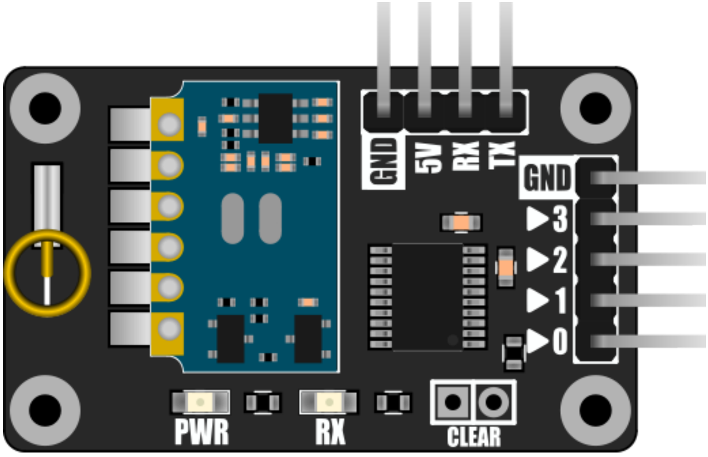
SmartRFy Digital Rx Module Manual



HCMODU0142

Revision 1.0.0

DISCLAIMER

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Table of Contents

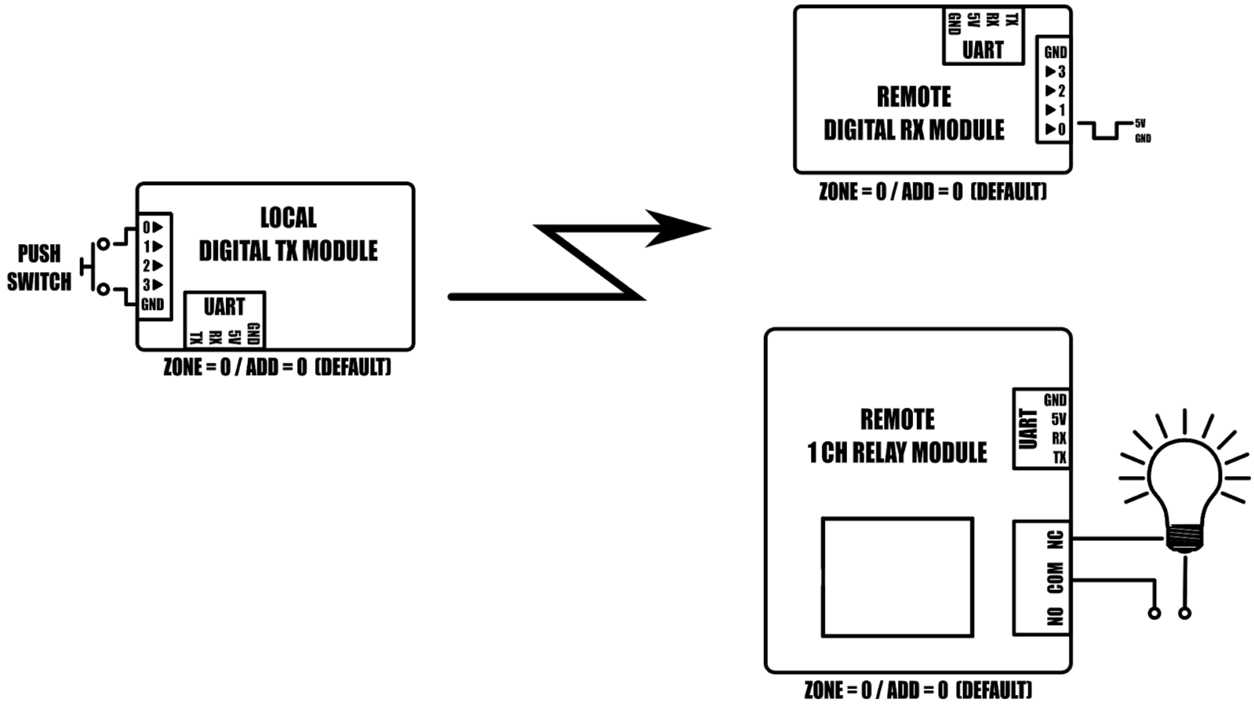
SmartRFy system overview

SmartRFy modules are a range of wireless modules that provide a simple low cost way of controlling and monitoring remote devices and sensors. They are designed to work at their basic level with no programming required. However, when reconfigured or controlled via their serial interface they can also provide more complex and even autonomous functions.

SmartRFy modules work by wirelessly communicating with one another using simple text based commands - for example, to turn on a remote relay a command such as RLY=1 can be sent, and to turn it back off RLY=0. These commands can be automatically sent from one module to another or can be sent by a user via a module's serial interface to manually control modules on the SmartRF network.

They are addressable and can be grouped into one of 255 zones, with each zone capable of individually addressing 255 devices, giving a total of over 65,000 unique addresses. SmartRFy modules are designed to be both easy and flexible to use by providing three levels of control:

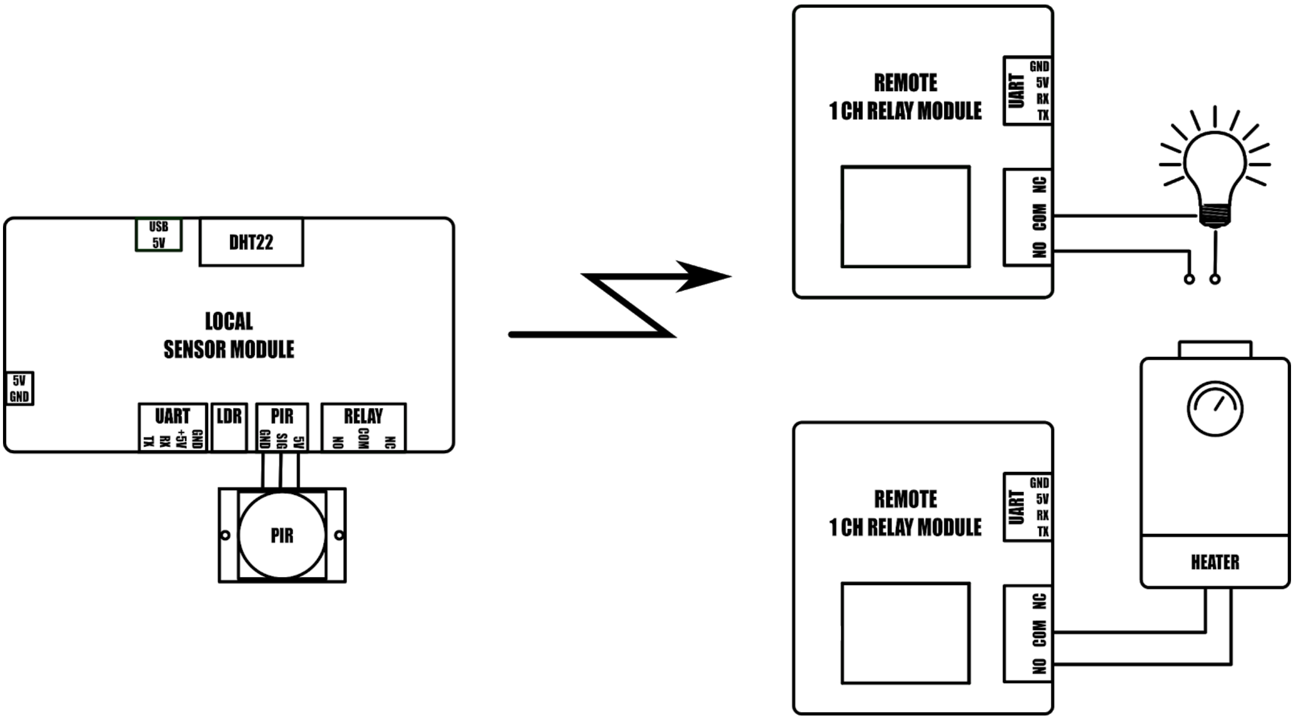
Zero configuration (out-of-the-box)



Example: Controlling a remote digital pin and light from a push switch.

With no configuration at all the SmartRFy range of modules allow basic functionality such as remotely switching relays, digital pins, or monitoring sensors, such as temperature, humidity, light, motion etc. All SmartRFy modules default to the same zone and address and so can respond to, or control, other modules without the need to modify any zone or address settings.

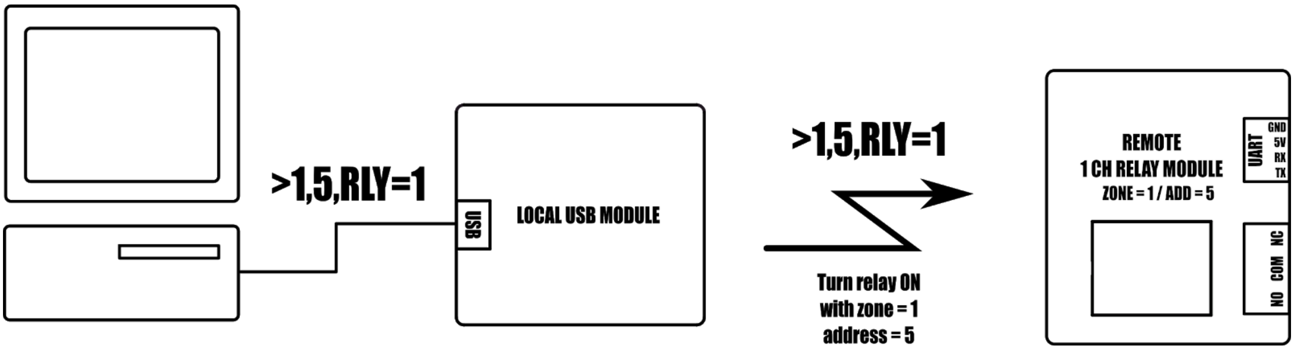
Serial port configuration



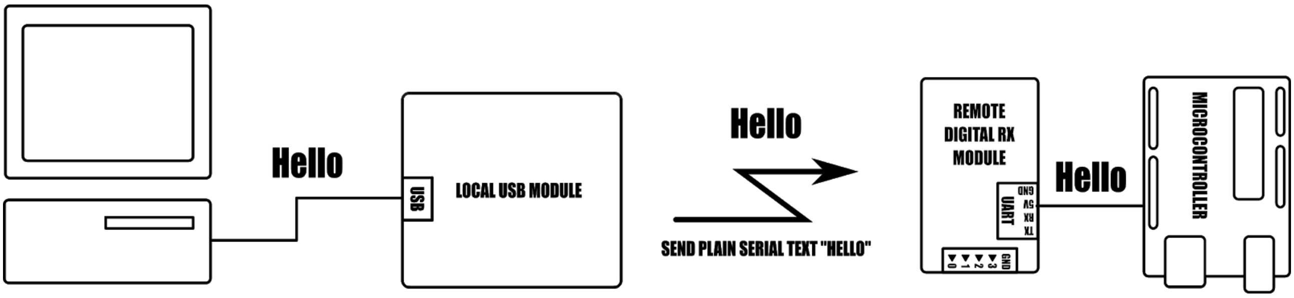
Example: Remote 1CH relay module configured to turn on light when local modules' PIR is triggered and second remote relay module is configured to control a heating device based on local modules' temperature sensor readings.

All smartRFy modules include a serial port which allows them to be re-configured using simple text based commands. These text commands allow changing of configuration settings and control of specific features of each module. Any setting changes are stored by the module's non-volatile memory and so are retained even when power is removed from the module. When reconfigured they are able to perform more complex functions and even some basic autonomous tasks. For example, a SmartRFy relay module can be reconfigured to control a heating system based on the temperature transmitted from a remote sensor or, turn on a flood light for a set amount of time when triggered by a remote PIR – all without any additional hardware. Serial port configuration also allows a module's zone and address (all SmartRFy modules default to zone and address 0) to be changed. This provides the option for modules to be placed into groups, which will then only respond to other modules with a matching zone or address.

Slave controlled



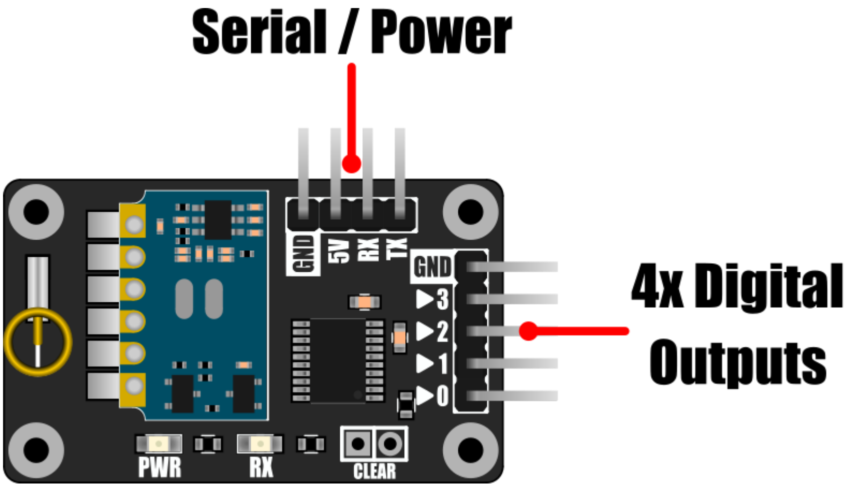
Example 1: Turning on a remote relay with zone = 1 and address = 5



Example 2: Send plain serial text "Hello" to a remote microcontroller

SmartRFy modules can also be controlled via their serial port by other devices such as microcontrollers or computer based automation software such as Node-RED. Using a SmartRFy module as a slave device (must be capable of transmitting/receiving) gives a master device the ability to monitor and control any other SmartRFy devices on the network, regardless of their zone and address. SmartRFy modules can even be used as a passive wireless serial port for passing non-SmartRFy data to other remotely connected devices.

SmartRFy digital Rx module



The SmartRFy digital Rx module provides a set of 4 digital output pins which can be remotely controlled by other SmartRFy modules. In particular when coupled with the digital Tx module (HCMODU0143) each pin on the Rx module will mimic the state of the 4 digital input pins on the Tx module without needing any configuration.

The digital Rx module also has many more advanced features and by changing settings via its serial port using simple text based commands the Rx module can be programmed to listen to a range of other remote SmartRFy devices and sensors. Like all SmartRFy modules it can even be used as a wireless serial port (receive only) allowing for non SmartRFy devices to communicate with one another using a SmartRFy connection.

The module can be powered via a single 5V power supply and standard 0.1” pitch header pins provide access to power, the 4 digital output pins, and the serial interface.

Features

4 independently controlled digital output pins

Digital pins can be directly controlled using remote digital Tx module

Local and remote control via simple text based serial commands.

Up to 255 zones and 255 addresses (default zone 0, address 0).

Basic automation features (requires a USB to serial adaptor or microcontroller for configuration).

Compatible with most microcontrollers featuring a serial UART interface.

Wireless serial communication with 8 different baud rates (9600 default).

Digital output pins can be controlled remotely via serial commands, or other SmartRFy modules. The module can be set to automatically toggle the digital pins based on temperature, humidity, light or motion and supports on/off, toggle, and timer modes.

Specification

Model number:	HCMODU0143
Supply Voltage:	4.5 to 5.5V
Supply current min:	9.5mA (idle)
Supply current max:	13mA (receive)
Operating frequency:	433MHz (OOK)
Operating range:	30 Meters (unobstructed)
Interfaces:	RF Rx, serial UART, and 4x 5V digital output
Digital output pin characteristics:	max pin sink current (digital pin 0 & 1) = 4mA max pin sink current (digital pin 2 & 3) = 10mA max pin source current (digital pin 0 & 1) = 4mA max pin source current (digital pin 2 & 3) = 10mA Output low max (sink current = 1mA) = 0.25V Output high min (Vdd = 5V, 4mA source) = 4.4V
Digital Tx to Rx pin response time:	0.8 seconds (default settings)

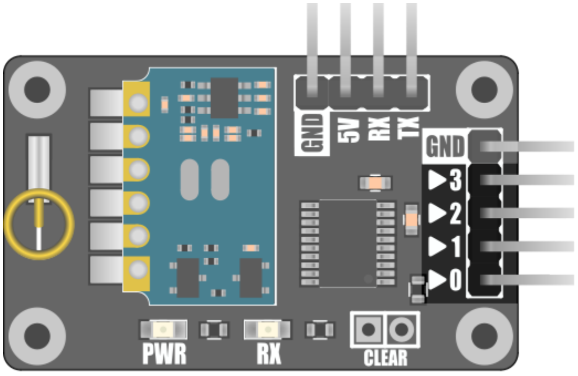
	0.6 seconds (remote TRS=0)
Module dimensions (WxDxH):	39.4mm x 23.9mm x 20mm

Digital Rx Module Features

Power

Power can be applied to the module via the 5V and GND pins on the serial interface header. It can be powered using an external power supply ranging from 4.5 to 5.5V with a minimum current capacity of 50mA.

Digital output pins



PIN	LOW	HIGH
3	SW3=0	SW3=1
2	SW2=0	SW2=1
1	SW1=0	SW1=1
0	SW0=0	SW0=1

The module includes 4 digital output pins which can be individually switched between a digital logic low (0V) and digital logic high (5V). By default these pins can be remotely controlled using the 4 digital input pins on a digital Tx module (HCMODU0143) or using the SWx command where x is the digital pin number (0 to 3). The module will respond to this command being sent via its serial interface, or remotely from any other SmartRFy device set to the same zone and address. Setting the SWx command to 1 (e.g. SW0=1) will set the pin to a logic high, and setting it to 0 (e.g. SW0=0) will set it to a logic low.

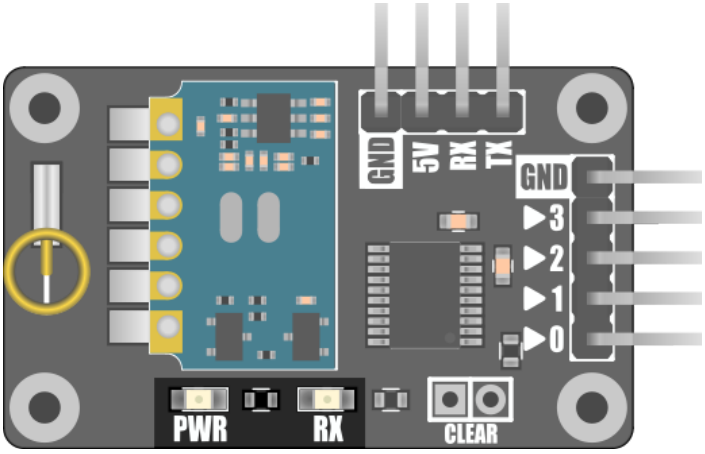
The four digital pin commands (SW0, SW1, SW2, SW3) can also be renamed to any three letter command and when renamed to an existing device name (e.g. PIR, TMP, LDR etc.)

they can be made to automatically respond to other devices set to the same zone and address.

The digital pins can also be configured to pulse high for a set period of time (specified in seconds) using the SxO command (where x is the digital pin number 0 to 3), or set to a toggle (high/low) mode where their state will toggle when receiving an appropriate trigger command. For more information on how to configure the digital pins to automatically respond to certain conditions please see Appendix A: Digital output examples.

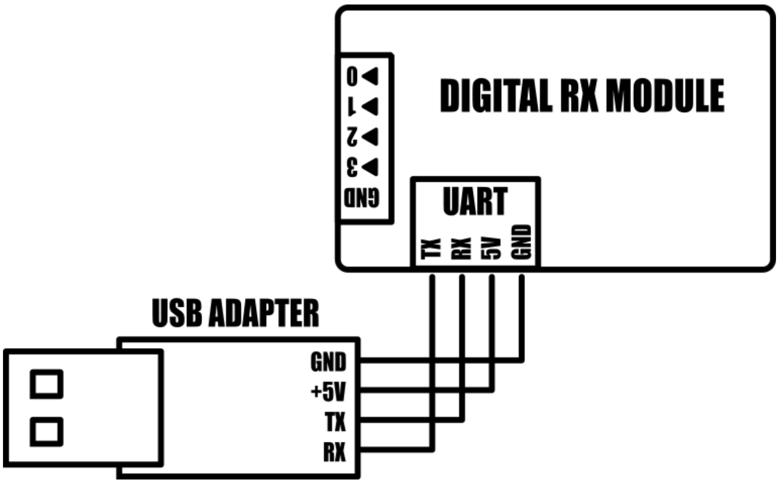
LEDs

The sensor module includes 2 LEDs which indicate the current state of the module.



PWR LED (green)	Indicates the module is currently powered.
RX LED (amber)	Indicates the module is currently receiving data from another SmartRFy device with any zone or address.

Serial UART



Command interface feature

The module includes a full duplex serial UART interface which can be used for issuing local commands and settings directly to the module (local commands).

By default the serial interface will also output any received data from other SmartRFy modules no matter what their zone and address settings. The type of information that the serial interface outputs can be controlled using the verbose command (VBM).

Wireless serial port feature

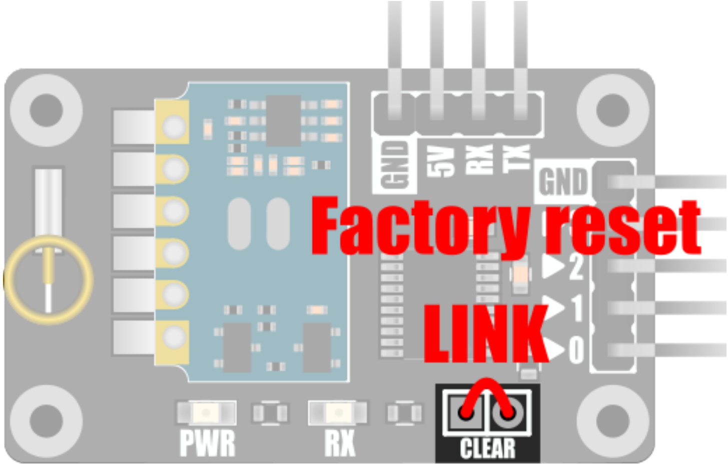
Additionally, the serial interface can also act as a passive wireless serial port for receiving non-SmartRFy related data from other devices connected to remote SmartRFy modules.

Default configuration settings

By default the serial interface is configured to 9600 baud, 8 data bits, no parity, and 1 stop bit. See the serial interface control section for more information on setting the baud rate, verbose mode, and issuing commands.

Note: Connecting the module to a PC via its serial port will require an additional USB to serial adapter (see Hobby Components items HCARDU0011 or HCMODU0076).

Clear (Factory Reset)



The module is capable of storing a number of user configuration settings in its non-volatile memory. This allows it to retain these settings even after power is removed. The two pads marked ‘CLEAR’ provide a means of restoring the module back to its original factory default settings. Should you wish to reset the module, connect power to the module whilst shorting the two pads together.

Alternatively the module can be restored back to factory default settings by issuing the factory reset (FTRE) command via the serial interface – see the SmartRFy commands section for more information.

SmartRFy commands

Command formats

SmartRFy modules are capable of responding to an array of text based commands sent via the serial interface. These commands can be either module configuration settings or commands to control the locally connected module or a remote module.

Command format requirements

In all cases the command must always be terminated with a carriage return (ASCII code 13) and a line feed (ASCII code 10).

The digital Rx module does not have transmit capability. Therefore commands can only be processed by the module itself (local commands) and cannot be transmitted to other modules (remote commands). To tell the module that you are issuing a local command, the command must be prefixed with an asterisk (*). For example *SW0=1 will cause output pin 0 to go high. Remote commands, i.e. commands prefixed with a greater than symbol (>) will be ignored.

Commands must always be in uppercase and no part of the command should include white space characters, including spaces.

Some commands require more than one parameter. In this case parameters should be separated by commas (,) with no spaces.

Commands are always 4 characters in length. Commands that require one or more parameters will have an equals (=) as the last character (e.g. XXX=), and commands that are querying information will have a question mark (?) as the last character (e.g. XXX?).

The device will respond to a successful local command with the response ‘OK’. An unsuccessful command will respond with an ‘ERROR’. There is no response by the local device when issuing remote commands. All responses are terminated with a carriage return and line feed.

No serial data sent to the local device, command or otherwise, may exceed 25 characters in length (including carriage return / linefeed termination).

Local command format

Prefix	Command	Optional parameter	Optional parameter	Optional parameter	Carriage return	Line feed
*	XXXX	<parameter 1>	,<parameter 2>	,<parameter n>	0x0D (\r)	0x0A (\n)

Example: *Setting and confirming the zone of the local device*

*ZON=1<CR><LF>

Sets the zone of the connected module to 1.

Response:

OK<CR><LF>

*ZON?<CR><LF>

Requests the current zone of the local device.

Response:

1<CR><LF>

Command quick lookup table

SmartRFy generic commands – quick lookup table

Command	Description	Parameter(s)	Response
FWV?	Get firmware version	None	Vx.x (C) HobbyComponents.com
ZON?	Get zone number (default: 0)	None	Zone number (0 to 255)
ADD?	Get address (default: 0)	None	Address (0 to 255)
STO=*Time*	Sets the timeout time for the serial interface (default: 2000ms)	*Time*: Timeout time in milliseconds (0 to 65535)	OK
BUR=*Baud*	Sets the BAUD rate for the serial interface	Baud: 0 = 1200 BAUD Baud: 1 = 2400 BAUD Baud: 2 = 4800 BAUD Baud: 3 = 9600 BAUD (default) Baud: 4 = 19200 BAUD Baud: 5 = 38400 BAUD Baud: 6 = 57600 BAUD Baud: 7 = 115200 BAUD	OK
TRS=*Resends*	Sets the number of times any Tx data will be retransmitted	*Resends*: Number of resends (0 to 5)	OK
VBM=*Mode*	Sets the verbose mode which specifies what received data is output to the serial interface (default: 0)	Mode: 0 = Both passive serial & commands from all zones and addresses Mode: 1 = Only passive serial data from all zones and addresses Mode: 2 = Only control from all zones and addresses Mode: 3 = Both passive serial & commands with matching zone and address Mode: 4 = Only passive serial data with matching zone and address Mode: 5 = Only commands with matching Zone and address	OK
ZON=*Zone*	Sets the devices zone number	*Zone*: Zone number (0 to 255)	OK
ADD=Address	Sets the devices address	*Address*: Devices address (0 to 255)	OK
TRP=*State*	Turns on or off repeater mode (default: off)	*State*: Repeater state (0 = off, 1 = on) Note: Only available on modules with both RF Tx & Rx capability	OK
FTRE	Performs a factory reset – all settings a restored to their default values	None	OK

Digital Rx module specific commands – quick lookup table

Command	Description	Parameter(s)	Response
SWx=*State*	Sets the state of digital output pin x	*x*: The digital output pin number (0 to 3). E.g. SW0 is digital output pin 0 *State*: Floating point value which determines the state of the digital output pin depending on TxH, TxL, MxH, & MxL settings. Default: 0 = pin low, 1 = pin high	OK
SxN=*Name*	Sets an alternative three letter command name the digital output pin will respond to (default SWx)	*x*: The digital output pin number (0 to 3). E.g. S0N is digital output pin 0 Name: Three letter name of the alternate command	OK
SxO=*Time*	Sets the amount of time the digital output pin will stay high when triggered. The digital output pin will automatically return low when time has elapsed	*x*: The digital output pin number (0 to 3). E.g. S0O is digital output pin 0 Time: Digital output pin on time in seconds (0 to 65525). Default = 0 (disabled).	OK
TxH=*Threshold*	Sets the threshold value required to set the digital output pin high (default: 1)	*x*: The digital output pin number (0 to 3). E.g. T0H is relay 0 Threshold: A decimal number which sets the level required to pull the pin high	OK
TxL=*Threshold*	Sets the threshold value required to set the digital output pin low (default: 0)	*x*: The digital output pin number (0 to 3). E.g. T0L is relay 0 Threshold: A decimal number which sets the level required to pull the pin low	OK
MxH=*Mode*	Sets the test condition under which the digital output pin will be set high (default: =)	*x*: The digital output pin number (0 to 3). E.g. M0H is relay 0 *Mode*: > The value passed by the SWx= command must be greater than the Threshold level set by the TxH= command *Mode*: = The value passed by the SWx= command must equal the Threshold level set by the TxH= command *Mode*: < The value passed by the SWx= command must be less than the Threshold level set by the TxH= command	OK
MxL=*Mode*	Sets the test condition under which the digital output pin will be set low (default: =)	*x*: The digital output pin number (0 to 3). E.g. M0L is relay 0 *Mode*: > The value passed by the SWx= command must be greater than the Threshold level set by the TxH= command *Mode*: = The value passed by the SWx= command must equal the Threshold level set by the TxH= command *Mode*: < The value passed by the SWx= command must be less than the Threshold level set by the TxH= command	OK

Generic SmartRFy commands

Commands listed below are common to all SmartRFy modules, including the digital Rx module. Note that all commands must be proceeded with a carriage return and line feed, but for clarity purposes this is omitted from the examples in this section.

Firmware version (FWV?)

Gets the firmware version of the module.

Example: *FWV?

Returns:

```
Vx.x
(C) HobbyComponents.com
```

Where Vx.x is the version number

Get the modules zone (ZON?)

Gets the modules current zone number

Example: *ZON?

Returns: The current zone number as a decimal value (0 to 255)

Get the modules address (ADD?)

Gets the modules current address

Example: *ADD?

Returns: The current address as a decimal value (0 to 255)

Serial serial timeout time (STO=)

Sets the timeout time for the serial interface in milliseconds. Maximum timeout time is 65535ms (65.535 seconds). If a complete command (including CR + LF termination) is not received within this time the command will be ignored and an ‘ERROR’ will be returned.

Default: 2000 (2 seconds)

Example: *STO=1000

The above example will set the serial port timeout time to 1000ms (1 second).

Returns: OK

Set the baud rate (BUR=)

Sets the communication baud rate for the serial UART interface. There are 8 (0 to 7) possible settings for the baud rate:

0 = 1200 BAUD
1 = 2400 BAUD
2 = 4800 BAUD
3 = 9600 BAUD (default)
4 = 19200 BAUD
5 = 38400 BAUD
6 = 57600 BAUD
7 = 115200 BAUD

NOTE: This command sets the serial communication speed between the connected device and the SmartRFy module – it does not set the wireless RF communication speed between modules.

Default: 3

Example: *BUR=5

The above example will set the serial port baud rate to 38400 baud.

Returns: OK

Set number of transmit resends (TRS=)

Sets the number of times the module will automatically re-transmit data. Increasing the number of times data is retransmitted will reduce the chances of the data not being received due to interference but will also increase transmission times and network traffic. The number of resends can be set from 0 (no resends) to 5.

Default:	2
Example:	*TRS=3

The above example will set the number of resends to 3. Therefore any data wirelessly transmitted by the module will be transmitted a total of 4 times.

Returns: OK

Set the serial verbose mode (VBM=)

Sets what type of data received by the module is automatically output to its serial port.
There are 6 possible modes (0 to 5):

0 = Both passive serial and commands from all zones and addresses
1 = Only passive serial data from all zones and addresses
2 = Only control from all zones and addresses
3 = Both passive serial and commands with matching zone and address
4 = Only passive serial data with matching zone and address
5 = Only commands with matching zone and address

Default:	0
Example:	*VBM=5

The above example will set the module to only output received commands that have been transmitted from a module with the same zone and address as itself.

Returns: OK

Set the modules zone number (ZON=)

Sets the modules zone number. The zone number can be between 0 and 255.

Note that zone 255 is a special zone number. Setting the module to this zone number means that it will treat received data from any zone as if it were in the same zone as itself. Therefore this zone number can be used when you wish the module to respond to commands from modules in multiple zones. Additionally, when transmitting data with a zone of 255 all modules within range will respond to the data as if it is in the same zone as itself. Therefore this zone number can also be used when you require the module to control multiple remote modules in different zones.

Default:	0
Example:	*ZON=2

The above example will set the modules zone number to 2.

Returns: OK

Set the modules address (ADD=)

Sets the module's address. The address can be between 0 and 255.

Note that address 255 is a special address. Setting the module to this address means that it will treat received data from any address as if it were the same address as itself. Therefore, this address can be used when you wish the module to respond to commands from modules with different addresses. Additionally, when transmitting data with an address of 255 all modules within range will respond to the data as if it has the same address as itself. Therefore this address can also be used when you require the module to control multiple remote modules with different addresses.

Default: 0

Example: *ADD=5

The above example will set the modules address to 5.

Returns: OK

Turn on/off repeater mode (TRP=)

Turns repeater mode on or off. When turned on the module will retransmit any data it receives regardless of its zone and address. This mode can be used when a remote module is outside the range of a module that needs to communicate with it, but the repeating module is within range of both modules. Setting the repeater mode to 1 will turn on repeater mode and setting it to 0 will turn it off.

Note:

> This mode is only supported by SmartRFy modules with both RF receive and transmit capabilities.
>
> Turning on the repeater mode will double network traffic for any modules within range.

Default: 0 (off)

Example: *TRP=1

The above example will turn on repeater mode.

Returns: OK

Factory reset (FTRE)

Performs a factory reset of the module. All module settings will be restored to their factory defaults.

Example: *FTRE

The above example will restore all settings to their defaults.

Returns: OK

SmartRFy Rx module commands

Commands below are specific to the SmartRFy digital Rx module and can be used to configure parameters relating to the hardware features of this module.

Set the state of a digital pin (SWx=)

Sets the state of one of the module's digital output pins. This command can be used to set a logic high (5V) or logic low (0V) of the pin. To specify which output pin the command is intended for substitute x for the pin number (0 to 3). For example SW0= for pin 0, SW1= for pin 1, etc.

Default: 0 = off / 1 = on

Examples:

Via modules serial port:	*SW0=1
Via remote module (assumes default zone/add = 0):	>0,0,SW0=1

The above example will energise set output pin 0 high.

Returns: OK

Set an alternative pin name (SxN=)

Sets an alternative 3 letter command name which the digital output pin will respond to. Setting an alternative command name allows a pin to be controlled by other devices such as temperature sensors, PIR’s, switches etc. (Also see pin commands SxO, TxH, TxL, MxH, MxL, and Appendix A for more options and examples of configuring the output pins). To specify which pin the command is intended for substitute x for the pin number (0 to 3). For example S0N= for pin 0, S1N= for pin 1, etc.

Default:	SW0 for pin 0
	SW1 for pin 1
	SW2 for pin 2

SW3 for pin 3

Example: *S0N=ABC

The modules output pin 0 will now respond to a command in the format of ABC=xxxx

Returns: OK

Set the output pin high time (SxO=)

Sets the amount of time in seconds that the output pin will be pulled high for. Setting the pin high time to 0 (default) will disable the pin high timer (for that particular pin) and the pin will not return low unless it receives a command to do so. Setting the pin high time to anything between 1 and 65535 will cause the pin to stay high until that amount of time, in seconds, has elapsed. To specify which pin the command is intended for substitute x for the pin number (0 to 3). For example S0O= for pin 0, S1O= for pin 1, etc.

Default: 0 (disabled)

Example: *S0O=60

In the above example the modules' pin 0 will automatically return low after 60 seconds from receiving a command to set it high.

Returns: OK

Set the threshold value to set a pin high (TxH=)

Sets the threshold value which will be used to determine if the output pin should be pulled high when a SWx= command is received. The pin high threshold can be a positive or negative decimal number. The module will compare this value with the value received from an SWx command and together with the pin high mode (MxH) determine if the pin should be pulled high. (Also see pin commands SxO, TxH, TxL, MxH, MxL, and Appendix A for more options and examples of configuring the output pins). To specify which pin the command is intended for substitute x for the pin number (0 to 3). For example T0H= for pin 0, T1H= for pin 1, etc.

Default: 1

Example: *T0H=100

In the above example pin 0 will be pulled high if the module receives the pin command SW0=100 (assuming M0H is set to default).

Returns: OK

Set the threshold value to set a digital pin low (TxL=)

Sets the threshold value which will be used to determine if the output pin should be pulled low when a SWx= command is received. The pin high threshold can be a positive or negative decimal number. The module will compare this value with the value received from an SWx command and together with the pin low mode (MxL) determine if the pin should be pulled low. (Also see pin commands SxO, TxH, TxL, MxH, MxL, and Appendix A for more options and examples of configuring the output pins). To specify which output pin the command is intended for substitute x for the pin number (0 to 3). For example T0L= for pin 0, T1L= for pin 1, etc.

Default: 0

Example: *T0L=-50

In the above example pin 0 will de-energise if the module receives the pin command SW0=-50 (assuming M0L is set to default).

Returns: OK

Set the test condition for setting a pin high (MxH=)

Sets the threshold condition used to determine if the output pin should be pulled high. When a pin command (SWx) is received its parameter value is tested against the appropriate pin threshold high (TxH) value, and this threshold condition determines if the pin should be energised. To specify which pin the command is intended for substitute x for the pin number (0 to 3). For example M0H= for pin 0, M1H= for pin 1, etc. The MxH threshold condition can be set to one of three values:

MxH=< The output pin is pulled high if the value received by the SWx command is *less than* the pin threshold high (TxH) parameter.

MxH== The output pin is pulled high if the value received by the SWx command is *equal to* the pin threshold high (TxH) parameter.

MxH=> The output pin is pulled high if the value received by the SWx command is *greater than* the pin threshold high (TxH) parameter.

Default: =

Example: *M0H=>

In the above example pin 0 will be pulled high if the module receives the pin command SW0 with a value greater than the current pin threshold high (T0H) level.

Returns: OK

Set the test condition for setting a pin low (MxL=)

Sets the threshold condition used to determine if the output pin should be pulled low. When a pin command (SWx) is received its parameter value is tested against the appropriate pin threshold low (TxL) value, and this threshold condition determines if the pin should be pulled low. To specify which pin the command is intended for substitute x for the pin number (0 to 3). For example M0L= for pin 0, M1L= for pin 1, etc. The MxL threshold condition can be set to one of three values:

MxL=< The output pin is pulled low if the value received by the SWx command is *less than* the pin threshold low (TxL) parameter.

MxL== The output pin is pulled low if the value received by the SWx command is *equal to* the pin threshold low (TxL) parameter.

MxL=> The output pin is pulled low if the value received by the SWx command is *greater than* the pin threshold low (TxL) parameter.

Default:	=
Example:	*M0L=<

In the above example output pin 0 will be pulled low if the module receives the pin command SW0 with a value less than the current pin threshold low (T0L) level.

Returns: OK

Appendix A: Example output pin modes

By default the module's pins will respond to SW0 (for pin 0), SW1 (for pin 1), SW2 (for pin 2), or SW3 (for pin 3) commands to pull the pin high (5V) or low (0V). For example:

*SW0=1 will set output pin 0 high.

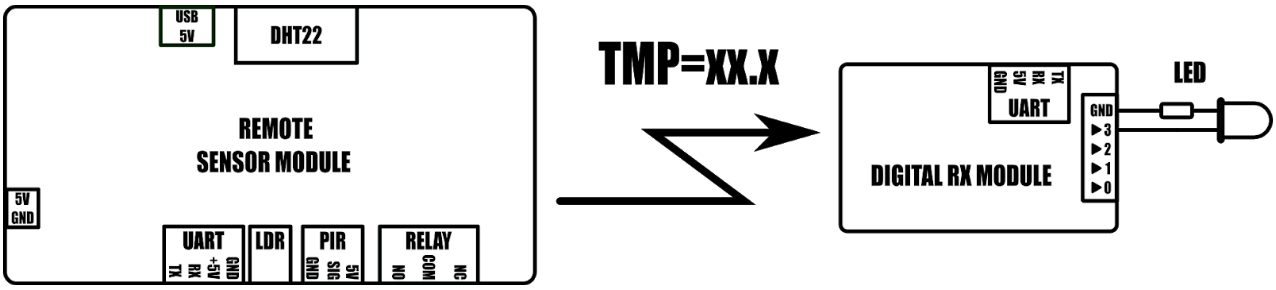
*SW0=0 will set output pin 0 low.

However, the pins can be programmed to listen to any command that passes a value as a parameter and toggle high or low based on predefined conditions. By altering the parameters SxN, SxO, TxH, TxL, MxH, and MxL (where x is the pin number) the pins can be configured to operate in one of 3 modes: Threshold mode, timer mode, and toggle mode. These three modes are explained below.

Threshold mode

In threshold mode a pin can be programmed to automatically pull high or low when a value goes above or below a predefined pair of thresholds.

Example: Remote low temperature warning indicator



Change the following settings via the modules serial interface (see serial UART section for information about interfacing to the modules serial interface):

*S3O=0	(default)
*S3N=TMP	(digital pin 3 will now listen to a remote temperature sensor)

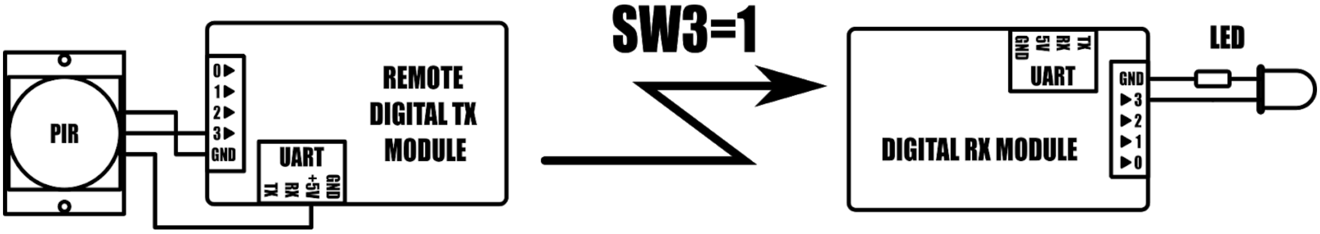
*T3H=0.5	(digital pin 3 high threshold is now set to 0.5)
*T3L=2.5	(digital pin 3 low threshold is now set to 2.5)
*M3H=<	(digital pin 3 will now go high when value from temperature sensor is less than T3H)
*M3L=>	(digital pin 3 will now go low when value from temperature sensor is greater than T3L)

Once the above settings have been changed, digital output pin 3 will now automatically turn on the LED when the temperature sensed by the remote sensor modules temperature sensor falls below 0.5oC and will turn the LED off when the temperature goes above 2.5oC. Note that the digital Rx modules zone and address must match that of the remote sensor.

Timer mode

Timer mode allows the option of configuring a digital pin to remain high for a specified amount of time, in seconds, whenever a command to pull the pin high is received. The pin will then automatically return low after that amount of time has elapsed. Timer mode is enabled by setting the appropriate digital pin on time (SxO) to a value other than 0.

Example: Remote PIR Trigger indicator



Change the following settings via the modules serial interface (see serial UART section for information about interfacing to the modules serial interface):

*S3O=60	(turn on the LED for 60 seconds when triggered)
*S3N=SW3	(default)
*T3H=1	(default)
*T3L=0	(default)

*M3H==	(default)
*M3L==	(default)

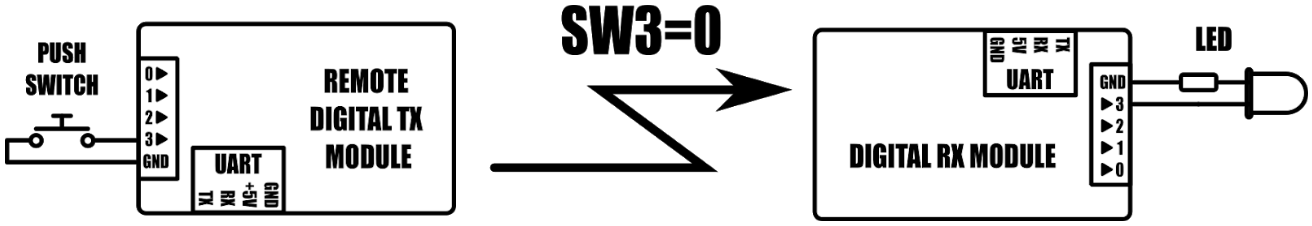
Once the above settings have been changed, output pin 3 on the Rx module will now turn on the LED whenever the PIR triggers input pin 3 (SW3=1) on the remote digital Tx module. The LED will remain on for 60 seconds and then will automatically turn off. If a subsequent SW3=1 command is received whilst the LED is already on the timer will be reset and the LED will remain ON for a further 60 seconds. Note that the digital Rx modules zone and address must match that of the remote digital Tx module module.

Note: In timer mode a command to set the output pin low will be ignored and the pin will only return low once the on time has elapsed.

Toggle mode

In toggle mode digital output pins can be configured to toggle their state whenever a valid trigger command is received. This mode is enabled by setting the pin high and low thresholds (TxH & TxL) to the same value and pin modes (MxH & MxL) to ‘=’.

Example: Toggling an LED from a remote push button

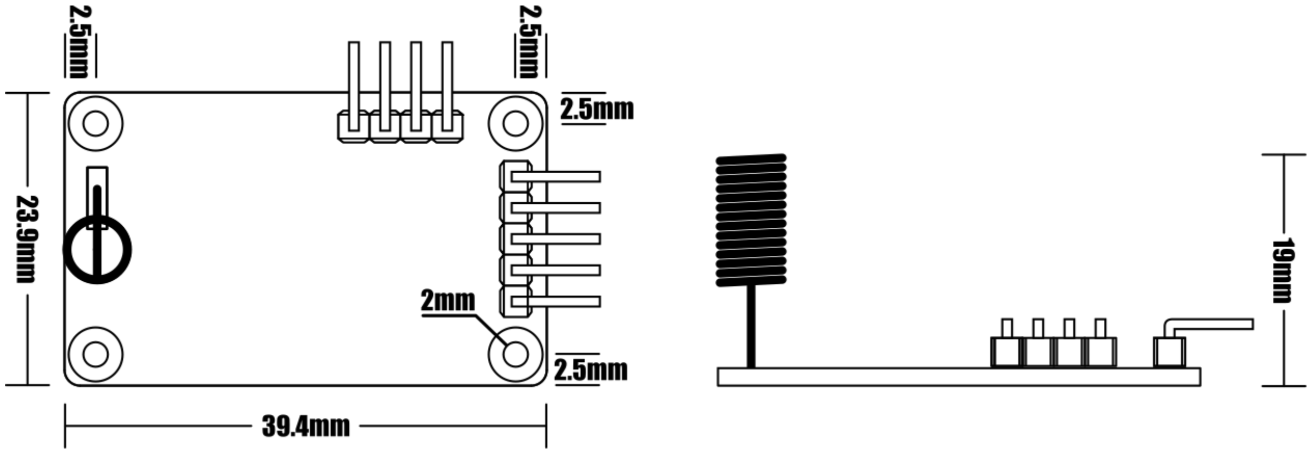


Change the following settings via the modules serial interface (see Serial UART section for information about interfacing to the modules serial interface):

*S3O=0	Timer mode off (default)
*S3N=SW3	Output pin 3 will now listen to switch SW3 (default)
*T3H=0	Trigger when SW0=0
*T3L=0	Set to same value as T0H
*M3H==	(default)
*M3L==	(default)

Once the above settings have been changed the digital Rx module will toggle the LED whenever the push button on the remote module is pressed.

Dimensions



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