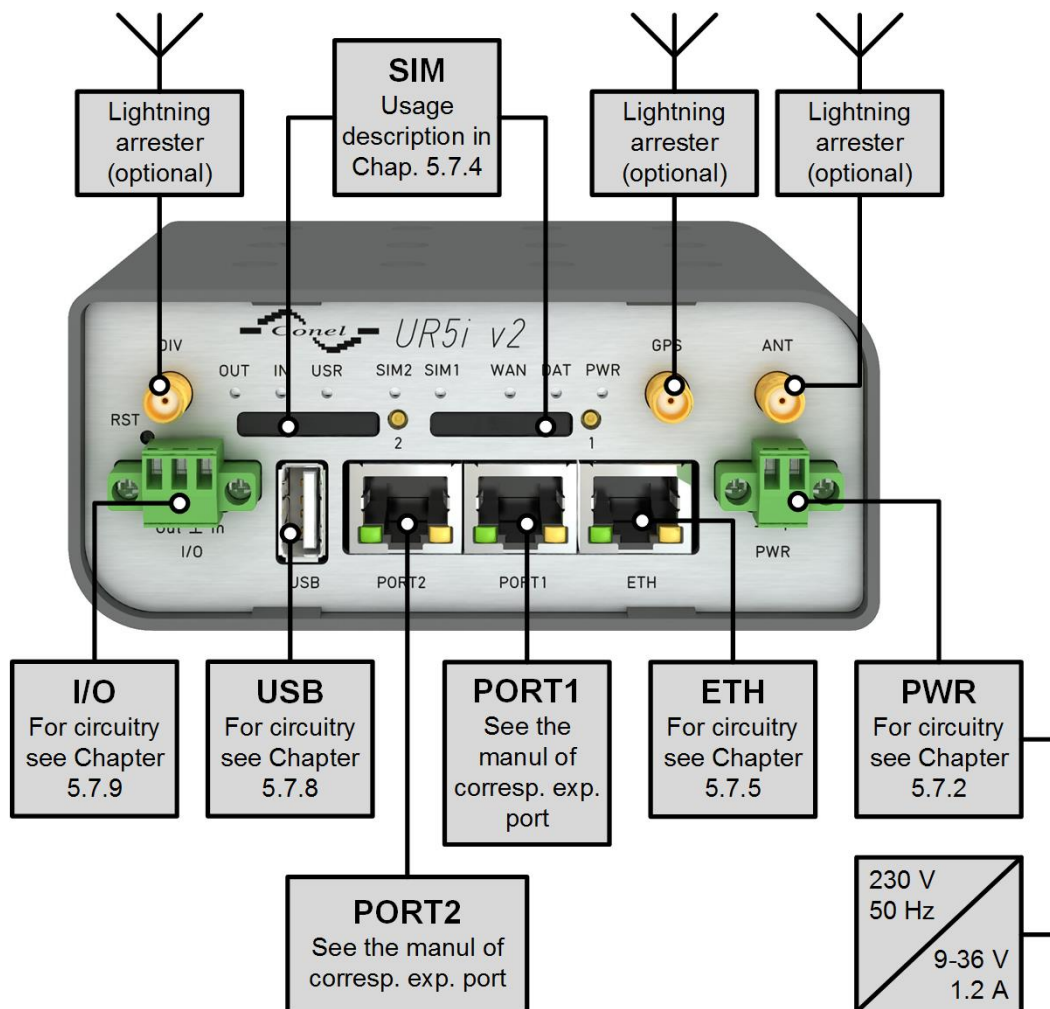


Figure 31: Router connection

## 6.2 Start

The router is put into operation when the power supply is connected to this router. By default, the router will automatically start to log on to the default APN. DHCP server will start to assign addresses for devices on the Ethernet port ETH0. Router behavior can be changed via the web interface. This is described in detail in the *Configuration manual for v2 routers*.

The power consumption during receiving is 2.6 W. The peak power consumption during data sending is 5.5 W. However, values of consumption can be increased, if some expansion port is equipped. For correct operation it is necessary that the power source is able to supply a peak current of 1 A.

## 6.3 Configuration



**Attention!** If no SIM card is inserted in the router, it is not possible to operate. Inserted SIM card must have activated data transmission.

### 6.3.1 Configuration over web browser

For status monitoring, configuration and administration of the router is available a web interface which can be accessed by entering the IP address of the router into the web browser. The default IP address of the router is 192.168.1.1.



Figure 32: Entering the IP address of the router

Configuration may be performed only by the user "root" with default password "root".

Figure 33: Entering login information

After successfully entering login information user gains access to the router via his internet browser.

| Status                                                                                                                                                                                           | General Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>General</li> <li>Mobile WAN</li> <li>WiFi</li> <li>WiFi Scan</li> <li>Network</li> <li>DHCP</li> <li>IPsec</li> <li>DynDNS</li> <li>System Log</li> </ul> | <p><b>Mobile Connection</b></p> <p>SIM Card : Primary<br/>IP Address : Unassigned<br/>State : Offline</p> <p>&gt; More Information &lt;</p> <p><b>Primary LAN</b></p> <p>IP Address : 10.40.28.66 / 255.255.252.0<br/>MAC Address : 7C:66:90:38:30:F0<br/>Rx Data : 4.2 MB<br/>Tx Data : 140.8 KB<br/>Bridged : Yes</p> <p>&gt; More Information &lt;</p> <p><b>Secondary LAN</b></p> <p>IP Address : 10.40.28.66 / 255.255.252.0<br/>MAC Address : 7C:66:90:38:30:F0<br/>Rx Data : 0 B<br/>Tx Data : 0 B<br/>Bridged : Yes</p> <p>&gt; More Information &lt;</p> <p><b>WiFi</b></p> <p>IP Address : Unassigned<br/>MAC Address : 78:A5:04:22:2A:67</p> <p>&gt; More Information &lt;</p> <p><b>Peripheral Ports</b></p> <p>Expansion Port 1 : RS-232<br/>Expansion Port 2 : RS-485<br/>Binary Input 0 : Off<br/>Binary Input 1 : Off<br/>Binary Output : Off</p> <p><b>System Information</b></p> <p>Firmware Version : 5.3.0 (2015-10-01) BETA #120<br/>Serial Number : N/A<br/>Profile : Standard<br/>Supply Voltage : 12.0 V<br/>Temperature : 38 °C<br/>Time : 2000-05-16 00:57:08<br/>Uptime : 0 days, 0 hours, 39 minutes</p> |

| Configuration                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>LAN</li> <li>VRRP</li> <li>Mobile WAN</li> <li>PPPoE</li> <li>WiFi</li> <li>WLAN</li> <li>Backup Routes</li> <li>Firewall</li> <li>NAT</li> <li>OpenVPN</li> <li>IPsec</li> <li>GRE</li> <li>L2TP</li> <li>PPTP</li> <li>DynDNS</li> <li>NTP</li> <li>SNMP</li> <li>SMTP</li> <li>SMS</li> <li>Expansion Port 1</li> <li>Expansion Port 2</li> <li>USB Port</li> <li>Startup Script</li> <li>Up/Down Script</li> <li>Automatic Update</li> </ul> |

| Customization                                                  |
|----------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>User Modules</li> </ul> |

| Administration                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Users</li> <li>Change Profile</li> <li><b>Change Password</b></li> <li>Set Real Time Clock</li> <li>Set SMS Service Center</li> <li>Unlock SIM Card</li> <li>Send SMS</li> <li>Backup Configuration</li> <li>Restore Configuration</li> <li>Update Firmware</li> <li>Reboot</li> <li>Logout</li> </ul> |

Figure 34: Router web interface



A detailed description of the router settings via the Web interface can be found in the document *Configuration manual for v2 routers*.

## 6.3.2 Configuration over Telnet

For status monitoring, configuration and administration of the router can be also used Telnet. After entering the IP address of the router you will be allowed to configure the router using commands. The default IP address of the router is 192.168.1.1. Configuration may be performed only by the user "root" with default password "root".



A detailed description of the router settings via the Telnet can be found in the document *Configuration manual for v2 routers*.

## 7. Technical Parameters

### 7.1 Basic parameters

| UR5i v2              |                              |                                                                                          |
|----------------------|------------------------------|------------------------------------------------------------------------------------------|
| Temperature range    | Operating<br>Storage         | -40 °C to +75 °C<br>-40 °C to +85 °C                                                     |
| Humidity             | Operating<br>Storage         | 0 to 95 % relative humidity non condensing<br>0 to 95 % relative humidity non condensing |
| Altitude             | Operating                    | 2000 m / 70 kPa                                                                          |
| Degree of protection |                              | IP30                                                                                     |
| Supply voltage       |                              | 9 to 36 V DC                                                                             |
| Battery for RTC      |                              | CR1225                                                                                   |
| Consumption          | Idle<br>GPRS<br>UMTS         | 2.6 W<br>to 3.5 W (GPRS transmission)<br>to 5.5 W (UMTS transmission)                    |
| Dimensions           | Plastic box<br>Metal box     | 51 x 87 x 116 mm (DIN 35 mm)<br>42 x 87 x 113 mm (DIN 35 mm)                             |
| Weight               |                              | UR5i v2 – 150 g<br>UR5i v2 SL – 280 g                                                    |
| Antenna connector    |                              | 3x SMA – 50 Ohm                                                                          |
| User interface       | ETH<br>USB<br>PORT1<br>PORT2 | Ethernet (10/100 Mbps)<br>USB 2.0<br>On customer's request<br>On customer's request      |

Table 16: Basic parameters

## 7.2 Standards and regulations

The router complies with the following standards and regulations.

| Standards and regulations                  |                                                                                                                                                         |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Telecom and emission                       | ETSI EN 301 511 V12.5.1, ETSI EN 300 440 V2.1.1, ETSI EN 301 908-1 V11.1.1, ETSI EN 301 908-2 V11.1.1, ETSI EN 300 328 V2.1.1, ETSI EN 300 220-2 V3.1.1 |
| EMC                                        | ETSI EN 301 489-1 V2.1.1, ETSI EN 301 489-3 V2.1.1, Draft ETSI EN 301 489-52 V1.1.0, ETSI EN 301 489-17 V3.1.1                                          |
| Safety                                     | EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013 + AC:2011, EN 62311:2008                                                                      |
| E-Mark – EMC for devices in transportation | E-Mark homologation number: 10R – 04 7054                                                                                                               |

Table 17: Standards and regulations

## 7.3 Technical parameters of module

| HSPA+ module         |                                                                                                                                                                         |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HSPA+ parameters     | Bit rate 14,4 Mbps (DL) / 5,76 Mbps (UL)<br>3GPP rel. 6/7 standard<br>Data compress 3GPP                                                                                |
| UMTS parameters      | Bit rate 384 kbps (DL) / 384 kbps (UL)<br>3GPP rel. 4 standard                                                                                                          |
| GPRS/EDGE parameters | EDGE bit rate 237 kbps (DL) / 237 kbps* (UL)<br>GPRS bit rate 85,6 kbps (DL) / 85,6 kbps* (UL)<br>Multislot class 12, CS 1 to 4,<br>3GPP rel. 99/4 standard             |
| Support channels     | UMTS/HSDPA/HSUPA/HSPA+: B6 (800 MHz), B5 (850 MHz), B8 (900 MHz), B2 (1900 MHz), B1 (2100 MHz)<br>GSM/GPRS/EDGE: 850/900/1800/1900 MHz<br>Max power – typical 26–33 dBm |

Table 18: Technical parameters of module

## 7.4 Technical parameters of GPS

| GPS specifications |                                                                                                      |
|--------------------|------------------------------------------------------------------------------------------------------|
| Antenna            | SMA 50 $\Omega$ – active                                                                             |
| Protocols          | NMEA 0183 v3.0                                                                                       |
| Frequency          | 1575.42 MHz                                                                                          |
| Sensitivity        | Tracking: -161 dBm*<br>Acquisition (Assisted): -158 dBm**<br>Acquisition (Standalone): -145 dBm**    |
| Acquisition time   | Hot start: 1 s<br>Warm start: 29 s<br>Cold start: 32 s                                               |
| Accuracy           | Horizontal: < 2m (50 %); < 5 m (90 %)<br>Altitude: < 4 m (50 %); < 8 m (90 %)<br>Velocity: < 0.2 mps |

Table 19: Technical parameters of GPS

\* Tracking sensitivity is the lowest GPS signal level for which the device can still detect an in-view satellite 98 % of the time when in sequential tracking mode.

\*\* Acquisition sensitivity is the lowest GPS signal level for which the device can still detect an in-view satellite 50 % of the time.

## 7.5 Other Technical Parameters

| Other technical parameters |                                              |
|----------------------------|----------------------------------------------|
| CPU                        | 32b ARM microprocessor<br>0.25 DMIPS per MHz |
| Flash memory               | 16 MB DDR SDRAM                              |
| RAM                        | 64 MB                                        |
| M-RAM                      | 128 kB                                       |

Table 20: Other technical parameters

## 7.6 Technical parameters of I/O port

| Binary input and output |                               |                                                                       |
|-------------------------|-------------------------------|-----------------------------------------------------------------------|
| Input/Output            | Binary input<br>Binary output | Reed contact with trigger level 1.3 up to 1.4 V<br>100 mA / max. 30 V |

Table 21: Technical parameters of I/O port

## 7.7 Technical parameters of expansion port

Technical parameters of expansion ports are provided in separate manuals.

## 8. Recommended Literature

- [1] Advantech B+B SmartWorx: **Start Guide for v2 routers,**
- [2] Advantech B+B SmartWorx: **Configuration Manual for v2 Routers,**
- [3] Advantech B+B SmartWorx: **User's manual – Expansion port RS232,**
- [4] Advantech B+B SmartWorx: **User's manual – Expansion port RS485/422,**
- [5] Advantech B+B SmartWorx: **User's manual – Expansion port MBUS,**
- [6] Advantech B+B SmartWorx: **User's manual – Expansion port CNT,**
- [7] Advantech B+B SmartWorx: **User's manual – Expansion port ETH,**
- [8] Advantech B+B SmartWorx: **User's manual – Expansion port SWITCH,**
- [9] Advantech B+B SmartWorx: **User's manual – Expansion port WIFI,**
- [10] Advantech B+B SmartWorx: **User's manual – Expansion port WMBUS,**
- [11] Advantech B+B SmartWorx: **User's manual – Expansion port SD,**
- [12] Advantech B+B SmartWorx: **Application note – Expansion port mounting,**
- [13] Advantech B+B SmartWorx: **Application note – Programmer guide.**

## 9. Troubleshooting

If you cannot connect to the router from your PC, your network card may be configured in such a way that it is not possible to connect to the router. Take one or more of the following steps in order to solve the problem:



- Make sure your PC's network card is configured to obtain the IP address from the DHCP server (by default the DHCP server is running in the router).
- Set the communication rate to 10 MB/s in the properties of your network card.
- Connect the router to the PC via Switch.
- Connect the router to the PC, start the router first and then start the PC after the router's initialization.

### 9.1 FAQ



#### **The router reboots itself and the Ethernet connection fails.**

- *The router will not work well without an antenna. Keep the antenna as far as possible from the power supply.*



#### **Ethernet connection fails or is not establishing.**

- *It is possible to turn auto negotiation off and set a rate and duplex manually on the Ethernet interface of the router. Available on "LAN Configuration" page in the router.*



#### **Mobile WAN connection fails.**

- *Check the signal power ("Mobile WAN status" page). If the signal power is weak, you will have to use a better antenna. If the neighbouring cells have a similar signal strength, you will need to use a directional antenna. For proper operation, the signal levels have to be good.*
- *Try to enable automatic ping from the router, which will check the connection when there are no data running and in the case of a failed ping, restart the connection. This can be done on the "Mobile WAN Configuration" page in the router in the "Check connection" section. "Enable + bind" option is to ensure the ping goes always through Mobile WAN network interface.*



#### **Mobile WAN connection cannot be established.**

- *Check the "Mobile WAN Configuration" – APN, name, password and IP address (all can be blank).*
- *Try to enter the SIM card PIN – verify that the SIM card has the PIN code entered. Available on "Unlock SIM Card" page in the "Administration" section.*

- In a private APN it is not recommended to get the DNS settings from operator (on "Mobile WAN" page)
- Go to "System Log" page in "Status" section and observe where the error occurs.

 **I cannot connect from the Internet to the device behind the router. I have NAT enabled.**

- The device's gateway has to be configured so it points to the router.

 **I can't access my Web server placed behind the router over NAT.**

- The remote HTTP access to the router has to be disabled on "NAT Configuration" page in the router. Also enable "Send all remaining incoming packets to default server" feature and fill in the IP address of your Web server. On the Web server, the default gateway has to be the IP address of the router.

 **DynDNS doesn't work.**

- With private APN this will not work.
- If the same IP address is recorded in your canonic name as a dynamically assigned address, it means that the operator is using NAT or a firewall.
- You can verify NAT using ping to your server with static address and then compare with router's IP address.
- You can verify a Firewall by accessing remotely to the router's Web interface.
- The operator may not provide the address of DNS server and without DNS server's address it is impossible to connect to the dyndns.org server. The following messages will be shown in the System Log:
  - DynDNS daemon started
  - Error resolving hostname: no such file or directory
  - Connect to DynDNS server failed

 **L2TP or IPSec isn't establishing.**

- Check the "System Log" page for error messages.

 **IPSec tunnel establishes but the communication does not run.**

- Probably there are bad routing rules defined in the connected devices, or the default gateway.

 **I switched the router to offline mode by SMS message, but the router is in online mode after reboot.**

- SMS messages do not change the router configuration. They remain in effect only until the router is rebooted.

 **Serial communication is not working.**

- *Verify that the router model supports serial communications. Also verify the serial communication settings. To do so, open the router's configuration menu via the web browser, select the appropriate "Expansion Port" from "Configuration" part of the menu and verify the settings.*

 **Is the router Cisco compatible? Can I use the Cisco configuration?**

- *No, the Firmware in the router (Conel OS) is based on Linux with BusyBox. Thus the Cisco configuration cannot be used. But network connections are defined by standards so connecting the router to the Cisco or other networking devices is possible and will be compatible.*

 **FTP or SFTP does not work**

- *FTP will work on v2 routers only. You can use SFTP on all routers to transfer files to/from the router. If having troubles with FTP on v2 routers, make sure you have FTP enabled: "Configuration" section, "Services", "FTP". Then you can connect with any client on port 21 with name and password same as for the Web interface. If having troubles with SFTP, make sure you have SSH enabled: "Configuration" section, "Services", "SSH". Then you can connect with any client on port 22 with name and password same as for the Web interface.*

 **How can I connect to the router's command line? (SSH, Telnet)**

- *You can use SSH on all routers or Telnet on v2 routers only. SSH is enabled by default, but you can verify in Web interface in "Configuration" section, "Services", "SSH". Then connect with any SSH client on port 22 of the router. User and password is the same as for the Web interface. Telnet on v2 routers can be enabled here: "Configuration" section, "Services", "Telnet".*

## 10. Customers Support

### 10.1 Customer Support for NAM

E-mail: [support@advantech-bb.com](mailto:support@advantech-bb.com)  
Web: [www.advantech-bb.com](http://www.advantech-bb.com)

### 10.2 Customer Support for Europe

E-mail: [iiotcustomerservice@advantech.eu](mailto:iiotcustomerservice@advantech.eu)  
Web: [www.advantech-bb.com](http://www.advantech-bb.com)

### 10.3 Customer Support for Asia

E-mail: [icg.support@advantech.com.tw](mailto:icg.support@advantech.com.tw)  
Web: [www.advantech.com](http://www.advantech.com)



#### Upkeep – Advices:

- The SIM-card must be handled carefully as with a credit card. Don't bend, don't scratch on this and do not expose to static electricity.
- During cleaning of the router do not use aggressive chemicals, solvents and abrasive cleaners!



Hereby, Advantech B+B SmartWorx s.r.o. company declares that the radio equipment narrated in this user's guide is in compliance with EU Directive **2014/53/EU**.

The full text of the EU Declaration of Conformity is available at the following internet address:  
[www.advantech-bb.cz/eudoc](http://www.advantech-bb.cz/eudoc)