RF200D (V2)

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User Manual

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RF200D Programming

Output Channels 1 & 2 - Relay Test

The RF200D has a build in relay test function. When the output and signal LED's 5 & 6 are flashing, pressing the right switch will turn on the outputs relay and signal LED 1.

Tamper Output / 3rd Channel - Overview

The tamper channel can work as a tamper relay or a third channel. Pairing the tamper channel to any local or remote tamper functions automatically configures the third channel's output into tamper mode. In tamper mode the relay is permanently energised while no tamper fault has been detected. This is a fail safe system to prevent a power failure not showing as a tamper fault. Setting any of the following configures the third channel as a tamper channel:

1) Enable local tamper switch
2) Enable missing status updates
3) Pair any remote RF200D's tamper channel.

It's also possible to pair a standard input from a remote RF200D to the tamper channel. A standard input from a remote RF200D will not switch the third channel into a tamper channel, but it can be used as another tamper input. When a remote input is being used on a tamper channel, triggering the input switches off the tamper relay, i.e. the signal is inverted. This can be a useful feature if you wish to report back a remote tamper state from a bell box or PIR etc.

If none of the above have been enabled or paired, the tamper relay works as a third channel. In this mode the normal state is 'Normally Open'. The only supported mode for this channel is momentary.

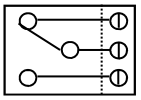
Note: When the local tamper switch is disabled, its status is still transmitted to other RF200D devices.

Hardware Description

Outputs 1 & 2

Both outputs are volt free with normally open, normally closed contacts and are capable of switching loads of up to 1A @ 30V. Under software control these outputs can be configured to work in either momentary, toggle or timer mode. The electrical connections are as follows:

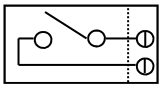
Relay Outputs 1 & 2



Output 3 / Tamper Relay

Output 3 has volt free contacts and can switch up to 1A @ 30V. This output can be configured to work as either a tamper circuit (energised normally closed) or a third channel (Normally Open [NO]). Please refer to the programming section to configure this output. The electrical connections are as follows:

Tamper / Output 3



Power Supplies

The RF200D works from a DC9–14V (Max.) power supply. The RF200D is also reverse polarity protected. If using a separate power supply to drive the inputs please ensure the 0V connections are commoned together.

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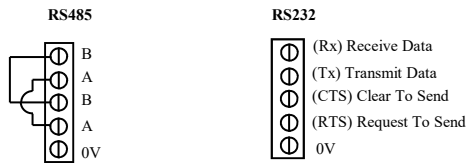
Electrical	
Operating Voltage	DC9-14V DC (Max.)
Operating Current (Idle)	25mA (Max.)
Operating Current (All Relays & LED's)	100mA (Max.)
Relays Max. Working Voltage	30V AC/DC
Relay Contact Type	Volt Free
Relay 1 & 2 Max Current	1A
Relay 3 / Tamper Relay Max. Current	1A
Input 1 & 2 Voltage	14V (Max.)
Input 1 & 2 Resistance	11.2K Ohms
Radio	
Operating Frequencies	433.5 - 434.5MHz
Transmit Power	<= 10mW
Tx Radio Data Rate	40 KHz
Tx Deviation	20KHz (SSB)
Rx Bandwidth	115KHz
Data Channel (Only on certain models)	
Interface Type	RS232 or RS485
Baud Rate	2400 - 19200
Protocols	Genlink, Open & Pelco P /D
Mechanical	
Case Size without Aerial and Grommet	115 x 65 x 40mm
Overall Size with Aerial and Grommet	305 x 65 x 40mm
Case Rating	IP65
Environmental	
Temperature Range	-20 to +55 Degrees
Relative Humidity	95% Non-Condensing

Hardware Description

RS232 / RS485 Data Channel

The RF200D has a data channel with either an RS232 or RS485 interface (Depending on Model). Serial baud rates from 2400 to 19200 are possible with none, odd or even parity. Supported protocols are: Genlink, Pelco D & P and an open channel.

The electrical connections for both the RS232 and RS485 are listed below:



Aerial Connector

A threaded M4 connector for mounting of the rubber duck aerial. Please ensure the aerial has its supplied rubber washer fitted between the case and aerial, and that the aerial is done up hand tight to create a waterproof seal. If the washer is not fitted or the aerial is loose possible water damage may occur which is not covered under the product guarantee.

Programming Connector

The programming connector is for firmware upgrades and PC configuration of the RF200D. Do not connect anything to this connector other than the recommended programming tool. Please, if required, contact your supplier for purchase information on the PC configuration / programming tool.

RF200D Programming

Output Channels 1 & 2 - Operational Modes

The RF200D outputs can operate in three modes, Momentary, Toggle or Timer.

1) Momentary means if any paired input is triggered the relay output is switched on.
2) Toggle mode causes its output to flip on detection of any positive going signal from a paired device.
3) In timed mode any positive going signal from a paired device will either start the timer or reset the timer period to the beginning.

Output Mode	Flashing LED's	Static LED's
Momentary	Output x + Signal LED 6	Signal LED 1
Toggle	Output x + Signal LED 6	Signal LED 2
Timer	Output x + Signal LED 6	Signal LED 3

Note: Output x = Output LED 1 or 2

Output Channels 1 & 2 - Timer Periods

The RF200D allows various time periods, per channel, from 1 second to 30 minutes. Listed below are the various timer periods.

Output Mode	Flashing LED's	Static LED's
1 Second	Output x + Signal LED 5	Signal LED 1
5 Seconds	Output x + Signal LED 5	Signal LED 2
10 Seconds	Output x + Signal LED 5	Signal LED 3
30 Seconds	Output x + Signal LED 5	Signal LED 4
1 Minute	Output x + Signal LED 5	Signal LED's 1 & 4
15 Minutes	Output x + Signal LED 5	Signal LED's 2 & 4
30 Minutes	Output x + Signal LED 5	Signal LED's 3 & 4

Note: Output x = Output LED 1 or 2

RF200D Programming

Restore Factory Settings

This option resets the RF200D back to factory default and erases any previously paired devices. When selected all the status LED's flash together

To reset the RF200D, hold down the right switch and wait for the signal LED's to increment from 1 to 6, this is a warning stating all settings are about to be erased.
When the 6th LED is on there will be a short pause followed by the RF200D flashing all its LED's before rebooting.

Once the RF200D has rebooted it will have restored its factory defaults and erased any previously paired devices.

Disclaimer

The RF200D is a general purpose wireless telemetry device with an EN300 220 receiver category of 2 (Standard Performance)

The RF200D is **not** designed for use in high security, life support or safety applications.

Main Features

- Repeat Mode
- 6 x RF Channels
- Site Survey Mode
- Easy Pairing Menu
- Encrypted Protocol
- DC9-14V Operation
- 433MHz Licence Free
- Signal Strength Meter
- 3 x Volt Free Relay Outputs
- 2 x Analogue / Digital Inputs
- IP65 (All Weather) Rated Enclosure
- Momentary, Toggle & Timer Outputs
- Genlink, Pelco (D & P) and Open Protocols
- Timer outputs From 1 second to 30 Minutes
- Missing Status Update Monitoring (Signal Jamming)
- Internal Input to Output Pairing (For Timer Function)
- RS232 or RS485 Data Channel (Depending on Model)
- 500m Range in Ideal Conditions (Requires Line of Sight)

RF200D Programming

Input Channels 1 & 2 - Internal Input To Output Pairing

The RF200D has an option to pair its own input to its own output. One good reason for doing this is to use the RF200D as a timer but still transmit its status to other units. You can only pair input 1 to output 1 or input 2 to output 2.
The options are:

Input / Output Pair	Flashing LED's	Static LED's
Input / Output Enabled	Input x + Signal LED 5	Signal LED 2 ON
Input ./ Output Disabled	Input x + Signal LED 5	Signal LED 1 ON

Note: Input x = Input 1 or 2

Output Channels 1 & 2 - Pairing

In this mode the RF200D accepts a pairing signal from another RF200D. Only inputs can be paired to an output unless the data channel has been configured for either the Pelco or Genlink protocol. For each new paired device (up to 5 units per channel) the signal LED's 1-5 increment. Holding down the right switch for more than 3 seconds clears any previously paired devices on the currently selected output.

To pair a Pelco Aux command to an output, ensure Pelco is already configured before entering configuration mode. Press the Aux channel you wish to pair on the Pelco interface and the RF200D will learn its address and Aux channel.

Pair Outputs 1 or 2	Flashing LED's	Static LED's
1 Device Paired	Output x LED Only	Signal LED 1
2 Devices Paired	Output x LED Only	Signal LED 2
3 Devices Paired	Output x LED Only	Signal LED 3
4 Devices Paired	Output x LED Only	Signal LED 4
5 Devices Paired	Output x LED Only	Signal LED 5

Note: Output x = Output LED 1 or 2

Basic Functions

While the RF200D is in normal operation the three PCB switches have some engineer friendly features, as listed below:

Site Survey Mode

This mode sends out a beacon signal every second to assist the engineer in finding an ideal location for installing the RF200D. You should aim for a minimum of 2-3 bars of signal strength for a reliable link.

By pressing switches 1 & 2 together for a brief second the RF200D enters 'Site Survey' mode. Site Survey mode only sends out a beacon signal and does not control any of the RF200D's outputs. To exit this mode, again press switches 1 & 2 for a brief second, or replace the box cover for 5 seconds.

It is only advisable to enter one unit into site survey mode at any particular time.

Channel 1 or 2 Input Test

Holding down either switch 1 or 2 for half a second sends the corresponding channel 'ON' signal. Any receiving device paired to this channel will activate its corresponding outputs. Again this is useful for a engineer to check a channel is working correctly.

Tamper Switch

Holding down the tamper switch for 5 seconds simulates the box lid being closed and switches off all of the internal status LED's. The RF200D will also send a status packet on the tamper switch changing state. There is also a one second delay when you release the tamper switch before the status LED's become active. Holding down the tamper switch while in configuration mode for 5 seconds exits configuration mode without saving any new changes.

General Description

The RF200D is a full featured 433MHz wireless interface designed for short range transmissions. The heart of the RF200D is the Si4455 radio transceiver which gives the RF200D full bi-directional communication for its inputs, outputs, serial data and repeat functions. Cased in an IP65 rated enclosure the RF200D is designed for indoor and outdoor use.

Each RF200D has two input channels which can be programmed to one of four states to activate, 12V signal, 0V signal, open circuit or short circuit.

Outputs 1 & 2 are volt free relay contacts and can be configured to work in three modes, momentary, toggle and timed outputs (with intervals from 1 second to 30 minutes). An option to pair its own input to output allows the RF200D to work as a timer as well as transmitting its status to other paired devices.

The third output can be switched between a tamper relay and a third channel. In tamper mode the RF200D can monitor local and remote tamper switches, lost status update signal from remote units or report a paired input from a remote unit. When not used as a tamper circuit the third channel can function as a momentary volt free output.

Other features include a built in signal strength meter, site survey mode for the engineer to check signal strengths when installing units and a RS232 / RS485 serial interface for transmission of protocols Pelco P & D and any open channel protocol.

RF200D Programming

Repeat Mode - Pairing

In this mode, briefly pressing the right switch of the RF200D transmits a pairing signal to another device. If the RF200D receives a pairing signal from another device, signal LED 6 flashes twice and the bottom five signal LED's will increment. Holding down the right switch for more than three seconds clears any previously paired devices from this channel. When pairing a RF200D repeat, all functions from the RF200D will be repeated. Up to five RF200D units can be repeated. Listed below are the LED states for repeat mode pairing.

Pair Data Channel	Flashing LED's	Static LED's
1 Device Paired	Input 1 & 2 Alternating to Output 1 & 2 LED's	Signal LED 1
2 Devices Paired	Input 1 & 2 Alternating to Output 1 & 2 LED's	Signal LED 2
3 Devices Paired	Input 1 & 2 Alternating to Output 1 & 2 LED's	Signal LED 3
4 Devices Paired	Input 1 & 2 Alternating to Output 1 & 2 LED's	Signal LED 4
5 Devices Paired	Input 1 & 2 Alternating to Output 1 & 2 LED's	Signal LED 5

RF Channel Selection

The RF200D has 7 RF channels and defaults to channel 5. Below is a list of all the channel numbers and their corresponding frequencies:

RF Channels	Flashing LED's	Static LED's
Channel 1 (433.5MHz)	None	Signal LED 1
Channel 2 (433.7MHz)	None	Signal LED 2
Channel 3 (433.9MHz)	None	Signal LED 3
Channel 4 (434.1MHz)	None	Signal LED 4
Channel 5 (434.3MHz)	None	Signal LED 5
Channel 6 (434.5MHz)	None	Signal LED 6

Status / Signal LED's

Each input / output on the RF200D has a closely mounted status LED to indicate the channel is active. For the signal strength a strip of 6 LED's is mounted in the centre at the top of the RF200D. A brief description of the status / signal LED's is listed below:

Signal LED's

The signal LED's have two meanings. When the display raises from the bottom upwards this indicates a received signal strength, depending on the receive level will depend on how many LED's will light. For a transmission the LED's will pulse from the centre outwards.

Inputs / Outputs 1 & 2

The input / output LED's for channels 1 & 2 flash at half second intervals when a channel is active.

Channel 3 / Tamper

The status LED flashes at half second intervals providing the tamper fault is local, if a remote tamper fault has been detected the status LED will pulse twice.
When using this output as a third channel the status LED will only flash at half second intervals when active.

Data Channel (Data Models Only)

The status LED on the data channel emits a short pulse when sending or receiving data over the RS232 or RS485 port. If the status LED stays on continuously for half a second or more there is a problem with either the serial port settings or the protocol used.

Power Saving

The status LED's will extinguish when the tamper switch is held down for more than 5 seconds. They will eliminate once the tamper switch is released.

RF200D Programming

Data Channel - Protocol Continued

Listed below are the LED states for the data channel protocol.

Protocol	Flashing LED's	Static LED's
Genlink Protocol	Data + Signal LED's 5 & 6	Signal LED 1
Pelco P & D	Data + Signal LED's 5 & 6	Signal LED 2
Open Protocol	Data + Signal LED's 5 & 6	Signal LED 3
Spare	NA	NA

Input Channels 1 & 2 - Transmit Pairing Signal

When input channels 1 or 2 are flashing, The RF200D is in "Send Pairing Signal" mode. By briefly pressing the right button the signal LED's will flash a TX signal (flashing from middle outwards) to send the pairing signal to another RF200D device. The receiving device will flash its signal LED 6 to indicate the reception of this pairing signal.

Send Pairing Signal	Flashing LED's	Static LED's
Pair Input 1 or 2	Input LED's 1 or 2	None

Input Channels 1 & 2 - Set Input Mode

Four possible modes are available (see Hardware Description) and are listed below:

Input 1 or 2 Mode	Flashing LED's	Static LED's
Positive Trig 8V-14V	Input x + Signal LED 6	Signal LED 1
Negative Trig < 4V	Input x + Signal LED 6	Signal LED 2
I/P N.O Trig	Input x + Signal LED 6	Signal LED 3
I/P N.C Trig	Input x + Signal LED 6	Signal LED 4

Note: Input x = Input LED 1 or 2

RF200D Programming

Tamper / Third Channel - Status Update Monitoring

Enable or disable status update monitoring. When enabled any missing status updates generate a tamper fault and flash the tamper LED twice.

Status Update Monitoring	Flashing LED's	Static LED's
Disabled	Tamper + Signal LED 5	Signal LED 1 ON
Enabled	Tamper + Signal LED 5	Signal LED 2 ON

Tamper / Third Channel - Relay Test

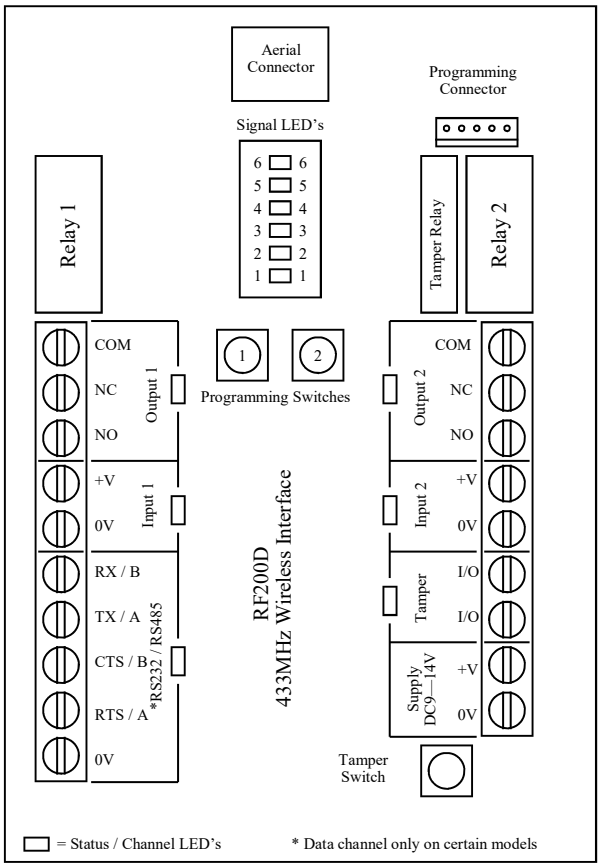
The RF200D has a build in relay test function. When the tamper and signal LED's 5 & 6 are flashing, pressing the right switch turns on the relay and signal LED 1.

Status Update Period

Enabling the status updates forces the RF200D to transmit its status at a given period even if there are no input changes. If a receiving RF200D has its status update monitoring enabled and there is a loss of signal a tamper fault will be generated.

Status Update Period	Flashing LED's	Static LED's
Disabled	Tamper + Input 1 & 2 LED's	All Signal LED's OFF
1 Seconds	Tamper + Input 1 & 2 LED's	Signal LED 1 ON
10 Seconds	Tamper + Input 1 & 2 LED's	Signal LED 2 ON
30 Seconds	Tamper + Input 1 & 2 LED's	Signal LED 3 ON
1 Minute	Tamper + Input 1 & 2 LED's	Signal LED 4 ON
2 Minute	Tamper + Input 1 & 2 LED's	Signal LED 5 ON
4 Minutes	Tamper + Input 1 & 2 LED's	Signal LED 6 ON

RF200D Hardware Layout



RF200D Programming

Data Channel - Set Parity

In this mode, briefly pressing the right switch changes the parity for the RS232 / RS485 port. The parity must match the other communicating equipment's parity to function correctly. Listed below are the LED states for the different parity settings.

Parity	Flashing LED's	Static LED's
None	Data + Signal LED 5	Signal LED 1
Even	Data + Signal LED 5	Signal LED 2
Odd	Data + Signal LED 5	Signal LED 3

Data Channel -Protocol

In this mode, briefly pressing the right switch changes the selected protocol for the RS232 / RS485 port. Currently three protocols are available and are listed below:

1) Genlink protocol. This protocol is used for outputting all paired devices radio transmissions over either RS232 or RS485 port. It is also possible to control a paired RF200D's outputs via this protocol. A typical use for this protocol is expander modules (extra I/O channels). Reading of an RF200D's analogue input voltages, status monitoring in software, door access control etc. Please refer to the programming guide.

2) Pelco P & D protocol. This is mainly used for CCTV telemetry. The RF200D automatically detects Pelco P or D, and has built-in support to pair Pelco AUX commands to any of the RF200D's three outputs (see programming section).

3) Open protocol. This protocol has no input filtering and will transmit any data sent through the RS232 or RS485 lines. Care needs to be taken with the hardware connections to prevent the RF200D permanently transmitting data because of poorly connected cables. It is advisable to use the above protocols (Genlink & Pelco) if possible.

Additional Features

Status Updates

When an RF200D's inputs change it automatically transmits an status update. This is a normal procedure, but if the inputs do not change for a while the receiver does not know if the transmitter is still functioning correctly. To overcome this the RF200D can be programmed to transmit a status update at a given period. Status updates have two main functions:

1) If a receiver becomes out of sync with the transmitter e.g. a power cut, receiving automatic status updates will re-sync the receiver.
2) The receiver can also be programmed to detect missing status updates, if two or more status updates are missing the receiver generates a tamper fault and the tamper LED flashes twice to indicate a remote tamper fault.

To enable status updates please refer to the programming section.

Input Channels Analogue Updates

When an RF200D transmits a status update it measures the input voltages and transmits this level as a digital value in 0.1V steps. The purpose of this feature is for remote data logging etc. and has no affect on the inputs previously described.

Repeat Function

An RF200D can repeat other RF200D's signals. The repeating RF200D still can use its own inputs and outputs while repeating other units. For an RF200D to repeat another units data it physically has to receive the first transmission and then re-transmit this on the same frequency. This is perfectly ok for status updates but for the data channel if a high data throughput is required we cannot guarantee its operation.

RF Channel Selection

Six RF channel channels are available in the 433-434MHz band. All RF200D units must be on the same channel for them to communicate. If a particular channel is found to be poor it is advisable to try another channel.

Hardware Description

Inputs 1 & 2

Listed below are the four modes of operation for Inputs 1 & 2:

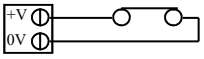
Mode 1: To activate the input apply a voltage between 8 —14V. To de-activate the input apply a voltage of less than 4V.

Mode 2: To activate the input apply a voltage of less than 4V. To de-activate the input apply a voltage between 8—14V.

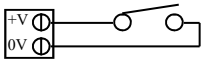
Mode 3 - Self Sensing Normally Closed Input

In this mode the RF200D outputs a sensing pulse to check to see if there is a open or short circuit present. Idle state is represented by an short circuit where an active state is represented by a open circuit. Typical examples would be a magnetic door contact or a PIR sensor

Normally Closed - Active State



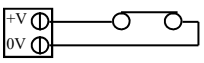
Normally Open - Idle State



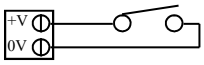
Mode 4 - Self Sensing Normally Open Input

In this mode the RF200D outputs a sensing pulse to check to see if there is an open or short circuit present. Idle state is represented by an open circuit, where an active state is represented by a short circuit. A typical example would be an open collector output from an alarm panel etc.
less than 4V de-activates the input.

Normally Closed - Idle State



Normally Open - Active State



RF200D Programming

Tamper / Third Channel - Pairing

In this mode, briefly pressing the right switch of the RF200D transmits a pairing signal to another device. If the RF200D receives a pairing signal from another device, signal LED6 flashes twice and the bottom five signal LED's will increment by 1. Holding down the right switch for more than 3 seconds clears any previously paired devices from this channel. It is only possible to pair a data channel with another data channel. Listed below are the LED states for the data channel pairing.

Pair Data Channel	Flashing LED's	Static LED's
1 Device Paired	Tamper LED Only	Signal LED 1
2 Devices Paired	Tamper LED Only	Signal LED 2
3 Devices Paired	Tamper LED Only	Signal LED 3
4 Devices Paired	Tamper LED Only	Signal LED 4
5 Devices Paired	Tamper LED Only	Signal LED 5

Tamper / Third Channel - Local Tamper Switch

Enable or disable local tamper switch. This does not affect the local switches state being transmitted to other RF200D interfaces. The options are as follows:

Tamper Switch	Flashing LED's	Static LED's
Disabled	Tamper + Signal LED 6	Signal LED 1 on
Enabled	Tamper + Signal LED 6	Signal LED 2 on

RF200D Programming

The RF200D is configured by a software menu system using the status and signal LED's to show the currently selected options. When in configuration mode the currently selected option is shown by one or more LED's pulsing twice and the currently selected parameter shown by one or more of the signal LED's 1 - 4.

To Enter configuration mode hold down switches 1 & 2 for 3 seconds. Once 3 seconds have elapsed all the RF200D's LED's flash 3 times.

While in configuration mode, switches 1 - 3 work as follows:

- Switch 1 changes the current menu's option.
- Switch 2 changes the currently selected parameter.
- Pressing switch 1 for three seconds saves all the new settings, flashes all of the RF200D LED's twice and reboots the system.
- Pressing the tamper switch for five seconds exits configuration mode and switches off all LED's without saving new settings.

RF200D Pairing Example

The RF200D follows the same procedure for pairing any input to an output including the data channel and repeat mode. Listed below is an example to demonstrate how to pair a single input to an output. The following pages in this manual describe the other configuration modes for pairing the remaining peripherals

To pair an input to an output is as follows:

1. Place both RF200D's in configuration mode
2. Select an output channel to pair (first RF200D)
3. Select an input channel you wish to pair from (second RF200D)
4. On the second RF200D press the right button. The first RF200D's signal LED 6 should flash twice and the signal LED's 1-5 should increment.
5. Save configuration by holding down switch 1 for three seconds
6. Test the connection by pressing the input channel switch for half a second and make sure the second box responds.
7. Pairing complete!

RF200D Programming

Data Channel - Pairing

In this mode, briefly pressing the right switch of the RF200D transmits a pairing signal to another device. If the RF200D receives a pairing signal from another device, signal LED6 flashes twice and the bottom 5 signal LED's will increment.

1. Holding down the right switch for longer than 3 seconds clears any previously paired devices from this channel. It's only possible to pair a data channel with another data channel. Listed below are the LED states for data channel pairing.

Pair Data Channel	Flashing LED's	Static LED's
1 Device Paired	Data LED Only	Signal LED 1
2 Devices Paired	Data LED Only	Signal LED 2
3 Devices Paired	Data LED Only	Signal LED 3
4 Devices Paired	Data LED Only	Signal LED 4
5 Devices Paired	Data LED Only	Signal LED 5

Data Channel - Set Baud Rate

In this mode, briefly pressing the right switch changes the baud rate from 2400 to 19200 for the RS232 / RS485 port. The baud rate must match the other communicating equipment's baud rate to function correctly. Listed below are the LED states for the different baud rates.

Baud Rate	Flashing LED's	Static LED's
2400 Baud	Data + Signal LED 6	Signal LED 1
4800 Baud	Data + Signal LED 6	Signal LED 2
9600 Baud	Data + Signal LED 6	Signal LED 3
19200 Baud	Data + Signal LED 6	Signal LED 4