

RC4Magic Series 2

Wireless DMX and
Wireless Dimming System



User Manual





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Disclaimers

WIRING AND INSTALLATION OF BATTERIES, DIMMERS, AND LOADS MUST BE IN ACCORDANCE WITH APPLICABLE LOCAL AND NATIONAL ELECTRICAL CODES. RC4 Wireless devices and equipment are operated at the user's own risk and RC4 Wireless accepts no liability, either direct or consequential, as a result of using this equipment.

Not for Use Where Human Safety May Be At Risk

RC4 Wireless accepts no liability for direct, indirect, or consequential damages resulting from the use of any RC4 Wireless product or group of products. RC4 Wireless does not guarantee the suitability of any product for any purpose; user assumes all risk. RC4 dimmers must be used strictly in accordance with manufacturer's instructions and cannot be used for unsupervised operation. RC4 Wireless products must be installed and operated only by qualified technicians, as outlined in the manufacturer's documentation, and should be inspected and tested on a regular basis to ensure proper operation.

Not for Control of Pyrotechnical Devices

RC4 Wireless products should not be used to control pyrotechnics of any kind. A brief output surge on dimmer outputs during power-up could trigger these devices. RC4 Wireless accepts no liability if RC4 equipment is used for this or any other purpose.

Product Safety

RC4 receiver/dimmers are capable of controlling very large currents at up to 30VDC (typically 12V). Dimmers should not be allowed to operate at dangerous temperatures. Appropriately sized wire and connectors must be used, along with suitable ventilation and external fuses rated for the load being operated. Additional information is provided in this manual.

Statements of RF Conformity

United States (FCC)

RC4Magic Series 2 devices contain XBeePro radios, **FCC ID OUR-XBEEPRO**, and comply with Part 15 of the FCC Rules. Operation is subject to the following two conditions: *(i)* these devices may not cause harmful interference and *(ii)* these devices must accept any interference received, including interference that may cause undesired operation.

Canada (IC)

RC4Magic Series 2 devices contain XBeePro radios, **IC: 4214A-XBEEPRO**.

Japan

RC4Magic Series 2 devices contain XBeePro radios, **ID: 005NYCA0378**.

Europe (ETSI)

XBeePro radios used in RC4Magic Series 2 devices have been certified for use in most European countries. Norway prohibits operation near Ny-Alesund in Svalbard. Other restrictions may apply. For additional information, please contact RC4 Wireless.

Other Countries and Jurisdictions

XBeePro radios used in RC4Magic Series 2 devices have also been issued Declarations of RF Conformity for Australia/New Zealand, and Korea. For additional information, please contact RC4 Wireless.

RC4Magic Quick Start – It's Easy!

RC4Magic Series 2 is truly Plug-n-Play – you can start using it right away.

DMX Transmitter

If your system has just one DMXio module, it is configured as a transmitter.

If you have multiple DMXio modules, only one is configured as a transmitter, the rest are configured as receivers. A temporary label has been provided to identify the transmitter.

Connect the supplied wall-transformer power supply to your DMXio transmitter. Plug in a DMX data source and see that the DMX led comes on. That's it – you're on the air.



DMX Receiver

Connect a supplied wall-transformer power supply to a DMXio receiver. It can take anywhere from 3 to 15 seconds for the receiver to connect with the transmitter. When the DMX led comes on, you have DMX data coming out. That's it – you have a 200 foot wireless DMX link.

Identifying Transmitters and Receivers

If you've lost track of which DMXio is your transmitter, watch the leds during power-up. An led chase from left to right – think "signal going out" – indicates a transmitter. A chase from right to left – think "signal coming in" – indicates a receiver.

Wireless Dimming

DMX2dim and DMX4dim receiver-dimmers are complete standalone wireless dimmers. New DMX2dim units are pre-assigned to DMX channels 1 and 2 with a linear dimming curve. DMX4dim units are pre-assigned to DMX channels 1, 2, 3, and 4 with a linear dimming curve. (It's easy to change channel and curve assignments later.)

Using a small screwdriver, connect a power supply (usually a 12V battery) to the +/-DC IN screw terminals. Connect a load (usually an MR16 or MR11 12V lamp) to the DimA+/- terminals. After power-up, it can take anywhere from 3 to 15 seconds for the receiver to connect with the transmitter.

Fade DMX channel 1 up and down. See your lamp dim up and down. That's it!

Now it's time to read through this manual to learn how to set dimmer channels, change system IDs, and more. Thank you for choosing RC4Magic Series 2!

RC4Magic – An Overview



DMX Cable Replacement / DMX Distribution

The heart of RC4Magic Series 2 (RC4M-S2) is the DMXio module. A DMXio can act as a wireless transmitter or receiver, and any number of receivers can be used in a system. A pair of DMXio units configured as transmitter and receiver replaces a standard DMX cable. RC4Magic modules work reliably to 200 feet or more inside theatres and other performance spaces.

Any number of receivers can be used in an RC4Magic system, taking the place of splitters and distribution boxes, and providing a superior level of electrical isolation along with the uncluttered convenience of wireless.

Configured as a transmitter, the DMXio encodes and encrypts the incoming DMX universe, and broadcasts it using Direct Sequence Spread Spectrum (DSSS) digital radio. Unlike wired DMX, the broadcast signal includes error checking and correction codes, and is not affected by minor interruptions and interference. All incoming DMX channels are broadcast with appropriate speed, redundancy and accuracy, with additional bandwidth dynamically allocated to channels that are changing.

As a receiver, the DMXio decodes the rf signal from the associated transmitter, rebuilds the DMX universe, and generates a DMX signal with the same number of channels and packet timing as the original input. DMX in and out are compliant with the USITT DMX512/1990 standard.

RC4Magic Series 2 does not transmit DMX messages with start codes other than zero. Thus, it can only be used for dimmer data. It will not work with non-zero packets carrying proprietary data or RDM packets. (RDM functionality will be added to the DMXio in future firmware updates.)



Wireless Low-Voltage Dimming

The DMX2dim and DMX4dim receiver-dimmers decode the rf signal from the DMXio transmitter and send user-selected DMX channel levels to built-in low-voltage dimmers. In addition to DMX channel, each dimmer can be assigned a linear, inverse square-law, or non-dim dimmer curve.

Any number of DMX2dim and DMX4dim receiver-dimmers can be used in an RC4Magic system.

Note: RC4Magic Series 2 modules cannot communicate with original RC4Magic systems.

System ID Numbers

A system ID is a unique code, similar to a password or encryption key. When multiple RC4Magic Series 2 devices are configured with the same ID, they form a Private Area Network (PAN). Other devices on other IDs can form their own PANs. RC4Magic supports over 60,000 unique IDs, and up to 15 independent PANs can operate in the same physical space.

Every RC4Magic Series 2 device is factory programmed with 3 unique private ID numbers and one common public ID. All 4 IDs are indicated on the outside of each unit. In most cases, all the units in a system share the same 4 ID choices, but this is not strictly necessary.

When ordering additional devices for an existing RC4Magic Series 2 system, you must specify the ID numbers to be factory programmed, which can be any combination of IDs previously assigned to you, and/or new IDs. To ensure the reliability and security of all RC4Magic Series 2 systems for all users, every new system is assigned its own set of private IDs.

Following a special procedure, IDs stored in a DMXio transmitter can be adopted by any RC4Magic Series 2 receiver or receiver-dimmer. Later, the originally programmed factory IDs can easily be restored. Additional information about ID adoption is provided later in this manual.

Power-Up Sequence and Radio Channel Assignments

When an RC4Magic Series 2 DMXio transmitter first powers up, it scans the 2.4GHz radio band, which is quite large and supports many radio channels, looking for the frequency with the least traffic and lowest pre-existing rf power levels. It then sets itself to operate on that frequency and begins transmitting DMX packets encoded with a specific system ID number. When this power-up process is complete, and signals are being broadcast, the RF Active led blinks steadily at a moderate speed.

When a DMXio receiver or DMX2dim/4dim receiver-dimmer powers up, it scans the 2.4GHz band looking for signals from a DMXio transmitter using the selected ID number. When it finds valid data, the RF Active led blinks steadily at double the speed of the led on the transmitter.

If a receiver does not receive valid data for 5 seconds, the start-up scan procedure repeats. Thus, if the transmitter has been turned off and back on (or there has been a power failure) and it is now transmitting on a different radio frequency, the receiver will reconnect after a brief period of data silence on the original frequency.

Multiple RC4Magic Series 2 systems using different IDs can operate at the same time in the same space, and each system will provide a separate wireless DMX universe. In a space with little or no other radio activity, there is enough bandwidth in the 2.4GHz band to support up to 15 RC4Magic Series 2 systems, each with any number of receivers and dimmers. Even in more crowded rf environments there will usually be enough bandwidth for 3 or more separate RC4Magic systems.

Note: Only a single ID is used by an RC4Magic device at any one time, supporting one DMX universe with up to 512 channels. A separate DMXio transmitter on a separate ID is required for each DMX universe being broadcast.

Advanced Settings

Inside each RC4Magic Series 2 DMXio there are 4 dipswitches. Switch 1 selects transmitter or receiver mode: OFF for transmit, ON for receive. Switches 3 and 4 select a system ID.

DMX2dim and DMX4dim receiver-dimmers have recessed pushbuttons. Holding these buttons down during power-up, or pressing them at particular times, will select different IDs or invoke advanced features and functions.

Additional information about device configuration and ID adoption is provided later in this manual.

DMXio Transmitter Setup

Only one DMXio in transmitter mode should be operated on each system ID. Multiple transmitters on the same ID will produce undesirable and unpredictable results.

Mode Selection and Connections

To use an RC4Magic DMXio as a transmitter, internal dipswitch 1 must be in the OFF position. In this mode, the LEDs will chase left to right when first powered up. Simply connect your DMX signal and the supplied power adaptor.

The DMX input is compliant with USITT DMX512/1990(4us), with no internal termination. If you are putting the DMXio at the end of a long DMX cable, a terminator plug should be inserted in the DMX output jack. For short cable runs, termination is often (but not always) unnecessary.

Power should be 8V – 12VDC and can come from the power supply provided (wall transformer) or batteries. A small pack of 6 AA or AAA batteries can be used for portable operation with, for example, a battery powered DMXter, Pocket Console DMX, or other portable DMX signal source. The power inlet is a standard 2.1mm receptacle, center-positive.

The DMX output jack is ideal for inserting the DMXio in a wired DMX network. In many cases, it can be used right at the output of your lighting console or other controller, before your DMX signal continues to other devices in your system. Internally, the DMX input connects directly to the DMX output, so the data will always pass through, even if the DMXio is not powered.

Once everything is connected, position the red circle RF Hotspots on all RC4Magic devices so they are all facing upward. If this is difficult, face the RF Hotspots towards any common reflective surface, like a wall, ceiling, or open floor area.

Line-of-sight is NOT required for RC4Magic, but dense objects between units – like concrete walls – will attenuate the radio signal and reduce the available range.



LEDs in Transmitter Mode

Four LED indicators assist with troubleshooting. *On power-up, an LED chase from left to right indicates transmitter mode.*

The **DMX** indicator is on when valid DMX data is present at the DMX input. It goes out after 1 second if valid data is no longer present. *In normal operation with DMX data present, this led should be solidly on.*

The **RF Data** indicator is on whenever data is being sent. *In normal operation this LED appears to blink rapidly, and will shimmer or flicker while DMX levels are changing.*

The **RF Active** indicator will light continuously after power-up, while radio channels are being scanned. When a clear channel is located and transmission has begun, this indicator will blink slowly and steadily. *In normal operation, this led should be blinking.*

The **RSSI/COP** indicator – Computer Operating Properly – steadily blinks with a short duty cycle (more off time than on time) to show that the sophisticated software inside the transmitter is running properly. *During normal transmitter operation, this led should be blinking slowly.*



DMXio Receiver Setup

Any number of DMXio units in receiver mode can be used in an RC4Magic Series 2 system.

Mode Selection and Connections

To use an RC4Magic DMXio as a receiver, internal dipswitch 1 must be in the ON position. In this mode, the LEDs will chase right to left when first powered up. Simply connect the supplied power adaptor, and connect the DMX output to your DMX devices. It can sometimes take 10 seconds or more for DMXio receiver to connect to the DMXio transmitter and begin outputting useful DMX data, but it will often connect much faster.



The DMXio receiver output is compliant with USITT DMX512/1990, and closely mimics the data going into the associated DMXio transmitter. It will output the same number of channels and the same timing between packets. DMX packets can contain anywhere from 1 to 512 channels, with a frame rate of anywhere from 12 packets to thousands of packets per second. (Of course, high frame rates require fewer channels in each packet.)

If you are putting the DMXio receiver at the beginning of a long DMX cable run, a terminator should be used at the far end. For short cable runs, termination is often (but not always) unnecessary.

Remember: The DMXio receiver is a DMX data source and acts as a controller.

Power should be 8V – 12VDC and can come from the power supply provided (wall transformer) or batteries. A small pack of 6 AA or AAA batteries, or a 12V battery, can be used for portable operation. The power inlet is a standard 2.1mm receptacle, center-positive.

Once everything is connected, position the red circle RF Hotspots on all RC4Magic devices so they are all facing upward. If this is difficult, face the RF Hotspots towards any common reflective surface, like a wall, ceiling, or open floor area.

Line-of-sight is NOT required for RC4Magic, but dense objects between units – like concrete walls – will attenuate the radio signal and reduce the available range.

LEDs in Receiver Mode

Four LED indicators assist with troubleshooting. *On power-up, an LED chase from right to left indicates receiver mode.*

The **DMX** indicator is on while a DMX data packet is being output. At slow DMX data rates, it will appear to flicker rapidly. *In normal operation this led is continuously on.*

The **RF Data** indicator is on whenever data is being received by radio. *In normal operation this LED appears to blink rapidly, and will shimmer or flicker while DMX levels are changing.*

The **RF Active** indicator will light continuously after power-up, while radio channels are being scanned. When valid data from an associated DMXio transmitter is found, this indicator will blink

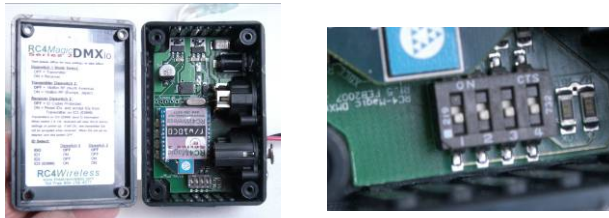


at double the speed of the RF Active LED on the transmitter. *In normal operation, this led should be blinking.*

The **RSSI/COP** provides Receiver Signal Strength Indication by blinking faster when the rf signal is stronger. With the strongest signal, it appears to be almost solidly on with a slight shimmer. With no signal at all, it blinks with the same pattern as a transmitter. *In normal operation, this led should be blinking or flickering.*

DMXio Internal Dipswitches

The DMXio contains 4 internal dipswitches. They can be accessed by removing the 4 screws in the corners of the top cover, and hinging the cover back on the label. Inside the cover is a legend indicating the functions of the switches.



Make changes with the power removed. New settings do not take effect until the next power-up.

DMXio Transmitter Dipswitches

Dipswitch 1: Mode: OFF for transmitter mode, ON for receiver mode.

Dipswitch 2: RF Output Power:
OFF for 18dBm (North America)
ON for 10dBm (Europe, Japan, etc.)

Dipswitches 3 and 4: Select system ID:
both 3 and 4 OFF for private ID0
3 OFF and 4 ON for private ID1
3 ON and 4 OFF for private ID2
Both 3 and 4 ON for the public ID, ID3

DMXio Receiver Dipswitches

Dipswitch 1: Mode: ON for receiver mode, OFF for transmitter mode.

Dipswitch 2: Restore original factory IDs, and enable adoption of new IDs:
ON to restore IDs, and enable adoption of new IDs from an associated transmitter.
OFF to protect internal IDs.
Public ID3 must be selected while adopting new IDs.

Dipswitches 3 and 4: Select system ID:
both 3 and 4 OFF for private ID0
3 OFF and 4 ON for private ID1
3 ON and 4 OFF for private ID2
Both 3 and 4 ON for the public ID, ID3

DMXio dipswitch settings are transmitted to all receivers. When the transmitter rf power level is changed, all receiver power levels change automatically. RC4Magic radios are actually transceivers – they can both transmit and receive, and they communicate bidirectionally during system operation.

DMX2dim Receiver-Dimmer Setup

The DMX2dim is a completely standalone unit that includes a built-in RC4Magic Series 2 radio receiver and 2 low-voltage pulse-width-modulation dimmers.

Any number of DMX2dim receiver-dimmers can be used in an RC4Magic Series 2 system.

The radio operates identically to the DMXio in receiver mode. Line-of-sight is NOT required for RC4Magic, but dense objects between RC4Magic units – like concrete walls – will attenuate the radio signal and reduce the available range. It can take 10 seconds or more for the DMX2dim to connect to the DMXio transmitter and begin powering the dimmer outputs, but it will often connect much faster.



Connections

Small screw terminals are provided for connection of the power supply (+/-DC IN) and load devices (+/-DimA and +/-DimB). **The power supply operates both the internal electronics and the connected loads and must be powerful enough to run the load without significant voltage drop.** The dimmers use high-frequency pulse-width-modulation, switching on the negative side of the circuit.

The most typical power supply is a 12V rechargeable sealed lead-acid (SLA) battery, sometimes called a "gel cell". **The maximum voltage for the DMX2dim is 18V (12V nominal).** An internal self-resetting circuit breaker protects the microcontroller, radio, and dimmer electronics. A user-accessible blade-type automotive fuse (Bussmann ATC series) protects the connected wiring and loads and is in the positive side of the circuit. **The maximum fuse size is 15A (ATC-15), and should be the fast-blow type. Always use the smallest possible fuse value for the connected load, and be sure the wire gauge you are using is suitable for the fuse rating chosen.**

The internal circuitry of the DMX2dim requires a minimum of 5V to operate efficiently. It will run at voltages as low as 3.5V, but this is not recommended because the dimmer circuitry may overheat.

Once everything is connected, position the red circle RF Hotspots on all RC4Magic devices so they are all facing upward. If this is difficult, face the RF Hotspots towards any common reflective surface, like a wall, ceiling, or open floor area.

WIRING AND INSTALLATION OF BATTERIES, DIMMERS, AND LOADS MUST BE IN ACCORDANCE WITH APPLICABLE LOCAL AND NATIONAL ELECTRICAL CODES. Low voltage circuitry CAN be dangerous. RC4 Wireless devices and equipment are operated at the user's own risk and RC4 Wireless accepts no liability, either direct or consequential, as a result of using this equipment.



Selecting System IDs

Each RC4Magic Series 2 DMX2dim has 3 system IDs programmed internally. IDs are selected by holding down a recessed pushbutton during power-up.

Note: Although the associated DMXio transmitter can be set to any of 4 available IDs, only 3 are available on the DMX2dim. When using DMX2dim dimmers, do not use ID2 on the DMXio transmitter.

To select ID0, hold down the SetA/ID0 button while powering on the DMX2dim unit. The left-most RSSI led will blink 10 times rapidly to confirm the setting. Immediately release the button when the blink confirmation appears.

To select ID1, hold down the SetB/ID1 button while powering on the unit. The middle Data led will blink 10 times rapidly to confirm the setting. Immediately release the button when the blink confirmation appears.

To select ID3 (the public ID), hold down both buttons together while powering on. The three left-most leds (RSSI, Data, and RF Con) will blink together 10 times rapidly to confirm the setting. Immediately release the buttons when the blink confirmation appears.

Note: Failure to release buttons before the blinking confirmation completes could invoke other features and functions. Due to the small size of the DMX2dim dimmer, various functions and operations have been multiplexed onto these two buttons.

The ID setting is stored in non-volatile eeprom memory and will be used for all subsequent operations until the ID is changed using this same procedure.

Assigning DMX Channels to DMX2dim Dimmers

Assigning DMX channels and dimmer curves is easy. The process requires a powered and functioning DMXio in transmitter mode, a DMX data source, and the DMX2dim dimmer. It is easiest if you set everything up together, near your DMX console. If you are not using a console, useful alternatives include a DMXter, a Pocket Console DMX, or any similar DMX tester or controller capable of outputting a DMX level on a specific channel.



Follow these simple steps:

1. Apply power to your DMXio transmitter and DMX2dim dimmer. Wait for the scanning process to complete. The RF Active indicator on the transmitter, and the RF Con indicator on the receiver, should both be blinking. (The indicator on the dimmer blinks faster.)
2. At your DMX source, set all DMX channels to zero. Ensure that special channels (like house lights) are also at zero – it is important that all channels are off.
3. Bring up the level of a single channel you wish to assign to a DMX2dim dimmer. This is the channel you will be assigning to the dimmer (or any number of dimmers). The level you set determines the dimmer curve that will be assigned:
 - a. Non-dim: 100% (80% or higher)
 - b. Linear dimming: 70% (anywhere from 60% and 79%)
 - c. Inverse-square-law (ISL) fast: 50% (40% to 59%)
 - a. Inverse-square-law (ISL) slow: 30% (20% to 39%)

See the **Dimmer Curves and Output Resolution** section of this manual for more information about curves, slow and fast ISL response, etc.

4. Channels below 12% are ignored by the channel assignment process.
5. On the DMX2dim, use the end of a bent paper clip or other small tool to press and hold the SetA or SetB recessed button for one second, or until the corresponding dimmer led comes on (be sure the load fuse is good or the dimmer leds will not work). The selected dimmer will be assigned to the lowest non-zero DMX channel currently being broadcast from the associated DMXio transmitter.

Channel and dimmer curve assignments are stored in non-volatile eeprom memory and will be used for all subsequent operations until settings are changed using this same procedure.

Hidden Functions

The small size of the DMX2dim only allows for 2 small recessed buttons. Thus, various functions have been multiplexed onto them. This has been designed to cause the least possible aggravation for everyday users, but requires patience and concentration when accessing advanced features.

To restore original factory IDs and enable adoption of new IDs (equivalent to setting dipswitch 2 in a DMXio unit):

Power up the unit with no buttons down. When the power-up right-to-left led chase begins, immediately press and hold both SetA and SetB together. Watch the leds. When the center Data led remains lit while the RSSI and RF Con leds blink alternately, release the buttons. Factory IDs are now restored, and ID adoption is enabled until power is removed. If power is interrupted before new IDs have been received, this step must be repeated.

See the *How Do I...* section of this manual for additional information about changing ID assignments.

Note: *When adoption is enabled in the dimmer, it immediately restores original factory IDs before waiting for new IDs from the transmitter.*

LED Indicators

Five LED indicators on the narrow front side of the DMX2dim assist with troubleshooting.

The right-most **DimA** and **DimB** indicators are directly connected to the dimmer outputs, after the power fuse. Thus, a blown fuse will disable these indicators. They appear to dim more smoothly and linearly when using the inverse-square-law dimming curve – this is because leds have a square-law response.



The **Data** indicator is on whenever data is being received by radio. *In normal operation this LED appears to blink rapidly, and will shimmer or flicker while DMX levels are changing.*

The **RF Con** indicator will light continuously after power-up, while radio channels are being scanned. When valid data from an associated DMXio transmitter is found, this indicator will blink at double the speed of the RF Active LED on the transmitter. *In normal operation, this led should be blinking.*

The **RSSI** led provides Receiver Signal Strength Indication by blinking faster when the rf signal is stronger. With the strongest signal, it appears to be almost solidly on with a slight shimmer. With no signal at all, it blinks with the same pattern as a DMXio transmitter. *In normal operation, this led should be blinking or flickering.*

DMX4dim Receiver-Dimmer Setup

The DMX4dim is a completely standalone unit that includes a built-in RC4Magic Series 2 radio receiver and 4 low-voltage pulse-width-modulation dimmers.

Any number of DMX4dim receiver-dimmers can be used in an RC4Magic Series 2 system.



The radio operates identically to the DMXio in receiver mode. Line-of-sight is NOT required for RC4Magic, but dense objects between RC4Magic units – like concrete walls – will attenuate the radio signal and reduce the available range. It can take 10 seconds or more for the DMX4dim to connect to the DMXio transmitter and begin powering the dimmer outputs, but it will often connect much faster.

Connections

Small screw terminals are provided for connection of the power supply (+/-DC IN) and load devices (+/-DimA, +/-DimB, +/-DimC, +/-DimD). **The power supply operates both the internal electronics and the connected loads and must be powerful enough to run the load without significant voltage drop.** The dimmers use high-frequency pulse-width-modulation, switching on the negative side of the circuit.

The most typical power supply is a 12V rechargeable sealed lead-acid (SLA) battery, sometimes called a “gel cell”. **The maximum voltage for the DMX4dim is 18V (12V nominal).** An internal self-resetting circuit breaker protects the microcontroller, radio, and dimmer electronics. A user-accessible blade-type automotive fuse (Bussmann ATC series) protects the connected wiring and loads and is in the positive side of the circuit. **The maximum fuse size is 15A (ATC-15), and should be the fast-blow type. Always use the smallest possible fuse value for the connected load, and be sure the wire gauge you are using is suitable for the fuse rating chosen.**

The internal circuitry of the DMX4dim requires a minimum of 5V to operate efficiently. It will run at voltages as low as 3.5V, but this is not recommended because the dimmer circuitry may overheat.

Once everything is connected, position the red circle RF Hotspots on all RC4Magic devices so they are all facing upward. If this is difficult, face the RF Hotspots towards any common reflective surface, like a wall, ceiling, or open floor area.

WIRING AND INSTALLATION OF BATTERIES, DIMMERS, AND LOADS MUST BE IN ACCORDANCE WITH APPLICABLE LOCAL AND NATIONAL ELECTRICAL CODES. Low voltage circuitry CAN be dangerous. RC4 Wireless devices and equipment are operated at the user's own risk and RC4 Wireless accepts no liability, either direct or consequential, as a result of using this equipment.

Selecting System IDs

Each RC4Magic Series 2 DMX4dim has 4 system IDs programmed internally. IDs are selected by holding down a recessed pushbutton during power-up.

To select ID0, hold down the SetA/ID0 button while powering on the DMX2dim unit. The left-most RSSI led will blink 10 times rapidly to confirm the setting. Immediately release the button when the blink confirmation appears.

To select ID1, hold down the SetB/ID1 button while powering on the unit. The middle Data led will blink 10 times rapidly to confirm the setting. Immediately release the button when the blink confirmation appears.

To select ID2, hold down the SetC/ID2 button while powering on the unit. The right RF Con led will blink 10 times rapidly to confirm the setting. Immediately release the button when the blink confirmation appears.

To select the public ID (ID3), hold down the SetD/ID3 button while powering on the unit. The three left-most leds (RSSI, Data, and RF Con) will blink together 10 times rapidly to confirm the setting. Immediately release the button when the blink confirmation appears.

The ID setting is stored in non-volatile eeprom memory and will be used for all subsequent operations until the ID is changed using this same procedure.

Assigning DMX Channels to DMX4dim Dimmers

Assigning DMX channels and dimmer curves is easy. The process requires a powered and functioning DMXio in transmitter mode, a DMX data source, and the DMX4dim dimmer. It is easiest if you set everything up together, near your DMX console. If you are not using a console, useful alternatives include a DMXter, a Pocket Console DMX, or any similar DMX tester or controller capable of outputting a DMX level on a specific channel.



2. Apply power to your DMXio transmitter and DMX4dim dimmer. Wait for the scanning process to complete. The RF Active indicator on the transmitter, and the RF Con indicator on the receiver, should both be blinking. (The indicator on the dimmer blinks faster.)
3. At your DMX source, set all DMX channels to zero. Ensure that special channels (like house lights) are also at zero – it is important that all channels are off.
4. Bring up the level of a single channel you wish to assign to a DMX4dim dimmer. This is the channel you will be assigning to the dimmer (or any number of dimmers). The level you set determines the dimmer curve that will be assigned:
 - a. Non-dim: 100% (80% or higher)
 - b. Linear dimming: 70% (anywhere from 60% and 79%)
 - c. Inverse-square-law (ISL) fast: 50% (40% to 59%)
 - d. Inverse-square-law (ISL) slow: 30% (20% to 39%)
5. Channels below 12% are ignored by the channel assignment process.
6. On the DMX4dim, use the end of a bent paper clip or other small tool to press and hold the SetA, SetB, SetC, or SetD recessed button for one second, or until the corresponding dimmer led comes on (be sure the load fuse is good or the dimmer leds will not work). The selected dimmer will be assigned to the lowest non-zero DMX channel currently being broadcast from the associated DMXio transmitter.

Channel and dimmer curve assignments are stored in non-volatile eeprom memory and will be used for all subsequent operations until settings are changed using this same procedure.

Hidden Functions

The small size of the DMX4dim only allows for 4 small recessed buttons. Thus, various functions have been multiplexed onto them. This has been designed to cause the least possible aggravation for everyday users, but requires patience and concentration when accessing advanced features.

To restore original factory IDs and enable adoption of new IDs (equivalent to setting dipswitch 2 in a DMXio unit):

Power up the unit with no buttons down. When the power-up right-to-left led chase begins, immediately press and hold both SetA and SetD together. Watch the leds. When the center Data led remains lit while the RSSI and RF Con leds blink alternately, release the buttons. Factory IDs are now restored, and ID adoption is enabled until power is removed. If power is interrupted before new IDs have been received, this step must be repeated.

See the *How Do I...* section of the manual for additional information about changing ID assignments.

Note: When adoption is enabled in the dimmer, it immediately restores original factory IDs before waiting for new IDs from the transmitter.

LED Indicators

Seven LED indicators on the narrow front side of the DMX4dim assist with troubleshooting.

The left-most **DimA/B/C/D** indicators are directly connected to the dimmer outputs, after the power fuse. Thus, a blown fuse will disable these indicators. They appear to dim more smoothly and linearly when using the inverse-square-law dimming curve – this is because leds have a square-law response.



The **Data** indicator is on whenever data is being received by radio. *In normal operation this LED appears to blink rapidly, and will shimmer or flicker while DMX levels are changing.*

The **RF Con** indicator will light continuously after power-up, while radio channels are being scanned. When valid data from an associated DMXio transmitter is found, this indicator will blink at double the speed of the RF Active LED on the transmitter. *In normal operation, this led should be blinking.*

The **RSSI** led provides Receiver Signal Strength Indication by blinking faster when the rf signal is stronger. With the strongest signal, it appears to be almost solidly on with a slight shimmer. With no signal at all, it blinks with the same pattern as a DMXio transmitter. *In normal operation, this led should be blinking or flickering.*

Dimmer Resolution and Curves

Dimmer Resolution

All dimmer curves provide 14-bit digital resolution (16,384 steps).

When all available output channels (dimmers) are set for the linear curve, the PWM frequency is 92Hz. This low frequency provides greater efficiency than high frequency switching, reducing heating in the output circuitry and allowing larger loads to be used before thermal shutdown occurs. Higher efficiency provides longer battery life – a very important consideration for wireless dimming. Although a quiet but audible filament buzz can sometimes be heard from incandescent lamps modulated at 92Hz, this sound is comparable to what is heard from traditional high-voltage AC fixtures with 50/60Hz chopped-wave dimming.

If any channel is configured for an inverse-square-law (ISL) curve, the PWM frequency is increased to 738Hz. This eliminates visible flicker with LEDs and ensures there will be no beating with video frame rates. This higher frequency can be audible with incandescent lamps, and is intended only for use with LEDs and other silent solid-state devices.

Because LEDs have no inherent filament persistence and respond very quickly to changes in power level, visible stepping during fades can be visible, particularly when viewed peripherally. This phenomenon can be reduced with smoothing techniques and higher step resolutions.

RC4Magic Series 2 smoothing, either slow or fast, makes use of the high-resolution of RC4Magic dimmers by gliding through in-between steps. Although single DMX channels provide a range of only 256 steps (0 – 255), having a much higher output resolution also ensures higher accuracy at the bottom of the ISL curve where changes in power level must be very small.

The slow ISL curve provides a long glide time to emulate the filament persistence of a large incandescent lamp. The fast ISL curve uses a shorter glide time more reminiscent of an MR16 lamp. In general, large LED light sources, including arrays of many emitters, will look more pleasing with the slow ISL response. Smaller sources will look better with the fast ISL response.

Dimmer Curves

When setting dimmer channels and curves, channel level ranges provide the following curves:

Dimmer Curve	Level Percentage	Level Dec (0-255)	Level in Hex (0-FF)
Non-Dim	100% (80% or higher)	255 (205 or higher)	0xFF (0xCD or higher)
Linear (no smoothing)	70% (60% - 79%)	180 (154-204)	0xB4 (0x9A-0xCC)
ISL Fast Smoothing	50% (40% - 59%)	128 (103-153)	0x80 (0x67-0x99)
ISL Slow Smoothing	30% (20% - 30%)	77 (52-102)	0x4D (0x34-0x66)
Channel Ignored	Less than 12%	Less than 32	Less than 0x20

Use **ISL Slow** for large, high-power LED devices to reduce stepping during fades.

Use **ISL Fast** for smaller LED devices.

Linear is ideal for incandescent loads, including halogen MR16s and MR11s.

Non-Dim is intended for use with relays, solenoids, air brakes, and other on/off devices.

Hysteresis ensures there will be no noise or oscillation, even if the source DMX level is slowly changing or is noisy. The DMX level must rise above 54% (dec 138, hex 0x8A) to turn on. Then, the level must fall below 46% (dec 117, hex 0x75) to turn off.

Optimizing Radio Performance



Under ideal circumstances, the range of RC4Magic Series 2 radios exceeds 300 feet and has been reported to be as far as 700 feet. But ideal circumstances are rare. Our published specification of 200 feet is realistic in most common situations.

Range is affected by:

1. The orientation of the antennas (RF Hotspots) relative to each other.
2. The number of obstructions between radios.
3. The density of obstructions between radios.
4. Other activity in the 2.4GHz radio band, including leaky microwave ovens.
5. General electrical interference from ac dimmer racks and other power equipment.

Each piece of the RC4Magic Series 2 system has a radio antenna inside which must not be obstructed with metal or other dense objects. This is why the cases are made of tough ABS plastic – they must be transparent to radio waves. The position of the internal antenna is indicated with red circles on the device label – this is called the RF Hotspot.

For best performance, face all RF Hotspots in the same direction, usually upward.

Often there are numerous obstructions between the transmitter and receivers, or there are several receivers positioned in various locations and orientations around the performance space. In this case, try to aim all the RF Hotspots toward a common reflective surface, like a ceiling or wall. The closer the receiver is to the transmitter, the less important orientation becomes.

The high frequency radio signals used by the RC4Magic system tend to reflect more than penetrate. This means that more of the signal will bounce around a room, rather than radiate through the walls to an adjacent space. This helps improve performance between receivers in a performance space, even when line-of-sight between devices is not possible.

Even so, some of the radio signal does penetrate walls and other objects. Provided the transmitter is not too far away, you can successfully place receivers inside theatrical props and practicals, behind flats, and under risers. In these cases, try to place the transmitter as close as possible to these pieces.

An inexpensive RF spectrum analyzer, like the Metageek WiSpy, can be used to inspect the 2.4Ghz radio band and see how well the RC4Magic signal (and other signals) are getting through your space. WiSpy analyzers are available from RC4Wireless at www.theatrewireless.com. See www.metageek.net for more information about the product.



How do I...

... Select a different ID for a DMXio?

You choose between 4 different IDs (ID0, ID1, ID2, or ID3) by changing the dipswitch setting inside the DMXio module. Remove the 4 screws from the top of the unit. Fold open the cover (it hinges on the product label). A label on the inside of the cover indicates the various dipswitch setting options. Dipswitches 3 and 4 select the ID. More information is provided earlier in this manual.

... Select a different ID for a DMX2dim or DMX4dim?

This is done by holding down one or more of the recessed pushbuttons while powering up the unit. The DMX2dim can be set to ID0, ID1, or ID3 (no access to ID2). The DMX4dim provides access to all four IDs. Further details are provided earlier in this manual.

... Program new IDs into a DMXio?

A DMXio in receiver mode can adopt the system ID codes in any DMXio transmitter. These codes remain available when a receiver is switched from transmitter mode to receiver mode, allowing transmitters to be cloned.

The ID adoption process can only be executed while operating on the public system ID, ID3 (999). When running on ID3, DMXio transmitters embed system ID codes in the data stream being broadcast. DMXio receivers will not adopt and save incoming ID codes unless internal dipswitch 2 is ON.

To copy system ID settings from one DMXio to another, follow these steps:

1. Put the DMXio source unit in transmitter mode on public ID3, by setting internal dipswitch 1 OFF, and dipswitches 3 and 4 ON.
2. Put the destination unit in receiver mode on public ID3, by setting internal dipswitch 1 ON, and dipswitches 3 and 4 ON.
3. Enable ID adoption on the receiver by setting the adoption enable dipswitch 2 ON. *All 4 dipswitches are ON.*
4. Power-up the DMXio receiver.

With dipswitch 2 on, the unit immediately restores the internal IDs to original factory settings. If this is your goal, do not turn on the transmitter, go to step 6.

5. Turn on the DMXio transmitter. It may take up to 15 seconds for them to connect. After they connect, a unique up-down led chase on the receiver indicates that new IDs have been sent from the transmitter and been adopted and saved in the receiver.
6. On the receiver unit, turn adoption enable dipswitch 2 OFF.
7. Change both units to ID0 by setting dipswitches 3 and 4 OFF.
8. Turn power off, then on, on both units. If they connect and work normally, they now share the same set of IDs.

Multiple receivers can be set to adopt at the same time, it is not necessary to do one at a time.

... Program new IDs into a DMX2dim or DMX4dim?

ID adoption will occur only when operating on the public system ID, ID3. When running on ID3, DMXio transmitters embed system IDs codes in the data stream being broadcast. DMX2dim and DMX4dim receiver-dimmers will not adopt and save incoming ID codes unless ID adoption is enabled.

To copy system ID settings from a DMXio to a DMX2dim or DMX4dim dimmer, follow these steps:

1. Put the DMXio source unit in transmitter mode on public ID3, by setting internal dipswitch 1 OFF, and dipswitches 3 and 4 ON.
2. Set the destination dimmer unit on public ID3. On a DMX2dim, power up with both buttons (SetA and SetB) held down. On a DMX4dim, power up with the SetD button held down. Release the button(s) while three leds will blink together in acknowledgement. The dimmer is now set to the public ID.
3. Enable adoption on the destination dimmer unit. Power up the unit with no buttons down. When the power-up right-to-left led light chase begins, immediately press and hold two buttons together: SetA and SetB on the DMX2dim, SetA and SetD on the DMX4dim. Watch the leds. When the center Data led remains lit while the RSSI and RF Con leds blink alternately, release the buttons.

Internal IDs have now been restored to original factory settings. If this is your goal, do not turn on the transmitter, go to step 6.

The dimmer now has adoption enabled until it is powered down. Keep the unit powered on. (If power is interrupted before new IDs have been received, this step must be repeated.)

4. Power up the DMXio transmitter configured in step 1. It will transmit data with embedded ID data. It may take up to 15 seconds for the transmitter and receiver to connect. After they connect, a unique up-down led chase on the receiver indicates that new IDs have been adopted and saved.
5. Turn off the DMXio transmitter, and change it to ID0 by setting dipswitches 3 and 4 OFF.
6. Turn off the DMX2dim or DMX4dim dimmer, and power it back up with the SetA/ID0 button held down. Release the button while the RSSI led blinks 10 times. The unit is now set for ID0.
7. Power up the DMXio transmitter. If the transmitter and dimmer connect and work normally, they now share the same set of IDs.

... Combine multiple RC4Magic Series 2 systems for a large project?

There are two ways:

1. Use the common public ID that all RC4Magic Series 2 devices can access.
2. Temporarily use the public ID, and set all receivers to adopt private IDs from one transmitter. Then, switch all units to a common private ID. This method is more work, but is also more secure since you are using a private ID that only you can access. When the project is done, it's easy to restore the original IDs to any units that have been reprogrammed.

... Restore the original factory IDs?

Follow the steps for adopting new IDs (outlined above), without operating a DMXio transmitter. If no new IDs are received, the internal IDs are restored to the original factory IDs issued to you at time of purchase.

Note: Your original IDs are private, assigned only to you and your system. Unless special arrangements have been made, no other RC4Magic user has been assigned the same IDs.

Troubleshooting and Frequently Asked Questions

General

What simple actions can I try if I am having performance difficulties with my RC4Magic Series 2 system?

First, turn your DMXio transmitter off and on. This will force it to rescan the 2.4GHz radio band and find a new radio channel. Receivers that are already running will take approximately 10 seconds to respond to the loss of data and find the transmitter on the new channel.

The most common cause of problems with DMX2dim dimmers (and all other wireless dimmers on the market) is weak or dead batteries, or batteries that are too small to reliably operate the radio electronics and the external load. Replace, recharge, or upgrade your batteries to resolve the issue.

Test your batteries and loads by directly connecting them together. If they don't work on their own, or they don't last very long, they will not work any better with the dimmer.

One of my dimmers has stopped responding. The RF indicator stays solidly lit. What is wrong?

The dimmer is probably set to the wrong system ID. Check to see which ID your transmitter is set to (this requires opening the cover). Then, follow the instructions for setting the same ID on your dimmer (by holding down one or more recessed buttons while powering on the unit). Additional instructions for each of these steps is provided earlier in this manual.

We have received a small number of reports that dimmers changed IDs spontaneously. In most cases, this was traced to either dropping the unit while it was powered, or severe mechanical stress. Any circumstance that causes a button to momentarily depress at the same time power is briefly interrupted could cause an ID change. Hardware design improvements as of January 2010 have largely eliminated these issues. Updates are available for older units.

Radio Performance

How common are radio interference problems?

Not common at all. We give this issue a fair amount of attention because users fear radio problems and are very concerned about them. In fact, RC4Magic radios are among the best available and rarely suffer problems. Their ability to automatically seek out and use unoccupied frequencies virtually eliminates radio related issues, and makes it very easy to overcome them when they do arise.

What is the maximum range of the RC4Magic radio link?

Under ideal circumstances range exceeds 300 feet. More typically, it is around 200 feet. Depending on your situation, range could be less. See *Optimizing Radio Performance* in this manual for additional information.

Is it possible to extend the range of the RC4Magic radio link?

Range can be improved by reducing obstructions, aiming the RF Hotspots differently, eliminating sources of electrical interference, and trying other RF Channels (by turning the DMXio transmitter off and on, forcing a new scan for the clearest channel).

In particular, substantial improvements can be achieved by placing the transmitter high enough to radiate over people's heads.

It is also possible to use high-gain external antennas with the DMXio. This requires returning the units to the factory for modifications at additional cost. Wireless data can be transmitted over very long distances using precisely aimed directional antennas. Contact RC4 Wireless for additional information.

A high-gain version of the DMXio with a whip antenna is available as a regular item. Note, however, that most users do not require this – our internal RC4Magic Series 2 antennas are very efficient, despite being hidden within the device enclosure.

How can I tell if a performance problem is related to radio interference or not?

Watch the LED indicators on the RC4Magic units. On the transmitter, be sure the RF Active indicator is slowly blinking, which means it has found a frequency and is transmitting. Then, see that the RF Active indicator is blinking twice as fast on the receiver. If it is, then the receiver has found and connected with the transmitter. Now check the receiver RF Data indicator. It should blink and shimmer with DMX activity. If it occasionally drops out or appears dim, then some DMX data packets are getting lost. In this case, try aiming the RF Hotspot differently and/or reducing the distance between the transmitter and receiver. Also, watch the speed of the receiver RSSI led, which indicates the strength of the radio signal. The faster the blink, the better the signal. If it is blinking so rapidly that it looks more like a flicker than a blink, then signal is excellent.

You can also monitor radio activity with external test equipment. The low-cost Wi-Spy spectrum analyzer from www.metageek.net is particularly useful, and is available from RC4 Wireless.

What causes radio interference?

Radio interference is caused by other radio signals on or near the same frequency, and sometimes by harmonics of lower radio frequencies. Sources include other radio devices (including WiFi, Bluetooth, and Zigbee devices) and leaky microwave ovens.

Many radio devices (including WiFi, Bluetooth, and Zigbee) only transmit when they need to. Thus, it is possible that the RC4Magic could find a free channel that is not actually free all the time – intermittent interference could occur when the other device occasionally transmits. In this case, turn the RC4Magic DMXio transmitter off and on, forcing it to find a new channel. Ideally, turn it on when other devices are transmitting.

Very few rf devices are as accommodating as RC4Magic – most are user-configured for a particular rf channel and stay there. Thus, it is often best to turn on your RC4Magic system last, after all other systems are up and running.

Mounting and Positioning

Can I put an RC4Magic receiver inside a metal pop, practical, or wagon?

If a radio receiver is completely surrounded by metal, particularly grounded metal, it is unlikely to work well. Our product cases are made of tough ABS plastic so that radio signals will pass through to the antenna inside. Some signal will usually get through openings and wire mesh.

Note, however, that mesh does not pass radio at all frequencies – this is why a glass and mesh window can be used in the door of a microwave oven. In general, the more open the mesh, the better it will pass the RC4Magic radio signal.

If you build a box out of old microwave oven doors, you'll be able to see the unit but it won't be able to pick up any signal.

If possible, build your set pieces out of fiberglass, wood, and plastic. These materials are more transparent to radio than metal is. Minimize the use of metal. Metal framing is fine, but a non-metallic covering over the frame is preferred.

How critical is RF Hotspot positioning?

At distances under 100 feet, RF hotspot positioning is usually not critical at all. When trying to operate at the greatest possible distances, positioning becomes much more important. Performance is usually best when all Hotspots face up, but there are some cases where it is better to face them towards a clear nearby surface, like the theatre back wall.

In general, a common reflective surface helps the signal propagate. Thus, facing everything up works well indoors in a theatre, but doesn't work as well outdoors.

Dimmer Drop-Outs

One or more dimmers works fine when first turned on, but then turns off. Later it comes back on by itself. It seems to cycle or oscillate this way. Why?

This is the over-temperature or over-current protection stepping in to avoid electronic failure of the dimmer. It means that either (a) the load you are using is too large for the dimmer, or (b) the ambient temperature in the dimmer is too high.

Overloading can occur without blowing the fuse. This is because the maximum device current for the DMX2dim and DMX4dim is 15A, but each individual dimmer can often deliver as much as 10A. If you put a 15A load on one dimmer, the fuse will not blow, but that dimmer will over heat.

When the dimmer overheats, it turns itself off. Then, because it is off, it cools down. When it cools down enough, it comes back on. Of course, it then overheats again. And this cycle continues, on and on.

All dimmers generate heat when operating. In addition, internal voltage regulators produce some heat. If the dimmer pack is sealed in a tight space with very little airflow, the temperature of the entire unit will slowly rise and rise. Eventually, it will thermally shutdown, even if the loads are not too high. In this case, more airflow is required.

You can increase the dimmer power capacity and reduce thermal shutdown issues by removing the dimmer circuit board from the plastic case. Directing a cooling fan on the board substantially increases its capacity. Doing these things *neatly and carefully without shorting the board against metal objects* will not void your product warranty.

One of the dimmers in a pack is occasionally blinking or flickering. The other is fine. Why?

This is most likely caused by loose wiring, faulty or poorly mated connectors, or broken solder joints. If everything outside the dimmer seems fine, take the dimmer apart and check the screw terminals and solder joints on the circuit board – connector pins and solder joints can break under heavy use, particularly after over-tightening.

Some users may choose to remove the original screw terminals and solder 16- or 18-gauge wires directly to the circuit board. Done *neatly and carefully*, this will not void your product warranty.

Both of the dimmers on a DMX2dim occasionally shut off by themselves at the same time, and stay off for quite a long time. Why?

The radio receiver is resetting, and then takes 10 seconds or more to reconnect to the DMXio transmitter. This is usually a power-supply or battery problem, but could also be an electrical interference problem, or a DMX fault before the DMXio transmitter.

First, be sure the DMX data source at the DMXio transmitter is operating properly. If DMX input data disappears for more than 1 second, dimmer levels will drop to zero and DMXio receivers will stop outputting data.

Next, confirm that the radio link is reliable:

1. The RF Con indicator on the DMX2dim is blinking to indicate it is connected to a transmitter. If this indicator stays solidly on, the unit may be assigned to the wrong system ID.
2. The RSSI led is blinking reasonably fast to indicate adequate rf signal strength.
3. The Data indicator is blinking and shimmering with DMX data.

Finally, be sure the battery is in good condition, is fully charged (if rechargeable), and is large enough to power the connected load. Measure the battery voltage with a voltmeter while you bring up the dimmer channels. If the voltage drops substantially under load, the battery is inadequate for the task at hand.

Connect your load devices directly to your battery. If this doesn't work, or the battery dies out quickly, it will not work any better with a dimmer.

RC4Magic Series 2 Specifications

RC4Magic RF Technology

Indoor/Urban Range:	Up to 300' (100 m), 200' (66 m) typical
Outdoor Line-of-Sight Range:	Up to 1 mile (1.6 km)
Transmit Power Output:	Up to 100 mW (20 dBm) EIRP ¹
Receiver Sensitivity:	-100dBm
Operating Frequency:	2.4 GHz ISM band
Agency Approvals:	United States FCC OUR-XBEEPRO Canada IC 4214A XBEEPRO Europe CE ETSI ¹ Japan 005NYCA0378 ¹

¹ RC4Magic radio modules must be configured for 10dBm output in Europe, Japan and some other jurisdictions. Output power is configurable with an internal dipswitch in the DMXio unit.

RC4Magic DMX Protocol Compliance

DMX inputs and outputs comply with USITT DMX512/1990(4us).

Packets with non-zero start codes are not transmitted; RC4Magic cannot transfer proprietary data or RDM packets. (RDM functionality is expected to be added in future firmware updates.) DMXio receiver output closely mimics DMXio transmitter input, providing the same number of DMX channels and the same number of packets per second (pps).

Minimum number of DMX channels per packet:	1
Maximum number of DMX channels per packet:	512
Minimum packet-per-second rate:	12pps (slow rates used <i>only</i> when incoming dmxi is slow)
Maximum packet-per-second rate:	44pps with 512 channels, 10000pps with 1 channel

DMXio

RF Specifications as indicated above. Hidden internal antenna (external high-gain antenna option available).

Dimensions: 3.4" x 2.2" x 1.6" nominal
(approx. 86mm x 56mm x 40mm)

Power Input: 8VDC – 12VDC, 500mA (from a battery or power adaptor)
standard 2.1mm power receptacle, center positive
a power adaptor is provided with each DMXio unit

Transmitter Mode

Only 1 DMXio transmitter should be operated on each system ID.

DMX Input: meets USITT DMX512/1990(4us)
with 1-second data hold after dropout
NO INTERNAL DMX TERMINATION
DMX Output: straight-thru hardware connection
from DMX input to output

Receiver Mode

Any number of DMXio receivers may be used in a system.

DMX Output: meets USITT DMX512/1990,
closely mimics DMX data coming into the associated DMXio transmitter, providing the same number of DMX channels with the same number of packets per second
straight-thru hardware connection from DMX input to output (output signal is present on both DMX connectors)



DMX2dim Receiver-Dimmer

RF Specifications as indicated above. Hidden internal antenna.

Any number of DMX2dim receiver-dimmers may be used in a system.

Dimensions: 2.4" x 1.4" x 0.8" nominal
(approx. 61mm x 36mm x 20mm)

Power Input: 6VDC – 18VDC (12V typical), 70mA minimum,
screw terminal connections

Dimmer Outputs: 2 individual dimmer channels, each with
assignable DMX channel and dimmer curve,
screw terminal connections

Dimmer Technology: MOSFET PWM (pulse-width-modulation)
pwm resolution 14-bit (16,384 steps)
pwm frequency, linear curve: 92Hz
pwm frequency, ISL curves: 738Hz (will not beat with video frame rates)
maximum output power per dimmer 10A
maximum total device output power 15A

Circuit Protection: each dimmer output is individually protected against over-current and over-temperature



MAXIMUM TOTAL DEVICE CURRENT IS LIMITED BY CIRCUIT BOARD TRACE SIZE. User changeable Bussmann ATC load fuse should not exceed 15A and should be fast-blow type.

DMX4dim Receiver-Dimmer

RF Specifications as indicated above. Hidden internal antenna.

Any number of DMX4dim receiver-dimmers may be used in a system.

Dimensions: 3.15" x 1.55" x 0.8" nominal
(approx. 80mm x 40mm x 20mm)

Power Input: 6VDC – 18VDC (12V typical), 70mA minimum,
screw terminal connections

Dimmer Outputs: 4 individual dimmer channels, each with
assignable DMX channel and dimmer curve,
screw terminal connections

Dimmer Technology: MOSFET PWM (pulse-width-modulation)
pwm resolution 14-bit (16,384 steps)
pwm frequency, linear curve: 92Hz
pwm frequency, ISL curves: 738Hz (will not beat with video frame rates)
maximum output power per dimmer 10A
maximum total device output power 15A

Circuit Protection: each dimmer output is individually protected against over-current and over-temperature



MAXIMUM TOTAL DEVICE CURRENT IS LIMITED BY CIRCUIT BOARD TRACE SIZE. User changeable Bussmann ATC load fuse should not exceed 15A and should be fast-blow type.

RC4Magic Series 2 technical specifications are subject to change without notice.

Warranty Policy

Seven-Day Easy Return

You may return any RC4 Wireless Products delivered to you new within the last seven days for a refund, *excluding custom engineered and/or custom manufactured items*. We regret that we cannot refund the shipping charges, or pay for shipping the item back to us. We will not hassle you with mountains of paperwork, but we do require that items be returned *unused in the original packaging*.

Thirty-Day Replacement or Fast-Turn Service Guarantee

If RC4 Wireless technology delivered new to you within the previous thirty days fails to perform to published specifications while being used for its intended application, we will ship a replacement unit to you and arrange for return of your original unit. You will usually have a functioning unit within two business days (including Saturday where delivery services are available) at no charge to you. If a replacement unit is not in stock, we will service your unit in our shop with 48 hour turnaround.

One Year Parts and Labor General Guarantee

If RC4 Wireless technology you have received during the last twelve months fails to perform to published specifications while being used for its intended application, we will service it in our own shop with no charge to you for parts or labor. You pay the shipping to return the unit to us. We pay the shipping to send it back to you fully repaired. Service work is guaranteed for thirty days, during which our fast-turn policy applies.

Out of Warranty Service Policy

If your RC4 Wireless technology requires servicing after the first year, our regular shop rate will apply and parts will be billed at nominal costs. You pay the shipping charges both ways. Service work is guaranteed for thirty days, during which our fast-turn policy applies.

Disclaimers We Must Make

All repair periods are subject to parts availability, and do not apply to holidays or our corporate vacation times (usually the last two weeks of August, subject to change without notice). For critical projects, we recommend purchasing spare equipment. You cannot use our equipment in a show, then return it for a refund: our warranty is not a free rental program. The above warranty policies will not apply if equipment has been abused, misused, or mishandled. We will not be responsible for physical damage, failures caused by incorrect wiring, electrical overloading and/or over-voltage, overheating caused by insufficient ventilation, or damage caused by insufficient packaging during return shipping. We will not be responsible for consequential damages to other equipment, or for lost revenues. We do not guarantee our equipment to be suitable for applications other than those discussed in our application notes and brochures. In particular, no RC4 products should ever be used to control pyro devices. Published power output ratings of some items are accurate only at specific voltages, duty-cycles, and operating temperatures. Some items may require additional cooling and/or protection circuitry to operate reliably with certain loads. Call RC4 Wireless for advice if you are unsure about any operating characteristics.

If your account payments are not up to date, we reserve the right to withhold service until payment is received.

RC4 Wireless pricing, warranty terms, and technical specifications are subject to change without notice.

We want you to be a happy and satisfied customer. Please help us serve you better by letting us know exactly what you need. Thank You!

How to Reach RC4 Wireless

Physical Address

RC4 Wireless is a registered trade-name of **Soundsculpture Incorporated**

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RC4Magic

Series 2

Wireless DMX and Wireless Dimming System

User Manual R1.1 Mar-2010

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