WP2P Digital

User Guide

WP2P Digital

Version 1.10





QTECH DATA SYSTEMS

Contents

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Revision Details

1.1	February 2015	First Edition
1.2	May 2015	Minor error corrections
1.3	September 2019	Quick Start Guide updated to User Manual. First issue to support Rev E hardware.
1.4	January 2020	Minor error corrections
1.5	March 2020	Addition of product codes in Technical Specification
1.6	August 2020	Update of product code
1.7	August 2020	Update current consumption & standby battery capacity notes
1.8	April 2021	Updated images for Rev E hardware
1.9	December 2021	Clarified behaviour of link and stat LEDs
1.10	March 2023	Clarified output relay ratings

About This User Guide

This document provides assistance with the installation and operation of the QTech Wireless Point to Point (WP2P) system revision E. Included in this document is:

- How to install the WP2P modules
- WP2P and repeater operation
- Device Configuration
- Device Specifications

Other documents that should be read in conjunction with this document include:

- Installation Guide for the RSS01 Remote Solar Station environmental enclosure

Contact QTech for application notes, which can be obtained to provide guidance for specific configuration scenarios, detailing the configuration workflow steps.

Product overview

WP2P modules are used to link electrical devices together in situations where the physical separation or terrain between them would make direct wiring uneconomic or impractical.

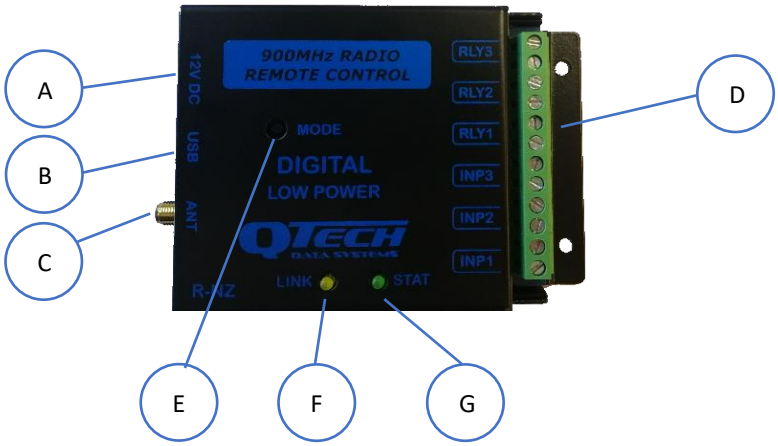
The most basic WP2P system comprises two WP2P modules which have been configured as a pair. The modules simply use their onboard radios to communicate their input state to the other module.

Each WP2P – Digital module has three switch inputs and three relay outputs.

Features

- 3 digital inputs
- 3 digital outputs
- 900 MHz (FSK modulation) short range radio up to approximately 350m for local network communications. Extensible up to 4000m with high gain antenna configurations
- Supports use of a single repeater for difficult terrain or range extension
- USB interface for diagnostics and firmware upgrades
- Solar power charging and battery operation (when supplied with QTech RSS01 Remote Solar Station)
- Firmware is field upgradeable

Hardware

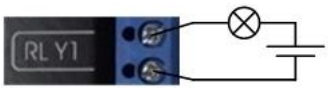


Feature	Function
A	Power input (nominally 12V DC)
B	USB type Mini B for configuration and firmware upgrades
C	Antenna connector SMA
D	I/O pairs (signal/ground) - RLY1, RLY2, RLY3 relay contacts - INP1, INP2, INP3 digital inputs
E	Mode pushbutton
F	LINK indicator LED (device link communications state)
G	STAT indicator LED (device status and power on indicator)

Digital I/O

The WP2P modules operate by copying the state of each switch input to the corresponding relay output on the other WP2P module. When a switch input is closed, the relay output on the other module will close, and when the switch is released, the relay will open again.

WP2P Module 1
Close switch contact on "INP1"



WP2P Module 2
"RLY1" closes operating light

The delay between an input activating and the corresponding output activating is normally less than 1 second (see note at end).

Output Relays

The output relays are normally open devices with a maximum rating of 32V DC at a current of 2A.
The relays can switch DC low voltage, low current devices directly.
However, we recommend using interface relays as they improve future serviceability and are required or higher voltages or currents.
The relays are internally protected by solid state snubbers for operating with inductive loads.

The output state of each WP2P, on loss of communication between the pair, can be configured to either remain in their previous state or to default to the open state (refer to Adjustments and Settings below).

> ⚠ **Warning – Do not directly connect to 220V AC voltage. The New Zealand and Australian wiring regulations require that any wiring in excess of 32 volts must be carried out or be certified by a registered electrician. Consult your local electrical installer for further guidance.**

Switched Inputs

The inputs (labelled INP1, INP2 and INP3) are electrically isolated, normally open inputs. They are connected to suitable mechanical switches, contacts and other closure devices. An input is active or ON when the input switch is closed and inactive or OFF when the input switch is open.

> **Warning – Only mechanical switches or mechanical closure devices should be connected to the inputs. No external voltage or other electrical source is to be connected to the inputs.**

WP2P Repeater Module

A WP2P Repeater Module is available to increase the range and coverage of a WP2P system. It is used in situations where the WP2P modules are a long way apart or there is an obstacle preventing line-of-sight between them.

The WP2P Repeater Module operates by listening for complete and valid WP2P messages and then re-transmitting them. It can be used with both WP2P Digital and WP2P Digital & Analogue type modules simultaneously.

Please refer to the WP2P Repeater User Manual for further details.

Preparing for Installation

Line of site communications is necessary for optimum operation of the WP2P Digital & Analogue System. When planning the installation consider the following and contact QTech for advice if necessary:

a) Consider using high gain antennas supplied by QTech for extended communications range and if communication is unreliable due to weak signal strength.
b) Consider undertaking a field radio survey to ascertain antenna requirements and identify potential radio channel interference by neighbouring transmitters.
c) If the device is to be mounted outdoors please use an environmentally protected enclosure.
d) Antenna elevation is important to obtain best performance. Ensure antennas are mounted in free space, unobstructed by solid objects.
e) Consider the use of a QTech WP2P Repeater if the terrain does not permit clear line of sight.
f) Ensure the device is operating the latest firmware especially if the device has been in storage for some time. If in doubt, contact QTech for advice.
g) Ensure that the power supply meets the correct specifications detailed herein.

Installation Notes

To comply with the New Zealand and Australian wiring regulations the WP2P cannot be connected to any external voltages exceeding 32 Volts AC or DC. To connect to or control higher voltage equipment please consult a Registered Electrician.

Mounting

For indoor mounting, the device should be mounted onto a flat surface using the Qty 4x M4 fixing holes at ~102mm x 50mm centres. Where the device is to be operated outside or in other adverse site conditions, then, the device should be housed in an appropriate plastic enclosure.

For outdoor mounting, use the RSS01 solar charging environmental enclosure and follow the installation guide for those products. Alternatively use a minimum of IP65 rated enclosure to suit the device and any additional equipment to be housed, ensuring that all cables use suitable cable glands.

If the WP2P is to be enclosed in a metal cabinet, then an optional external antenna will be needed. Please contact your equipment supplier for alternative antenna details and advice.

Avoid mounting in locations that may be subject to shock or vibration or temperature extremes.

Antenna

The device is a low power device that is designed specifically for operation in New Zealand and Australia. Each unit is supplied with a stub antenna that will provide an operating range of 50 to 350 meters, dependent upon terrain and obstacles such as trees and buildings. All radio systems work most reliably when the path between the radios is clear “line of sight”. This needs to be considered when planning longer range systems.

Optional higher gain, long range antennas are available. Please contact QTech for details and advice.

For best performance mount the antenna up high and away from large objects.

> **Warning – Do not operate the device without an antenna attached. Do not substitute antennas; use only those antennas recommended by your equipment supplier. Failing to comply with these requirements can damage the device.**
>
> **Never operate the devices in violation of RSM conditions. AS/NZS 4268:2008 specifies a maximum EIRP of 1 watt.**

Power Supply Notes

Power Supply

The WP2P operates from a DC power supply of 6 – 24 Volts. The power connector is a 2.1mm DC Socket, centre pin positive. The supply voltage should be clean, continuous and transient free with an output of 6 - 24 Volts DC. The WP2P incorporates reverse and over Voltage protection.

> **Warning – Do NOT use Switch Mode Power Supplies (SMPS) with this product. The DC power supply used for this product MUST have a grounded negative or be a "linear" transformer-based plug pack. The reason is that the antenna, programming port and external connections can provide exposed earth points and the SMPS can impose an AC voltage on the DC ground, which can lead to damage. Suitable cost-effective plug packs are available from QTech P/N PD5412, PD5413 & PD5414.**

The WP2P is over voltage protected to 30 Volt. Voltages greater than 28 Volts DC will blow the internal 500mA fast blow fuse. Any solar/battery design needs to take this into account.

Internal Fuse

The device is protected by a 20mm x 5mm 500mA fast blow fuse. This is located on the internal circuit board. To access the fuse, remove the top cover by carefully prizing it off its retaining dimples. Only replace the fuse with an identical type, do not use alternatives. This fuse will blow if the power supply maximum voltage is exceeded.

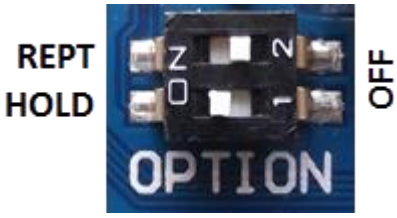
Current Consumption & Standby Battery Capacity

Solar systems utilising a solar charged battery backup facility are provided by the RSS01 or RSS02 product. For systems where a custom solution is sought then the power consumption of the device can be used to calculate the required standby battery capacity.

Average current consumption is ~6mA, which can be used as a guideline to assist with standby battery capacity calculations.

Adjustments & Settings

There are two DIP switches labelled "OPTION" that allow configuration options for each WP2P to be set.



HOLD switch: Output Relay Configuration

- "ON" The outputs will retain (HOLD) their current state if the communication link between the WP2P pair is lost.
- "OFF" The outputs will return to the open (OFF) state after 30seconds if the communication link between the WP2P pair is lost.

Once the communication link is re-established the outputs will update to reflect the current input states of the other module.

REPT switch: Repeater Configuration

- "ON" The WP2P is to be used with a repeater.
- "OFF" The WP2P is to be used without a repeater.

> ***Note* - Both WP2P modules in a system must have the same REPT switch setting.**

Radio Address (RA)

All WP2P systems have a unique *Radio Address* which is programmed into WP2P modules during manufacture as security measure to prevent unauthorised access. The Radio Address is printed on the WP2P case represented in the following format “192.168.0.0”.

***Note* - All WP2P modules in a given system must have the same first three numbers in their Radio Address. The 4th number must be a sequential pair starting from the even number e.g. 0.1.1.40 & 0.1.1.41.**

The Radio Address must be stated for purchasing for WP2P module replacement.

Using Multiple WP2P Systems in the same area

There are ten individual frequency bands referred to as *Channel Numbers* allowing up to ten WP2P systems to be used in the same area. The Channel Number is identified by the “#” on the packaging label; this example is “Channel #1”.

Warning – Do not use the same channel for adjacent systems. For example, if you currently use “#1” ensure that the adjacent system is “#3” etc.

Operation Notes

How do the modules communicate?

The WP2P modules use an event driven approach to communications. When the WP2P modules detect a change of their input state, they will immediately transmit a message to the other module. There is however, a very small chance that another radio device on that channel wanted to send a message at exactly the same time. This will result in a “collision”, but the WP2P modules can detect this and use a collision avoidance scheme to retransmit their messages.

STAT Indicator

The STAT indicator indicates the current operational status of the device. It provides a heartbeat indication that the device is operating ok or it displays a coded error indication for faults.

Code	Meaning
1 short flash, 2s interval	Normal operating mode, Processor running
~4 Short flashes on power up	Indicates the device booting after power up or watchdog reset. LED should usually then display normal operating mode indication.

LINK Indicator

WP2P modules have a Link Status LED which is located next to the STAT indicator.

This is to assist with site diagnostics and checking by indicating the state of the communications link between pairs of WP2P modules.

The Link light functions as follows:

Code	Meaning
OFF	Module failure, no power, fuse blown, circuit failure, etc.
OFF (with occasional short flashes)	Link communication fault with partner module. Multiple flashes can occur approximately every 30s.
ON	Healthy wireless communications over the link. The LED will briefly flicker off each time messages are sent.

Link Status indicator is based on the “keep-alive” message the WP2P modules send if it has been longer than 30 seconds since they last sent a message. Therefore, if one of the modules is turned off, it will take no longer than 30 seconds for the other module to detect that the link is down. If the connected I/O is changing more frequently than once every 30 seconds, then they don’t need to send keep-alive messages.

Link faults can be caused by but not limited to

- Poor received signal strength (RSSI) due to units positioned too far apart or obstacles preventing reliable or line of site operation.
- Radio data collisions with other transmitters in the area.
- Excessive tree growth degrading radio communications between the units.

Technical Specifications

Note. Specifications are subject to change without notice.

Item	Parameter	Specification
General		
	Product Code	PD8810E-WP2P (pair of matched modules)
	Product Code	PD8810E (single module)
	Dimensions	112 x 76 x 26 mm Mounting holes 4 x M4
	Weight	250 gm
	Temperature	Operating: 0-70 degrees C Storage 0-70 degrees C
	Humidity	0-90% non-condensing
	Ingress Protection	IP20 Water contact must be avoided
	Power	Input voltage: 6 – 24V DC (Max 28V DC) Current: 6mA average Internal 500mA fast blow fuse
I/O	WP2P Digital	3 x digital inputs, electrically isolated with internal pull-up resistor 3 x relay outputs, normally open, 32V and 2A max
	Indicators	STAT – operational status and power LINK – communications link activity
	Pushbutton	Operating Mode switch
Radio	Regulatory	ISM band, AS/NZS 4268
	Antenna	Detachable SMA
	Operating Frequency	915 – 928 MHz
	Output power	20 dBm max. →100mW
	Modulation	GFSK
Communications		
	USB	USB 2.00, type Mini-B connector Interface (configuration and firmware upgrades)

Warranty

The hardware and software for this product is covered by the QTech Limited Warranty Agreement and software End User License Agreement, respectively.

Please refer to the QTech Limited Product Warranty Agreement, which may be downloaded from the QTech website: www.qtech.co.nz

QTech Data Systems Limited does not warrant the suitability of this product for any particular application as the conditions in which it is used are beyond our control. This is not withstanding warranty of merchantability.

Additional Information and Support

If you have problems try the following:

- Visit the QTech web site for application notes and guides
- Refer to the troubleshooting section if one is present in this document
- Contact the support desk at support@qtech.co.nz
- Phone the support desk, contact details at beginning of this document