Users Manual

V2.0

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DENSION

WRC-9201-1

Disclaimer

Please read and fully understand this manual before installing and operating WiRC. **Everyone should use WiRC on their own responsibility.**
Children under 12 years should use WiRC with adult supervision.

Improper use of models may cause injuries or property damage, so please always drive with extreme caution. Never use models on public roads, crowded areas, near small children or animals.

Take extreme care when connecting electrical components. Do not use cables with damaged connectors or insulation and take care of correct polarity. Incorrect electrical connections may cause short circuit or even fire.
Models have moving and rotating parts and some components may get hot after use. To avoid injuries, do not touch these parts!

Incorrect setup of failsafe functions and too low battery voltage may cause the loss of control on model, and may cause damages.
Read and understand the manual of other components (incl. batteries, chargers, etc) connected to WiRC. Use only such components that fit the WiRC technical specifications.

Other WiFi networks or strong electromagnetic fields may affect the performance of WiRC! By using WiRC consider applicable local regulations on personality rights and data protection laws.

WiRC has 12 month full warranty, which covers defects caused by defective parts or workmanship.
Warranty does not cover defects, damages or injuries due to improper installation, regardless use of WiRC driven models, or any problems caused by other parts in model.

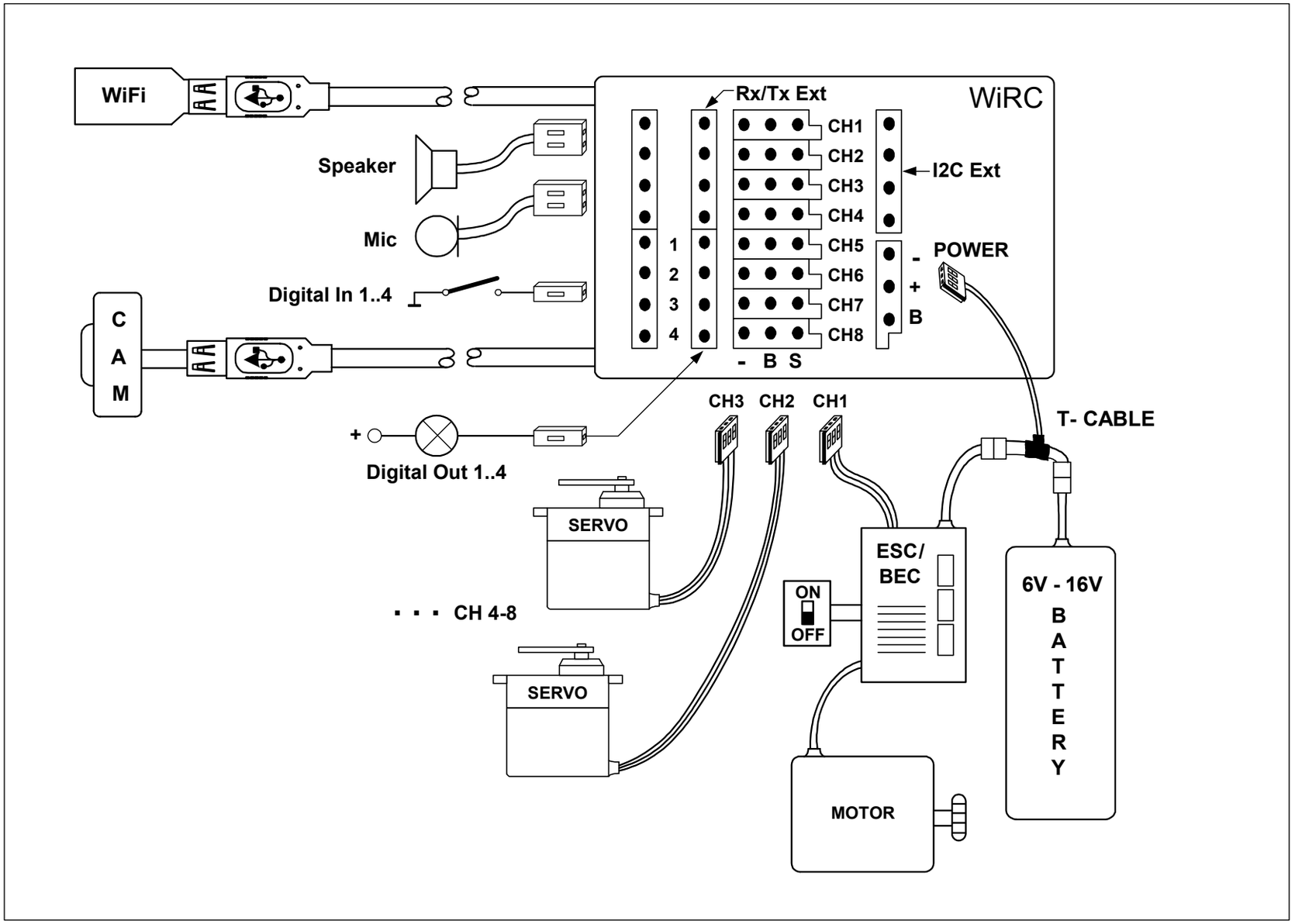
Dension reserves right to change the product, it's components or contents of this manual, without any prior notice!

1 Installation and setup

1.1 Package content

- WiRC module
- USB Camera
- USB WiFi stick
- Power T-cable (Tamiya connector)

1.2 System overview



1.3 Positioning and fixing parts

- **Camera:**
  - Mount on a stable base, which doesn't move or resonate
  - The camera should have a free sight, with no parts in front of the lens
  - Do not place the camera in a position where it can be damaged when the model hits an obstacle
  - Secure the plastic clip of the camera with included cable tie
- **WiFi dongle**
  - Position it on the top part of the model
  - Place it as far away from metal parts as possible
  - Fasten the USB connector with included cable tie
- **WiRC module:**
  - Use the place of the original receiver, if possible
  - Make sure that cables (Camera, WiFi, Power, Servos, ESC) can run and connect to the module smoothly
  - Fix WiRC with included double-sided adhesive tape

Before starting installation, disconnect all the battery, servo, ESC cables and remove the original receiver – if any.

WiRC is not waterproof. Water and humidity can cause damage to WiRC, for which we assume no liability.

1.4 Connecting the cables

1. Connect the camera cable to one of the USB ports on the WiRC module (You can select any of the two ports)
2. Connect the WiFi dongle to the other USB port
3. Connect the Servo / ESC cables to the WiRC module. Note the default channel layout as below:

Channel	Function
Ch-1	Steering servo
Ch-2	Speed control

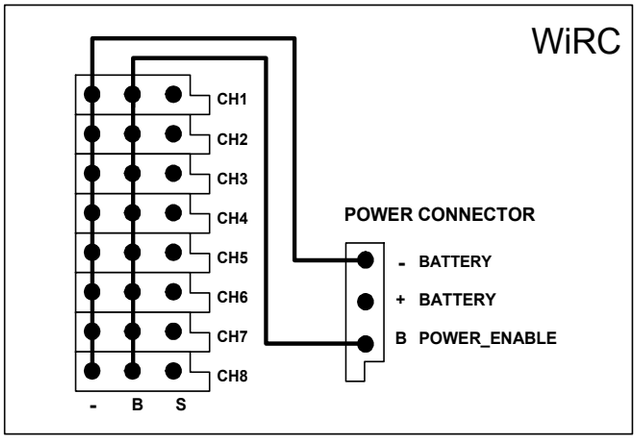
4. Connect the power cable to the WiRC module
5. Secure any loose cables
6. Connect the Power cable to the battery and the ESC

1.5 Powering WiRC

Usually, an RC receiver is powered by the ESC (Electronic Speed Control) or by a standalone BEC (Battery Eliminator Circuit). WiRC however has higher power consumption and a minimum input voltage requirement of 5.5V, that many BECs or ESCs cannot provide.

Therefore WiRC has to be connected directly to the battery, by using the included T-cable.
(see also system diagram on page 3)

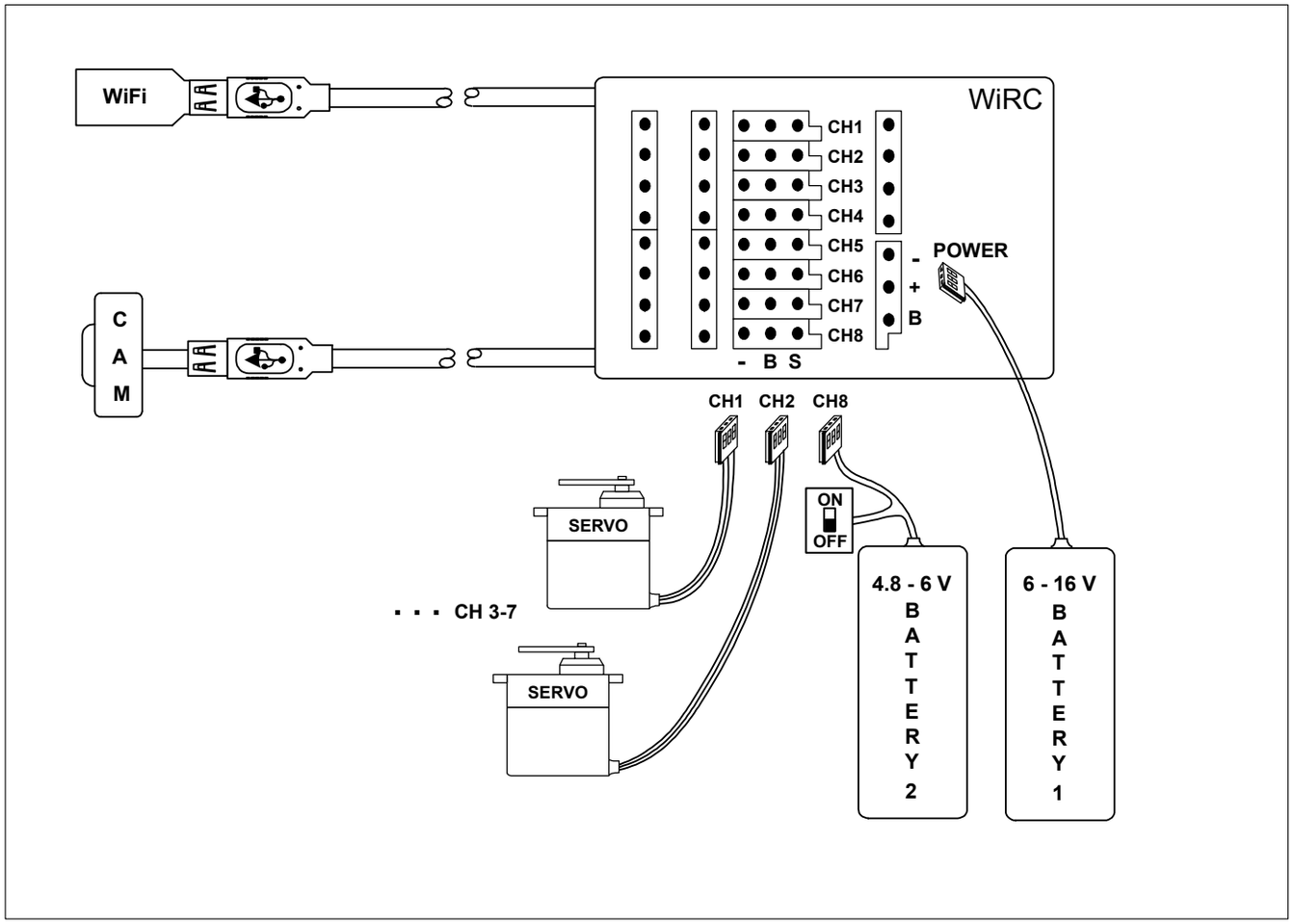
WiRC does not have its own on/off switch.



Instead, it powers on by applying voltage to one of the servo channels or the POWER_ENABLE pin of the Power Connector. This ensures that WiRC is always powered on and off together with the other electrical components of the model.

Please note, that WiRC does not supply power to the servos, the Ch1-8 connectors only distribute external power coming from BEC, ESC or additional battery.

If your RC model has no BEC or ESC, then connect WiRC directly to the Battery_1 to provide the necessary power to WiRC and use an additional Battery_2 with switched cable for servos.



WiRC has an operating voltage of 5.5–16V Servos normally operate on 4.8-6V. Please check servo specification before built in!

2 WiRC smartphone Application

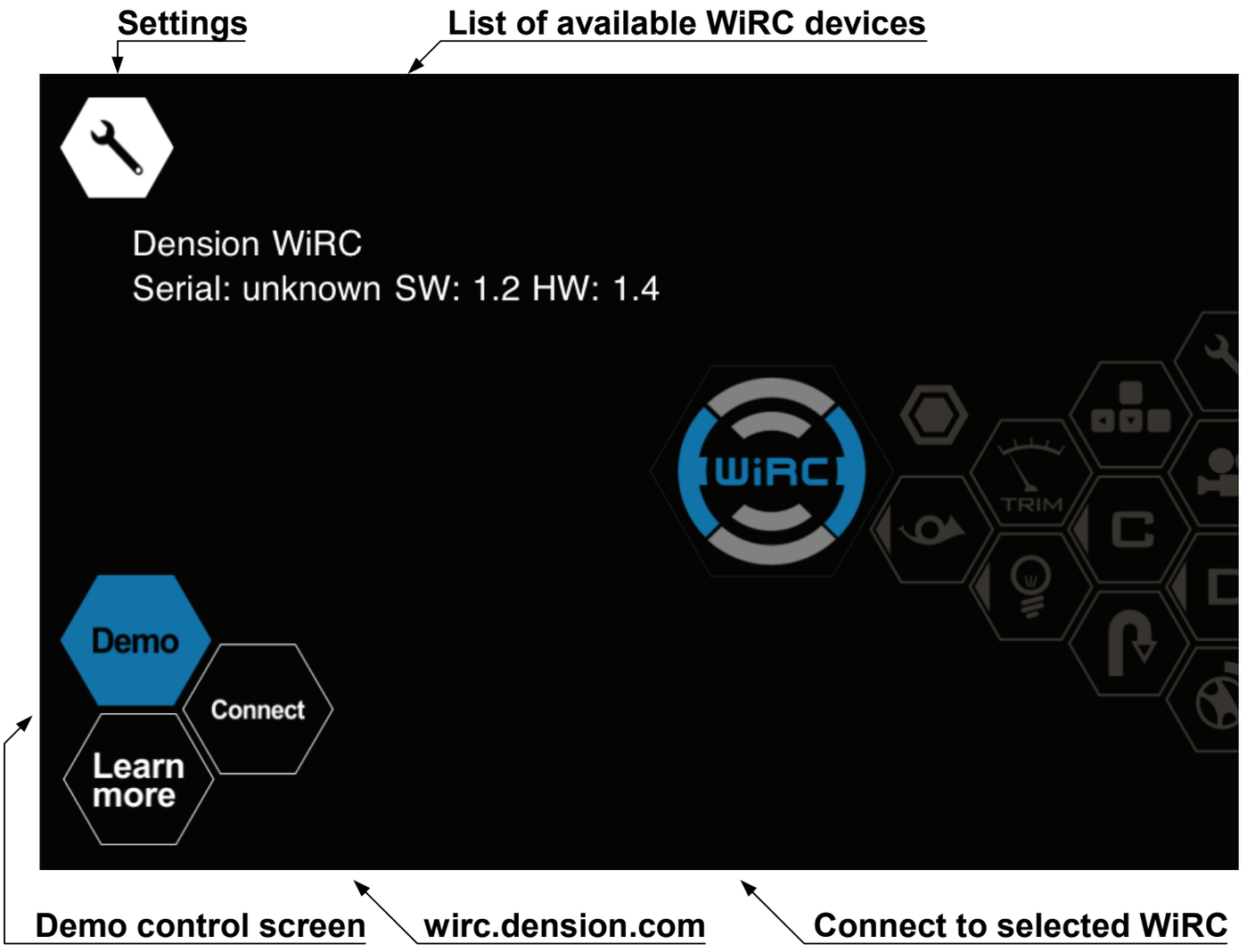
To operate your WiRC based model, you need a smartphone Application.
Smartphone compatibility and links to Application can be found on **wirc.dension.com**

2.1 Connecting your smartphone

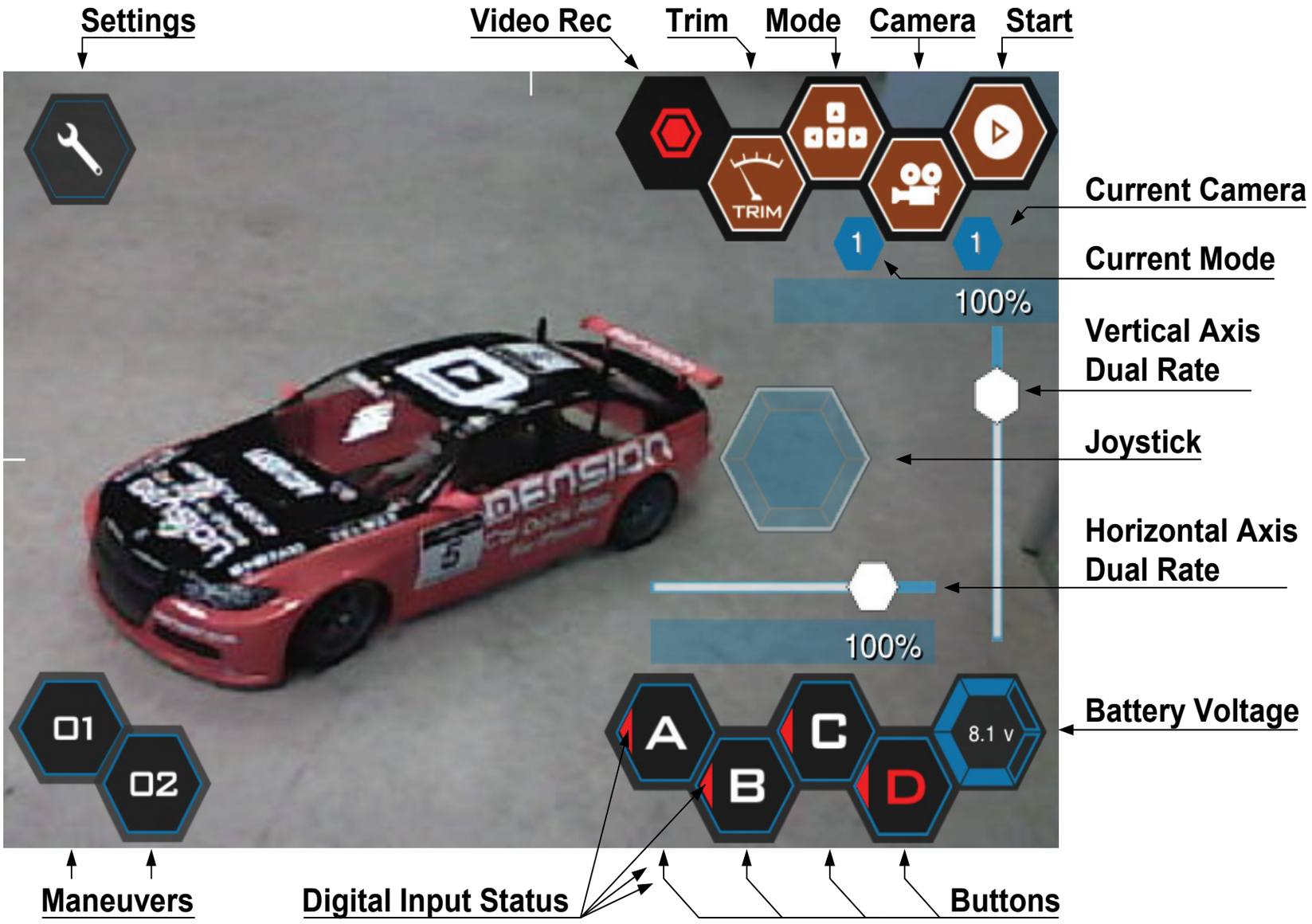
1. Power up your model
2. Wait for about 5 sec, until WiRC initializes
3. By default WiRC acts as a WiFi hotspot (router), that other devices can connect to. In the WiFi setup menu of your smartphone, connect to the “Dension WiRC” network.
4. Launch the WiRC application. You will see the Start screen.
5. Connect to the WiRC device
6. If you have successfully installed WiRC, you should see control screen and the video stream running in the background
7. Press Start button on control screen to enable joysticks and other controls

Before proceeding with configuration, secure your model on a stand, so that the servos/motors can move, but the model itself cannot.

2.2 Start Screen



2.3 Control Screen



Start button:

The control can be enabled/disabled by pressing the start button. If the control is disabled, then trim values set on all channels and joysticks, buttons, etc do not have effect.

Trim button:
When this button is pressed then trim values of the channels can be adjusted with the vertical and horizontal sliders (normally these sliders set the dual rate. Dual rate settings change both minimum and maximum outputs on a given channel).
The trim settings can be also changed from the settings menu.

Mode switch button:
Four different modes can be configured in the settings menu. You can assign the user inputs (joysticks etc.) to the channels and digital outputs differently in different modes.
You can change the current mode by pressing the mode switch button.
The number of the current mode is displayed below the button.

Camera switch button:
If there is more than one camera connected to the WiRC. You can switch camera stream source by pressing the camera switch button.
The ID of the currently selected camera is displayed on the right side of the button.

2.4 Settings Menu

For configuration and settings you need to connect to WiRC, start the application, and select “Settings” icon on the top left corner of the screen.

2.4.1 Basic Settings

You can access the Settings menu with the Settings icon on the top left corner of the screen. Here you can set:

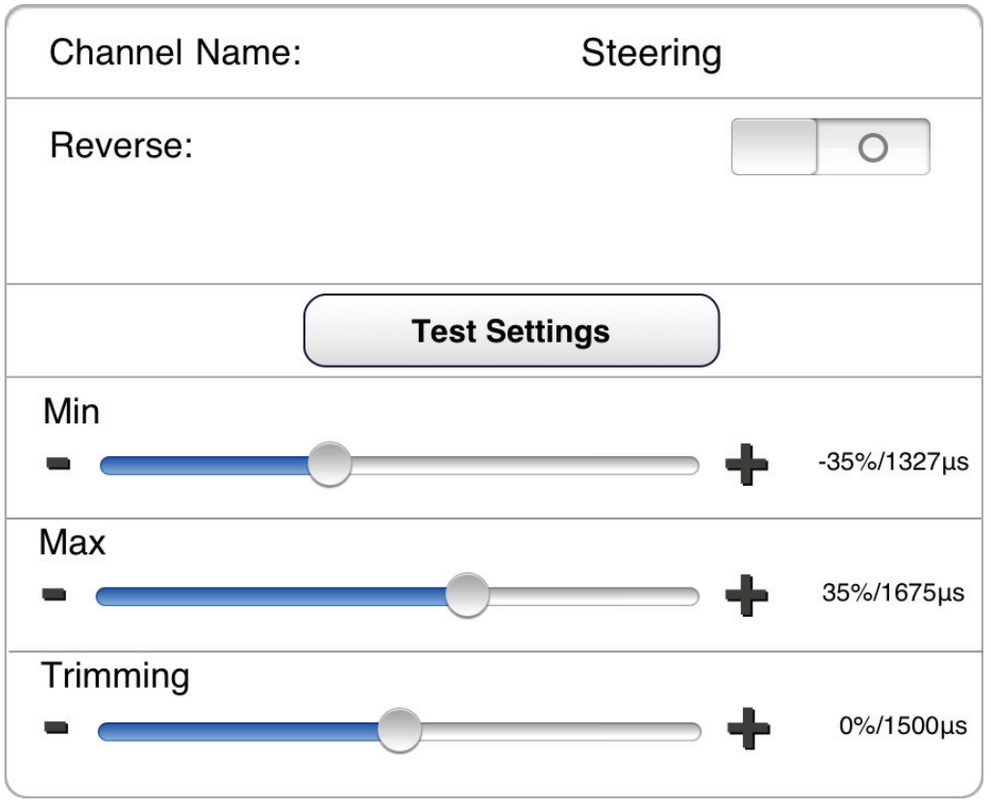
Transmitter name
The name of the transmitter. By default, this is the name of your smartphone

Transmitter priority
Defines the priority of your transmitter for multi-driver scenarios. Changes will effect only new connections.

2.4.2 Channel settings

For each channel being used do following settings:

Channel 1-8



Channel name:
Name the channels to remember its function e.g. Steering, Speed, etc.

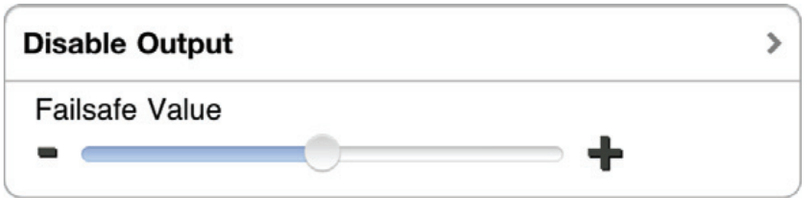
Reverse:
Changes the direction of the servo rotation in relation to the joystick movement.

Test settings button:
Use this button to test Min/Max/Trim settings, when you are connected to the WiRC. While pressed, the Trim value will be output for the channel. Once you set Min/Max, their last value will be output. This allows the quick setup of the three parameters.

Min/Max:
Set the Min/Max value to the desired servo movement or ESC speed. Max corresponds to the Up or Right position of a joystick or the maximum speed, while Min corresponds to the Down or Left position, and the maximum reverse speed.

Trimming:
Sets the center position of a servo, or the idle state of an ESC

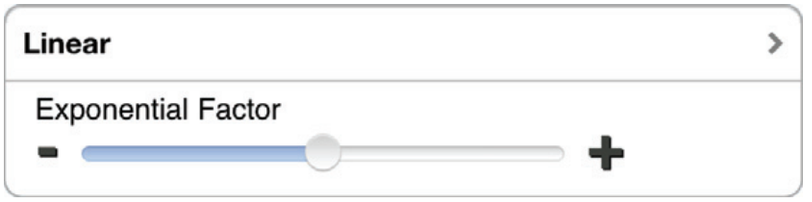
Failsafe:
Select the link-loss failsafe action for the channel:



- **Disable output**:
  Disable the output of the channel, so that other failsafe mechanisms can take over
- **Last good**: WiRC continues to output the last received value

- **Pre-Set**: WiRC will output the value you set with the slider

Sensitivity:



Sets the sensitivity type of the channel. It can be linear to the control value, or follow an exponential curve. Negative value of Exponential Factor means the sensitivity is higher near the center position and lower near the end position. Positive Exponential Factor means the sensitivity is lower near the center position and higher near the end position.

Sensitivity mix / Value mix:

Mixers allow you to set up dependencies between channel output values. For example, if you want to reduce the steering sensitivity at higher speeds, you can set up a **Sensitivity** mix with a negative factor between the ESC and servo channels. When the ESC output value is high, the negative sensitivity mix reduces the channel output changes for the same steering joystick movement.

Value mixing enables mixing of output values of channels.

Repeat:

Sets the PPM repeat frequency. It can be set for the pair of channels: 1-2, 3-4, 5-6. Channels 7-8 have a fixed repeat rate of 50Hz.

Digital Output 1 - 4

Invert output:
Inverts the state of the digital output, i.e. 0 is output instead of 1 and vice versa

State On range:
Defines the input value at which the digital output is switched on
Between Min-Max range: On
Outside of Min-Max range: Off

2.4.3 Controls

You can assign a control element (joystick, gyroscope or button) to each channel or digital output.
Only those joystick axes will be present on the drive screen, which are configured for at least one channel.

Gyro X: Tilting the smartphone to the left or right

Gyro Z: Tilting the smartphone towards

Mode 1-4: Select one of the Modes to configure

Channels 1-8: Select the control element for the channel

Digital outputs: Select the control element for the digital output

Hold position: The selected joystick axis won't return to its zero position when released

Buttons:

- Trigger: The button is only active while being pressed
- Toggle: The button is switched on/off at each press
- Off / On: The output value for the button in each state

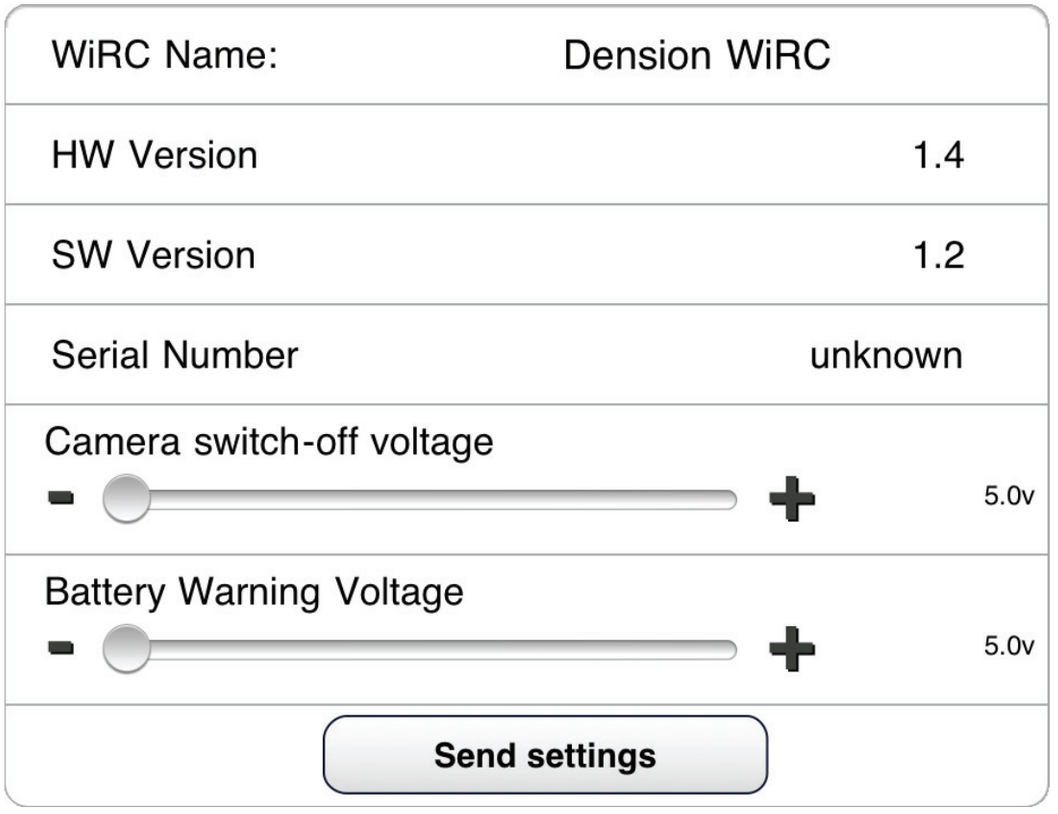
2.4.4 Maneuver

Maneuvers allows you to set up pre-set maneuvers for stunts or hard to control cases. You can instantly access the 2 maneuvers from the drive screen.

Override: If switched on, the below value will be output during the maneuver

Value: Set the channel output value

2.4.5 WiRC menu



WiRC name:
You can name your WiRC device (i.e. model) to easily distinguish between different receivers.

HW, SW version, Serial number:
Information about your WiRC. Make sure to include these in a support request.

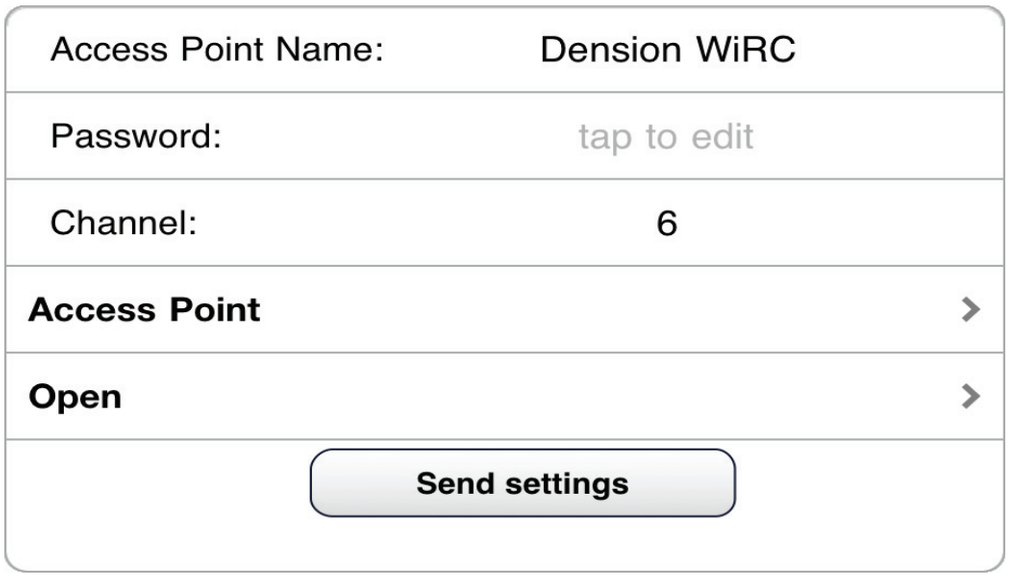
Camera switch-off voltage:
You can set a voltage threshold level, below which the camera is automatically turned off. Useful if you are trying to save your device running out of battery.

Battery Warning Voltage:
You can set a voltage threshold level, below which the WiRC application shows a battery warning on the screen.

Wi-Fi Settings
By default the WiRC works in **Access Point** (AP) mode (like a WiFi Hotspot or Router), so that other devices can connect to it. Use this mode, if you want to directly connect to your model without use of any WiFi infrastructure. (default operating mode)

In **Client mode** WiRC does not create a WiFi network, but can connect to an existing one.

At **WiFi** Menu you can set the WiFi mode and related parameters.



For **Access Point mode:**

Access Point name:
SSID of the WiRC WiFi network (default: Dension WiRC)

Password:
WPA2 password of the WiRC's network (default: no password)

Channel:
WiFi network channel on which the WiRC is operating (default: 6)

Client mode Settings:

Access Point name:
SSID of the WiFi network to which the WiRC is connecting

Password:
WPA2 password of the network to which the WiRC is connecting

Channel: not used

Notes:

- Network’s security type must always be set properly (i.e. “Open” or “Secure (WPA2)”), detection is not automatic (default: Open)
- Settings available one-way only. They can be set by the WiRC application but they are non-readable from the WiRC. If you forgot the last configured WiFi settings on the WiRC and cannot connect to it, refer to Section: Troubleshooting.

Firmware upgrade

This option appears only when App recognizes new Firmware is available for WiRC. You can manually start update process.
An update takes about 3 minutes. Do not disconnect batteries or switch off the model. After update you have to reconnect the smartphone to WiRC.

2.4.6 Profiles

You can save all above configuration settings in profiles:

Save:
Your settings are automatically saved to the current profile

Copy:
Press the Copy button, if you would like to copy a profile as a basis for a new profile.

Delete:
Swipe to the right on the profile list item and press the Delete button

Rename:
Click in the highlighted name field of the Profile and enter a new name.

2.4.7 Videos

You can record camera stream by pressing the red Record button on the control screen.
To manage previously recorded videos can be done as follows:
Playback: Select the video from the list and playback will start

Delete: Swipe to the right on the video item and press the delete button

Recorded videos can be saved using iTunes, however playback at the moment is possible only with the WiRC App.

2.5 Multiple users

Up to 5 smartphones can connect to a WiRC at the same time. They can all watch the video feed and hand over control from each other.
Please note that the WiFi bandwidth is shared among users, so range and video speed might be reduced by connecting with multiple smartphones.

Control can be handed over as follows:

- If you want to **take over** the control, just press the **Start** button on the control screen.
- If you have the control, and you want to **hand it over**, “Swipe up” in the middle of the control screen to see the list of connected smatrphones. Just select one.

Priority settings:

If you want to restrict other smartphones to take over the control (e.g. during shows, races or trainer-trainee mode)set high priority in the Settings menu.
A lower priority smartphone won't be able to take the control, but the control can be given from higher priority device.

3 Technical specifications

Parameter	Value
Operating voltage	5.5 - 16V
Power consumption	200 mA @7V
PPM output min/max	880us / 2200us
PPM repeat freq (ch 1-6)	50 HZ - 200Hz
PPM repeat freq (ch 7-8)	50 HZ
PPM voltage (peak to peak)	3.3V
ADC input range*	max 16V
Digital inputs	Internal 10K pull-up, short to ground to activate
Digital output	Open-collector, via 330 Ohm serial res (max 100 mA)
Internal Status LED	Starting up: Constant on Failsafe/no WiFi: Slow blinking WiFi network on: Fast blinking Firmware update: Very Fast blinking
Speaker Output*	1.4 W / 8 Ohm, 2.6 W / 4 Ohm
Microphone in*	Electret Mic, 3V Phantom.
Rx/Tx Serial Extension*	3.3V level
I2C Extension*	3.3V level

*Will be Supported in later Firmware versions

4 Troubleshooting

Symptom	Cause	Solution
WiRC does not start up.	ESC (Electrical Speed Controller) or BAT channel not connected.	Check ESC/BEC functions, and the proper wiring as indicated on diagrams at the Powering section.
WiRC is not detected by the smartphone application.	The smartphone is not connected to the same WiFi network as the WiRC.	Check the WiFi settings menu in the smartphone and connect to the WiFi network according to WiRC WiFi settings. If you forgot the WiFi settings on the WiRC, restore WiRC to factory default settings, restart the application and connect to the WiRC with default settings.
WiFi network is not created by the WiRC.	WiRC WiFi is configured to Client mode.	In Client mode the WiRC requires an existing WiFi network. If this network does not exist or if you have misconfigured the Client mode settings restore WiRC to factory default.
WiFi network is not created by the WiRC.	The USB WiFi stick could not be initialized.	Check if the USB dongle is connected to the USB. Try to restart the WiRC.
Connection lost to WiRC.	The power dropped of the excessive overload.	Restart the WiRC. In the long-term, the solution is to use larger battery, or limit the Min Max settings of the speed control.
Connection established to WiRC, but the connection is not stable. (WiRC operate in AP	The distance is too long between WiRC and smartphone, or too many WiFi networks use the	Reduce the distance between WiRC and smartphone, or configure WiRC to a different WiFi channel.

mode)	same channel around as the WiRC.	
Connection established to WiRC, but the connection is not stable. (WiRC operate in Client mode)	The distance is too big between WiRC and WiFi Access Point, or the used WiFi network is overloaded.	Reduce the distance between WiRC and WiFi Access Point, or connect WiRC to a different WiFi network.
Connection established to WiRC, but the video stream is not visible.	Wrong or disconnected USB camera.	Check the USB connection of the camera.

4.1 Further assistance

If you need further assistance in using your Dension product, please contact your local supplier or visit www.dension.com and click on ‘Support’.

Please check the download section for the latest firmware version and product documentation, as these may provide additional features or easier use of the product.

4.2 Restore factory default settings

If you have miss-configured or forgotten WiFi settings, or by any reason you need to restore WiRC default settings:

1. Go to http://wirc.dension.com
2. Download the WRC_Reset_Settings.den file from the Downloads section
3. Copy the file to a USB flash stick
4. Plug the flash stick into the USB connector, in place of the WiFi stick
5. Apply power to WiRC and wait 30 sec.