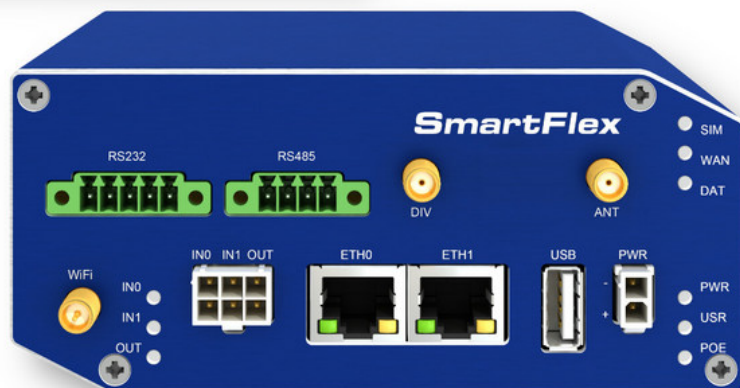
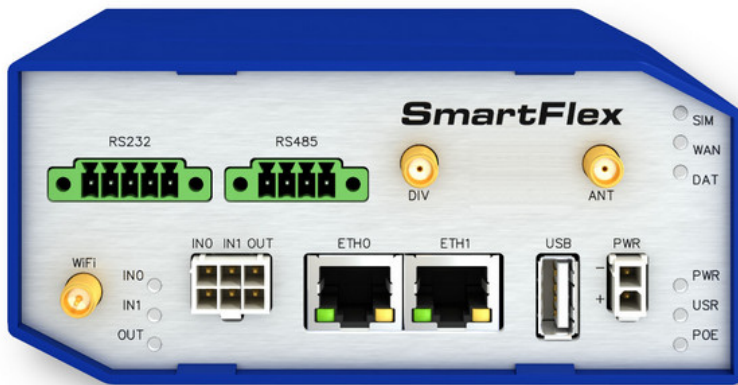


## Hardware Manual

### Industrial Cellular Router

## SmartFlex SR310



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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 – Useful tips or information of special interest.

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# 1. Router Description

SmartFlex SR310 is an industrial cellular router intended for the global markets. This router is an ideal device for wireless communication in mobile networks that make use of LTE, UMTS, EDGE or GPRS technology. Due to the high speed of data transfer up to 130 Mbps (download) and up to 30 Mbps (upload) is this router an ideal solution for specialized M2M devices and IoT as well as for wireless connection of traffic and security camera systems, individual computers, LAN networks, automatic teller machines (ATM) and other self-service terminals.

The standard configuration includes two Ethernet 10/100 ports, one USB 2.0 Host port, two binary inputs and one output (I/O connector). The device also has two readers for 3 V and 1.8 V SIM cards, which are located on the rear panel of the router. The router also includes a microSD card port that supports up to 64 GB card storage (32 GB in the case of SDHC cards). The router can be equipped with a WiFi module, but this must be part of the initial configuration – it cannot be assembled to the router at some point in the future.

The router can be equipped with PoE PD (Power over Ethernet – Powered Device), which allows the router to be powered via Ethernet. It can also be equipped with PoE PSE (Power over Ethernet – Power Source Equipment), which lets the router to power other devices via Ethernet. The SmartFlex router can also be configured with a wide variety of port options. These can be SWITCH – three switched Ethernet ports; RS232-RS485/422 – combination of serial interfaces; RS232-RS485-ETH – combination of serial interfaces and Ethernet port with higher insulation. The router can be provided in either a plastic or metal casing, depending upon the customer's requirements.

Configuration of the router may be done via a password-protected Web interface. Web interface provides detailed statistics about the router's activities, signal strength, detailed system log etc. The router supports the creation of VPN tunnels using IPSec, OpenVPN and L2TP to ensure safe communication. DHCP, NAT, NAT-T, DynDNS, NTP, VRRP, control by SMS, backup primary connection and many other functions are supported.

The router provides diagnostic functions which include automatically monitoring the PPP connection, automatic restart in case of connection losses, and a hardware watchdog that monitors the router status. The user may insert Linux scripts which are started on various actions. It is possible to create up to four different configurations for the same router. These configurations can be switched whenever necessary via Web interface, SMS or binary input status. The router can automatically upgrade its configuration and firmware from your central server. This allows for mass reconfiguration of numerous routers at the same time.

The router supports automatic upgrades of both its configuration and firmware, leveraging updates from a central server. This feature ensures that the router remains up-to-date with the latest enhancements and security protocols.

This model is compatible with Advantech's remote device management platforms: [WebAccess/DMP](#) and [WebAccess/VPN](#). These platforms facilitate comprehensive management and monitoring of network devices.



## Examples of possible applications

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

## 1.1 Usage of the Router

The router is primarily intended for these four basic situations:

### I. Access to the Internet from LAN

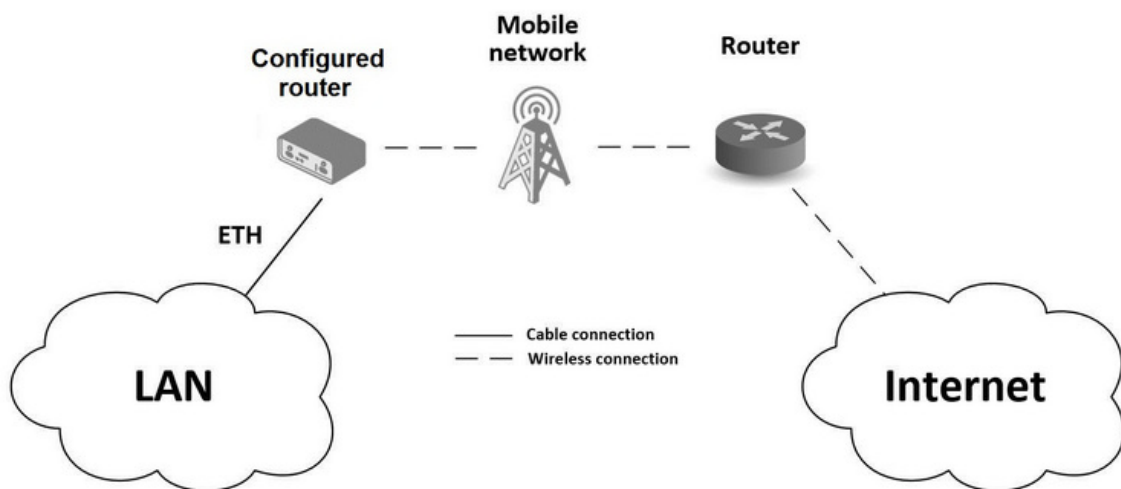


Figure 1: Access to the Internet from LAN

## II. Backed up access to the Internet (from LAN)

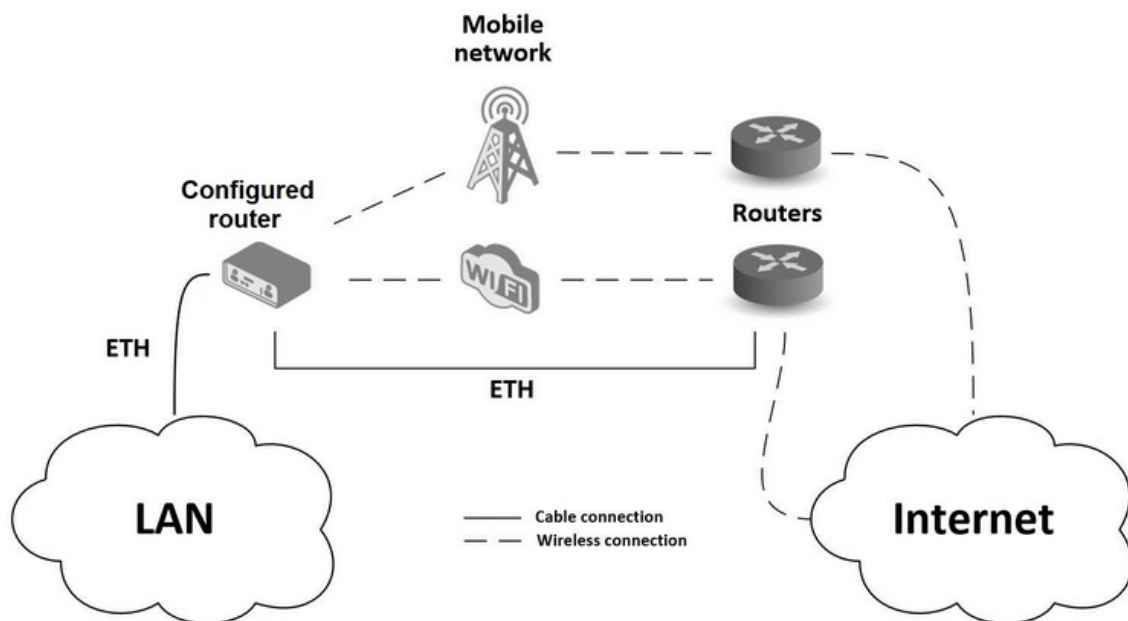


Figure 2: Backed up access to the Internet

## III. Secure networks interconnection or using VPN

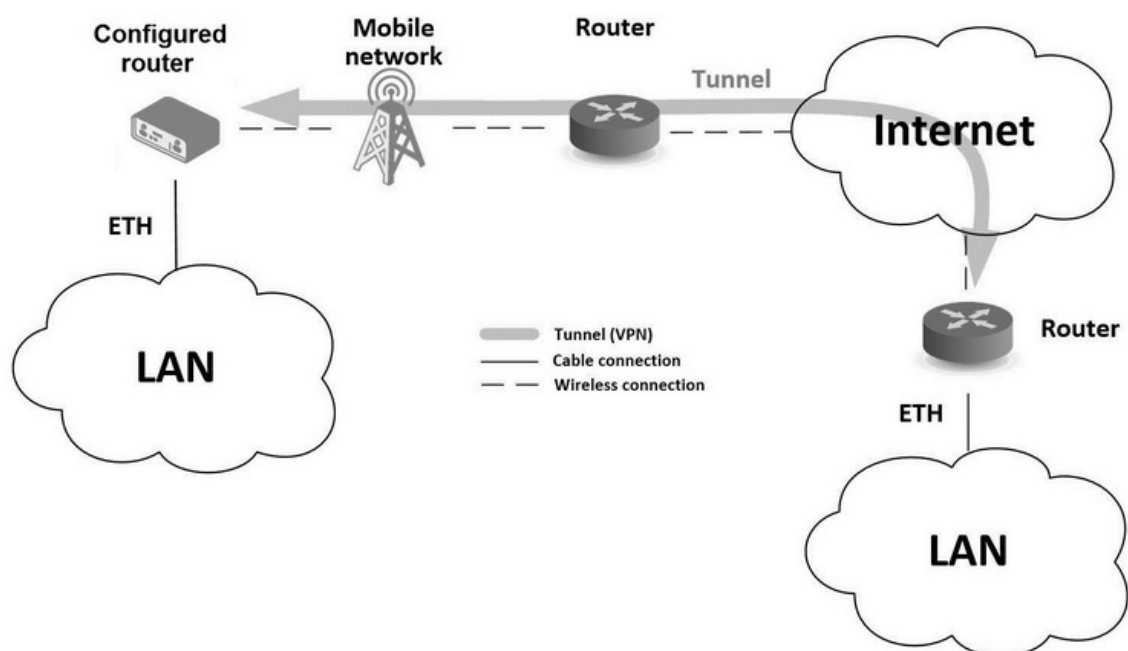


Figure 3: Using VPN tunnel

IV. Serial Gateway

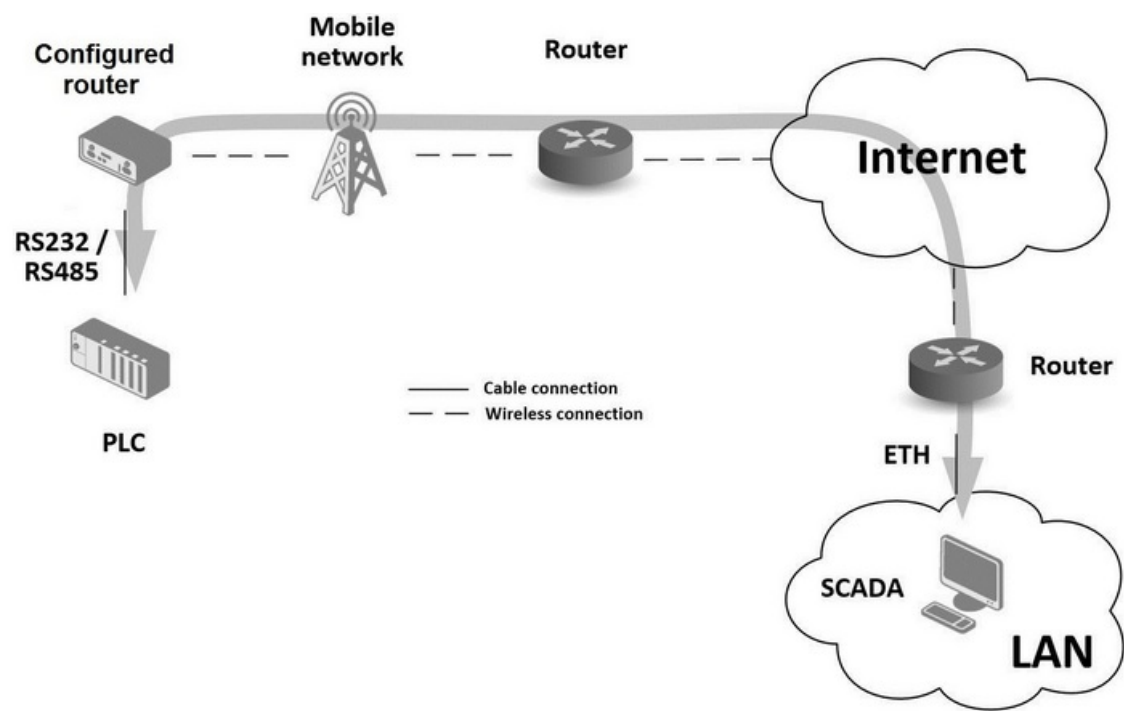


Figure 4: Serial Gateway

## 2. Contents of Package



Basic delivered set of router includes:

- router,
- power supply,
- crossover UTP cable,
- up to three external antennas,
- loose power and I/O connector (+8 pins<sup>1</sup>),
- 4-pins and 5-pins terminal block for RS485 and RS232 (**only for version with interface RS232-RS485/422**),
- 2 pieces of 5-pins terminal block for RS485 (**only for version with interface RS485-RS485**),
- 3-pins and 4-pins terminal block for RS485 and RS232 (**only for version with interface RS232-RS485-ETH**),
- clip for the DIN rail,
- printed *Quick Start Guide Leaflet*.



Figure 5: Contents of package



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

<sup>1</sup>These pins are designed for cables with a diameter from 0.2 to 0.8 mm<sup>2</sup>

# 3. Router Design

## 3.1 Router versions



Check with your local Advantech sales representative for available options and HW configurations.

SmartFlex SR310 router is supplied in the following versions (see table below). All versions are available in plastic or metal box according to customer requirements. All versions are available with PoE PD (Power over Ethernet – powered device) so you can power the router from both ETH0 and ETH1 interfaces, or with PoE PSE (power source equipment) so you can power other devices by the router.

| Router versions                     | SIM | BIN | BOUT | USB | SD  | ETH | WiFi | 232 | 485 |
|-------------------------------------|-----|-----|------|-----|-----|-----|------|-----|-----|
| Basic version                       | 2 x | 2 x | 1 x  | 1 x | 1 x | 2 x |      |     |     |
| Basic version with WiFi             | 2 x | 2 x | 1 x  | 1 x | 1 x | 2 x | 1 x  |     |     |
| Version with SWITCH board           | 2 x | 2 x | 1 x  | 1 x | 1 x | 5 x |      |     |     |
| Version with SWITCH board & WiFi    | 2 x | 2 x | 1 x  | 1 x | 1 x | 5 x | 1 x  |     |     |
| Version with RS232-RS485/422 board  | 2 x | 2 x | 1 x  | 1 x | 1 x | 2 x |      | 1 x | 1 x |
| Version with RS232-RS485/422 & WiFi | 2 x | 2 x | 1 x  | 1 x | 1 x | 2 x | 1 x  | 1 x | 1 x |
| Version with RS232-RS485-ETH board  | 2 x | 2 x | 1 x  | 1 x | 1 x | 3 x |      | 1 x | 1 x |
| Version with RS232-RS485-ETH & WiFi | 2 x | 2 x | 1 x  | 1 x | 1 x | 3 x | 1 x  | 1 x | 1 x |

Table 1: Router versions

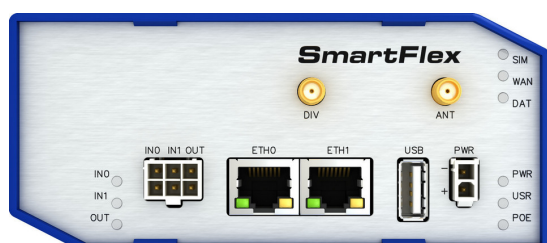


Figure 6: Basic version (plastic)

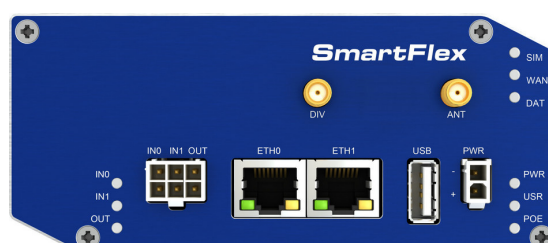


Figure 8: Basic version (metal)

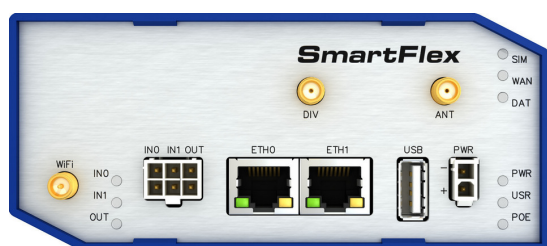


Figure 7: Basic version with WiFi (plastic)



Figure 9: Basic version with WiFi (metal)

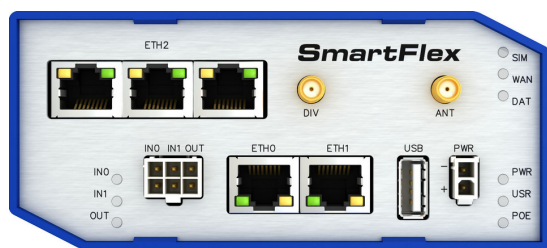


Figure 10: Version SWITCH (plastic)

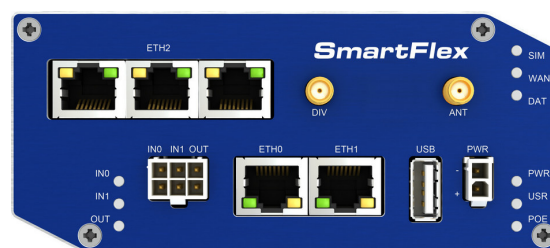


Figure 14: Version SWITCH (metal)

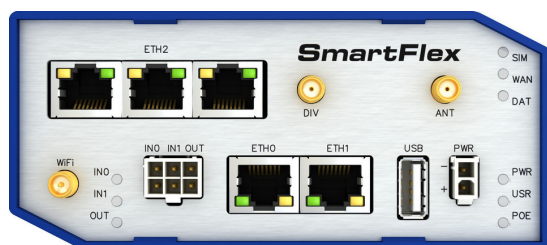


Figure 11: Version SWITCH and WiFi (plastic)

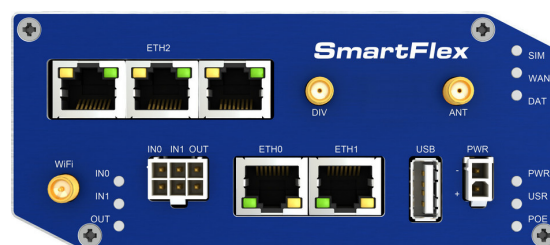


Figure 15: Version SWITCH and WiFi (metal)

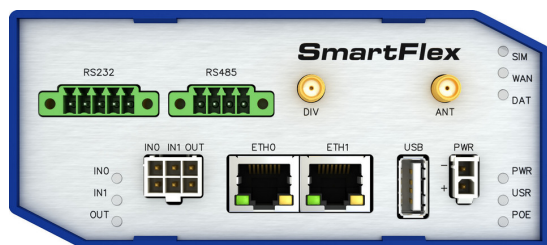


Figure 12: Version RS232-RS485 (plastic)

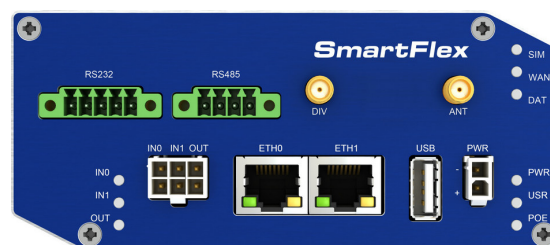


Figure 16: Version RS232-RS485 (metal)

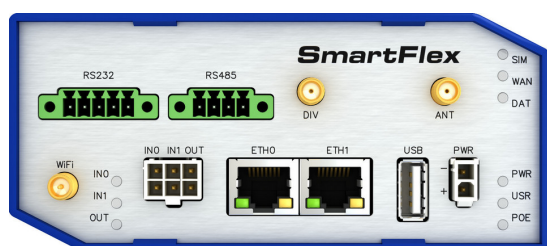


Figure 13: Ver. RS232-RS485 &amp; WiFi (plastic)

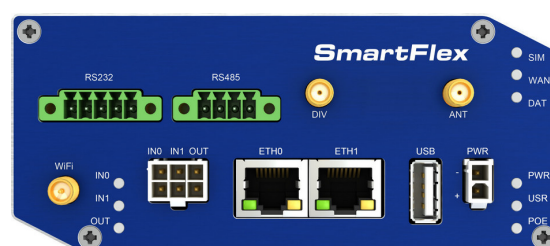


Figure 17: Version RS232-RS485 &amp; WiFi (metal)



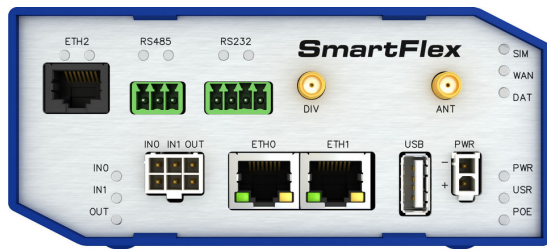


Figure 18: Version RS232-RS485-ETH (plastic)



Figure 20: Version RS232-RS485-ETH (metal)

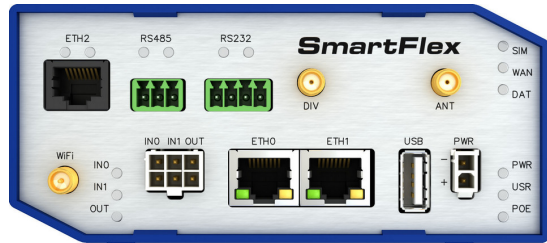


Figure 19: RS232-RS485-ETH &amp; WiFi (plastic)

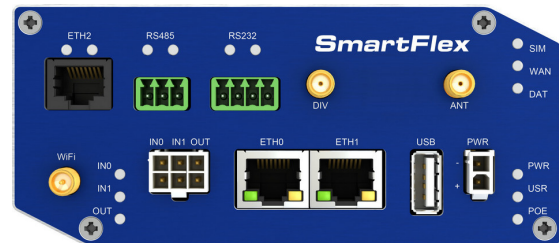


Figure 21: RS232-RS485-ETH &amp; WiFi (metal)



## 3.2 Product Revisions

For the product revision history of the entire product platform, refer to the table below. Please note that some revisions may not be available for certain order codes. The revision number is printed on both the packaging and product labels.

The router GUI can also display the product revision under *Status* → *General* → *System Information* → *Product Revision*. Please note that the default revision (Rev. 1.0) may not be available here.

| Rev.# | Description                                                     |
|-------|-----------------------------------------------------------------|
| 1.0   | Initial version (revision number not printed on the labels).    |
| 2.0   | New SIM slot type; see <a href="#">PCN-2022-03</a> for details. |

Table 2: HW Revisions History

## 3.3 Delivery identification

| Trade name      | Product name | Description                      |
|-----------------|--------------|----------------------------------|
| SmartFlex SR310 | SmartFlex    | Router in a plastic or metal box |

Table 3: Delivery identification

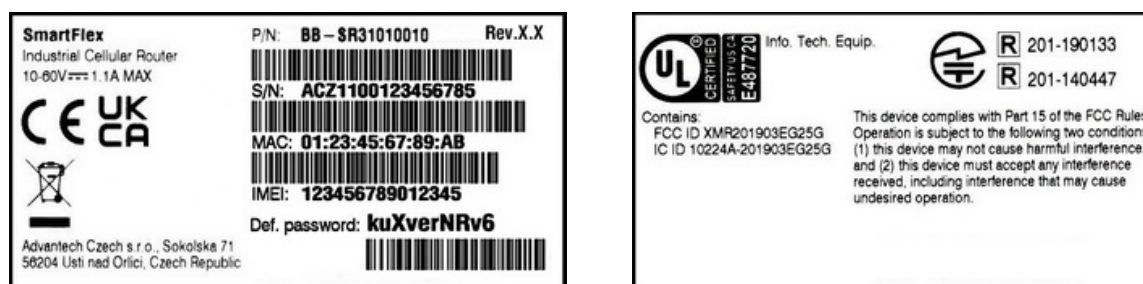


Figure 22: Label examples

## 3.4 Order codes

Order codes overview is shown in the table below.

| Product Name | Order code     | Features – interfaces                                                                                 |
|--------------|----------------|-------------------------------------------------------------------------------------------------------|
| SR310        | BB-SR3100x0yz* | LTE global module, 2x ETH, 1x USB, 2x BI, 1x BO, 1x microSD reader, 2x SIM reader                     |
| SR310        | BB-SR3101x0yz* | LTE global module, 2x ETH, 1x USB, 2x BI, 1x BO, 1x microSD reader, 2x SIM reader, WiFi               |
| SR310        | BB-SR3100x1yz* | LTE global module, 5x ETH, 1x USB, 2x BI, 1x BO, 1x microSD reader, 2x SIM reader                     |
| SR310        | BB-SR3101x1yz* | LTE global module, 5x ETH, 1x USB, 2x BI, 1x BO, 1x microSD reader, 2x SIM reader, WiFi               |
| SR310        | BB-SR3100x3yz* | LTE global module, 2x ETH, 1x USB, 2x BI, 1x BO, 1x microSD reader, 2x SIM reader, RS232, RS485       |
| SR310        | BB-SR3101x3yz* | LTE global module, 2x ETH, 1x USB, 2x BI, 1x BO, 1x microSD reader, 2x SIM reader, WiFi, RS232, RS485 |
| SR310        | BB-SR3100x4yz* | LTE global module, 3x ETH, 1x USB, 2x BI, 1x BO, 1x microSD reader, 2x SIM reader, RS232, RS485       |
| SR310        | BB-SR3101x4yz* | LTE global module, 3x ETH, 1x USB, 2x BI, 1x BO, 1x microSD reader, 2x SIM reader, WiFi, RS232, RS485 |

Table 4: Order codes overview



\* Replace the letters "x", "y" and "z" with the values from the following tables:

### Letter "x" – Power over Ethernet (PoE)

| Power over Ethernet (PoE)                               | Number "x" in code |
|---------------------------------------------------------|--------------------|
| Version without PoE                                     | 0                  |
| PoE PSE – Power Source Equipment – powers other devices | 8                  |
| PoE PD – Powered Device – can be powered via Ethernet   | 9                  |

Table 5: Power over Ethernet

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

| Type of box | Number "y" in code |
|-------------|--------------------|
| Plastic     | 1                  |
| Metal       | 2                  |

Table 6: Type of router box

**Letter "z" – type of power supply plug**

| Plug type                                       | Number "z" in code |
|-------------------------------------------------|--------------------|
| Without accessories                             | 0                  |
| European                                        | 1                  |
| Interchangeable plug adapters (EU, US, UK, AUS) | 5                  |

Table 7: Type of power supply plug

Examples of complete order code:

| Order code    | Features – interfaces                                                                                 | Box     | Plug type |
|---------------|-------------------------------------------------------------------------------------------------------|---------|-----------|
| BB-SR31000120 | LTE global module, 5x ETH, 1x USB, 2x BI, 1x BO, 1x microSD reader, 2x SIM reader,                    | metal   | –         |
| BB-SR31008110 | LTE global module, 5x ETH, 1x USB, 2x BI, 1x BO, 1x microSD reader, 2x SIM reader, PoE PSE            | plastic | –         |
| BB-SR31010015 | LTE global module, 2x ETH, 1x USB, 2x BI, 1x BO, 1x microSD reader, 2x SIM reader, WiFi               | plastic | universal |
| BB-SR31010425 | LTE global module, 3x ETH, 1x USB, 2x BI, 1x BO, 1x microSD reader, 2x SIM reader, WiFi, RS232, RS485 | metal   | universal |

Table 8: Examples of order code

### 3.5 Basic dimensions of the router box

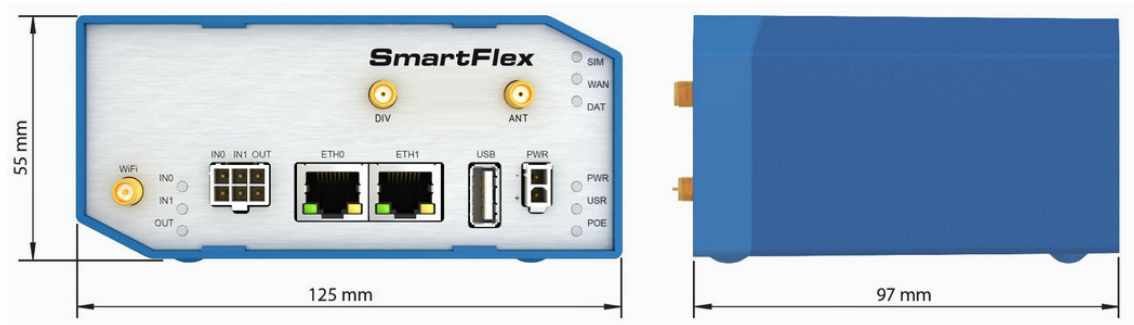


Figure 23: Basic dimensions of the router box

### 3.6 Mounting Recommendations

- It is possible to place the router on a flat surface,
- DIN rail EN 60715 with the included plastic or metal clip.

For most applications with a built-in router within a switchboard, it is possible to recognize two kinds of environments:

- A non-public, industry environment of low voltage with high interference,
- a public environment of low voltage and without high interference.

For both of these environments, it is possible to mount the router to a switchboard, after which there is no need to have examination immunity or issues in connection with EMC according to EN 61439-1:2011.



In compliance with the EN 61439-1:2011 specification, it is necessary to observe the following assembly instructions for a router attached to a switchboard:

- For whip antennas it is recommended to observe a minimum distance of 6 cm from cables and metal surfaces on every side in order to avoid interference. When using an external antenna separate from the switchboard it is necessary to fit a lightning conductor.
- When mounting a router on sheet-steel we recommend using a cable antenna.
- For all cables, we recommend to bind the bunch, and for this we recommend:
  - The length of the bunch (the combination of power supply and data cables) should be a maximum 1.5 m. If the length of data cables exceeds 1.5 m or if the cable is leading towards the switchboard, we recommend installing surge protectors.
  - Data cables must not have a reticular tension of  $\sim 230 \text{ V}/50 \text{ Hz}$  or  $\sim 120 \text{ V}/60 \text{ Hz}$ .
- Sufficient space must be left between each connector for the handling of cables,
- To ensure the correct functioning of the router we recommend the use of an earth-bonding distribution frame for the grounding of the power supply of the router, data cables and antenna within the switchboard.

### 3.7 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.

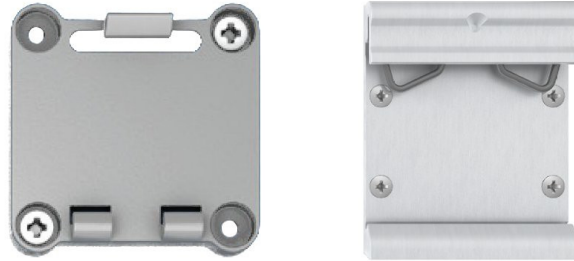


Figure 24: Default position of plastic and metal DIN rail clip

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.

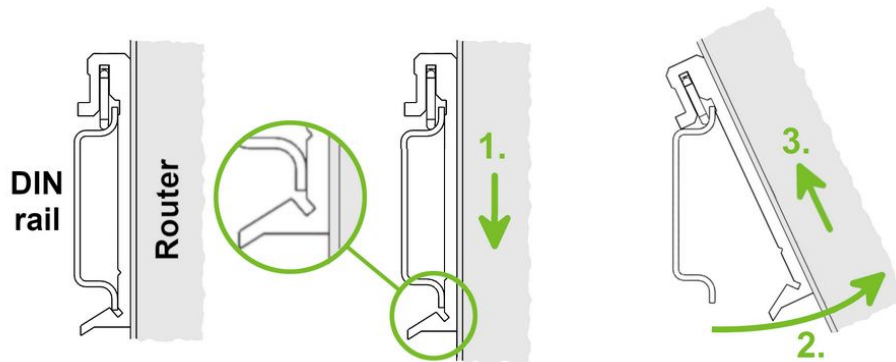


Figure 25: Removal from the DIN rail

3.8 Description of the rear panel

The rear panel contains two holders for SIM cards (*SIM1* and *SIM2*), a holder for microSD card (*SD*) and an *RST* button used to restore the default configuration and reboot the router.

3.9 Description of the front panel

On the front panel is the following:

| Caption | Connector      | Description                                                                                                         |
|---------|----------------|---------------------------------------------------------------------------------------------------------------------|
| PWR     | 2-pin          | Connector for the power supply                                                                                      |
| ETH0    | RJ45           | Connector for connection into the computer network, PoE (only for PoE PSE)                                          |
| ETH1    | RJ45           | Connector for connection into the computer network, PoE (only for PoE PSE)                                          |
| ANT     | SMA            | Connector for main antenna                                                                                          |
| DIV     | SMA            | Connector for diversity antenna                                                                                     |
| WiFi    | R-SMA          | Connector for WiFi antenna ( <b>only for versions with WiFi module!</b> )                                           |
| USB     | USB-A 2.0 Host | Connector for connection of USB devices to the router. Supports devices with PL-2303 and FTDI USB/RS232 converters. |
| I/O     | 6-pin          | Connector for connection of the binary inputs and output                                                            |

Table 9: Front panel description

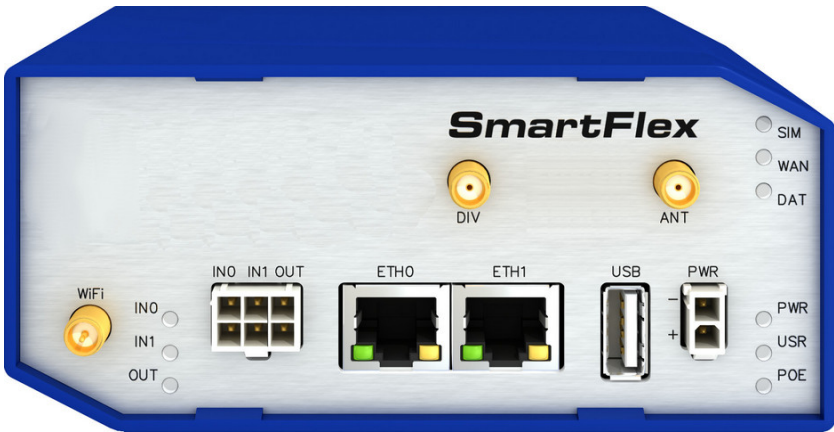


Figure 26: SmartFlex front panel

### 3.9.1 Status indication

There are status LEDs on the front panel to provide router status information. Each ETH port has two additional LEDs that provide information about the port status.

| Caption      | Color           | State                                                    | Description                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------|-----------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PWR          | Green           | On<br>Blinking<br>Fast blinking                          | The router is booting up.<br>The router booted up and is ready.<br>The router firmware is being updated.                                                                                                                                                                                                                                                                                       |
| USR          | Yellow          | —                                                        | The function of this LED is user-defined.                                                                                                                                                                                                                                                                                                                                                      |
| POE          | Yellow<br>Green | On<br>Blinking<br>On<br><br>Blinking<br>Off              | PSE: The insufficient voltage on the PWR connector.<br>PSE: The powered device takes too much power. <sup>1</sup><br>PD: The power supply is present on an ETH port.<br>PSE: A correct power supply on the PWR connector.<br>PSE: A device is powered via one of the ETH ports.<br>PD: The power supply is not present on an ETH port.<br>PSE: The PoE disabled in the Ethernet configuration. |
| SIM          | Green<br>Yellow | On (Green color)<br>On (Yellow color)                    | The first SIM card is active.<br>The second SIM card is active.                                                                                                                                                                                                                                                                                                                                |
| WAN          | Yellow          | Fades out 1x/5 s<br>Fades out 1x/2 s<br>Fades out 1x/1 s | Signal strength is good.<br>Signal strength is fair <sup>2</sup> .<br>Signal strength is poor <sup>3</sup> .<br>For value ranges of signal strength see <i>Configuration manual</i> , chapter <i>Mobile WAN Status</i> .                                                                                                                                                                       |
| DAT          | Red             | Blinking                                                 | Cellular communication is in progress.                                                                                                                                                                                                                                                                                                                                                         |
| IN0          | Green           | On                                                       | The first binary input is active.                                                                                                                                                                                                                                                                                                                                                              |
| IN1          | Green           | On                                                       | The second binary input is active.                                                                                                                                                                                                                                                                                                                                                             |
| OUT          | Yellow          | On                                                       | The binary output is active.                                                                                                                                                                                                                                                                                                                                                                   |
| ETH0<br>ETH1 | Green           | On<br>Off                                                | Selected 100 Mbps.<br>Selected 10 Mbps.                                                                                                                                                                                                                                                                                                                                                        |
| ETH0<br>ETH1 | Yellow          | On<br>Blinking<br>Off                                    | The network cable is connected.<br>Data transmission.<br>The network cable is not connected.                                                                                                                                                                                                                                                                                                   |

Table 10: LED status indication



The status indication of the WAN LED is updated every 10 seconds.

<sup>1</sup>Additionally it can indicate a device without PoE support connected on the other side of the cable. In this case the indication is caused by low impedance (lower than 500  $\Omega$ ) of the device without PoE support. This can be solved by disabling the PoE PSE feature on the relevant ETH port in the router's Web interface, see *Configuration manual* [1].

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

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

### 3.9.2 Power connector PWR

Panel socket 2-pin.

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

Table 11: Connection of power connector

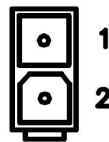


Figure 27: Power connector



The unit must be supplied by a power supply specified as a Limited Power Source (LPS) according to Annex Q of IEC 62368-1. If the power supply or cable provided with the device is not used, always use cables with a minimum wire size (nominal cross-section) of 0.5 square mm for the power supply connection.

For the power supply parameters, see chapter [5.1 Basic Parameters](#). 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!

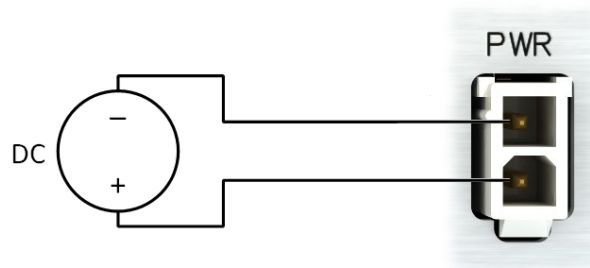


Figure 28: Connection of Power Supply



**Note for PoE:** See Chapter [3.9.9](#) for information on how PoE versions of the router impact the power supply usage. The power supply for a PoE router has to meet other specific requirements.



All metal parts are connected together with the negative pole of power supply (common pole).

#### Low Power Mode



In applications requiring low power consumption (such as solar power - not 7/24 mode) is strictly recommended to use LPM mode prior to powering down the entire router.

LPM (Low Power Mode) is a router mode where the router is in sleep mode with minimal power consumption. The router can be woken up from this mode by a signal applied to the BIN1 input or after a pre-determined period of time. Putting the router into LPM mode can be done using the `lpm` command, see [Command Line Interface](#) application note for more details. Consumption in LPM mode may vary depending on the configuration of the router.



### 3.9.3 Antenna connector ANT, DIV and WiFi

Main and diversity antennas are connected to the router using the SMA connector on the front panel. There is also available R-SMA antenna connector through which the additional antenna can be connected, if the router is equipped with WiFi module.

*ANT* connector is used to connect the main antenna router. To connect the diversity antenna is used the second antenna connector *DIV*. R-SMA connector named *WiFi* is designed for connection of WiFi antenna (available only for versions with WiFi module).



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



The *DIV* cellular antenna is required for the MIMO DL functionality.



For connection the antenna is used SMA connector. The antenna is connected by screwing this antenna to the SMA connector on the router's front panel (see the figure below).

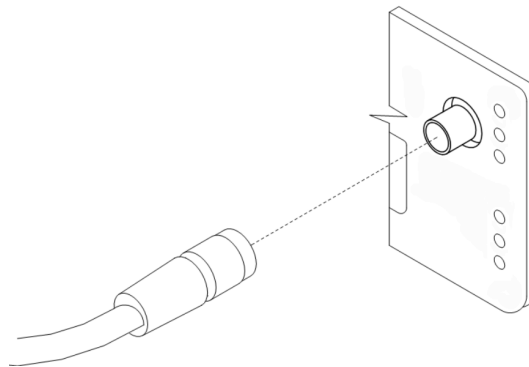


Figure 29: Connecting of the antenna



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

3.9.4 Japan Antenna Certification

The internal wireless modules of this router have been certified by Japan Telec.

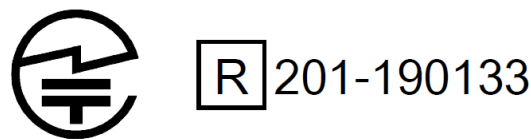


Figure 30: Antenna Certification Mark for Quectel EG25-G

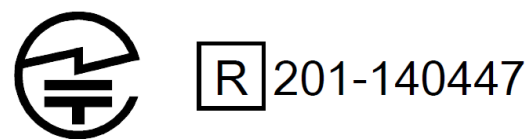


Figure 31: Antenna Certification Mark for Texas Instrument WL18MODGI

3.9.5 Antenna List

| Quectel EG25-G     |
|--------------------|
| BB-2JW0124Z-C868B  |
| BB-2J7041BGFA-300  |
| MA931.A.LBICGH.001 |

Table 12: Quectel EG25-G Antenna List

| Texas Instrument WL18MODGI |
|----------------------------|
| MA931.A.LBICGH.001         |
| BB-AW-A2458G-FSRPK         |

Table 13: Texas Instrument WL18MODGI Antenna List

There is a maximum gain of 3 dBi in either LTE or WCDMA Band.



You can find more information about antennas on our website [icr.advantech.com](http://icr.advantech.com) within *Certified Antennas.zip* file.

### 3.9.6 SIM card slot

Two SIM card slots for 3 V and 1.8 V SIM cards are located on the rear panel of the router. In order for the router to function, it is necessary to insert an activated SIM card with an unblocked PIN code. The SIM cards may have different APNs (Access Point Names) adjusted.



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

#### Changing the SIM card:

- Always disconnect the router from the power supply before handling the SIM card.
- To remove the SIM card, use the flat end of a spudger, or your fingernail, press the SIM card slightly into its slot until you hear a click.
- After hearing this click, release the card, and it will pop out of its slot.
- Remove the SIM card and push any other SIM card into the slot until it clicks into place.

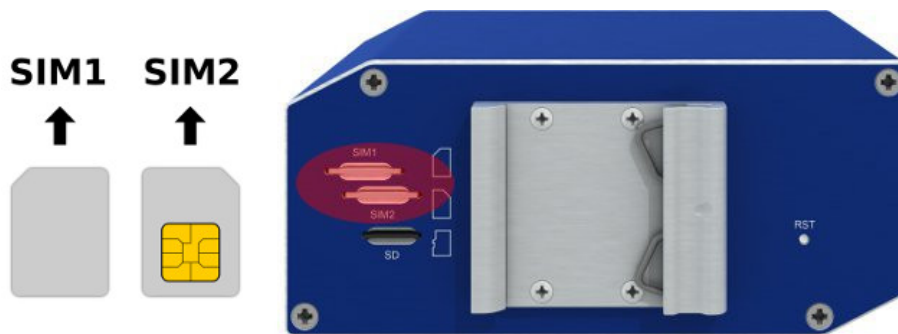


Figure 32: SIM cards

### 3.9.7 MicroSD card reader

The microSD card reader is located on the router's rear panel (the third slot). This card reader allows the router to operate with microSD memory cards. The technical specifications are stated in the table below. The microSD card changing procedure is described below.

| Technical specifications of microSD card |      |                        |
|------------------------------------------|------|------------------------|
| Supported technologies                   |      | SDHC, SDXC             |
| Supported capacity                       | SDHC | up to 32 GB            |
|                                          | SDXC | from 32 GB to 64 GB    |
| Supported microSD card filesystems       |      | vfat, ext2, ext3, ext4 |

Table 14: Technical specifications of microSD card

#### Changing the microSD card:

- To remove the microSD card, use the flat end of a spudger, or your fingernail, press the microSD card slightly into its slot until you hear a click.
- After hearing this click, release the card, and it will pop out of its slot.
- Remove the microSD card and push any other microSD card into the slot until it clicks into place.



Figure 33: MicroSD card

#### Mounting microSD Card to the System

It is necessary to mount the microSD card to be able to access it in the system of the router. Follow these steps to mount the card:

- Use the `dmesg` command to see the list of recently connected devices.
- In the output of the command find out the entry for the microSD card, for example:  
`mmcblk0: p1`
- To mount the card to `/mnt` directory, use the `mount` command:  
`mount /dev/mmcblk0p1 /mnt`



For more information about the commands for creating, mounting, checking and unmounting a file system on a microSD card, see the application note for [Ext4 Filesystem Utilities](#) router app.

### 3.9.8 Ethernet Ports (ETH0 and ETH1)

The panel socket RJ45 is used for this interface. The isolation barrier of the Ethernet signal ports against the ground is 1500 V.

| Pin | 10base-T & 100base-T | PoE (Mode B)          |
|-----|----------------------|-----------------------|
| 1   | Tx+ (Transmit Data+) | —                     |
| 2   | Tx- (Transmit Data-) | —                     |
| 3   | Rx+ (Receive Data+)  | —                     |
| 4   | —                    | PoE + (positive pole) |
| 5   | —                    | PoE + (positive pole) |
| 6   | Rx- (Receive Data-)  | —                     |
| 7   | —                    | PoE - (negative pole) |
| 8   | —                    | PoE - (negative pole) |

Table 15: Ethernet connector pinout

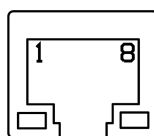


Figure 34: Ethernet connector

The crossover UTP cable (Ethernet cable) plugs into the RJ45 connector labeled as ETH0 or ETH1 (see the figure below).

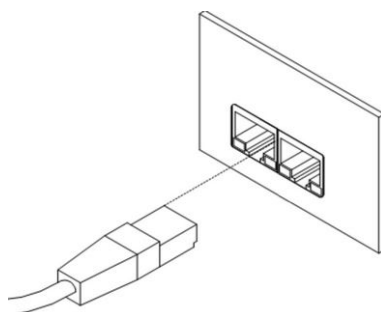


Figure 35: Connection of Ethernet cable



The insulation strength of Ethernet ports from each other and from the rest of the router (grounding) is dependent on the router version:

| Router Version | Insul. Strength from Router | Insul. Strength between Ports |
|----------------|-----------------------------|-------------------------------|
| Without PoE    | 1.5 kV                      | 1.5 kV                        |
| PoE PSE        | none                        | none                          |

Table 16: Insulation strength of Ethernet ports

### 3.9.9 Power over Ethernet (PoE)

- Available only for models with the PoE feature; see Chapter 3.4 for the order codes.
- You cannot power the router via the ETH2 ports on router versions with an integrated switch (often referred to as "SWITCH" versions). PoE PD functionality is available on the ETH0 and ETH1 ports only.
- The *IEEE 802.3af/PoE* (Type 1) and *IEEE 802.3at/PoE+* (Type 2) standards are supported. The device is Mode B compliant.
- You can use the `pse` command to control the PoE functionality; see the [Command Line Interface](#) application note.



The power supply voltage for a PoE-equipped router must be between **24 – 60 V DC** for the router to boot up correctly.

Based on the model configuration, the PoE PSE or PoE PD feature can be supported for both Ethernet ports (ETH0 and ETH1).

The PoE PSE version allows the router to power other devices over the Ethernet. The PoE PD version enables the router to be powered by another PoE PSE device over the Ethernet.

#### PoE PD

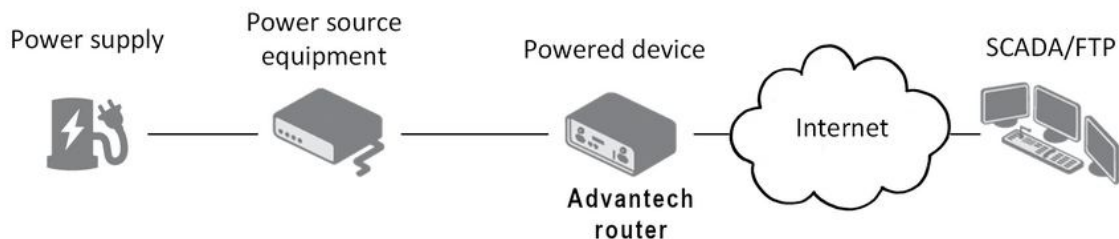


Figure 36: PoE PD usage

The PoE PD parameters can be found in Chapter 5.7. The POE LED on the front panel of the router lights up green when voltage is present on an Ethernet port, so the user knows the router can be PoE powered. You can still power the router with this connector even if the router is powered with PoE (in PoE PD version), but the input voltage must be **higher than 15 V DC**. If the input voltage is lower than 15 V DC and the PoE voltage is present (POE LED green on), the router will still be powered from the Ethernet connector via PoE.

## PoE PSE

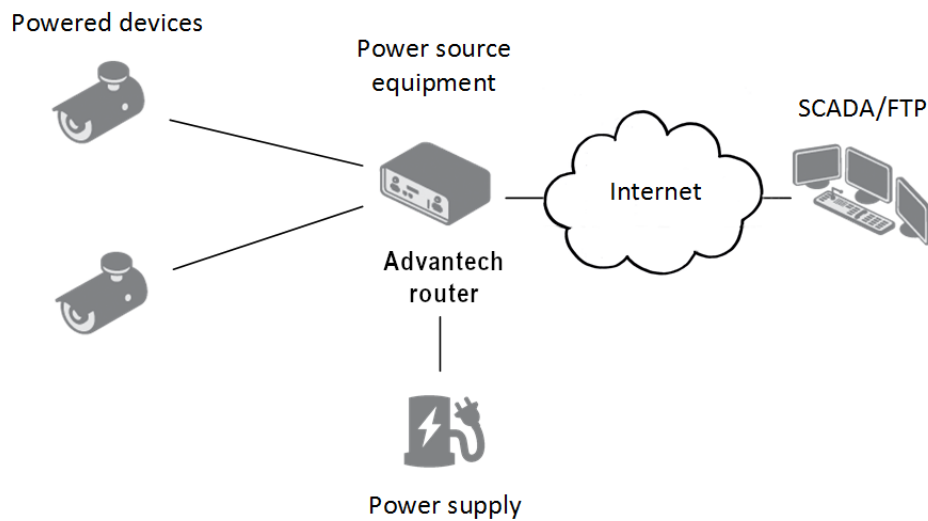


Figure 37: PoE PSE usage

**!** The power supply used with the PoE PSE router has to provide voltage from **44 to 57 V DC** and the output power has to be at least **65 W** for full PoE+ use (Class 4) in both Ethernet ports (ETH0 and ETH1).

The PoE PSE parameters can be found in Chapter 5.7. The PoE state is indicated by the POE LED on the front panel of the router, see Chap. 3.9.1. When sufficient voltage (44 to 57 V) and power is available is indicated by the green light. A yellow POE LED indicates insufficient power or voltage through the PWR connector. When a device is being powered from the router, the POE LED will be blinking green. Yellow blinking is shown for an overload (the powered device is using too much power) or a short circuit (incorrect wiring of the cable or of the device without PoE support).

You can enable or disable the PoE PSE feature separately on the ETH0 and ETH1 ports via the Web interface of the router. This can be found in the LAN configuration pages (*Primary* for ETH0, *Secondary* for ETH1). When PoE PSE is enabled, you can find the current, voltage, power and power class information on the *General* page of the router's Web interface; see the *Configuration manual* [1].

### 3.9.10 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 17: Connection of USB connector



Figure 38: USB connector



The USB port is disabled on overload to prevent its damage (connected device is trying to get too high current). The port is enabled again after the reboot of the router.

#### Mounting USB Flash Drive to the System

It is necessary to mount the USB flash drive to be able to access it in the system of the router. Follow these steps to mount the drive:

- Use the *dmesg* command to see the list of recently connected devices.
- In the output of the command find out the entry for the microSD card, for example:  
sda: sda1
- To mount the card to *mnt* directory, use the *mount* command:  
mount /dev/sda1 /mnt



For more information about the commands for creating, mounting, checking and unmounting a file system on a USB Flash Drive, see the application note for [Ext4 Filesystem Utilities](#) router app.



### 3.9.11 I/O Port

Panel socket 6-pin.

| Pin | Signal mark | Description    |
|-----|-------------|----------------|
| 1   | IN0         | Binary input 0 |
| 2   | IN0         | Binary input 0 |
| 3   | IN1         | Binary input 1 |
| 4   | IN1         | Binary input 1 |
| 5   | OUT         | Binary output  |
| 6   | OUT         | Binary output  |

Table 18: Connection of I/O port

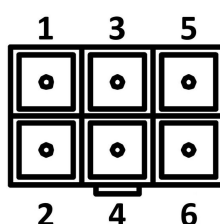


Figure 39: I/O connector

The I/O user Interface is designed for the processing of binary input and control (setting) of binary output. Binary output is open in the default configuration. The isolation strength is 1.5 kV. The pins are isolated from each other with the same strength.

The input circuits are bipolar and allow connection as needed with common plus or minus (according to the connection of an external voltage).

#### Binary inputs

- Characteristics of inputs:

| Logical 0/1* | Voltage | Current | Web interface status |
|--------------|---------|---------|----------------------|
| log. 1 max   | 3 V     | 0.4 mA  | Off                  |
| log. 0 min   | 5 V     | 0.7 mA  | On                   |
| log. 0 type  | 12 V    | 2 mA    | On                   |
| log. 0 max   | 60 V    | 7 mA    | On                   |

Table 19: Characteristics of inputs

\* The binary input status in the Shell is returned via `io get bin0` or `io get bin1`.

### Binary output

- Binary output parameters:
  - 60 V AC / 300 mA
  - 60 V DC / 300 mA
- The current of the binary output is limited by a resettable fuse (300 mA).

### Binary inputs and output connections

Binary inputs and output connections example:

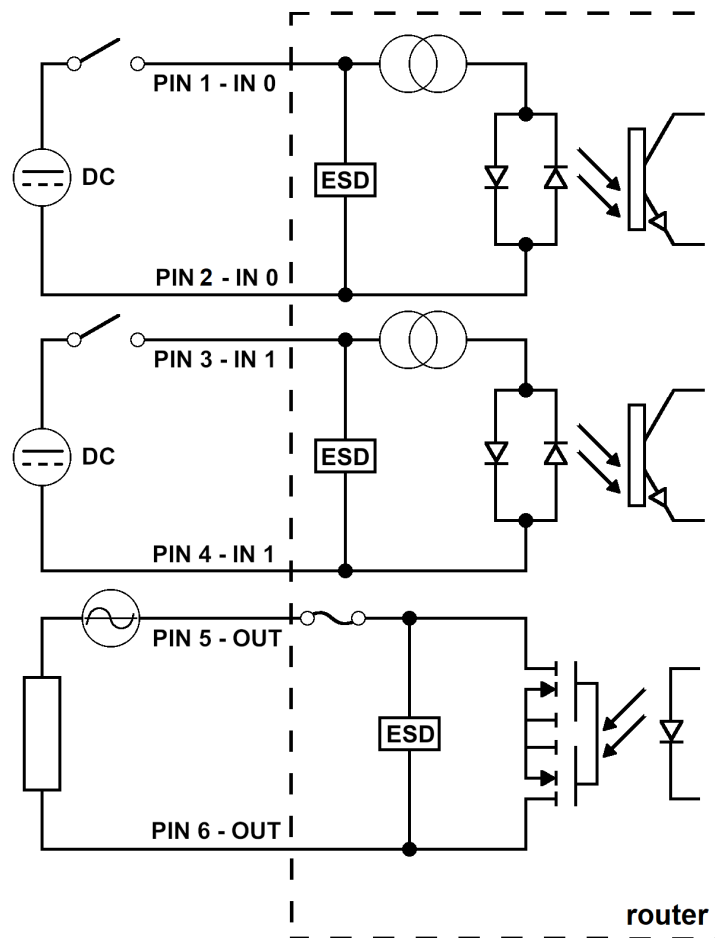


Figure 40: Binary connection

### 3.9.12 Reset

When the *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 rear panel. After pressing this button the default configuration will be restored and the router will reboot (after which the green LED will be on).



It is necessary to use a narrow screwdriver or any other small tool to press the *RST* button.

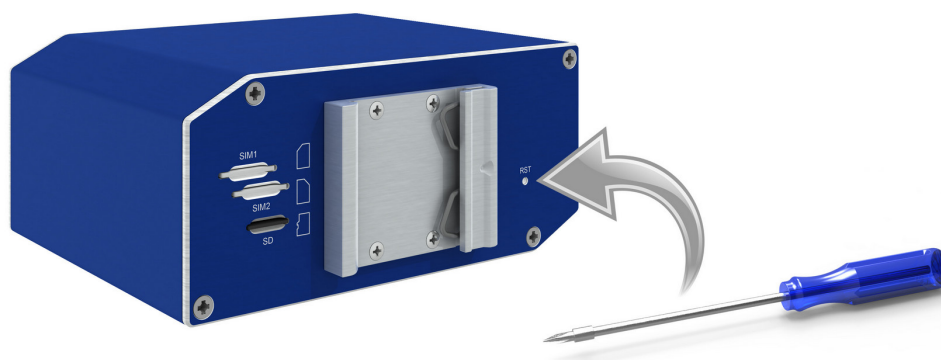


Figure 41: Router reset



Before resetting the router, it is recommended to back up the router configuration settings (see *Configuration manual*) because resetting the router will return all configuration settings to their default states.

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

| Action | Router behavior                                           | Invoking events                                                                                |
|--------|-----------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Reboot | Turns off and then turns on the router                    | Disconnect and reconnect the power,<br>press the <i>Reboot</i> button in the web configuration |
| Reset  | Restores the default configuration and reboots the router | Press the <i>RST</i> button                                                                    |

Table 20: Description of router reset and restart

3.10 Interfaces Description

Besides the basic version of SmartFlex router there are available versions with one of the following interfaces:

- SWITCH interface
- RS232-RS485/422 interface
- RS232-RS485-ETH interface



Note that only the Advantech service center can do the jumpering inside the router.

3.10.1 SWITCH Interface

The three LAN ports of the SWITCH interface for SmartFlex routers (RJ45 connectors for connecting Ethernet devices) act as a typical switch device. This means that the router reads Ethernet frames (data packets on an Ethernet link) from any port on the SWITCH interface and transmits them on other ports of the SWITCH interface. Each port can transmit frames independently on the other ports. State indication is displayed separately on each connector. These router versions comply with the standards and temperature ranges stated in Chap. efchap:BasicParams except for having a lower maximum operating temperature, which is +70 °C.

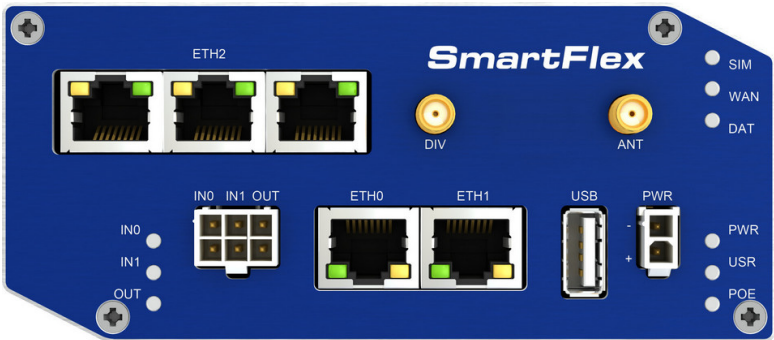


Figure 42: Version with SWITCH board

State indication of the interface:

| Description of indication |          |                                    |
|---------------------------|----------|------------------------------------|
| Green LED                 | On       | Selected 100 Mbps                  |
|                           | Off      | Selected 10 Mbps                   |
| Yellow LED                | On       | The network cable is connected     |
|                           | Blinking | Data transmission                  |
|                           | Off      | The network cable is not connected |

Table 21: State indication of the SWITCH interface

Technical specification of Ethernet IEEE 802.3:

| Ethernet interface, IEEE 802.3 standard     |          |
|---------------------------------------------|----------|
| Maximum data rate                           | 100 Mbps |
| Max. total cable length (300 Bd, 200 nF/km) | 100 m    |

Table 22: SWITCH interface parameters

3.10.2 RS232-RS485/422 Interface

These interfaces are physically connected through the 5-pin and 4-pin terminal block connectors. The insulation strength is up to 2.5 kV. **Attention, connectors are not isolated from each other!** No state indication is displayed for this interface. These router versions comply with the standards and temperature ranges stated in Chap. efchap:BasicParams.

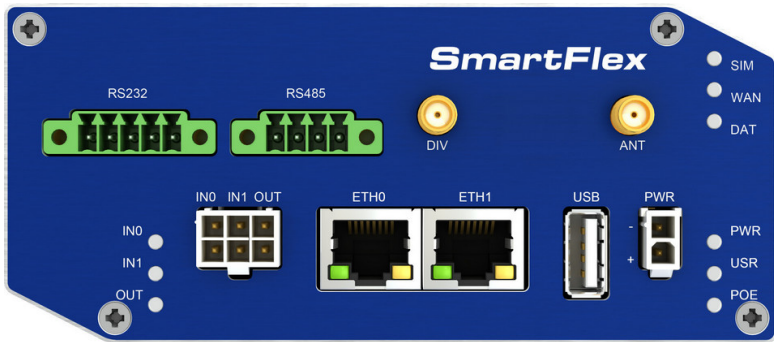


Figure 43: Version with RS232-RS485/422 interface



When connecting counterpart terminal block connectors (included in package with the router), use cables with nominal cross section 0.2 to 1.0 square mm (30 to 16 AWG). Recommended stripping length is 5 mm. For M2 captive screws the screw driver 0.5 x 3 mm is recommended. Tighten the screws with 0.3 Nm torque.

Connection of RS232 connector:

| Pin | Signal | Description     | Direction |
|-----|--------|-----------------|-----------|
| 1   | CTS    | Clear To Send   | Output    |
| 2   | RTS    | Request To Send | Input     |
| 3   | GND    | Signal ground*  | —         |
| 4   | RXD    | Receive Data    | Input     |
| 5   | TXD    | Transmit Data   | Output    |

Table 23: Connection of RS232 connector

\* Both connectors (RS232 and RS485/422) have a common ground connection.

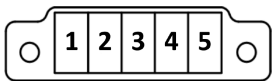


Figure 44: RS232 connector

Connection of RS485 connector:

| Pin | Signal | Description | Direction    |
|-----|--------|-------------|--------------|
| 1   | TxRx+  | RS485 B (+) | Input/Output |
| 2   | TxRx-  | RS485 A (-) | Input/Output |
| 3   | TxRx+  | RS485 B (+) | Input/Output |
| 4   | TxRx-  | RS485 A (-) | Input/Output |

Table 24: Connection of RS485 connector

Connection of RS422 connector:

| Pin | Signal | Description | Direction |
|-----|--------|-------------|-----------|
| 1   | RxD+   | RS422 (+)   | Output    |
| 2   | RxD-   | RS422 (-)   | Output    |
| 3   | TxD+   | RS422 (+)   | Input     |
| 4   | TxD-   | RS422 (-)   | Input     |

Table 25: Connection of RS422 connector

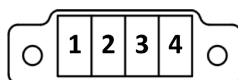


Figure 45: RS485/422 connector

The selection of either RS485 or RS422 can be performed by using jumpers on the board. Three jumpers are required for the RS485 interface or one jumper for the RS422 interface. **The default configuration is RS485 with termination off.**

Technical specification of RS232 and RS485 bus:

| RS232 and RS485 interface                   |                                            |
|---------------------------------------------|--------------------------------------------|
| Max. operating RS232 bus current            | 15 mA                                      |
| Max. number of devices on RS485 bus         | 32                                         |
| Max. output current on RS485 bus            | 60 mA                                      |
| Max. data rate                              | 230400 bps on RS232<br>230400 bps on RS485 |
| Max. total cable length (300 Bd, 200 nF/km) | RS232 20 m, RS485 1200 m                   |

Table 26: Technical specification of RS232 and RS485



The termination resistor can be activated directly on the port board using a jumper (termination resistor is part of the port board).

3.10.3 RS232-RS485-ETH Interface

This interface board includes a panel RJ45 connector for Ethernet connection (ETH2 in the figure), and four-pin and three-pin terminal block connectors for RS232 and RS485 connection. The insulation strength is up to 2.5 kV between the ETH2 and RS485 interfaces and from the rest of the router, too. The RS232 interface is not insulated from the rest of the router. State indication is displayed by LEDs above each connector, as shown in the table below. These router versions comply with the standards and temperature ranges stated in Chap. efchap:BasicParams.

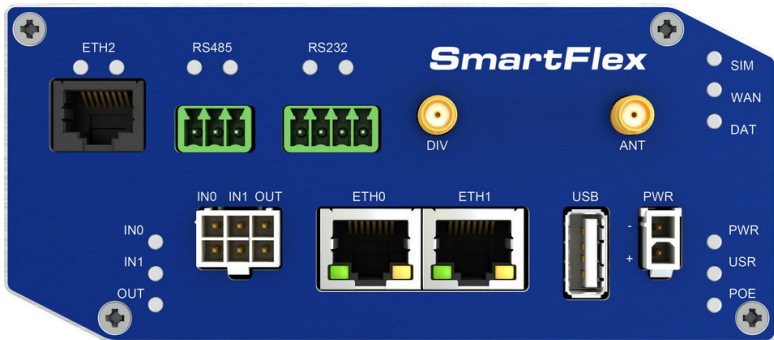


Figure 46: Version with RS232-RS485-ETH interface

Connection of ETH connector:

| Pin | Signal | Description                   | 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 27: Connections of the Ethernet Connector

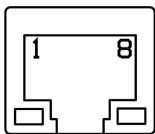


Figure 47: Ethernet connector





When connecting counterpart terminal block connectors (included in package with the router), use cables with nominal cross section 0.2 to 1.0 square mm (30 to 16 AWG). Recommended stripping length is 5 mm. For M2 captive screws the screw driver 0.5 x 3 mm is recommended. Tighten the screws with 0.3 Nm torque.

Connection of RS485 connector:

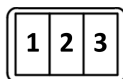


Figure 48: RS485 connector

| Pin | Signal | Description    | Direction    |
|-----|--------|----------------|--------------|
| 1   | GND    | Signal ground* | —            |
| 2   | TxRx+  | RS485 B(+)     | Input/Output |
| 3   | TxRx-  | RS485 A(-)     | Input/Output |

Table 28: Connections of Terminal Block Connector RS485

\* *Signal ground is isolated from the router's ground.*



The termination resistor can be activated directly on the port board using a jumper (termination resistor is part of the port board).

Connection of RS232 connector:

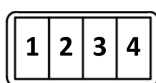


Figure 49: RS232 connector

| Pin | Signal | Description    | Direction |
|-----|--------|----------------|-----------|
| 1   | AUX    | +5 V/500 mA    | —         |
| 2   | GND    | Signal ground* | —         |
| 3   | RXD    | Receive Data   | Input     |
| 4   | TXD    | Transmit Data  | Output    |

Table 29: Connections of Terminal Block Connector RS232

\* *Common with router's signal ground.*

State indication of the interface:

| Description of indication |          |                                    |
|---------------------------|----------|------------------------------------|
| ETH2 – green LED          | On       | Selected 100 Mbps                  |
|                           | Off      | Selected 10 Mbps                   |
| ETH2 – Yellow LED         | On       | The network cable is connected     |
|                           | Blinking | Data transmission                  |
|                           | Off      | The network cable is not connected |
| RS485, RS232 – green LED  |          | Indicates Receive data             |
| RS485, RS232 – yellow LED |          | Indicates Transmit data            |

Table 30: State indication of the RS232-RS485-ETH interface

Technical specification of RS232, RS485 bus and Ethernet IEEE 802.3:

| ETH2, RS485 and RS232 interface             |                                                                |
|---------------------------------------------|----------------------------------------------------------------|
| Max. operating RS232 bus current            | 15 mA                                                          |
| Max. number of devices on RS485 bus         | 32                                                             |
| Max. output current on RS485 bus            | 60 mA                                                          |
| Max. data rate                              | 230400 bps on RS232<br>230400 bps on RS485<br>100 Mbps on ETH2 |
| Max. total cable length (300 Bd, 200 nF/km) | RS232 20 m<br>RS485 1200 m<br>ETH2 100 m                       |

Table 31: Technical specification of RS232, RS485 and Ethernet

## 4. First Use

### 4.1 Connecting the router before first use

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



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

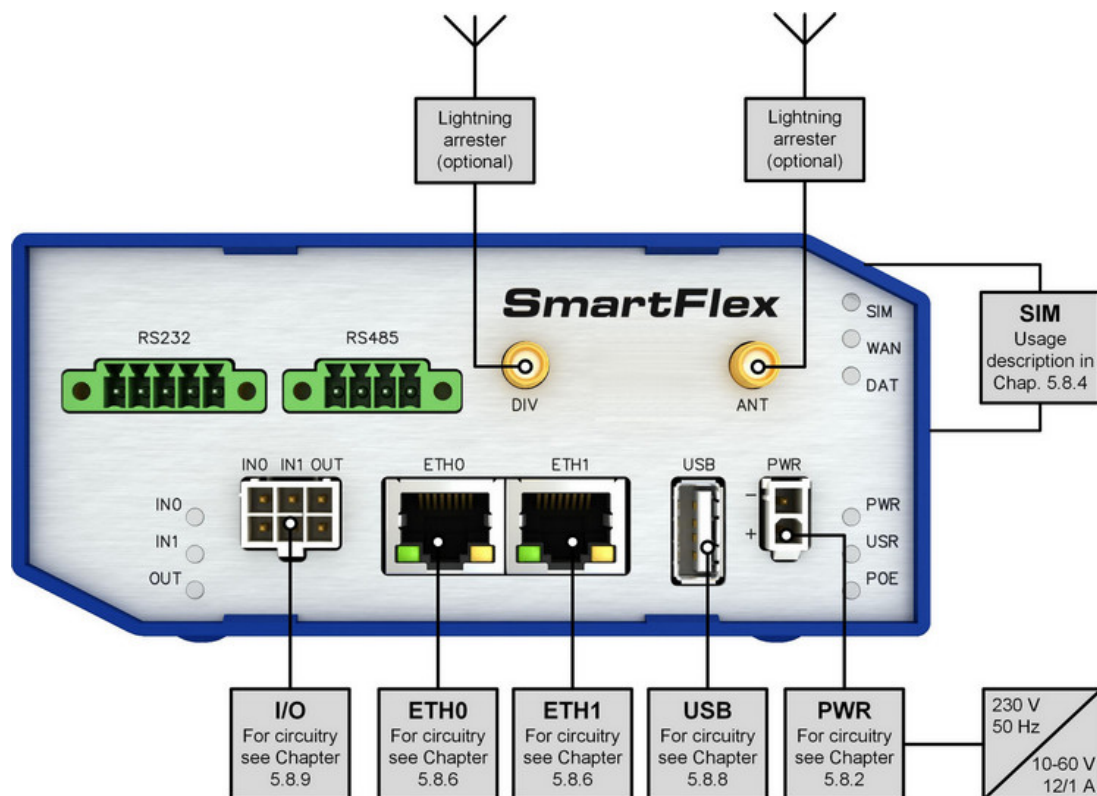


Figure 50: Router connection

## 4.2 Start

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

## 4.3 Configuration



If no SIM card is inserted in the router, it is not possible for the router to operate. Any inserted SIM card must have active data transmission.

### 4.3.1 Configuration by web browser

For status monitoring, configuration and administration of the router a web interface is available 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. **Attention, it is necessary to use HTTPS protocol for secure communication over a network!**



Figure 51: Entering the IP address of the router

By default, configuration may be performed only by the user "root". The default password is printed on the router's label.<sup>1</sup> Change the default password as soon as possible!



All routers have the *WebAccess/DMP* client pre-installed by default. The activated client periodically uploads router identifiers and configuration to the *WebAccess/DMP* server. See the configuration manual [1], chapter *Basic Information* → *WebAccess/DMP Configuration*, for more information.

Figure 52: Entering login information

After successfully entering login information, the user will have access to the router web interface via their browser.

<sup>1</sup>If the router's label does not contain a unique password, use the password "root".

| Status                 | General Status                               |
|------------------------|----------------------------------------------|
| General                | Mobile Connection                            |
| Mobile WAN             | SIM Card : Primary                           |
| WiFi                   | IP Address : 10.0.6.239                      |
| WiFi Scan              | Rx Data : 1.0 KB                             |
| Network                | Tx Data : 3.3 KB                             |
| DHCP                   | Uptime : 0 days, 0 hours, 1 minute           |
| IPsec                  | » More Information «                         |
| DynDNS                 | Primary LAN                                  |
| System Log             | IP Address : 192.168.1.1 / 255.255.255.0     |
|                        | MAC Address : 7C:66:9D:35:8B:74              |
|                        | Rx Data : 165.3 KB                           |
|                        | Tx Data : 431.7 KB                           |
|                        | » More Information «                         |
| Configuration          | Secondary LAN                                |
| LAN                    | IP Address : 192.168.2.1 / 255.255.255.0     |
| VRRP                   | MAC Address : 7C:66:9D:35:8B:76              |
| Mobile WAN             | Rx Data : 1.1 KB                             |
| PPPoE                  | Tx Data : 7.9 KB                             |
| WiFi                   | » More Information «                         |
| WLAN                   | Tertiary LAN                                 |
| Backup Routes          | IP Address : 192.168.3.1 / 255.255.255.0     |
| Firewall               | MAC Address : 00:80:0F:11:70:00              |
| NAT                    | Rx Data : 0 B                                |
| OpenVPN                | Tx Data : 0 B                                |
| IPsec                  | » More Information «                         |
| GRE                    | WiFi                                         |
| L2TP                   | IP Address : 192.168.4.1 / 255.255.255.0     |
| PPTP                   | MAC Address : 94:B1:F7:E1:2A:84              |
| DynDNS                 | Rx Data : 0 B                                |
| NTP                    | Tx Data : 0 B                                |
| SNMP                   | » More Information «                         |
| SMTP                   | Peripheral Ports                             |
| SMS                    | Expansion Port 1 : Ethernet Switch           |
| Expansion Port 1       | Expansion Port 2 : None                      |
| Expansion Port 2       | Binary Input 1 : Off                         |
| USB Port               | Binary Input 2 : Off                         |
| Startup Script         | Binary Output : Off                          |
| Up/Down Script         |                                              |
| Automatic Update       | System Information                           |
| Customization          | Firmware Version : 0.1.RC2 (2014-10-07) BETA |
| User Modules           | Serial Number : N/A                          |
| Administration         | Profile : Standard                           |
| Remote Access          | Supply Voltage : 12.0 V                      |
| Change Profile         | Temperature : 45 °C                          |
| Change Password        | Time : 2000-01-01 01:09:29                   |
| Add User               | Uptime : 0 days, 0 hours, 4 minutes          |
| Delete User            |                                              |
| Set Real Time Clock    |                                              |
| Set SMS Service Center |                                              |
| Unlock SIM Card        |                                              |
| Send SMS               |                                              |
| Backup Configuration   |                                              |
| Restore Configuration  |                                              |
| Update Firmware        |                                              |
| Reboot                 |                                              |

Figure 53: Router web interface



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

# 5. Technical Parameters

## 5.1 Basic Parameters

| SmartFlex Router     |                                       |                                                                                                                                                                                                                        |
|----------------------|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature range    | Operating<br>Storage                  | -40 °C to +70 °C (-40 °F to +158 °F)<br>-40 °C to +85 °C (-40 °F to +185 °F)                                                                                                                                           |
| Cold start           | -15 °C<br><br>-20 °C                  | Data transfers via mobile network are available immediately<br>Data transfers via mobile network are available approximately in five minutes after the start of the router. Everything else is functional immediately. |
| 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       |                                       | 10 to 60 V DC (for PoE version see <a href="#">3.9.9</a> )                                                                                                                                                             |
| Battery for RTC      |                                       | CR1225                                                                                                                                                                                                                 |
| Consumption          | Idle<br>Average<br>Peak<br>Sleep mode | 2.5 W<br>4 W<br>11 W<br>10 mW                                                                                                                                                                                          |
| Dimensions           |                                       | 55 x 97 x 125 mm (2.17" x 3.82" x 4.92")<br>(DIN 35 mm, EN 60715)                                                                                                                                                      |
| Weight               | Plastic box<br><br>Metal box          | approximately 170 g (0.37 lbs)<br>(depends on interface)<br>approximately 380 g (0,83 lbs)<br>(depends on interface)                                                                                                   |
| Antenna connectors   |                                       | 2x SMA – 50 Ω<br>1x R-SMA – 50 Ω (je-li osazen WiFi modul)                                                                                                                                                             |
| User interface       | 2x ETH<br>USB<br>I/O<br>Micro SD      | Ethernet (10/100 Mbps)<br>USB 2.0<br>6-pin panel socket<br>SDHC, SDXC                                                                                                                                                  |

Table 32: Basic parameters

## 5.2 Standards and Regulations

The router complies with the following standards and regulations.

| Standards and regulations |                                                                                                                                                                                                                                    |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Radio                     | ETSI EN 301 511, ETSI EN 301 908-1, ETSI EN 301 908-2, ETSI EN 301 908-13, ETSI EN 303 413, ETSI EN 301 893, ETSI EN 300 328, FCC part 22H, FCC part 24E, FCC part 27, FCC part 90R, PTCRB                                         |
| EMC                       | ETSI EN 301 489-1, ETSI EN 301 489-17, ETSI EN 301 489-19, ETSI EN 301 489-52, EN 55032, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-6-2, EN 61000-6-3, FCC Part 15 Subpart B, ICES-003 Issue 6 |
| Safety                    | EN IEC 62368-1, EN IEC 62311, IEEE 802.3, UL E487720                                                                                                                                                                               |
| Carrier approvals         | AT&T, T-Mobile US, Verizon                                                                                                                                                                                                         |
| Climatic                  | NEMA TS2                                                                                                                                                                                                                           |
| Cybersecurity             | EN 18031-1                                                                                                                                                                                                                         |
| National                  | CE, UKCA, FCC, IC, TELEC                                                                                                                                                                                                           |
| Environmental             | REACH, RoHS3 and WEEE compliant                                                                                                                                                                                                    |

Table 33: Standards and regulations

## 5.3 Type Tests and Environmental Conditions

| Phenomena                                    | Test                                       | Description                                   | Test levels                                        |
|----------------------------------------------|--------------------------------------------|-----------------------------------------------|----------------------------------------------------|
| ESD                                          | EN 61000-4-2                               | Enclosure contact<br>Enclosure air            | $\pm 6$ kV<br>$\pm 8$ kV                           |
| RF field AM modulated                        | EN IEC 61000-4-3                           | Enclosure                                     | 10 V/m (80 – 1000 MHz)<br>10 V/m (1000 – 6000 MHz) |
| Fast transient                               | EN 61000-4-4                               | Signal ports<br>Power ports<br>Ethernet ports | $\pm 1$ kV<br>$\pm 1$ kV<br>$\pm 1$ kV             |
| Surge                                        | EN 61000-4-5                               | Ethernet ports<br>Power ports<br>I/O ports    | $\pm 1$ kV<br>$\pm 1$ kV<br>$\pm 1$ kV             |
| RF conducted                                 | EN 61000-4-6                               | All ports                                     | 10 V/m (0,15 – 80 MHz)                             |
| Radiated emission                            | EN 55032                                   | Enclosure                                     | Class B                                            |
| Conducted emission                           | EN 55032                                   | DC power ports<br>Ethernet ports              | Class B<br>Class B                                 |
| Degrees of protection provided by enclosures | EN 60529                                   | IP30                                          |                                                    |
| Dry heat                                     | EN 60068-2-2                               | storage +85 °C, operation +75 °C              |                                                    |
| Cold                                         | EN 60068-2-1                               | storage -40 °C                                |                                                    |
| Damp heat                                    | EN 60068-2-30                              | +55 °C / +25 °C, rel. humidity 95%, 6 h - 6 h |                                                    |
| Shock                                        | EN 60068-2-14                              | -40 °C/+75 °C, 3h/3h, 2 cycles, 3 K/min       |                                                    |
| Low Temperature                              | NEMA TS2<br>chap. 2.1.5.1                  | storage -45 °C (-49 °F)                       |                                                    |
| High Temperature                             | NEMA TS2<br>chap. 2.1.5.1                  | storage +85 °C (185 °F)                       |                                                    |
| Low Temperature                              | NEMA TS2<br>chap. 2.2.7.3<br>chap. 2.2.7.4 | operation -34 °C (-30 °F)                     |                                                    |
| High Temperature                             | NEMA TS2<br>chap. 2.2.7.5<br>chap. 2.2.7.6 | operation +74 °C (165 °F)                     |                                                    |

Table 34: Type tests and environmental conditions



## 5.4 Parameters of Cellular Module

| Technical parameters of cellular module |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LTE parameters                          | <b>LTE:</b> LTE Cat 4, 3GPP Rel. 11<br><b>FDD frequencies:</b> B12 & B13 & B28 (700 MHz), B20 (800 MHz), B26 (850 MHz), B19 (850 MHz), B18 (850 MHz), B5 (850 MHz), B8 (900 MHz), B4 (1700 MHz), B3 (1800 MHz), B2 & B25 (1900 MHz), B1 (2100 MHz), B7 (2600 MHz)<br><b>FDD bit rates:</b> up to 150 Mbps (DL), 50 Mbps (UL)<br><b>TDD frequencies:</b> B39 (1900 MHz), B40 (2300 MHz), B41 (2500 MHz), B38 (2600 MHz)<br><b>TDD bit rates:</b> up to 130 Mbps (DL), 30 Mbps (UL)<br><b>Maximum aggregated bandwidth:</b> 20 MHz<br><b>Maximum output power:</b> 23±2 dBm |
| UMTS parameters                         | <b>UMTS:</b> 3GPP Release 8<br><b>Supported frequencies:</b> B19 (800 MHz), B6 (800 MHz), B5 (850 MHz), B8 (900 MHz), B4 (1700 MHz), B2 (1900 MHz), B1 (2100 MHz)<br><b>DC-HSDPA bit rates:</b> Max. 42 Mbps (DL)<br><b>HSUPA bit rates:</b> Max. 5.76 Mbps (UL)<br><b>WCDMA bit rates:</b> 384 kbps (DL) / 384 kbps (UL)<br><b>Maximum output power:</b> 24+1/-3 dBm                                                                                                                                                                                                     |
| EDGE parameters                         | <b>Supported frequencies:</b> 850 MHz, 900 MHz, 1800 MHz, 1900 MHz<br><b>Data throughput:</b> 296 kbps (DL) / 236.8 kbps (UL)<br><b>Maximum output power:</b> 27±3 dBm                                                                                                                                                                                                                                                                                                                                                                                                    |
| GPRS parameters                         | <b>Supported frequencies:</b> 850 MHz, 900 MHz, 1800 MHz, 1900 MHz<br><b>Data throughput:</b> 107 kbps (DL) / 85.6 kbps (UL)<br><b>Maximum output power:</b> 33±2 dBm                                                                                                                                                                                                                                                                                                                                                                                                     |

Table 35: Technical parameters of cellular module

### Antenna Requirements

- VSWR – <2:1 (Antenna input impedance response as function of frequency. This shows the antenna resonances and its bandwidth).
- SMA – 50  $\Omega$
- For good diversity performance, the primary and secondary antennas should have different polarizations.

## 5.5 Parameters of WiFi

| WiFi                                  |                                                                                                                             |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Antenna connector                     | R-SMA – 50 Ω                                                                                                                |
| Supported WiFi band                   | 2.4 GHz, 5 GHz                                                                                                              |
| Standards                             | 802.11a, 802.11b, 802.11g, 802.11n                                                                                          |
| 2.4 GHz supported channels            | 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13                                                                                   |
| 5 GHz supported channels <sup>1</sup> | 36, 38, 40, 42, 44, 46, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 149, 153, 157, 161, 165  |
| Type of device                        | Access point, station                                                                                                       |
| Max. clients in AP mode               | 10                                                                                                                          |
| WiFi TX Output Power                  | 17,3 dBm                                                                                                                    |
| WiFi RX Sensitivity                   | -96,3 dBm                                                                                                                   |
| AP maximum users                      | 10 users (WiFi module supports multi-role operation in STA and AP. Multi-role does not affect the maximum number of users). |

Table 36: Technical parameters of WiFi

## 5.6 Parameters of I/O Ports

- Characteristics of inputs:

| Logical 0 / 1* | Voltage | Current | Web interface status |
|----------------|---------|---------|----------------------|
| log. 1 max     | 3 V     | 0.4 mA  | Off                  |
| log. 0 min     | 5 V     | 0.7 mA  | On                   |
| log. 0 type    | 12 V    | 2 mA    | On                   |
| log. 0 max     | 60 V    | 7 mA    | On                   |

Table 37: Characteristics of inputs

\* The binary input status in the Shell is returned via `io get bin0` or `io get bin1`.

- Binary output parameters:
  - 60 V AC / 300 mA
  - 60 V DC / 300 mA

<sup>1</sup>Supported channels depends on selected Country Code.

## 5.7 Parameters of PoE

Standards IEEE 802.3at-2009 (PoE+) and IEEE 802.3af-2003 (PoE) are supported. Cabling needed is Category 5, up to 12.5  $\Omega$ . It is possible to use a passive PoE injector.

| PoE PSE parameters  |                         |
|---------------------|-------------------------|
| Power supply needed | 44 – 57 V, 65 W         |
| Power available     | 2x 25.50 W (ETH0, ETH1) |

Table 38: PoE PSE parameters

## 5.8 Other Parameters

| Parameter    | Description     |
|--------------|-----------------|
| CPU power    | 2 DMIPS per MHz |
| Flash memory | 256 MB          |
| RAM          | 512 MB          |
| M-RAM        | 128 kB          |

Table 39: Other technical parameters

# Appendix A: Troubleshooting

If you cannot connect to the router from your PC, your network card may be configured in a way that prevents a connection. Try one or more of the following steps to resolve the issue:

- Ensure your PC's network card is configured to obtain an IP address automatically from a DHCP server (the router's DHCP server is enabled by default).
- Connect the router to the PC via a network switch.
- Connect the PC directly to the router, but start the router first and wait for it to initialize completely before starting the PC.

## Ethernet Connection Fails or Is Unstable

- On the router's *Configuration* → *LAN* page, you can disable auto-negotiation and manually set a specific link speed and duplex mode. This can resolve compatibility issues with some network devices.

## Mobile WAN Connection Fails or Is Intermittent

- Check the signal strength on the *Status* → *Mobile WAN* page. If the signal is weak, a more powerful antenna is required. If neighboring cells have similar signal strength, a directional antenna may be necessary to lock onto the optimal cell tower.
- Enable the connection check feature on the *Configuration* → *Mobile WAN* page in the *Check connection* section. Select the *Enable + bind* option. This will send periodic pings to check connectivity and restart the connection if it fails. The "bind" option ensures the ping is always sent through the Mobile WAN interface.

## Cannot Establish Mobile WAN Connection

- Verify all settings on the *Configuration* → *Mobile WAN* page, including the *APN*, *username*, *password*, and *IP address*. For many public networks, these fields can be left blank.
- Check if the SIM card requires a PIN. If so, enter it on the *Administration* → *Unlock SIM Card* page.
- For private APN networks, it is often not recommended to obtain DNS server addresses from the operator. Disable this option on the *Configuration* → *Mobile WAN* page.
- Check the *Status* → *System Log* for error messages that can help diagnose the issue.

## Cannot Connect to a Device Behind the Router from the Internet (NAT)

- The device behind the router must be configured to use the router's IP address as its default gateway.

## Cannot Access a Web Server Behind the Router via NAT

- Remote HTTP access to the router itself must be disabled. This can be done on the *Configuration* → *NAT* page.
- On the same page, enable the *Send all remaining incoming packets to default server* feature and enter the IP address of your web server.
- Ensure the web server's default gateway is set to the router's IP address.

### **DynDNS Does Not Work**

- DynDNS will not work with a private APN if the router's IP address is not publicly accessible.
- If your DynDNS hostname resolves to the same private IP address that is assigned to the router, it means your mobile operator is using NAT or a firewall, preventing direct connections.
- You can verify operator NAT by pinging a server with a static public IP and comparing the source IP (seen by the server) with the IP address shown on the router's status page.
- You can test for a firewall by trying to access the router's web interface remotely.
- The operator may not be providing DNS server addresses. Without DNS, the router cannot resolve the DynDNS service hostname. The System Log would show errors like:
  - Error resolving hostname: no such file or directory
  - Connect to DynDNS server failed

### **L2TP or IPsec Tunnel Fails to Establish**

- Check the *Status* → *System Log* for specific error messages related to the VPN tunnel negotiation.

### **IPsec Tunnel Establishes, but No Data Is Transferred**

- This is typically caused by incorrect routing rules or a misconfigured default gateway on either the client device or the remote network.

### **Router Reverts to Online Mode After a Reboot, Despite Being Set to Offline via SMS**

- State changes made via SMS commands are temporary and do not alter the saved configuration. They remain in effect only until the router is rebooted.

### **Serial Communication Is Not Working**

- Verify that your router model is equipped with a serial port. Check the serial communication settings on the *Configuration* → *Expansion Port* page.

### **Is the Router Cisco Compatible?**

- No. The router's operating system (ICR-OS) is based on Linux, not Cisco IOS. Therefore, Cisco configuration commands cannot be used.
- However, since all network connections are based on open standards, the router is fully compatible and can be connected to Cisco devices or any other standard networking equipment.

### **FTP or SFTP Does Not Work**

- **FTP** is available on v2 platform routers only. Ensure it is enabled in *Configuration* → *Services* → *FTP*. Connect using any FTP client to port **21** with the same username and password as the web interface.
- **SFTP** (SSH File Transfer Protocol) is available on all routers. Ensure SSH is enabled in *Configuration* → *Services* → *SSH*. Connect using any SFTP-capable client (like FileZilla or WinSCP) to port **22** with the same credentials as the web interface.

### **How to Access the Router's Command Line**

- You can connect to the router's command line using SSH (all routers) or Telnet (v2 routers only).
- **SSH** is enabled by default. You can verify this in *Configuration* → *Services* → *SSH*. Use any SSH client to connect to the router's IP address on port **22**.
- **Telnet** can be enabled on v2 routers in *Configuration* → *Services* → *Telnet*.
- For both methods, use the same username and password as for the web interface.

# Appendix B: Customer Support

## Customer Support for Europe

### **Advantech Czech s.r.o.**

Sokolska 71  
562 04, Usti nad Orlici  
Czech Republic

Phone: +353 91 792444  
Fax: +353 91 792445  
E-mail: [iiotcustomerservice@advantech.eu](mailto:iiotcustomerservice@advantech.eu)  
Web: [www.advantech.com](http://www.advantech.com)

## Customer Support for NAM

### **Advantech B+B SmartWorx**

707 Dayton Road  
Ottawa, IL 61350 USA

Phone: +1-800-346-3119 (Monday – Friday, 7 a.m. to 5:30 p.m. CST)  
Fax: +1-815-433-5109  
E-mail: [support.iiot.ana@advantech.com](mailto:support.iiot.ana@advantech.com)  
Web: [www.advantech.com](http://www.advantech.com)

## Customer Support for Asia

Phone: +886-2-2792-7818 #1299 (Monday – Friday, 9 a.m. to 5:30 p.m. UTC+8)  
Fax: +886-2-2794-7327  
E-mail: [icg.support@advantech.com.tw](mailto:icg.support@advantech.com.tw)  
Web: [www.advantech.com](http://www.advantech.com)

# Appendix C: Regulatory & Safety Information

## Safety Notices



For your safety and the appropriate operation of the device, please observe the following instructions:



- The router must comply with all applicable international and national laws, including any specific regulations or restrictions concerning its operation in designated applications and environments.
- To avoid personal injury and damage to the device, use only accessories that are approved or supplied by the manufacturer. Unauthorized modifications or the use of non-approved accessories could damage the router, violate regulations, and result in loss of warranty coverage.
- Do not attempt to open the router enclosure under any circumstances.
- Before handling the SIM card, always switch off the router and disconnect it from the power supply.
- **Caution!** This equipment is not suitable for use by or near young children. Small children could accidentally swallow the SIM card.
- Ensure that the power supply voltage does not exceed 48 V DC.
- Do not expose the router to harsh environmental conditions. Protect it from dust, moisture, and excessive temperatures.
- Use routers with correct certifications and markings only in areas containing flammable or explosive materials (such as gas stations, chemical plants, or locations with explosives). In these environments, follow all restrictions regarding the use of radio devices.
- When traveling by airplane, always switch off the router. Using the router on board may endanger flight safety, interfere with mobile networks, and violate local regulations. Non-compliance can result in suspension or cancellation of telecommunications services, or legal penalties.
- Take special care when operating the router in close proximity to personal medical devices such as cardiac pacemakers or hearing aids.
- This device may cause interference if used close to television sets, radio receivers, or personal computers.
- Maintain a safe separation distance of at least 20 cm between the router and the human body during operation.
- It is strongly recommended to regularly back up all critical device settings stored in the router's memory.

## Product Disposal Instructions

The WEEE directive (Waste Electrical and Electronic Equipment: 2012/19/EU) ensures the environmentally responsible recycling and recovery of electronic products. This device contains high-quality materials and components suitable for recycling. At the end of its life, **do not dispose of this product with ordinary commercial waste**. The router also contains a battery. Remove the battery before disposing of the device, and ensure the battery is disposed of separately and in accordance with local regulations. For detailed information on product and battery disposal, consult your supplier's terms and conditions.

# Appendix D: Related Documents

[1] [Configuration Manual for SmartFlex Routers](#)



[EP] Product-related documents and applications can be obtained on **Engineering Portal** at <https://icr.advantech.com/download> address.





We, Advantech Czech s.r.o., declare that the radio equipment narrated in this user's manual complies with Radio Equipment Regulations 2017 (**S.I. 2017 No. 1206**).



We, Advantech Czech s.r.o., declare that the radio equipment narrated in this user's manual complies with Directive **2014/53/EU**.

The full text of the EU Declaration of Conformity is available at the following internet address:  
[icr.advantech.com/doc](http://icr.advantech.com/doc)